WATTBLOCK

Ratings & Assessment

Owners Corporation (XX XXXXX)

XXXXXXXXXXXXX, Glebe, NSW 2037

Updated: 13th December 2016

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Executive Summary

XXXXXXXXXXXXXXX is the recipient of a ratings and assessment grant from the City of Sydney. The strata block consist of 46 units with 5 residential floors. The common area annual electricity cost is $12,209 including GST and the building has a user pays gas heating common hot water system. XXXXXXXXXXXXXXX has previously participated in the City of Sydney Virtual Energy Assessments program run by Wattblock, which has assisted in the identification of energy efficiency and renewable energy opportunities. The building has already completed an LED lighting upgrade and is interested to explore further opportunities that have been identified. The aim of this study is to investigate cost reduction opportunities with using solar energy and alternative hot water heating systems in detail.

A community solar system is a concept where the common roof space of an apartment block can be used to install solar system for residential use. The system includes additional set up costs and billing costs in comparison to a standard solar system. The study identifies that a community solar system is not suitable for XXXXXXXXXXXXX as there is insufficient roof space to generate enough solar energy for both the common areas and 46 internal apartments. Nevertheless, the study still recommends a standard solar system for common area energy supply.

The existing gas hot water heating system at XXXXXXXXXXXXX is inefficient and is towards the end of its operating life. The study recommends the system to be retrofitted to a gas boosted heat pump system. The retrofit has a good financial payback and the energy usage for water heating can be significantly reduced. In addition, the roof space of an apartment building is fixed. If the strata building uses its scarce roof space with a certain technology, it may forego the installation of other environmental technologies which could further reduce the carbon footprint of the building. This study shows that the heat pump hot water heating generates the best financial return per square meter of roof space occupied by the system.

The combination of a solar energy system for powering common areas and gas boosted heat pump hot water system is estimated to achieve a reduction of 29 tonnes of carbon emissions per annum. The implementation of these projects can allow XXXXXXXXXXXXXXX to market themselves as a sustainable apartment block and attract buyers and renters who want to make a difference in reducing their environmental footprint. There is also increasing evidence that 'green properties' are attracting premium sale values. The study estimates a $6,130 increase in the average apartment valuation based on an earnings multiple of 20 applied to annual savings. Property owners can enjoy a higher value when selling the property and buyers can benefit from the lower operating cost creating a win-win-win situation. The project financials for the recommended projects are summarized in the table below.

Technology	Cost	Savings	Payback	Energy Savings	Reduction
Solar Energy for Common Area	$16,080	$2,763 p.a.	5.6 years	12.9 MWh p.a.	26%
Heat Pump Hot Water System	$74,377	$11,336 p.a.	6.6 years	263.7 GJ p.a.	70%
Total	$90,457	$14,099 p.a.	6.4 years		

Note: Total project costs may be reduced if implemented at the same time due to lower craning costs.

The annual energy and water savings identified for the building is summarized as follows:

- Annual energy savings: 12,900 kWh identified
- Annual gas savings: 263,700 kJ identified
- Annual kL water savings: N/A
- Percentage reduction against baseline grid energy/other resource consumption is 26% for common area electricity and a net 70% reduction for the common gas hot water system.

Acknowledgements

Wattblock would like to thank the following people who contributed to this case study:

- XXXXXX XXXXXXX (Chairperson)
- XXXXXX XXXXXXX (Executive Committee Member)
- XXXXXX XXXXXXX (Owner)
- XXXXXX XXXXXXX (Strata Manager)
- Brent Clark
- Ross McIntyre
- Scott Witheridge
- Jacky Zhong
- Alexander Prideaux
- George Guse
- Chad Floyd
- Kevin Ranalli
- Stuart McGregor
- Dean Mrakas
- Zaren Henderson
- Megan Chatterton

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Contents

1.0 Introduction

The strata block at XXXXXXXXXXXXXX previously participated in the City of Sydney Virtual Energy Assessments project run by Wattblock in 2015. As a participant the committee received an energy assessment report for their building covering energy efficiency benchmarks and a solar assessment. The objective of the virtual assessments project was to demonstrate how energy assessment reports, using data benchmarking, can mobilize a committee to take action.

