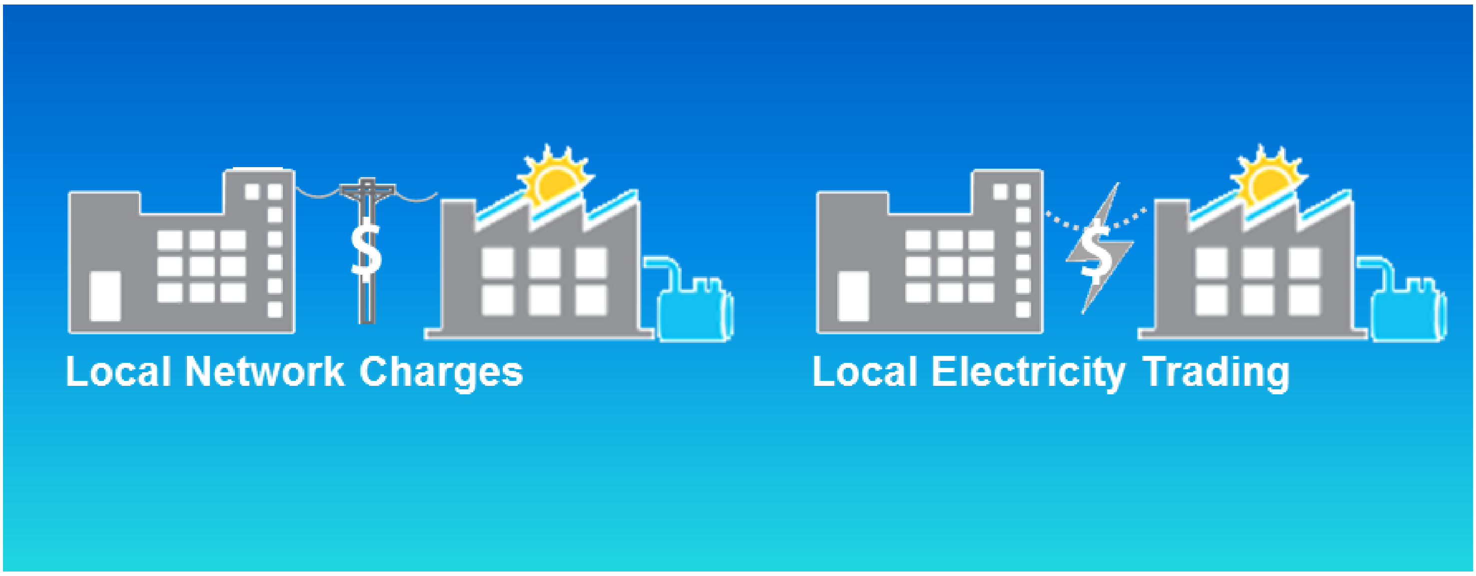

UTS: INSTITUTE FOR SUSTAINABLE FUTURES

VIRTUAL TRIAL OF LOCAL ELECTRICITY TRADING AND LOCAL NETWORK CREDITS: A COMMUNITY SOLAR FARM

Case Study and Implementation Plan for Moira Shire Council and Swan Hill Rural City Council. July 2016

2016

SWAN HILL
Rural City Council

MOIRA SHIRE
ON THE MURRAY

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ABOUT THE AUTHORS

The University of Technology Sydney established the Institute for Sustainable Futures (ISF) in 1996 to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protect and enhance the environment, human well-being and social equity. We seek to adopt an inter-disciplinary approach to our work and engage our partner organisations in a collaborative process that emphasises strategic decision-making.

Authors: Jay Rutovitz, Lawrence McIntosh, Edward Langham, and Alison Atherton.

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DISCLAIMER

This paper is prepared as part of the ARENA funded project ‘Facilitating Local Network Charges and Virtual Net Metering’. The project is due to be completed by August 2016 and results and papers are publicly available on the project webpage: http://bit.do/Local-Energy

For further information visit: **www.isf.uts.edu.au**

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FIGURES AND TABLES

LIST OF ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AFSL	Australian Financial Services License
ARENA	Australian Renewable Energy Agency
IRR	Internal Rate of Return
ISF	Institute for Sustainable Futures
kW	kilowatt

LIST OF ABBREVIATIONS (continued)

LET	Local Electricity Trading. The mechanism for 'netting off' electricity generation at one site against usage at a recipient site or sites. Also known as virtual net metering. See section 1.1 for further information.
LGC	Large-scale Generation Certificate. Under the Renewable Energy Target electricity retailers are required to surrender a number of renewable energy certificates corresponding to a set percentage of their sales. Registered renewable energy generators greater than 100kW create LGCs, with one LGC equivalent to 1 MWh of generation.
LGNC / LNC	Local Generation Network Credit / Local Network Credit These two terms represent the same concept, of a credit paid to local generators that are connected within the distribution network (see section 1.1 for more detail). A change to the National Electricity Rules to introduce such a credit is under consideration by the AEMC, and the rule change proposal uses the term Local Generation Network Credit. LNC has been used in this report except when the rule change is being discussed.
LRMC	Long run marginal cost
NEM	National Electricity Market
NPV	Net Present Value
PPA	Power Purchase Agreement. An agreement between an electricity generator and an electricity user, usually involving the user located at the same physical site as the generator.
PV	Photovoltaic
RET	Renewable Energy Target The federal Government renewable energy target, tracked via LGCs and STCs to
STC	Small-scale Technology Certificate. A renewable energy certificate representing 1 MWh of generation from a small scale renewable generator smaller than 100kW (see LGC above).
TEC	Total Environment Centre
TOU	Time of use
UTS	University of Technology Sydney
VEET	Victorian Energy Efficiency Target
VNM	Virtual Net Metering An alternative name for Local Electricity Trading (LET)

EXECUTIVE SUMMARY

This report provides results of the virtual trial undertaken for Moira and Swan Hill councils of the feasibility of a one-to-many community solar farm using Local Electricity Trading to supply generation from the solar array to the owners/ members. The trial looks at the feasibility of the project with and without a Local Network Credit in place.

The trial is part of a one year research project, *Facilitating Local Network Charges and Virtual Net Metering,* led by the Institute for Sustainable Futures (ISF) and funded by the Australian Renewable Energy Agency (ARENA). The Moira and Swan Hill trial was also funded by the Moira and Swan Hill Councils and the Victorian Government Department of Environment, Land, Water and Planning.

Moira and Swan Hill Councils' objectives for developing a Virtual Renewable Power Station (VRPS) are to:

- Increase renewable energy development in the area;
- Reduce Council's energy costs and greenhouse emissions;
- Increase community empowerment, local economic development, and access to renewable energy;
- Provide a template for other councils and communities seeking similar goals.

In previous work for Moira and Swan Hill Councils[1] ISF examined various models that the councils could adopt in meetings these objectives. A many-to-one VRPS and one-to-many VRPS were compared and contrasted. The one-to-many community solar farm was recommended, and was progressed to this virtual trial.

One-to-many Solar garden or Community Solar Farm is a single generator whose energy output is virtually 'split' and transferred to many individual sites. As with all Local Electricity Trading electricity sales, the physical electricity may not reach the buyer's site, but is reconciled against their usage for billing purposes.

Why a community solar farm?

A community solar farm offers everyone an opportunity to generate and use their own solar power. People may currently be excluded from solar ownership due to living in a rental property or apartment, having an unsuitable roof or lacking the capacity to maintain their own system.

Solar systems installed "behind the meter" have the best economic returns, as the value of the electricity is equal to the entire volume charge for the electricity, including energy and network charges. Thus peoples or businesses who can install solar on their own roofs will almost always get a better financial return than investing in a community project.

Community solar projects in Australia have usually relied on behind the meter sites with power sales via Power Purchase Agreements to electricity users located on the site, sometimes augmented by export sales to a retailer (retailer buyback). The project returns value to member investors through cash payments of dividends. However, behind the meter sites are limited.

[1] McIntosh, L., Rutovitz, J., and Langham, E. (2015) Renewable power options enabled by Local Electricity Trading

Local Electricity Trading offers an alternative, and has the potential to unlock standalone generation sites for solar projects. By directly crediting electricity generation to members, the benefit is equal to a proportion of their energy charges.

The community solar farm enabled by Local Electricity Trading is best suited to residential or small business electricity consumers who cannot install solar on their own roof, and have a relatively high electricity cost. Larger commercial and industrial facilities that pay low electricity volume charges (c/kWh) are unlikely to get an economic return from membership.

Methodology

An excel model was constructed to examine the business case for a community solar farm. The business case looks at the outcomes for potential investors in the solar farm, and for the project as a whole, with either just LET in place, or with LET and an LNC. A one-to-many solar farm relies on LET being available to net off output at the investors' premises, so the business case does not consider outcomes without LET.

The model calculates the changes in electricity costs for the potential investors in the community solar farm, and the ability of the management company to cover ongoing overheads. The following conceptual framework is used:

- Energy is netted off at user premises according to their share in the overall project (ie investment size), on a time of use basis.
- If the generation share exceeds demand for a particular investor at any time, the excess generation is treated as if it is exported at the customer premises, and attracts the relevant feed in rate. This is paid to that investor.
- All LGC or STC income goes to the management company, to cover operating costs. In the event that this is not sufficient to maintain a minimum operating margin of $5000 (plus inflation), a sufficient proportion of the energy output of the plant reverts to the operating company in order to maintain the operating margin.
- The customer pays network and other general charges (except energy) on the netted off electricity (for example, VEET, AEMO, RET), and the retail margin is still charged on the netted off electricity.

Key assumptions

	Value	Source
Capital cost	$1.90/ W	ISF estimate
Project Life	20 years	Set for project
Annual operating cost (% of initial capex)	1.50%	ISF estimate
Retailer buy back rate	$0.05/ kWh	AGL website
Retailer Margin	12.0%	Derived from QLD figures
NPV Discount rate (nominal)	5.0%	Supplied by Moira and Swan Hill Councils
NPV and IRR time horizon (years)	20	User adjustable
Inflation rate	2.43%	CPI all groups (ABS)
Local Generation Certificates	$50	ISF estimate
RET end year	2030	Federal RET policy
Management company administration costs	$2000/year	ISF estimate
Minimum operating surplus	$5000/year	ISF estimate

Tariffs used for calculation (no retail discount, GST exclusive)[1]

Tarriff	Energy charge (includes network, AEMO, VEET, RET)		
	Peak	Shoulder	Offpeak
	$/kWh	$/kWh	$/kWh
Residential	$0.34	$0.24	$0.18
Business	$0.32	n/a	$0.20

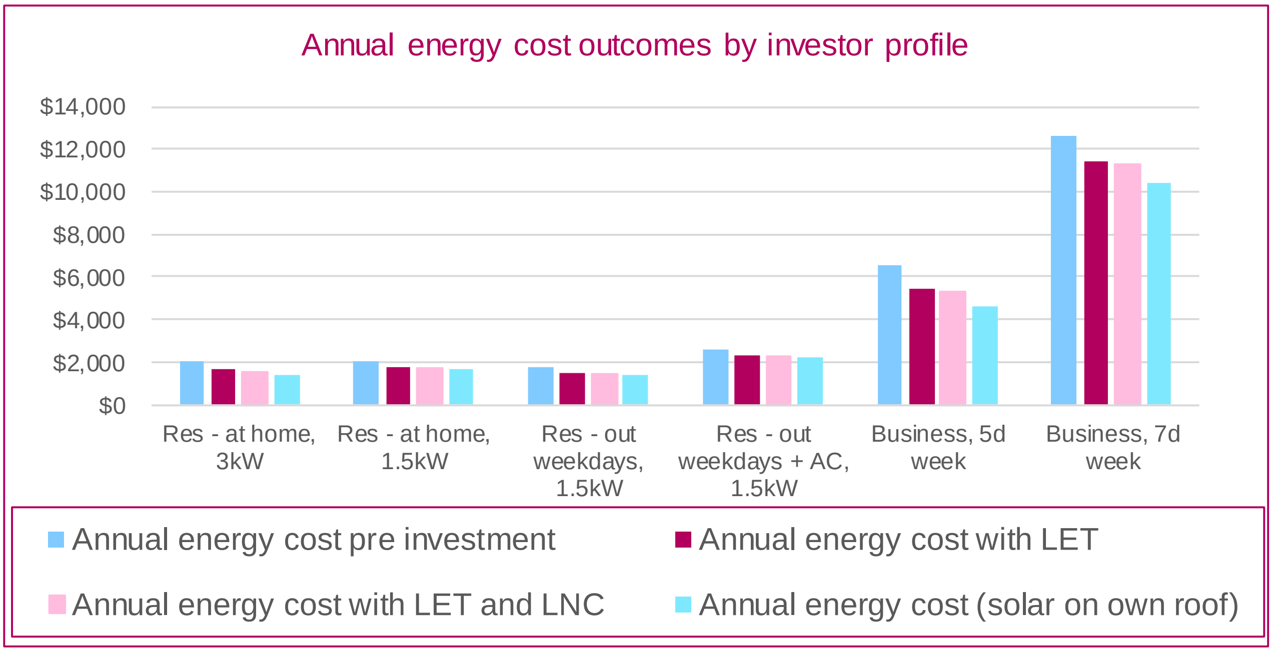
1) Derived from current AGL time-of-use tariffs

We defined five standard customer profiles, three residential and two business, with associated usage and electricity tariffs, and a portfolio of investors is defined from these user profiles in order to calculate results for the project as a whole. Key assumptions used in the model and the tariffs used to calculate the investor results are shown in the tables below.

Results for individual investors

The business case for investing in a community solar farm will vary according to the potential investor's current energy use profile and tariff, and the size of their investment. This will determine how the much they pay for energy to start with, the proportion of netted off energy which will be consumed on site, and their consequent savings. We defined six investor profiles, and modelled the outcomes for each one. The graph shows the outcomes for annual electricity costs by investor profile, and also shows the return if the same solar system could be put on their own roof. Table 5 gives all the outcomes by investor type, as well as the benefit. The major influence on the outcomes is the energy costs the investor would otherwise be paying.

The user profile also has a strong influence over how much value an investor will derive from their share of the community solar farm. The best outcomes are achieved when the netted off generation is used on site. Energy beyond the LET recipient's demand *at that moment in time* is treated as exported to the grid at the retailer buyback rate, which is lower than the rebated energy charge.



Key outcomes for different investor types

	RESIDENTIAL				BUSINESS	
	At home weekdays 3kW	At home weekdays 1.5kW	Out weekdays 1.5kW	Out weekdays with AC 1.5kW	5 day week 5kW	7 day week 5kW
Investment	$5,700	$2,850	$2,850	$2,850	$9,500	$9,500
Solar % of consumption	36%	27%	29%	16%	32%	18%
Generation used on site	49%	74%	67%	58%	86%	99%
Annual energy cost pre investment	$2,054	$2,054	$1,757	$2,565	$6,535	$12,612
Annual energy cost with LET	$1,649	$1,811	$1,526	$2,350	$5,428	$11,399
IRR with LET	4.3%	6.5%	5.9%	5.0%	10.8%	12.3%

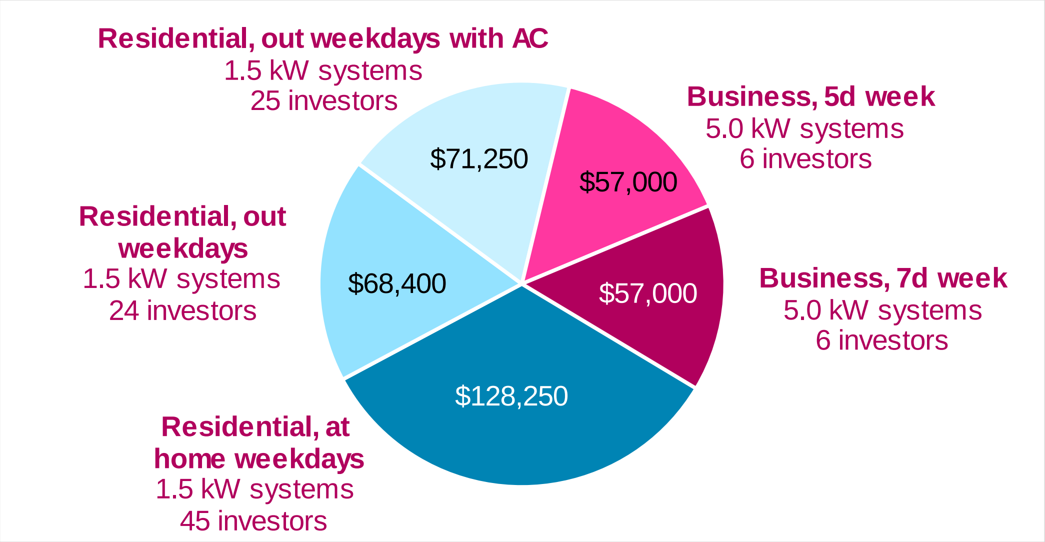
Results for the overall project

The results for the overall project are determined by the mix of investors, as the outcomes for different investor types vary considerably. The figure below shows the mix of profiles and the number of investors modelled for a project with a total size of 201 kW. The project would improve the annual energy bills in aggregate by approximately $35,000/year in the LET only case, and by approximately $42,000 for the combined LET and LNC case. In the context of a $380,000 capital investment, this represents a 10 to 11 year payback for investors overall. Note however that this is an average: the investment results for individual investors are as shown in Table 5**.**

Overall project results – residential and business investors

	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	$313,619	$277,837	$271,668
Simple payback (years)	n/a	11 yrs	10 yrs
Investment rate of return (IRR)	n/a	5% to 12.3%	7.5% to 14.2%
Lifetime benefit ($)	n/a	$756,547	$886,992

Residential and business investors – mix of investor profiles



Next steps

We have identified next steps, prioritising the highest areas of risk, as well as actions which are within the two Councils' control:

1) Determine whether there is appetite within Council to progress this project, and if so what role the Council wants to play and the level of involvement it is seeking from the community.
2) Identify a suitable retail partner – this is required for the project to go ahead, and has a strong influence on the return for the investors.
3) Start to engage the community either to seek active participants to progress the project or to understand community interest in being members of the project when it reaches the capital raising stage, or both.
4) Determine whether additional subsidy will be required in the absence of the LNC, based on the preliminary arrangement with the preferred retail partner.
5) Secure funding for developing the concept to the next stage. This could include partnering with other organisations looking to progress the low-income solar gardens (Community solar farm) model. This funding may address the requirement for seed funding, and potentially some additional gap subsidy if required in the short term.
6) Identify the preferred governance and ownership models, and consider establishing an interim governing board or steering committee.

Note that these are not presented in any particular order, and commencing one step does require completion of those listed higher on the list

There are a number of decision points where the Council may have to reconsider the viability of the project, for example, if Council cannot identify a suitable retail partner, or if it is unable to secure funding for actually developing the project. However, the results of the business case modelling indicate that progressing the project at this stage is worthwhile.

1 INTRODUCTION

This report provides results of the virtual trial undertaken for Moira and Swan Hill Councils on the business case for a one-to-many community solar farm using Local Electricity Trading to supply generation from the solar array to the owners/members. The trial looks at the feasibility of the project with and without a Local Network Credit in place. The Moira and Swan Hill trial stems from the Councils' investigation into a Virtual Renewable Power Station (VRPS).

The trial is part of a one year research project, *Facilitating Local Network Charges and Virtual Net Metering.* The project is led by the Institute for Sustainable Futures (ISF) and funded by the Australian Renewable Energy Agency (ARENA). The Moira and Swan Hill trial was also funded by the Moira and Swan Hill Councils and the Victorian Government Department of Environment, Land, Water and Planning. The overall research project is investigating two measures aimed at making local energy more economically viable:

- Local Network Charges for partial use of the electricity network.
- Local Electricity Trading (LET) (previously referred to as Virtual Net Metering or VNM) between associated customers and generators in the same local distribution area.

The project includes four other 'virtual trials' of the two measures in New South Wales, Victoria and Queensland, which examined 1-to-1 trials for business customers. The results of those trials are available in a summary report and individual case studies[2].

1.1 The concepts

Local Electricity Trading (LET)

LET is an arrangement whereby generation at one site is "netted off" at another site on a time-of-use basis, so that Site 1 can 'sell' or transfer generation to nearby Site 2. The exported electricity is sold or assigned to another site for billing purposes. LET can be applied in a number of different ways:

- A single generator-customer can transfer generation to another meter(s) owned by the same entity (e.g. a Council has space for solar PV at one site and demand for renewable energy at a nearby facility);
- A generator-customer can transfer or sell exported generation to another nearby site;
- Community-owned renewable energy generators can transfer generation to local community member shareholders (the one-to-many model); and
- Community retailers can aggregate exported electricity generation from generator-customers within a local area and resell it to local customers.

One-to-many

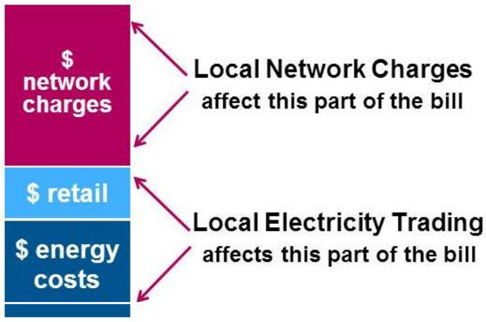
One-to-many: A single generator's energy output is virtually 'split' and transferred to many individual sites. As with all electricity sales, the physical electricity may not reach the buyer's site, but is reconciled against their usage for billing purposes. This could either be a council owned power station or a community owned facility (**Community Solar Farm or Solar garden**).

[2] http://bit.do/Local-Energy

Local Network Charges (LNC)

Local network charges are reduced network tariffs for electricity generation used within a defined local network area. This recognises that the generator is using only part of the electricity network and may reduce the network charge according to the calculated long-term benefit to the network. The rationale for a local network charge is to address some aspects of inequitable network charges levied on a generator/consumer pair; dis-incentivise duplication of infrastructure (private wires) set up to avoid network charges altogether; and maintain use of the electricity network. Further information on the LNC methodology is detailed in on page 38 in Appendix A: Additional information on methodology.

The interaction of local network charges and local electricity trading



Local Network Charges and LET are independent but complementary concepts with different effects on a consumer's energy bills. In most cases, the Local Network Charge will reduce the network portion of electricity bills, while Local Electricity Trading may reduce the combined energy and retail portion of bills for local generation.

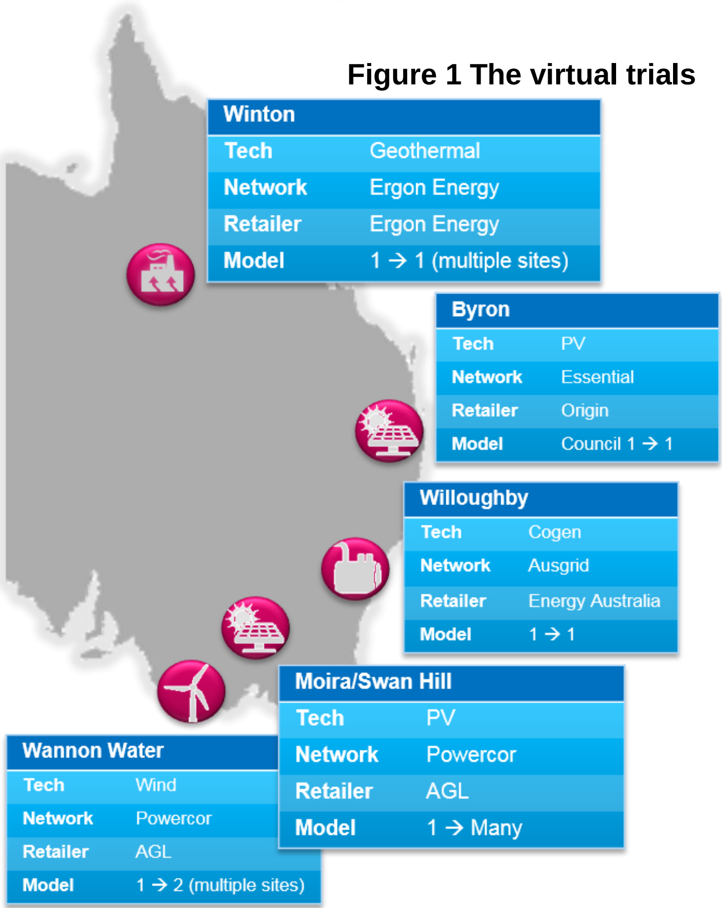
1.2 The overall project

The objective of the project is to create a level playing field for local energy, by facilitating the introduction of Local Network Charges and Local Electricity Trading. The key outputs are:

- Improved stakeholder understanding of the concepts;
- Five 'virtual trials' in NSW, Victoria, and Queensland;
- Economic modelling of the benefits and impacts of the measures;
- A recommended methodology for calculating local network charges;
- An assessment of the requirements and indicative costs for LET; and
- Support for the rule change proposal for the introduction of a Local Generation Network Credit.

The virtual trials aim to test the impact of Local Network Charges and Local Electricity Trading on local distributed energy projects, particularly the economic impacts, and to assess the real-world requirements for the measures to operate.

Figure 1 The virtual trials



2 WHY A COMMUNITY SOLAR FARM

Moira and Swan Hill councils have the following objectives for their Virtual Renewable Power Station (VPRS):

- Increasing renewable energy development in the area;
- Reducing Council's energy costs and greenhouse emissions;
- Increasing community empowerment, local economic development, and access to renewable energy;
- Providing a template for other councils and communities seeking similar goals, and
- Developing projects with low political, perception, financial and legal risks for Council.

One-to-many VRPS, also known as a Solar garden or Community Solar Farm is a single generator whose energy output is virtually 'split' and transferred to many individual sites. As with all Local Electricity Trading electricity sales, the physical electricity may not reach the buyer's site, but is reconciled against their usage for billing purposes.

In previous work for Moira and Swan Hill Councils *Renewable power options enabled by Local Electricity Trading*[3] we examined various models that the councils could adopt in meeting these objectives. A many-to-one VRPS and one-to-many VRPS were compared and contrasted. The one-to-many community solar farm was recommended because:

- The one-to-many performs better on economic development, community empowerment, and greenhouse gas reduction criteria.
- Wider sections of the community could participate, as it is not limited to those with access to a suitable roof.
- The legal liabilities are likely to be less than for a many-to-one option,
- It gives larger scope for the project to expand as it is only limited by the Councils' energy consumption and available sites.

Why a community solar farm

A community solar farm offers everyone an opportunity to generate and use their own solar power. People may currently be excluded from solar ownership due to living in a rental property or apartment, having an unsuitable roof or lacking the capacity to maintain their own system.