The committee has now completed an LED lighting upgrade in the fire stairs and basement carpark. As a result, the common area energy cost has been reduced by 13% and the committee wants to investigate further cost reduction opportunities for both the common area and internal apartments.

Wattblock has identified solar energy and hot water for further investigation. The following report examines the use of several different types of solar energy systems and hot water heating systems. These project alternatives are assessed based on the financial viability as well as the optimization of roof space usage for different projects.

2.0 Site Detail

- Site address: XXXXXXXXXXXX, Glebe, NSW, 2037
- 46 residential lots and 1 commercial lot
- 5 residential levels and 2 car parking levels
- 2 internal fire stairs
- One residential lift run from the basement levels
- Estimated free roof space: 200 square meters

Site Pictures

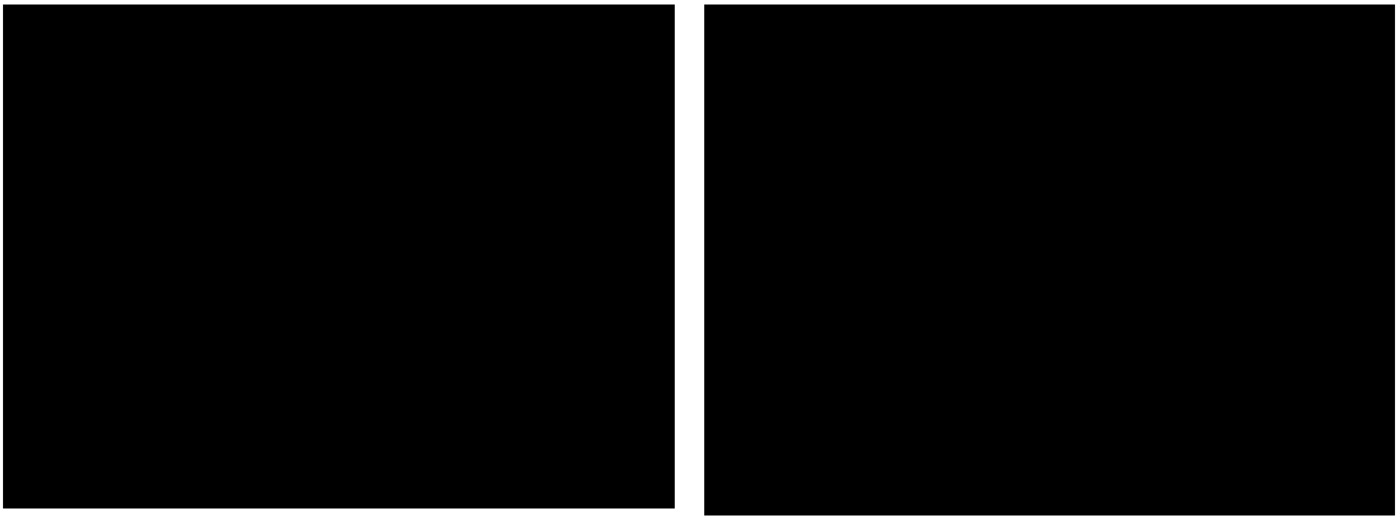

Figure 1: XXXXXXXXXXX Entrance (left) and Aerial View (right)