Solar systems installed "behind the meter" have the best economic returns, as the value of the electricity is equal to the entire volume charge for the electricity, including energy and network charges. Thus people or businesses who can install solar on their own roofs will almost always get a better financial return than investing in a community project.

Community solar projects in Australia have usually relied on behind the meter sites with power sales via Power Purchase Agreements to electricity users located on the site, or to a

[3] McIntosh, L., Rutovitz, J., and Langham, E. (2015)

retailer. The project returns value to member investors through cash payments of dividends. However, behind the meter sites are limited.

Local Electricity Trading offers an alternative, and has the potential to unlock standalone generation sites for solar projects. By directly crediting electricity generation to members, the benefit is equal to a proportion of their energy charges, which could be more valuable than a PPA with a retailer.

The community solar farm enabled by Local Electricity Trading is best suited to residential or small business electricity consumers who cannot install solar on their own roof, and have a relatively high electricity cost. Larger commercial and industrial facilities that pay low electricity volume charges (c/kWh) are unlikely to get an economic return from membership.

Council as an investor

Council has the ability to be an investor in the community solar farm along with any other community member or business. This will be most appropriate on small Council sites where electricity rates are high, and scope for a behind the meter installation is limited due to roofing or other constraints.

Council may also seek to pursue 'behind the meter' solar installations on their own larger sites where load and roof area are appropriate, as this is likely to be a more cost effective way to reduce Council's own energy costs. Council may consider using savings from behind the meter projects to support the development of the one-to-many community solar farm, in order to further their other objectives of supporting renewable energy, community empowerment, economic development, and providing an exemplar for other councils.

2.1 Community Solar Farms – examples of existing projects

The concept of netting off generation at a beneficial customer site, as proposed for the Moira and Swan Hill community solar farm projects is sometimes called a 'solar garden'.

Solar Gardens is a term used in the USA for community owned solar farms whose energy generation is directly 'netted off' the electricity bills of individual community owner investors. Energy is netted off at the full retail rate for LET transfers, and is reconciled over the entire billing period. Some examples of solar gardens in the USA include 'community sun solar condos' and the clean energy collective.

The Moira and Swan Hill trial differs from the US concept of a solar garden in a subtle but important way: Energy is netted off on a time of use (TOU) basis. Energy not used by the customer is not credited against future consumption, instead it is treated as exported from The customer's site. Consequently, the scheme favours consumers who use energy at the time the plant is generating.

Some examples of solar gardens are described below:

- **Ownership model:** Community Sun SolarCondos in Texas has a program whereby participants can purchase 'SolarCondos' that are small sections of a larger facility. This project has received confirmation from the US Securities and Exchange Commission (SEC) that the program is not considered to be a security. This is advantageous to community members as securities regulation can be challenging to navigate.

  More information: http://www.communitysun.com/

- **Ownership model:** Clean Energy Collective (CEC) owns and operates 39 projects across 9 states. These projects take advantage of virtual net metering legislation to enable 'roofless solar' for people in the community to purchase electricity from these projects.

Clean energy collective is one of the largest community solar developers in the world. Customers are able to purchase individual panels which are then operated by the CEC.

More information: http://www.easycleanenergy.com/

- **Subscriber model:** City Utilities' solar farm is a utility owned project that allows the customers of the utility to purchase the output of the solar farm at a fixed rate for up to 20 years. Customers to City Utility are able to subscribe for up to 100% of their bill to be sourced from the solar project. Solar energy can be 'banked' from one billing period to the next.

  More information: http://www.cityutilities.net/renewable/rnw-solar.htm

3 METHODOLOGY

3.1 Overview

This section gives a brief summary of the methodology used for the Moira and Swan Hill trial.

An excel model was constructed to examine the business case for a community solar farm with the two measures under investigation in the trials, namely Local Electricity Trading (LET) and a Local Network Credit (LNC). Further information on the LNC methodology is detailed in on page 38 in Appendix A: Additional information on methodology.

The business case looks at the outcomes for potential investors in the solar farm, and for the project as a whole, with either just LET in place, or with LET and an LNC. A one-to-many solar farm relies on LET being available to net off output at the investors' premises, so the business case does not consider outcomes without LET.

The model calculates the changes in electricity costs for the potential investors in the community solar farm, and the ability of the management company to cover ongoing overheads. It presents "live case" results based on inputs selected by the user to reflect the user's particular profile and the size of the investment they are contemplating, and also a set of results for six defined investor types.

The community solar farm project is at an early stage of development, but is under serious consideration by the proponent councils, and it was expected that the trial would assist with decisions on whether to, and how to, proceed.

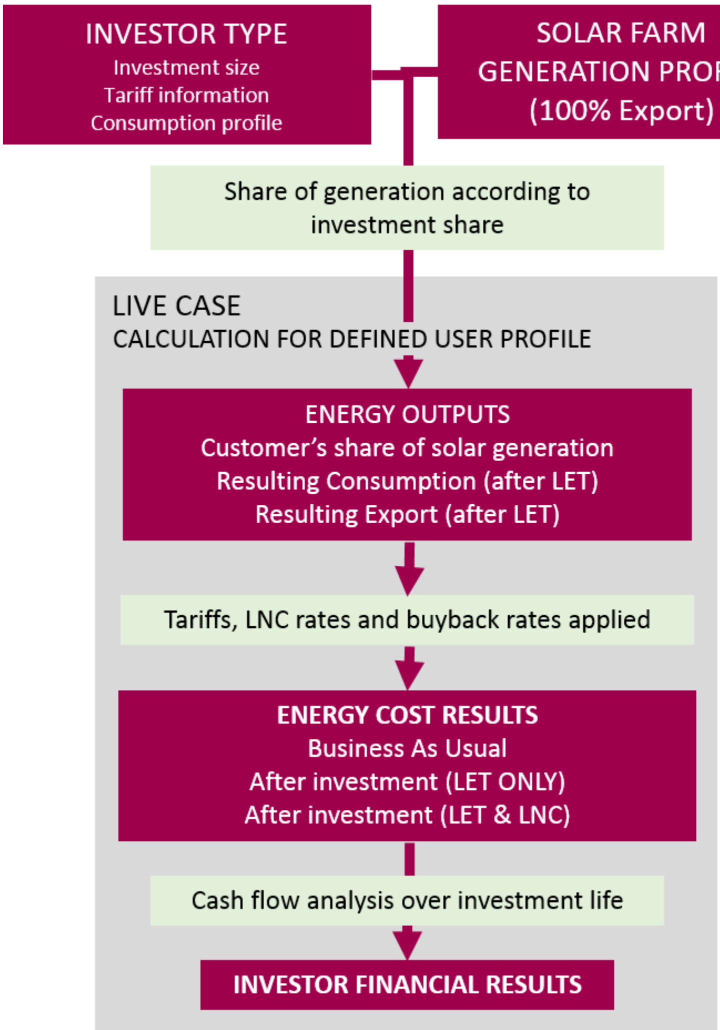
Conceptual framework

Figure 2 gives an overview of how the model works, which allocates generation from the facility to each investor according to their ownership share. The following framework conditions are in place:

- Energy is netted off at user premises according to their share in the overall project (i.e. their investment size), on a time of use basis.
- If the generation share exceeds demand for a particular investor at any time, the excess generation is treated as exported at the relevant feed in rate. This is paid to that investor. In other words, it is considered to be investor's export and not treated as centralised export.
- All LGC or STC income goes to the management company, to cover operating costs, and operation and maintenance of the solar farm. In the event that this is not sufficient to maintain a minimum operating margin, a proportion of the energy output of the plant reverts to the operating company.
- The customer would have to be on a time of use tariff in order to achieve the netting off. The model assigns the same tariff to the investor before and after investment, although this may not in fact be the case (for example, investors who are currently on fixed rate tariffs would be required to switch to time of use tariffs). A simplified set of tariffs has been used, based on AGL published tariffs. It should be noted that use of tariffs from different retailers could alter the results.
- The customer pays network and other 'general' charges (except energy) on the netted off electricity (for example, VEET, AEMO, RET)
- A retail margin is still charged on the netted off electricity.

We defined five standard customer type profiles, three residential and two business, with associated usage and electricity tariffs, and a portfolio of investors is defined from these user profiles in order to calculate results for the project as a whole.

Figure 2: Model overview



Model outputs

The model displays outcomes for investors based on the defined demand profiles, and different levels of investment in the centralised project. The output metrics are:

- Annual cost of electricity and cost of electricity per kWh before and after investment (note that this does not include financing costs as we have assumed investors will not use debt or borrow to purchase their share in the plant). This is calculated for individual investors by type, and for all investors as a group.
- Simple payback and lifetime benefit of the capital investment
- The proportion of generation that is netted off at investor premises.
- Internal Rate of Return on the investment (individual investors only)
- Operational income and outgoings for the organisation managing the solar project
- Greenhouse reduction for the project

Annual electricity cost, simple payback, and the lifetime benefit are calculated for standardised individual investors by type and all investors as a group, while the IRR is only calculated for standardised individual investors. The IRR for all investors is a group is not presented as presenting an average figure may be misconstrued by a user. All outputs are calculated with and without the payment of an LNC included.

3.2 User variables and individual results

In addition to the standard customer/investor types a user may enter in their own information to examine the financial results of their own participation.

A user may select their:

- total annual consumption
- desired investment size
- consumption tariff
- usage profile, from a series of pre-established options
- desired financial metric parameters (time horizon, discount rate, inflation rate)

The results from the user selected case are accessible in the 'my results' tab, but do not affect the results of the standard customer types used in the portfolio of investors making up the whole plant

Users may also vary assumptions for the live case on the assumptions sheet, however we expect most users not to delve this deeply.

3.3 Key assumptions and inputs

The following key assumptions were used in the model.

Table 1 Key assumptions

	Value	Source
Solar Farm capital cost	$1.90/ W	ISF estimate
Project Life – Generator (years)	20 years	Industry standard life for solar is 25 years, but the project economics make a 20 year life preferable
Annual operating cost (% of initial capex)	1.50%	ISF estimate
Management company administration costs	$2000/year	ISF estimate
Retailer buy back rate - residential	$0.05/ kWh	AGL website[4]
Retailer Margin	12.0%	Derived from QLD residential tariffs[5]
NPV Discount rate (nominal)	5.0%	Moira and Swan Hill councils
NPV and IRR time horizon (years)	20	User adjustable, default set to match project life
Inflation rate	2.43%	CPI all groups (ABS)

[4] www.agl.com.au/residential/energy-plans/electricity-and-gas-plans/solar-energy-plans

[5] Queensland Competition Authority. (2015). Regulated retail electricity prices for 2015–16.

	Value	Source
Local Generation Certificates	$50	ISF estimate
RET end year	2030	Federal RET policy

Table 2 Local Network Credit – the rates

	Value	Times
Super Peak (c/kWh) [1]	28	Summer weekdays 4pm to 8pm
Peak (c/kWh)	22	Winter weekdays 6am to 7am
Shoulder (c/kWh)	6	Winter, Autumn and Spring Weekdays 3pm to 9pm. Summer weekdays 3pm to 4pm and 8pm to 9pm
Offpeak (c/kWh)	0	All other times

Note 1) The local network credit calculated for the Powercor network in the Moira and Swan Hill area used differing times for the peak experienced on the lower network tiers (zone substations and below) to the times for peaks on the upper network tiers (subtransmission and above) Lower network and upper network levels peak times were generally not co-incident except for later afternoon early evening in the summer months. This resulted in a "super peak" or critical peak time, where relief provided by generation would have maximum value.

3.4 User profiles

We defined five user profiles, with associated usage and electricity tariffs,

- Residential at home during the day,
- Residential out during the day,
- Residential out during the day with summer air-conditioning,
- Business 5-day week, and
- Business 7-day week.

The consumption profiles for the above users were derived by ISF from anonymous customer profiles received from AGL. The residential profiles were categorised by the usage profile in to the three residential categories above.

Table 3: Standard investor types

Investor type	Annual Consumption (kWh)	Business As Usual (BAU) Annual Cost ($)
Household - at home weekdays	6,000	2,054
Household - out weekdays	5,000	1,757
Household - out weekdays & summer AC	8,000	2,565
Business - 5 day week	20,000	6,535
Business - 7 day week	40,000	12,612

3.5 Tariffs

Publicly available tariff information was obtained from the AGL and Powercor websites. While data from AGL and other project partners has been used in compiling project assumptions the potential Local Electricity Trading mechanism and its associated outcomes are not part of any AGL tariff offering. If AGL were in the future to offer such a Local Electricity Trading product, tariff rates and regimes may vary significantly from the assumptions used in this model. Given that AGL's potential future tariff offering is unknown, we are only able to include information from current tariffs, to serve as an approximation of a future LET product.

Table 4 gives an overview of the tariffs used to generate the results, with and without the application of a retailer discount. Appendix B lists all the tariffs available in the model.

Table 4 Tariffs available in the model – no retail discount, GST exclusive

Tariff	Used for results	Energy charge (includes network, AEMO, VEET, RET) Peak $/kWh	Shoulder $/kWh	Offpeak $/kWh	Supply charge $/day	Times
WITHOUT RETAIL DISCOUNT						
Residential [1]	YES	$0.34	$0.24	$0.18	$1.39	Note 3
Business [2]	YES	$0.32	n/a	$0.20	$1.67	Note 4
WITH RETAIL DISCOUNT						
Residential [1]	NO	$0.25	$0.18	$0.13	$1.39	Note 3
Business [2]	NO	$0.21	n/a	$0.13	$1.67	Note 4

1) Based on the flexible tariff for Residential Savers, Residential Maximiser, or Residential Set & Forget (these tariffs all have the same rates)
2) Based on the Trader E1 tariff for Business Savers, business Maximiser, or Business Set & Forget (these tariffs all have the same rates)
3) Peak 3pm-9pm Mon to Fri. Shoulder: 7am- 3pm and 9pm to 10pm Mon to Fri, and 7am to 10pm on weekends. Off-Peak: 10pm to 7am every day
4) Peak charges apply 7am to 11pm AEST all year

Application of retailer offered discounts

Depending on the tariff, AGL offers a one-year discount of 26% to 28% for new residential customers and 34 to 36% for new business customers. As the project is a twenty-year project, and the discounted plans are only 12 month plans we deemed it appropriate to use the non-discounted rates. Once again it is important to note however that any retailer offering LET is likely to create a new plan for this purpose with rates different to the standard plans used in this modelling.

There are many retailer players in the Victorian market with various offerings including greater and lesser amounts of discount on a wide offering of base tariff rates. Furthermore some are more directed towards renewable energy in their product offerings than others. As the project progresses there is uncertainty about which retailer may be involved in the next steps of the project. It is instructive to examine results based on the base tariff and the discounted tariff rates. Naturally, a consumer paying less for electricity will receive less benefit from an LET product.

Please see Appendix D: Outcomes by investor types – retailer discount included, for results based on the lower value of energy for customers receiving discounted energy prices.

Further detail on the methodology is provided in Appendix A

3.6 Peer review process

The model and calculation methodology were examined through an independent peer review process conducted by Urban EP[6]. In general, the external review concluded that there were no substantial omissions in the business case model, and that it contains the necessary functions and data to generate the intended outputs.

The process identified several improvements and errors warranting attention and provided an appropriate quality control to the complex calculations. The improvements and errors addressed following the peer review were:

- Error discovered (and corrected) in the formulas for peak and off-peak consumption
- Corrected profile used for calculation of exported energy
- Updated retailer margin
- Clarified use of nominal discount rate for NPV
- Added the ability to change basic financial parameters on the inputs sheet, or order to allow businesses to set figures more closely in line with their current practises.

[6] Urban EP. 2016. Peer review: Virtual Renewable Power Station business case for Moira Shire Council, June 2016.

4 THE BUSINESS CASE FOR A COMMUNITY SOLAR FARM: RESULTS

The business case for investing in a community solar farm will vary according to the potential investor's current energy use profile and tariff, and the size of their investment. This will determine how the much they pay for energy to start with, the proportion of netted off energy which will be consumed on site, and their consequent savings. We defined six investor profiles, and modelled the outcomes for each one. The investor types are

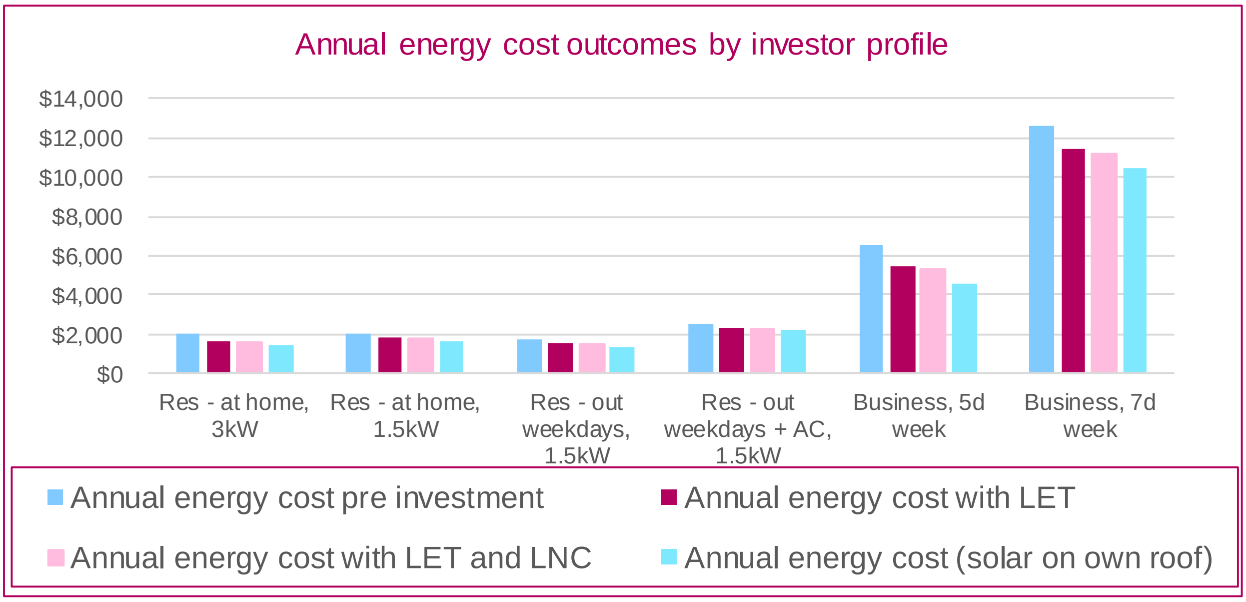
- A resident with an "At home weekdays" usage with a 1.5kW investment
- The same resident as in 1) but with a 3kW investment
- A resident with an "out weekdays" usage, with a 1.5kW investment
- A resident with an "out weekdays – with summer air conditioning" usage, with a 1.5kW investment
- A smaller-sized business using 20,000 kWh per year, operating on a five-day week.
- A larger-sized business using 40,000 kWh per year, operating on a seven-day week.

No large commercial or industrial investors were included, as the relatively low rate these customers pay for energy means a community solar farm is unlikely to be a cost effective investment.

4.1 Headline results

Figure 3 shows the outcomes for annual electricity costs by investor profile, and Table 5 gives all the outcomes by investor type. The results show a reasonable return for the project with LET with the assumptions used in the calculations. Savings are greatest for small business customers.

Figure 3 Annual energy cost outcomes by investor profile



Residential investors have average annual savings of $274, with an internal rate of return between 4.3% and 6.5%, and a simple payback between 11 and 13 years. If an LNC is available this goes up to average annual savings of $331, with an IRR of between 6.8% and 8.8% and a resulting payback period of 10 to 11 years.

Small business investors have average annual savings of $1,160, with an internal rate of return of between 10.8% and 12.3% and a simple payback between 8 and 9 years. With an LNC, this goes up to $1,314 with IRR of between 12.9% and 14.2% and a payback of 7 to 8 years.

The results for a 'behind the meter' installation i.e. an installation on an investor's own property is also displayed as a comparison. Naturally the financial outcomes are better for such a project as network charges and other non-energy charges are also avoided. As discussed in section 2 the community solar farm concept explored in this report is designed for and best suited to accommodate investors who do not have access to a property where it is possible to install their own 'behind the meter' installation.

Table 5: Outcomes for different investor types

	RESIDENTIAL				BUSINESS	
	At home weekdays 3kW	At home weekdays 1.5kW	Out weekdays 1.5kW	Out weekdays with AC 1.5kW	5 day week 5kW	7 day week 5kW
Investment	$5,700	$2,850	$2,850	$2,850	$9,500	$9,500
Solar % of consumption	36%	27%	29%	16%	32%	18%
Generation used on site	49%	74%	67%	58%	86%	99%
Annual energy cost pre investment	$2,054	$2,054	$1,757	$2,565	$6,535	$12,612
Annual energy cost with LET	$1,649	$1,811	$1,526	$2,350	$5,428	$11,399
Annual energy cost with LET and LNC	$1,556	$1,765	$1,480	$2,304	$5,274	$11,245
IRR with LET	4.3%	6.5%	5.9%	5.0%	10.8%	12.3%
Simple payback LET	13	11	12	13	9	8
IRR with LNC	6.8%	8.8%	8.3%	7.5%	12.9%	14.2%
Simple payback LET and LNC	11	10	10	11	8	7
Annual energy cost with behind the meter installation	$1,411	$1,639	$1,369	$2,216	$4,603	$10,449

4.2 Major factors influencing the investor outcomes

Energy costs

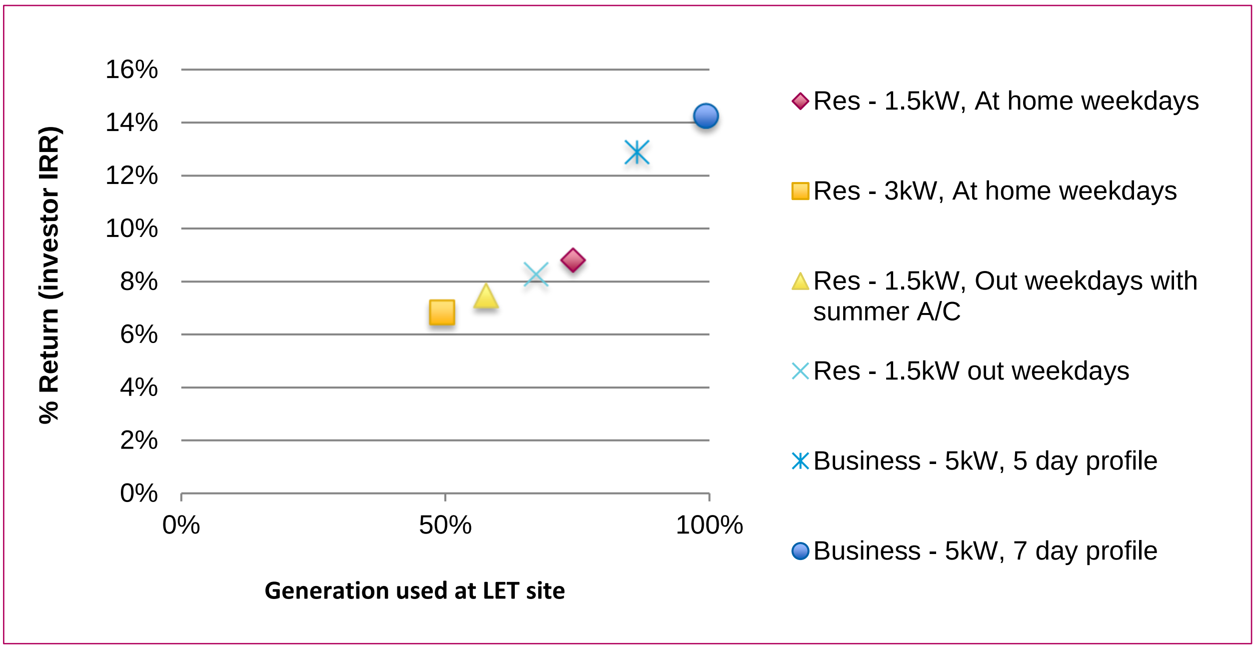
The key driver influencing the outcomes is the energy costs the investor would otherwise be paying. We have calculated outcomes for investors assuming they do not receive a discount on their electricity costs, on the assumption that such discounted prices only apply in the short term. However, if these discounts are included in the calculation, the returns on the project are marginal if no LNC is available. The residential IRR is reduced to between 1.4% and 2.1%, and the business IRR to between 2.3% and 2.7%, corresponding to simple paybacks of between 16 and 18 years. Appendix D shows the outcomes by investor type if the current retailer discount offered by AGL is applied.

User profile

The user profile also has a strong influence over how much value an investor will derive from their share of the community solar farm. The best outcomes are achieved when the netted off generation is used on site. Energy beyond the LET recipient's demand *at that moment in time* is treated as exported to the grid at the retailer buyback rate, which is lower than the rebated energy charge.

Figure 3 shows the IRR according to the proportion of energy used onsite. The chart illustrates how increasing the generation used on site increases the investor returns because the energy volume charge is greater than the buyback rate available for exported electricity.

Figure 4 Investor return plotted against generation used on site



Returns were comparatively stronger for business participants in the community solar farm. This was primarily because these users have:

- Greater electricity demand during the day, leading to higher levels of LET generation consumed
- A peak-pricing regime that included most of the daytime hours, maximising the value of the avoided energy purchase.

To maximise the value of the investment a residential investor could:

- Decrease the amount of the community solar farm they purchase to ensure their share of generation is consistently below their energy demand. This can be seen in the difference in outcome between the 3kW investment and the 1.5kW investment for the 'At home weekdays' resident
- Alter their usage profile to use more energy during the day. This can be seen in the difference in outcome for the 1.5kW "At home weekdays" investor compared with the other 1.5kW residential cases.

4.3 Overall project results

The results for the overall project are determined by the mix of investors included, as the outcomes for different investor types vary considerably. We show the outcomes for an entirely residential project, and for one that is a mix between residential and business investors. The outcomes for a mixed residential and business project are better on average, although this does not alter the outcomes for individual investors. **Figure 5** and Figure 6 show the mix of profiles and the number of investors in each project we modelled. Both have a total size of 201 kW.

A project approximately 200kW in size was chosen through considering Council requirements of manageable project size with the potential to retain the ability to expand, while including the desired number of investors and balancing network and area constraints. The precise figure of 201 kW was used in order to achieve a whole number of 'standard' investors. In reality the project size would of course be determined prior to allocating portions to investors.