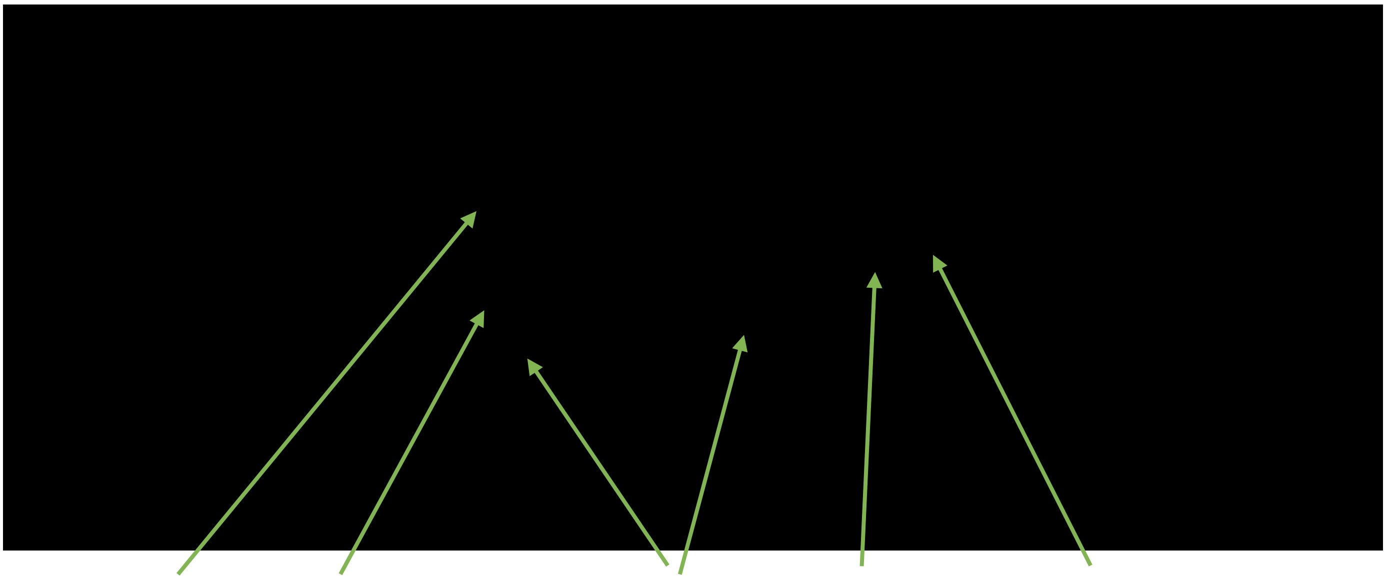

Figure 2: XXXXXXXXXXX Entrance Rooftop Detail

3.0 Energy Assessment

According to the Wattblock energy assessment, energy costs are split approximately $12,148 p.a. for common area facilities and $68,000 p.a. for apartments. Overall half of the common area energy was being used for lighting of carparking, fire exits, foyers, corridors and external lights. Other common energy usages included mechanical (lifts, gates), ventilation and water pumping.

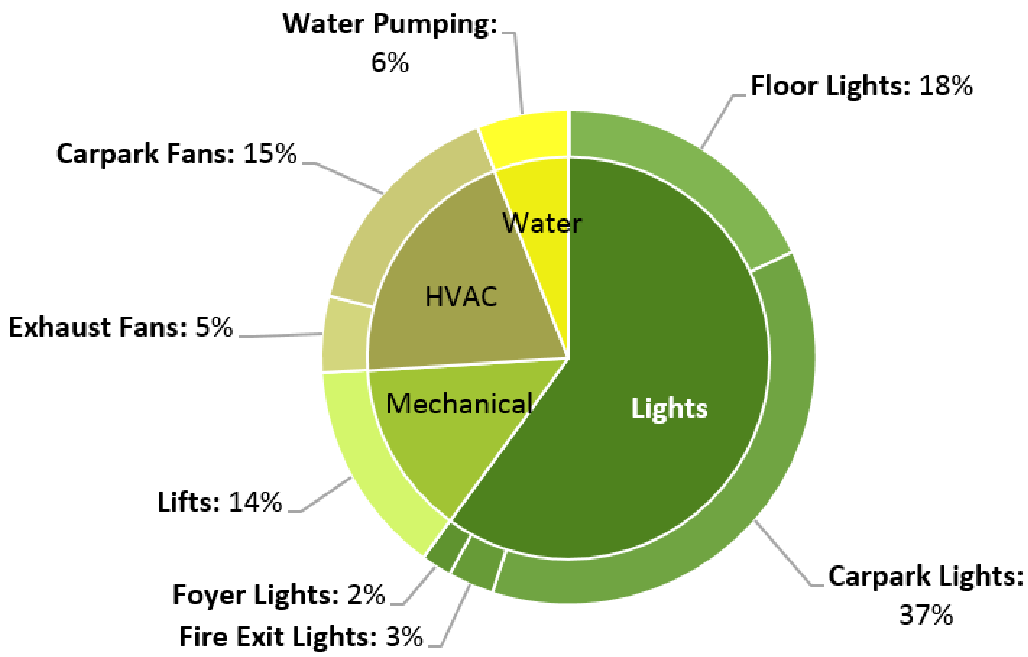

Figure 3: Energy Cost Distribution for Common Area Billing

There is a common hot water system located on the roof that services the apartments. However, the system is set up to bill the apartments directly, so it is not shown in the common energy cost breakdown in figure 3. Because hot water is common, it is within the Owners Corporations remit to manage this system. Cost of upgrading is ultimately covered by apartment owners. However, the benefits from improving energy efficiency would translate to billing reductions for tenants, who may or may not be owners. This split incentive reduces the appeal of water heating related projects for owner investors making such project proposals more difficult to pass.

Lighting represented the greatest opportunity for energy savings by switching to LED with sensors and timers. While other energy consuming facilities showed opportunity for further energy savings, the project costs, complexity of implementation, and return on investment were not as favourable.

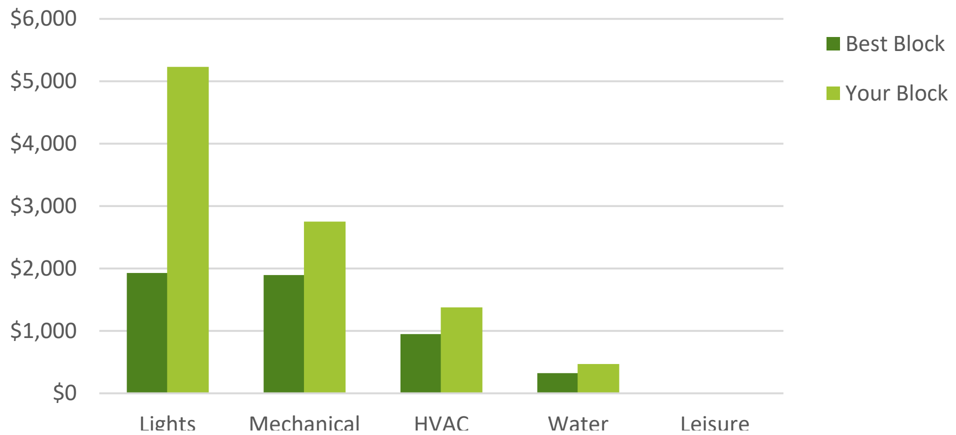

Figure 4: Annual Energy Cost Benchmarking for Common Areas

XXXXXXXXXXXXX completed an LED upgrade for common area lighting in the basement carparks and fire escapes at the beginning of 2015. The annual energy usage has been reduced by 13%, saving 7MWh of energy per annum. Since then the common area energy usage has remained at a consistent level.