The project consisting of residential investors, as shown in **Table 6**, would improve the annual energy bills in aggregate by approximately $31,000/year in the LET only case, and by approximately $37,000 for the combined LET and LNC case. In the context of a $380,000 capital investment, this represents an 11 to 13 year payback for investors overall. Note however that this is an average: the investment results for individual investors are as described in Table 5.

The project consisting of residential and business investors, as shown in **Figure 6**, would have slightly better outcomes on average, with a saving overall of $35,000 in the LET only case, and $42,000 for the combined LET and LNC case representing a pay back of 10 to 11 years for investors overall.

Table 6: Overall project results – residential investors only

	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	$280,753	$249,612	$243,443
Simple payback (years)	n/a	13 yrs	11 yrs
Investment rate of return (IRR)	n/a	5% to 6.5%	7.5% to 8.8%
Lifetime benefit ($)	n/a	$658,424	$788,869

Table 7: Overall project results – residential and business investors

	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	$313,619	$277,837	$271,668
Simple payback (years)	n/a	11 yrs	10 yrs
Investment rate of return (IRR)	n/a	5% to 12.3%	7.5% to 14.2%
Lifetime benefit ($)	n/a	$756,547	$886,992

Figure 5 Residential investors only – mix of investor profiles

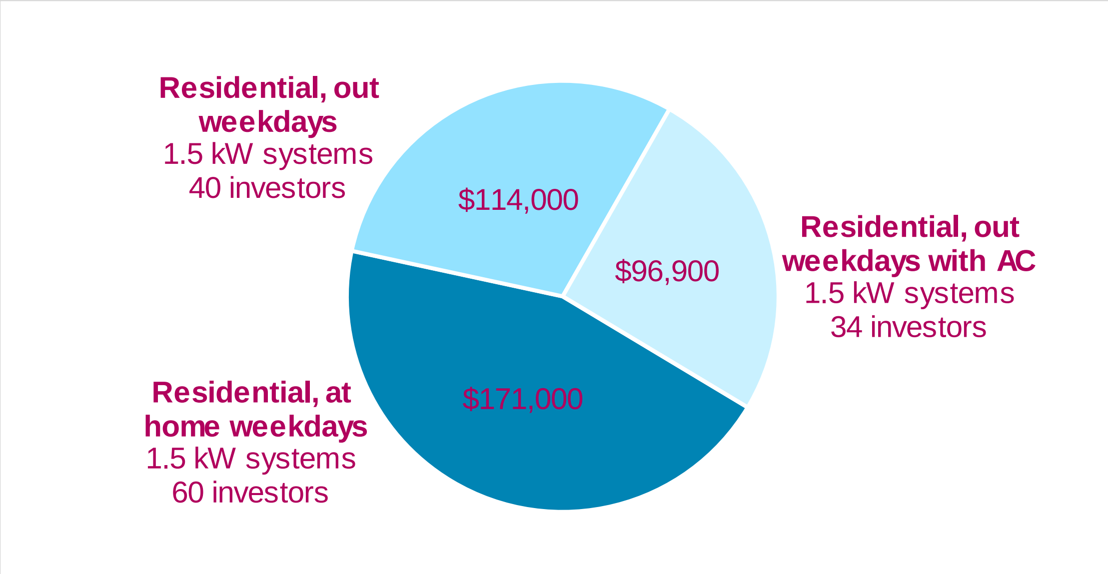
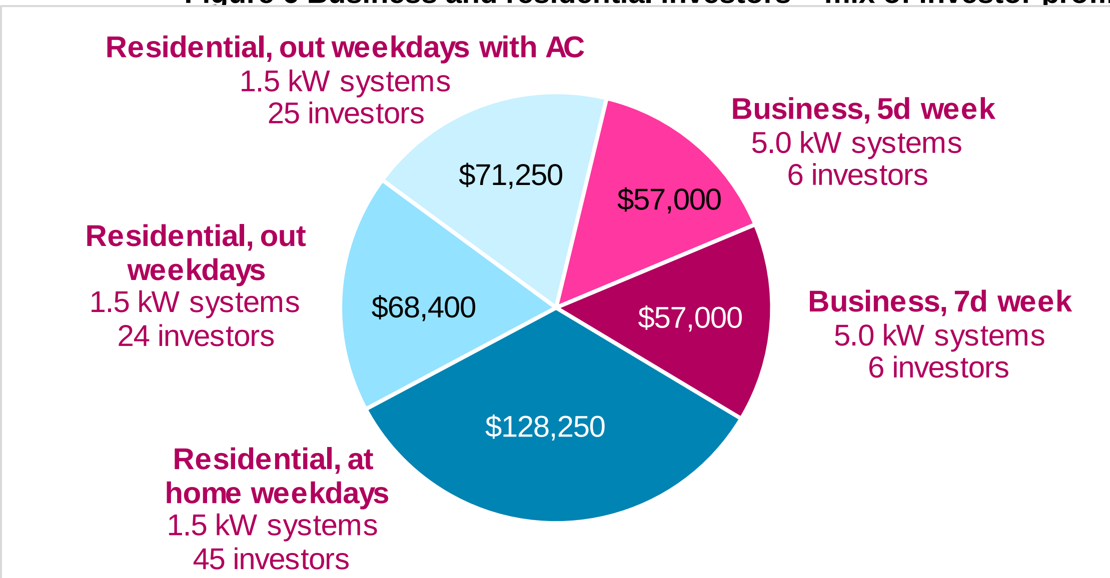


Figure 6 Business and residential investors – mix of investor profiles



4.4 Results for the project management organisation

Separate to investor outcomes, the project needs to consider ongoing maintenance, management and scheme administration. The annual costs for this will depend to a degree on the financial and legal structure selected to progress the project (refer to section 5.3).

The main source of income to meet operational costs is the Large Generation Certificates (LGCs) that the project will accrue over time due to the federal Renewable Energy Target (RET). The Renewable Energy Target scheme is currently scheduled to end in 2030.

The annual expenditure for operating the management organisation have been itemized as plant related expenses (operations and maintenance) and administrative expenses (Management, Administration etc). Plant related expenses are an estimate of the direct costs of employing a contractor to carry our basic maintenance tasks relating to the plant, based on the assumption of a maintenance fee of 1.5% of initial project capex. The administrative expesens represent a contribution to the general overhead of maintaining a legal entity. We have assumed the entity would be engaged in broader activities beyond a single solar farm and thus would receive a contribution towards its overhead from these other activities as well. The general overhead could be expected to include items such as insurance, members' registry, annual auditing, bookkeeping and other compliance related activities. This will also depend on the final legal structure selected.

It is assumed that the operating company will require a minimum operational budget, which is set at $5000 per year (plus inflation). If the operating margin falls below this amount, a corresponding proportion of the energy output of the project will revert to the operating company. Thus after the RET scheme ends, a significant portion of the output of the plant is diverted to meet operational expenses. For this reason, the project life has been set at 20 years, as it would not be cost effective to schedule a second inverter replacement (generally expected every ten years) once the income to the plant does not include LGCs.

This arrangement gives some flexibility to the operating company, as the reversion of energy to the company may not be required in the event that the RET scheme is extended, or indeed if the income from LGC is higher than modelled (LGCs are currently trading at $70, while a price of $50 has been used for the model). Alternatively, if LGC prices are lower than expected, the energy reversion may occur earlier.

Table 8 presents a simple operating budget for the first year of operation, for year 18 (the first year after the LGC income is expended), and the lifetime incomes and expenditures. Appendix E shows the 20 year cashflow for the company.

Table 8: Project management, maintenance and administration budget

	Annnual budget year 1	Annual budget year 18	Lifetime operating budget (cumulative, years 1 to 20)
ESTIMATED OPERATING COST			
Operations and maintentance	-$5,868	-$8,825	-$148,837
Management, Administration etc	-$2,000	-$3,008	-$50,731
Equipment replacement	$0	$0	-$36,180
TOTAL	-$7,868	-$11,833	**-$235,748**
INCOME			
LGC	$14,571	$0	$205,491
Energy sales [1]	$0	$12,012	$30,257
Brought forward	$0	$7,342	
SURPLUS / DEFICIT	**$6,703**	**$7,520**	**$0**

Note 1) Energy sales are triggered when LGC income is insufficient to maintain the specified operating revenue, so some generation is diverted to the management company, as discussed above.

5 MAKING THE SOLAR FARM HAPPEN

There are a number of guides published by the community energy sector on establishing a community energy project, with three useful resources listed in Section 5.1.

This section will not seek to recreate information already available, but instead cover implementation aspects that are specific to the Moira and Swan Hill community solar farm projects. However, the general resources which discuss establishing a community-owned renewable project would be required reading for taking the project forward.

Specific questions that Moira and Swan Hill Councils need to address are:

- Who within the Council and/ or the community is going to progress it?
- How would a solar farm be organised (ownership and governance)?
- Is there a suitable retail partner?
- Is the business case sufficiently strong, or is some funding required, for example in the absence of an LNC?
- How will the set up costs be covered?
- Is there community interest in such a project?

5.1 Resources

These resources provide important background reading, and a great deal of detailed information. A degree of familiarity with the concepts presented will be essential to implementing the community solar farm.

- **Community-owned renewable energy: A how-to guide, Community Power Agency** http://cpagency.org.au/wp-content/uploads/2014/06/CPAgency_HowtoGuide2014-web.pdf
- **Guide to Community-Owned Renewable Energy for Victorians** www.energyandresources.vic.gov.au/energy/sustainable-energy/community-energy
- **Community solar toolkit, SEE-Change** www.see-change.org.au/community-solar-toolkit/
- **Community energy Wiki, Embark** www.embark.com.au/display/public/content/Solar+park%3A+getting+started

5.2 Governance – considerations for Moira/ Swan Hill

Implementing a community solar project, especially one with an innovative feature such as Local Electricity Trading (LET), requires a strong and experienced governance structure, including a board to represent members' interests and manage the community investment with high levels of integrity and responsibility.

It is important to determine the desired relationship between the board and Council. The board is likely to be strongly connected with Council during feasibility stages. However, Council should carefully consider its long term relationship both with the board and the legal entity in which community members invest. At one end of the spectrum, Council may seek to merely provide a landscape where community solar projects can thrive, while at the other end, the Council may wish to retain a controlling interest in the project. Alternatively, the Council may wish to have a member on the board, and a partial ownership stake, but leave the bulk of the Governance responsibilities to the new entity. Each has pros and cons, and three possible variants along this spectrum are discussed below.

Council-led (and potentially controlled) project

Council would continue to develop the project and establish an investment entity such as a cooperative or unlisted public company or unit trust that remains largely within Council control. As local investment is obtained, significant control of the entity would be expected to pass to Directors elected by those investors. If Council wished to retain control, even after public investment, there are legal structures available, for example it could do so by:

- Retaining a controlling portion of the ownership of the entity.
- Issuing a class of non-voting shares to investors and retaining the voting shares (This would require a public company)
- Acting in the role of trustee for a unit trust managing the investment (Australian Financial Services Licencing (AFSL) is likely to be required)

A Council-led project has the following advantages and disadvantages

Advantages

- Council can have strong oversight of the project, guide project decisions and gain comfort over all aspects of the project.
- Council can claim full promotional and political credit for a community success.

Disadvantages

- Future councillors may determine the project is not a priority.
- At the time of investment raising, Councillors may experience a high level of political risk due to the nature of conducting a community investment scheme.
- Council bears full responsibility if the project is not a success.
- Community empowerment may be diminished due to the strong Council presence in decision making.
- Council decision making processes may slow down the establishment of the project in the longer term, because of the high degree of oversight required.

Council & Community guided project

Council would seek suitably qualified community leaders to form a board during the development stage and transfer project governance to that board. Council could retain a seat or seats on that board to continue to influence the project direction as development continues and as the project is opened for investment.

A Council guided project has the following advantages and disadvantages:

Advantages

- Council can have moderate guidance over the project, can guide project decisions and gain comfort over all aspects of the project.
- Council can claim full promotional and political credit for a community success.
- Community consultation would be stronger than a solely Council-led project, which may reduce the risk of not receiving sufficient investment interest.

Disadvantages

- At the time of investment fundraising, Councillors may still experience a high level of political risk due to the nature of conducting a community investment scheme. This may be compounded by the reduced control they would have over project direction when compared with a council-led project.

- Council would likely bear considerable responsibility if the project is not a success.

Community controlled project, with Council as enabler

Council may prefer a role as a facilitator of the conditions a Community solar farm needs, but distance itself from management of the scheme before the investment stage.

- Council would use its influence to secure a retailer for the community that is prepared to offer a LET scheme to projects meeting basic eligibility criteria.
- Council would offer favourable leasing conditions to community solar projects that make use of particular preselected council sites, but not mandate any particular site's use. Site choice would be left to the community/developer
- Council would offer seed funding to a community group and or community/developer partnership wishing to develop the concept and leave responsibility for the management of project development to that group or consortium.

Advantages

- Council would have no direct responsibility for the success or failure of a project taking advantage of a council offered site and/or the retailer offered LET scheme.
- Community members involved in community/developer partnerships would be strongly empowered in decision making regarding the project.

Disadvantages

- Council would have less control over the scheme, which may not preserve some of Council's objectives (for example, making the scheme open to low income groups)
- There would be less opportunity for Council to claim direct promotional benefit associated with any particular project, although Council could take full credit for creating the environment that empowered local community/developer partnerships.
- This option is dependent on community actors to drive the project forward, and these may or may not exist within the Moira/Swann Hill communities. Alternatively, it is dependent on a solar developer who understands community energy, including good community engagement processes and ownership models. In our experience, these developers do not yet exist in Australia.

The degree of Council control should not be considered as a binary choice but a spectrum of options ranging between the Council-led and Community controlled options discussed above. A hybrid between the two is certainly possible, for example, the Council taking on the initial set up of project, but ensuring that the scheme is handed over to a Community board which includes a Council representative prior to investment.

Establishing a 'proto-board'

To form the desired board, an initial 'proto-board' or steering committee allows governance practices to be developed over time. This approach can introduce board candidates to the concept of a future formal directorship. 'Proto-board' members would not be subjected to the liabilities and responsibilities of a formal directorship from the outset, however their terms of reference should include a preparedness to transition to a formal directorship role as the investment entity is formed.

Further information - governance

The Embark Community Energy wiki listed above includes a helpful article on:

- Governance basics.

- What is a board and who can be board members.
- Responsibilities of board members and office bearers.

The Community Power Agency (CPA) guide covers:

- A background of three main types of organisations that develop community solar projects.

The SEE-Change toolkit includes a guide covering:

- Sample terms of reference for a governance board.
- A guide to finding board members.
- Addressing barriers for people who may be interested in joining the board or project team.

5.3 Ownership - legal & financial structure

Legal and financial structure are closely intertwined and should be considered as a single question. Different legal structures will permit different financial relationships between the community solar farm and its members. A summary of common Australian legal structures is presented in Table 9.

ISF's understanding of the main requirements for the financial and legal structure is that they are to enable a project with a cost of approximately $350,000 to $400,000, with fifty to one hundred members, and with the financial benefit for investors to be in the form of reduced electricity bills (rather than a dividend or share income).

There are two main legal structures for a community solar farm:

- **A community investment company (private or public company) or cooperative**

  Community members would own shares in the community solar farm. Ownership of a share would entitle the community member to discounted energy, up to their share of the project's output. Given that members are directly doing business with the project through receipt of energy, a cooperative may be a more natural fit for this type of enterprise.

  This form of legal & financial structure would be possible for either the council controlled scenario or the community controlled scenario presented in 5.2.

  The ASIC rules that regulate investments means that the share offering for a private or public company or trust would be limited to 20 members a year and 50 total, in the absence of significant legal and compliance costs that would likely exceed the annual profit of the venture (see section 5.3.1 for more details). As such, public or private companies would not be suitable for the number of investors anticipated. A co-operative on the other hand is not restricted to 20 members.

  However, we note that one of the fundamental principles of a cooperative is one member one vote, so Council would not be able to have a controlling interest or share in the project. Council would be able to be a member with the same rights as all other members.

- **A Managed investment scheme**

  Community members could invest in units or bonds in the community solar farm, or even invest in the energy itself, with the investment managed by the scheme's responsible entity. There are many options for a managed investment scheme's legal structure, these could include

- Community investment in units in a unit trust, with the trustee holding the AFSL
- Community investment in council issued bonds.
- Community investment in a third party issuing bonds.
- Community investment in a third party managing the energy on behalf of the community members.

Whether this structure is more suited to a Council controlled scenario or a community controlled scenario will largely depend on the AFSL used. For example, use of the Local Government Funding Vehicle trustee could be expected to necessitate Council control.

Legal options summarised

In summary, a cooperative or a managed investment scheme are likely to be the two most feasible legal structures available for the solar project.

5.3.1 RESTRICTIONS ON ORGANISATIONAL STRUCTURE

Twenty, Twelve, Two Million rule[7]

The 20/12/$2mil rule is the colloquial term for a facet of Australian corporations law which describes the limit for 'small scale offerings' that do not require a disclosure document (s708 of the Corporations ACT 2001). To classify as a small scale offering, no more than 20 people must accept an investment offer and raise no more than $2m may be raised in a (rolling) 12 month period. Moira and Swan Hill councils should not expect to rely on exemptions provided for by this rule due to the low investor number limit. Companies wishing to raise beyond these limits must use an Offer Information Statement (OIS) for raises up to $10m. As the small scale offering rule is in corporation's law it does not apply to Cooperatives.

Proprietary company 50 owner limit

A Pty Ltd company has a limit of 50 owners. (s113 of the Corporations ACT 2001.)

Crowd Sourced Equity Funding (CSEF)

A CSEF bill was put to the Australian parliament in 2015 to "to establish a framework to facilitate crowd-sourced funding offers by small unlisted public companies and provide new public companies that are eligible to crowd fund with temporary relief from reporting and corporate governance requirements that would usually apply."

In many ways such legislation as was considered by the Federal Government could provide a suitable legal structure for community energy projects. However, the bill as posed did not proceed to legislation and its final form would not have been suitable for a community energy project due to the temporary nature of the relief it provided. Nonetheless the Federal Government may consider such legislation again in the future.

Australian Financial Services Licencing (AFSL)

Where a third party manages the investment, an Australian Financial Services License (AFSL) would be required due to investment being considered a 'managed investment scheme' (unless the investment is a small-scale offering). Organisations offering their own shares for sale are exempt from this AFSL requirement due to the 'self dealing exemption' (s766C(4)(c) of the Corporations ACT 2001.)

Council may be in a position to work in partnership with a suitable responsible entity that has an AFSL or use such an organisation as an intermediary in the community investment. The trustee

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[7] It is worth noting that the other structures previously used in Australia by some community energy projects such as Clearsky solar investments (small unit trust) and Repower Shoalhaven (pty ltd company) are ruled out largely on the basis of these rules.

for the Local Government Funding Vehicle associated with the Municipal association of Victoria is one possible alternative worth exploring.

Interim legal Structure

An interim legal structure is almost always required as a home for the conducting the work to determine the right structure for the community's investment. An interim organisation is usually established or an existing organisation auspices the project through the concept development phase and is used until the final legal structure for community investment is determined. Often an interim organisation is an incorporated association however any structure will suffice, provided it is recognised that this interim structure *will not be the responsible entity for raising money and managing the project*.

Some examples of this in practise include:

- Embark providing early support for Sydney Renewable Power Company
- SEE-Change as an incorporated association acting as an incubator for SolarShare Canberra
- Repower Shoalhaven Inc as a community association facilitating investments in Repower One, Two and Three as proprietary limited companies.

The Moira and Swan Hill Councils themselves may provide a suitable interim organisation pending a decision regarding the Councils' role in project governance detailed in section 5.2, and the final legal structure to be pursued.

Further information - legal structures

Community power agency guide: Section 5 on pages 30 to 33 includes a number of questions regarding legal structure that are useful to consider and examples of projects implementing various structures.

The embark Wiki has good information on cooperative and public unlisted company formation

- http://www.embark.com.au/display/public/content/Determining+the+right+legal+structure
- http://www.embark.com.au/display/public/content/Embark+mid-scale+solar+model+description
- The Victorian "Guide to Community-Owned Renewable Energy for Victorians" pages 34 to 37 describe all common legal options for community solar in Australia

Table 9: Common Australian Legal Structures

	Governing body	Profit	Example	Geography	Voting	Disclosure	Challenges	Benefits
Cooperative	Registrar of Coops Consumer affairs Victoria	Both: Distributing Non-Distributing	Hepburn Wind	State, but can register as foreign coop in other states	Democratic	Doc checked by registrar	Legal advice. Interstate investors. Can be seen as 'Kooky'	Values align, Offer document checks, Can distribute before tax, Unlimited members
Incorporated Association	Dept. of Fair Trading	NFP	Pingala	State	Democratic	n/a	No investment	Easy to setup
Company limited by Guarantee	ASIC	NFP	None	National	Democratic	n/a	No investment	National substitute for Inc assoc.
Private company (pty ltd)	ASIC	For Profit company tax rate	Repower Shoalhaven	National	Usually Proportional to shareholding. Can be democratic	Info Memorandum	20people/ 12months/ $2mil 50 people total	Easy to setup
Public company (ltd, unlisted)	AISC	For Profit, company tax rate	SolarShare, Sydney Renewable Power co.	National	Usually Prop can be Demo	<$10mil: OIS >$10mil Prospectus	Compliance costs	Unlimited members
Trust 'Unit' or 'Discretionary'	ASIC	For Profit. Tax rate of investors (not company tax rate)	Clear Sky Solar Investments	National	Trustee	Info Memorandum OR Managed investment scheme	20/12/$2miOR Australian Financial Services License	Tax treatment of profits Capital returns

Table adapted from work by the Community Power Agency and SolarShare.

Further information - financial resources

- Basic fundraising alternatives are presented in the CPA Guide in section 8
- The Embark wiki contains good detail on funding and finance options http://www.embark.com.au/display/public/content/Funding+and+finance
- The Victorian “Guide to Community-Owned Renewable Energy for Victorians” pages 29 to 33 describe all the main financing options for community solar

5.4 Barriers and largest sources of risk

Our assessment of the areas requiring the greatest attention are:

Local Electricity Trading retail partner

Without a retailer providing a Local Electricity Trading (LET) mechanism, the project will not be possible. Engaging with promising retailers early in the process will be crucial to developing a LET product. The specific terms offered for the netting off are also crucial to the business case for investors.

Community interest

Community engagement and market testing of the LET concept with local communities in Moira and Swan Hill will be important to ensure that there is sufficient interest in the scheme. However, this will have to be managed carefully as the terms of investment will not be known until, for example, there is a retail partner engaged on the project.

Development funding

Community energy projects can take upwards of three to four years to go from pre-feasibility to operation. Securing funding for development activities will be important for project success.

The business case for investors

The business case for investors is marginal, with payback periods of 10 to 13 years for residential investors. An LNC is not available in the absence of a rule change, and it may be that a subsidy is required for the project to be attractive for community investors.

Addressing political risk and governance

Establishing suitable governance to address any political risks that may be experienced by Councillors as the project nears the investment raising stage should be considered high priority. Detail on options for governance are covered in the Section5.2.

5.5 Next steps

We have identified actions which both address the highest areas of risk, and which are within the Council’s control.

1) Determine whether there is appetite within Council to progress this project, and if so what role the council wants to play and the level of involvement it is seeking from the community.

2) Start to engage the community either to seek active participants to progress the project or to understand community interest in being members of the project when it reaches the capital raising stage, or both.

3) Identify a suitable retail partner – this is required for the project to go ahead, and has a strong influence on the return for the investors.

4) Determine whether additional subsidy will be required in the absence of an LNC payment, based on the preliminary arrangement with the preferred retail partner.

5) Secure funding for developing the concept to the next stage. This could include partnering with other organisations looking to progress the low-income solar gardens (community solar farm) model. This funding may address the requirement for seed funding, and potentially some additional gap subsidy if required in the short term.

6) Identify the preferred governance and ownership models.

7) Establish an interim governing board, project team or steering committee, possibly including members from the local community

There are be a number of decision points where the Council may have to reconsider the viability of the project, for example, if Council cannot identify a suitable retail partner, or if it is unable to secure funding for developing the project.

However, the results of the business case modelling indicate that progressing the project at this stage is worthwhile.

APPENDIX A: ADDITIONAL INFORMATION ON METHODOLOGY

Unbundling published rates

As standard offers from AGL are 'bundled' i.e, display a single rate per kWh, we created a set of equivalent 'unbundled tariffs'. To unbundle a tariff, we began with the advertised AGL rate and subtracted Powercor's network charges. We further subtracted amounts for AEMO pool fees, ancillary services, LRET, SRES and VEET charges in the category of 'general charges'. Amounts for these fees were obtained from customer bills from an equivalent trial[8] for whom fully broken down bills were available. The result of the unbundling process was an amount representing energy charges and the retailer margin levied on energy charges. Appendix B gives the unbundled tariffs as modelled.

Only the energy charges were netted off in the LET process. General charges, network charges, and the retailer margin were levied on the full consumption profile.

Business tariffs

Due to modelling limitations, only volumetric tariffs could be applied i.e. no demand charge. This led to a single option available for selection for a business, with two possible discount rates (Savers at 34% discount and Maximiser at 36% discount). Given that discount rates are not applied this results in a single tariff. This tariff would be unlikely to apply to large commercial premises, as those customers are likely to be on a tariff including a demand charge. However, those customers are also unlikely to benefit from a LET scheme, as the underlying energy cost contained in their bill is generally significantly lower than the rates used here.

Residential tariffs

A number of different residential tariffs are available for a user to select. For the standard customer types we selected a plan with the highest level of TOU distinction, since to adopt LET a customer is likely to be required to have a TOU meter and adopt a TOU plan. This ruled out the Climate Saver and the 5 day TOU plan, in favour of one of the 'flexible' plan options.

We noted that the 'Residential Savers Flexible' tariff had equivalent rates to the 'Residential Maximiser flexible' and 'Residential Set and Forget Flexible' with the exception of the discount offered. Given that a relatively broad set of options narrows down to an equivalent set of rates we considered this to be a strong basis for use as the tariff for our standard residential customer types

[8] Rutovitz, J., Atherton, A., McIntosh, L.Teske, S., & Langham, E. (2015) *Virtual trial of Local Network Credits and Local Electricity Trading: Wannon Water and Glenelg Shire Council*. Institute for Sustainable Futures, UTS.

The Local Network Credit (LNC)

The business case for the Councils has been calculated with and without an LNC paid for the exported generation. This would only become available if there is a rule change requiring network businesses to pay an LNC to local generators.

It is assumed that the LNC would be paid on all the electricity exported from the community solar farm, and would be allocated to each investor according to their investment share.

The Local Network Credit methodology was developed as part of the overall project. The Trials Summary Report[9] describes in detail the LNC methodology and the calculations we performed for the various scenarios. Briefly, the calculation of the LNC has two parts:

1. Value setting (the base value of the LNC). We used the same value setting methodology that network businesses use for regular tariffs i.e. the Long Run Marginal Cost (LRMC) of the network.
2. Tariff setting (the application of a tariff structure to the base LRMC value). We applied a volumetric tariff for the Moira and Swan Hill trial.

The rates for the LNC were calculated for the Moira and Swan Hill trial by the Methodology for calculating a local network credit published as part of the wider body of work[10]. The rates are shown in Table 2

Generation profile

The Moira and Swan Hill generation profiles were established using four main inputs

- Hourly profiles of two pre-existing systems located in Moira[11] (Cobram) and Swan Hill[12] respectively, combined with their size and orientation accessed from an online repository of system outputs.
- Bureau of meteorology data for the ‘flat plate’ incident sunlight for each day of the year for Moira (Cobram station no. 080109) and Swan Hill (Swan Hill Aerodrome station no. 077094)[13]
- Azimuth, elevation and size of the proposed community solar farms to be installed by Moira and Swan hill Councils as provided by the council.
- Plataforma Solar de Almeria (PSA) Algorithm[14] outputs describing the sun’s location, incidence angle and expected intensity throughout the year for a given latitude

These inputs were used in the following steps to create the generation profiles for the Moira and Swan Hill plants.

1. BOM data combined with PSA algorithm correction between flat plate and the proposed community solar farm for actual orientation and an assumed performance ratio was used to determine how a new installation would perform on an annual total. The resulting annual totals were
    - 1490 kWh/kWp/year for Swan Hill
    - 1463 kWh/kWp/year for Moira

[9] Rutovitz, J., Langham, E., Teske, S., Atherton, A. & McIntosh, L. (2016) *Virtual trials of Local Network Charges and Local Electricity Trading: Summary Report*. Institute for Sustainable Futures, UTS.
[10] McIntosh, L., Langham, E., Rutovitz, J. & Atherton, A. (2016) Methodology for calculating a local network credit. Institute for Sustainable Futures, UTS.
[11] http://pvoutput.org/list.jsp?id=33&sid=1445
[12] http://pvoutput.org/list.jsp?id=33&sid=737
[13] http://www.bom.gov.au/climate/data/index.shtml
[14] http://www.psa.es/sdg/sunpos.htm

The assumed performance ratio was 70.75% based on the following assumed derating factors: Temperature: 15%; Dust: 5%; module tolerance: 3%; AC losses: 3%; DC losses: 3%; inverter losses 4%.

2. Data for the two existing systems in the Cobram and Swan Hill area was used to determine the hourly distribution of the total generation.
3. Where this PV-output data was incomplete, information from a substitute date with a similar level of total sunlight was used. The BOM data was used to select which dates had comparable incident sunlight.
4. The results of steps two and three was a weather pattern across the course of a year, for a system located at a particular azimuth and elevation matching the pre-existing systems.
5. The PSA algorithm was used to calculate theoretical output for hypothetical systems located at the azimuth and elevation of the existing pv-output systems, under perfect weather conditions. This allowed the weather effects to be isolated from azimuth and elevation impacts.
6. The weather pattern resulting from step five was scaled to the total output for the new systems determined at step one.

The model - detailed description

The model uses a live case to examine the difference between the investors' energy costs under Business As Usual (BAU), with the energy from their share of generation netted off on a time of use basis (the LET scenario), and with the additional income that would be received if an LNC was in place (the LET and LNC scenario).

The customer is modelled as owning a share of the larger generator, so energy generation for the whole power station is scaled to represent the customer's share, and energy is netted off at the customer premise on a time of use basis. Importantly, the netting off only affects energy charges: network charges, pool fees and environmental schemes are still charged based on the full demand profile.

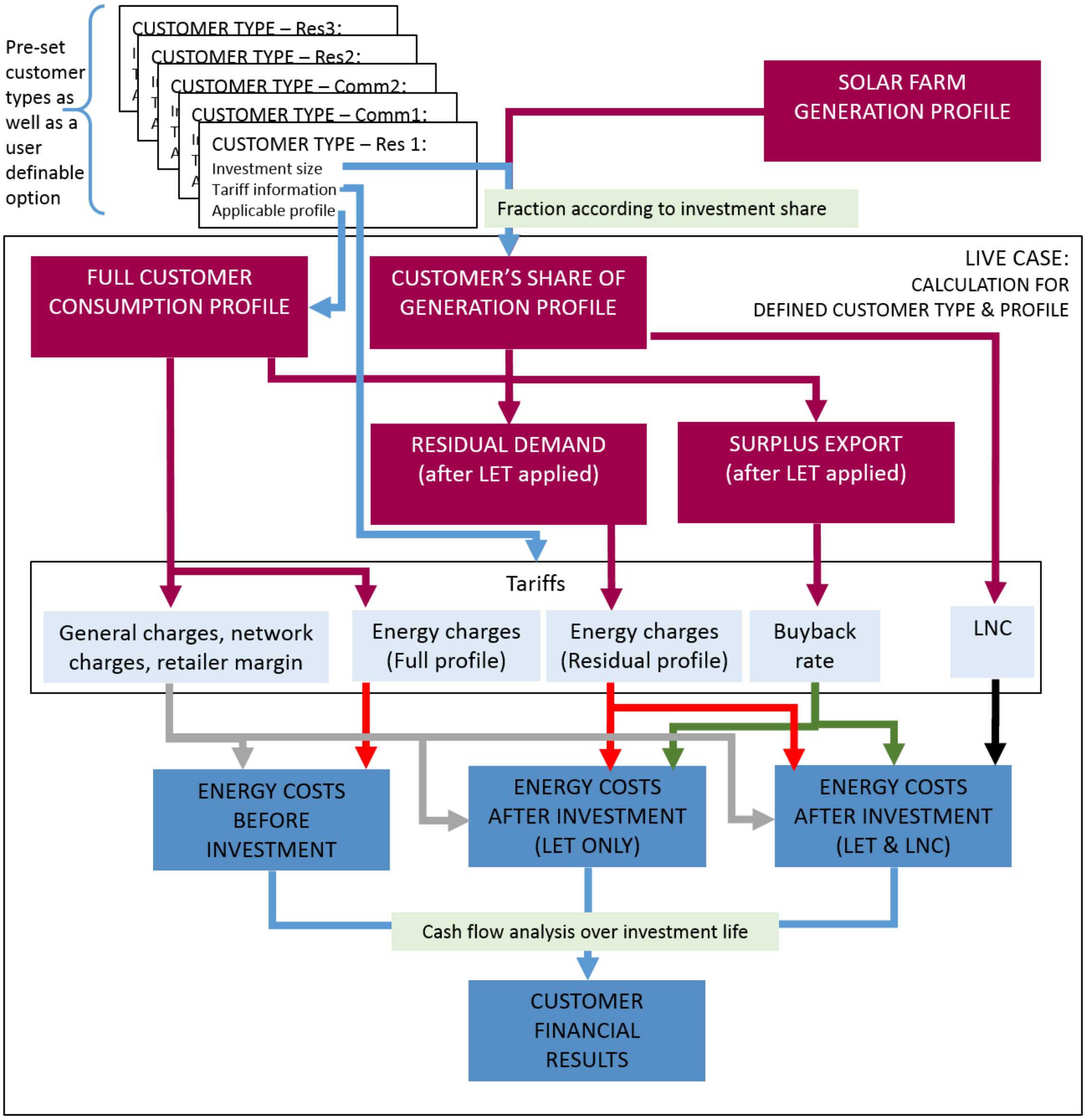
The live case calculates the annual energy cost for the recipient site based on the various line items in the tariff applicable to that customer. However, the tariff input information contains a single bundled per kWh rate, so the model unbundles the tariff into line items such as energy charges, network charges, standing charges, and VEET scheme in order to calculate the effect of LET.

Energy costs are also calculated if an LNC is paid, with the LNC divided among customers according to their share of the generator. The LNC tariffs were calculated from each network partner's data, using the methodology developed for this project.

The yearly financial results for the customer are extrapolated out over the expected life of the generator to estimate the total financial outcome for the customer, in financial metrics such as payback period and Internal Rate of Return (IRR).

The parameters of the customer for the live case can be changed, additional standard customer profiles for easy processing of alternate live cases can be used. For example the relevant consumption profile, consumption tariff and share of generator owned can all be set and stored as a standard case (aka scenario). The full outcome of the community solar farm is built up from modelling a number of different customers as the live case and constructing a profile for the whole VPRS based on the results of the constituent customers.

Figure 7 Detailed model overview



APPENDIX B: TARIFFS

Table 10 All tariffs available in the model

Tarriff	Used in standard profiles	Energy charge (includes network charges, AEMO, VEET, RET) Peak $/kWh	Shoulder $/kWh	Offpeak $/kWh	Supply charge $/day	Times
Residential (Savers / Maximiser / Set & Forget) Flexible	Yes	$0.336	$0.238	$0.175	$1.385	Peak 3pm to 9pm Monday to Friday. Shoulder 7am to 3pm and 9pm to 10pm Monday to Friday, and 7am to 10pm on weekends. Off-Peak 10pm to 7am every day
Business (Savers / Maximiser / Set & Forget) Business Trader E1	Yes	$0.321	n/a	$0.202	$1.673	Peak charges apply 7am to 11pm AEST all year
Residential Fixed Climate Saver	No	$0.239	n/a	$0.145	n/a	Peak period applies from 1 November to 31 March inclusive. Off peak applies all other times
Residential Fixed TOU	No	$0.269	n/a	$0.150	$1.205	Peak charges apply 7am to 11pm AEST Monday to Friday
Residential Fixed Flexible	No	$0.284	$0.201	$0.148	$1.171	Peak: 3pm to 9pm Monday to Friday. Shoulder 7am to 3pm and 9pm to 10pm Monday to Friday, and 7am to 10pm on weekends. Off-Peak 10pm to 7am every day
Residential (Savers / Maximiser / Set & Forget) Climate Saver -	No	$0.283	n/a	$0.171	n/a	Peak from 1 November to 31 March inclusive. Off peak applies all other times
Residential (Savers / Maximiser / Set & Forget) TOU	No	$0.318	n/a	$0.177	$1.426	Peak charges apply 7am to 11pm AEST Monday to Friday

Note: all tariffs are shown without the retailer discount and exclusive of GST

Table 11 Tariffs used in standard customer profiles, with retailer discount applied

Tarriff	Used in standard profiles	Discount applied	Energy charge (includes network charges, AEMO, VEET, RET) Peak c/kWh	Shoulder c/kWh	Offpeak c/kWh	Supply charge c/day	Times
Residential Flexible (Savers / Maximiser / Set & Forget)	Yes	Savers: 26%	$0.25	$0.18	$0.13	$1.39	**Peak** 3pm to 9pm Monday to Friday. **Shoulder** 7am to 3pm and 9pm to 10pm Monday to Friday, and 7am to 10pm on weekends. **Off-Peak** 10pm to 7am every day
Business Trader E1 (Savers / Maximiser / Set & Forget)	Yes	Savers: 34%	$0.21	n/a	$0.13	$1.67	**Peak** charges apply 7am to 11pm AEST all year

Note: all tariffs are shown exclusive of GST

Table 12 All tariffs available in the model – unbundled

	Energy charge			Network Charge			AEMO / RET / VEET	Standing charge	
	Peak	Shoulder	Offpeak	Peak	Shoulder	Offpeak	All times	Retail	Network
Tariff	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	c/kWh	$/day	$/day
Residential Flexible (Savers / Maximiser / Set & Forget)	$0.164	$0.144	$0.132	$0.157	$0.079	$0.029	$0.015	$1.039	$0.347
Business Trader E1 (Savers / Maximiser / Set & Forget)	$0.190	n/a	$0.099	$0.116	n/a	$0.088	$0.015	$1.221	$0.452
Residential Fixed Climate Saver	$0.108	n/a	$0.103	$0.116	n/a	$0.027	$0.015	n/a	n/a
Residential Fixed TOU	$0.111	n/a	$0.105	$0.143	n/a	$0.030	$0.015	$0.858	$0.347
Residential Fixed Flexible	$0.112	$0.108	$0.105	$0.157	$0.079	$0.029	$0.015	$0.824	$0.347
Residential Climate Saver (Savers / Maximiser / Set & Forget)	$0.152	n/a	$0.130	$0.116	n/a	$0.027	$0.015	n/a	n/a
Residential TOU (Savers / Maximiser / Set & Forget)	$0.160	n/a	$0.132	$0.143	n/a	$0.030	$0.015	$1.079	$0.347

Note: all tariffs are shown without the retailer discount and exclusive of GST

APPENDIX C: INDIVIDUAL INVESTOR RESULTS

Residential Investors at home weekdays: comparison of different investment sizes

Residential - at home weekdays, with a 3kW investment

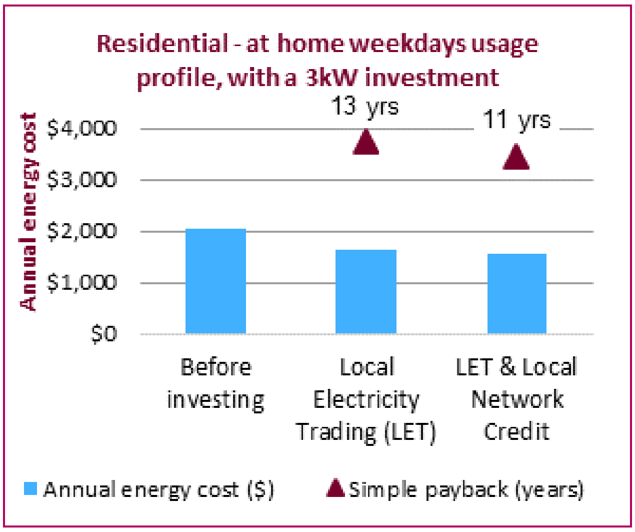
Solar % of consumption	36%	Investment	**$5,700**
Total Energy Use	6,000 kWh	Generation used on site	49%

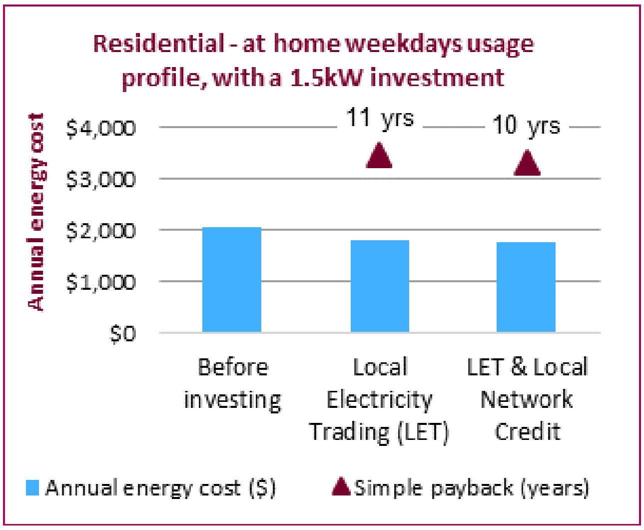
	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	$2,054	$1,649	$1,556
Total cost (c/kWh)[1]	34.2 c/kWh	27.5 c/kWh	25.9 c/kWh
Simple payback (years)	n/a	13 yrs	11 yrs
Investment rate of return (IRR)	n/a	4.3%	6.8%
Lifetime benefit ($)	n/a	$8,573	$10,520

Residential - at home weekdays, with a 1.5kW investment

Solar % of consumption	27%	Investment ($)	**$2,850**
Total Energy Use	6,000 kWh	Generation used on site	74%

	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	$2,054	$1,811	$1,765
Total cost (c/kWh)[1]	34.2 c/kWh	30.2 c/kWh	29.4 c/kWh
Simple payback (years)	n/a	11 yrs	10 yrs
Investment rate of return (IRR)	n/a	6.5%	8.8%
Lifetime benefit ($)	n/a	$5,131	$6,104





Tariff: AGL Flexible tariff for Residential Savers, Residential Maximiser, or Residential Set & Forget (see Table 4 for details)

Residential Investors out weekdays: comparison of with and without air-conditioning

Residential - out weekdays, with a 1.5kW investment

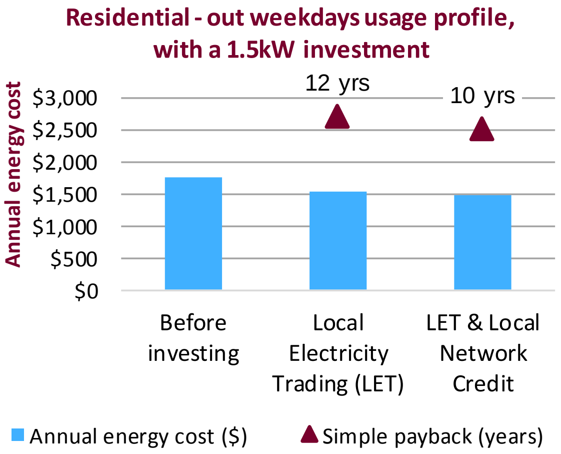
Solar % of consumption	29%	Investment	**$2,850**
Total Energy Use	5,000 kWh	Generation used on site	67%

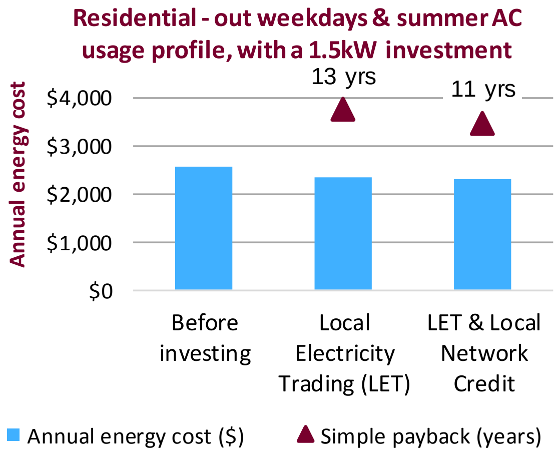
	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	**$1,757**	**$1,526**	**$1,480**
Total cost (c/kWh)[1]	**35.1 c/kWh**	**30.5 c/kWh**	**29.6 c/kWh**
Simple payback (years)	**n/a**	**12 yrs**	**10 yrs**
Investment rate of return (IRR)	**n/a**	**5.9%**	**8.3%**
Lifetime benefit ($)	**n/a**	**$4,890**	**$5,864**

Residential - out weekdays & summer air conditioning, with a 1.5kW investment

Solar % of consumption	16%	Investment ($)	**$2,850**
Total Energy Use	8,000 kWh	Generation used on site	58%

	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	**$2,565**	**$2,350**	**$2,304**
Total cost (c/kWh)[1]	**32.1 c/kWh**	**29.4 c/kWh**	**28.8 c/kWh**
Simple payback (years)	**n/a**	**13 yrs**	**11 yrs**
Investment rate of return (IRR)	**n/a**	**5.0%**	**7.5%**
Lifetime benefit ($)	**n/a**	**$4,558**	**$5,531**





Tariff: AGL Flexible tariff for Residential Savers, Residential Maximiser, or Residential Set & Forget (see Table 4 for details)

Business Investors – comparison of different usage profiles

Business - 5 day week usage profile, with a 5kW investment

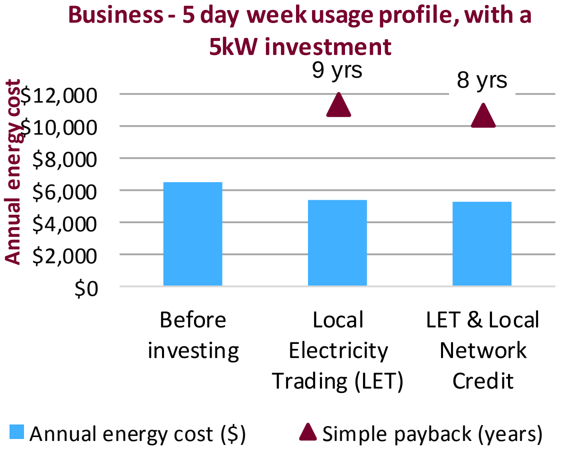
Solar % of consumption	32%	Investment	**$9,500**
Total Energy Use	20,000 kWh	Generation used on site	86%

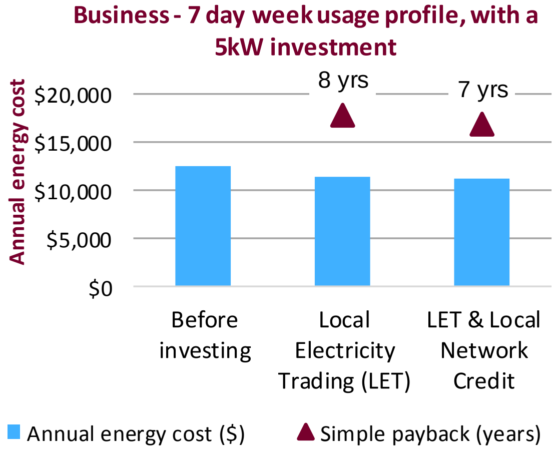
	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	**$6,535**	**$5,428**	**$5,274**
Total cost (c/kWh)[1]	**32.7 c/kWh**	**27.1 c/kWh**	**26.4 c/kWh**
Simple payback (years)	**n/a**	**9 yrs**	**8 yrs**
Investment rate of return (IRR)	**n/a**	**10.8%**	**12.9%**
Lifetime benefit ($)	**n/a**	**$23,399**	**$26,644**

Business - 7 day week usage profile, with a 5kW investment

Solar % of consumption	18%	Investment ($)	**$9,500**
Total Energy Use	40,000 kWh	Generation used on site	99%

	Before investing	Local Electricity Trading (LET)	LET & Local Network Credit
Annual energy cost ($)	**$12,612**	**$11,399**	**$11,245**
Total cost (c/kWh)[1]	**31.5 c/kWh**	**28.5 c/kWh**	**28.1 c/kWh**
Simple payback (years)	**n/a**	**8 yrs**	**7 yrs**
Investment rate of return (IRR)	**n/a**	**12.3%**	**14.2%**
Lifetime benefit ($)	**n/a**	**$25,659**	**$28,904**





Tariff: AGL Trader E1 for Business Savers, Business Maximiser, or Business Set & Forget (see Table 4 for details)

APPENDIX D: OUTCOMES BY INVESTOR TYPES – RETAILER DISCOUNT INCLUDED

These calculations include a discount of 26% - 34% applied to the variable charges, which is currently available for on-time payments for the tariffs used in the calculations.

	RESIDENTIAL				BUSINESS	
	At home weekdays 3kW	At home weekdays 1.5kW	Out weekdays 1.5kW	Out weekdays with AC 1.5kW	5 day week 5kW	7 day week 5kW
Investment	$5,700	$2,850	$2,850	$2,850	$9,500	$9,500
Solar % of consumption	36%	27%	29%	16%	32%	18%
Generation used on site	49%	74%	67%	58%	86%	99%
Annual energy cost pre investment	$1,651	$1,651	$1,432	$2,030	$4,521	$8,532
Annual energy cost with LET	$1,374	$1,503	$1,286	$1,888	$4,018	$8,014
Annual energy cost with LET & LNC	$1,282	$1,457	$1,240	$1,842	$3,865	$7,861
IRR with LET	0.3%	0.9%	0.8%	0.5%	1.1%	1.4%
Simple payback LET	20	18	18	19	17	17
IRR with LET and LNC	3.3%	3.8%	3.7%	3.5%	4.0%	4.2%
Simple payback LET and LNC	14	14	14	14	14	13

APPENDIX E – MANAGEMENT COMPANY CASHFLOW

Table 13 Management company cash flow waterfall years 1 to 10

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Period start Cash position	-	6,703	13,086	19,145	24,876	30,276	35,340	40,065	44,447	48,480
Incomes										
LGCs	14,571	14,442	14,313	14,186	14,060	13,936	13,812	13,689	13,568	13,447
Value of generation diverted to management company for export	-	-	-	-	-	-	-	-	-	-
Total Income	**14,571**	**14,442**	**14,313**	**14,186**	**14,060**	**13,936**	**13,812**	**13,689**	**13,68**	**13,447**
Expenses										
Maintenance costs per year	(5,868)	(6,010)	(6,156)	(6,306)	(6,459)	(6,616)	(6,777)	(6,942)	(7,110)	(7,283)
Management Organisation Admin	(2,000)	(2,049)	(2,098)	(2,149)	(2,202)	(2,255)	(2,310)	(2,366)	(2,424)	(2,482)
Inverter replacement cost	-	-	-	-	-	-	-	-	-	(36,180)
Total Expenses	**(7,868)**	**(8,059)**	**(8,255)**	**(8,455)**	**(8,661)**	**(8,871)**	**(9,087)**	**(9,308)**	**(9,534)**	**(45,945)**
Period end cash position	**6,703**	**13,086**	**19,145**	**24,876**	**30,276**	**35,340**	**40,065**	**44,447**	**48,480**	**15,982**

Table 14 Management company cash flow waterfall years 11 to 20

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Period start Cash position	15,982	19,307	22,271	24,868	27,094	28,944	17,665	7,342	7,520	7,703
Incomes										
LGCs	13,328	13,209	13,092	12,976	12,861	-	-	-	-	-
Value of generation diverted to management company for export	-	-	-	-	-	-	1,229	12,012	12,304	4,713
Total Income	**13,328**	**13,209**	**13,092**	**12,976**	**12,861**	**-**	**1,229**	**12,012**	**12,304**	**4,713**
Expenses										
Maintenance costs per year	(7,460)	(7,641)	(7,827)	(8,017)	(8,212)	(8,412)	(8,616)	(8,825)	(9,040)	(9,259)
Management Organisation Admin	(2,543)	(2,605)	(2,668)	(2,733)	(2,799)	(2,867)	(2,937)	(3,008)	(3,081)	(3,156)
Inverter replacement cost	-	-	-	-	-	-	-	-	-	-
Total Expenses	**(10,003)**	**(10,246)**	**(10,495)**	**(10,750)**	**(11,011)**	**(11,279)**	**(11,553)**	**(11,833)**	**(12,121)**	**(12,415)**
Period end cash position	**19,307**	**22,271**	**24,868**	**27,094**	**28,944**	**17,665**	**7,342**	**7,520**	**7,703**	**-**

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