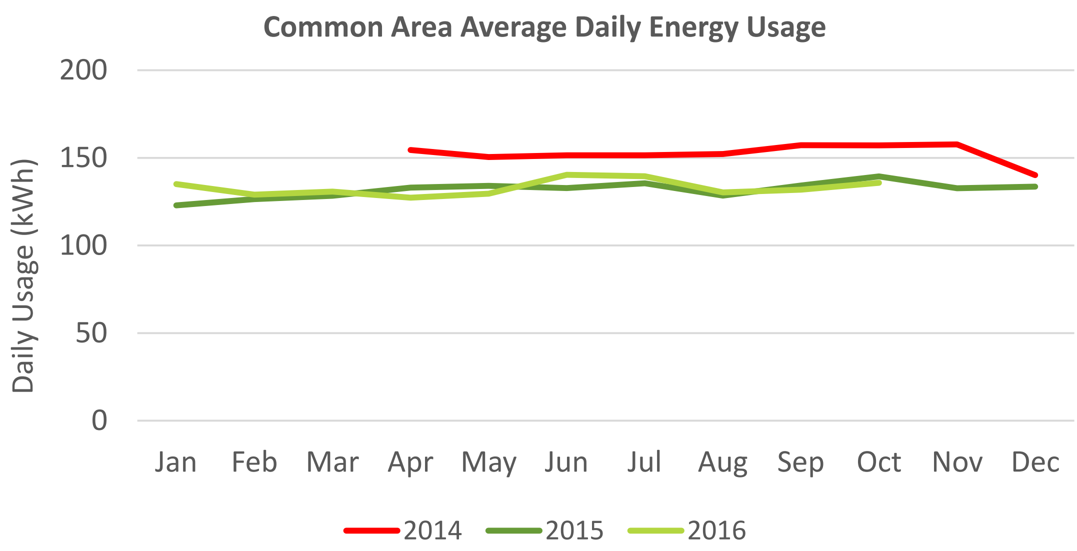

Figure 5: Common area energy reduced 13% in 2015

According to the Wattblock assessment there is further opportunity to reduce power consumption from common area lighting. However, the projects implemented to date go a long way toward improving energy efficiency and further lighting projects will have lower payback economics.

Recently the building has re-done the water proofing on the roof space in accordance with the buildings maintenance program. This has further improved the viability of a solar energy installation as solar installations can increase the chance of water leakages where located on an ageing rooftop.

[redacted] [redacted]

Figure 6: Before and after images showing the completion of water proofing on the roof top

In addition, the common gas hot water heating system at XXXXXXXXXXXXX is exposed to the natural environment. The committee decided to build a cover for the system aiming to better protect the plant and equipment and extend the system lifespan. This has now been completed. Both projects cost roughly $130,000 including GST for the upgrade.

[redacted] [redacted]

Figure 7: Before and after images showing the cover for the common gas hot water system

4.0 Ratings and Assessment Scope

Following on from recent energy efficient lighting upgrades the Owners Corporation is interested in investigating further opportunities. Wattblock has been engaged to assist in the assessment of solar energy and hot water projects. The following sections investigate alternatives options including:

- Solar Energy for Common Area Power
- Solar Energy for Common Areas &Apartments
- Solar Hot Water
- Hot Water Heat Pumps
- Combination Projects

5.0 Solar Energy Assessment

In this review we look at the challenges of solar energy on residential apartment buildings and two different scenarios for using rooftop solar. Solar power for strata buildings has most frequently been used to supply energy for common areas only due to relative ease of implementation. Recently community solar systems have been gaining popularity. Community solar systems allow solar energy generated on a common roof space to be used by both common areas and individual apartments.

5.1 Challenges of Solar Energy on Apartment Buildings

5.1.1 Restriction of roof space

The roof space at XXXXXXXXXXXXX is suitable for solar installation and has no problem with shading from nearby buildings. However, as with all apartment buildings their roof space is restricted. The maximum size of solar system that can be installed at XXXXXXXXXX is estimated to be 20kW.

[redacted]

Figure 8: Conceptual layout of a 20kW solar energy system

5.1.2 Designing the right solar system size

The quotation of solar systems for apartment buildings can often be oversized if they do not account for energy efficiency opportunities within the building. For example, LED lighting upgrades is one of the most cost effective ways to reduce the energy usage in the common area. If a solar system was sized at the usage level prior to lighting upgrade, then a larger portion of the solar energy generated will end up being exported back into the electricity grid when the building decides to implement lighting upgrades. This would worsen the financial payback of the oversized solar system as the benefit of energy export to the grid is minimal. XXXXXXXXXXX has completed its LED lighting prior to investigating solar as their next project. This is the best approach as the building's demand has been reduced and only a smaller solar system will be needed for common area power.

5.1.3 Regulation on shared common space

In order for a solar project to be approved on a strata building, a special resolution is required. Under a special resolution all owners will be asked to vote and not more than 25% of owners on a lot entitlement basis and in good standing can vote against the motion, for it to proceed.

5.1.4 System Installation and Maintenance

One of the potential risks with solar installation is damaging the water proofing membrane on the roof, which can lead to water leakages. The water proofing membrane generally has a lifespan of about 15 years and it is recommended to re-do the water proofing prior to the installation of a solar system. There are generally two types of mounting system for solar installation; flash mount and ballast mount.

Flash Mount Installations

Flash mount installation is normally used on tin and tile roofs and it involves poking holes through the roof.

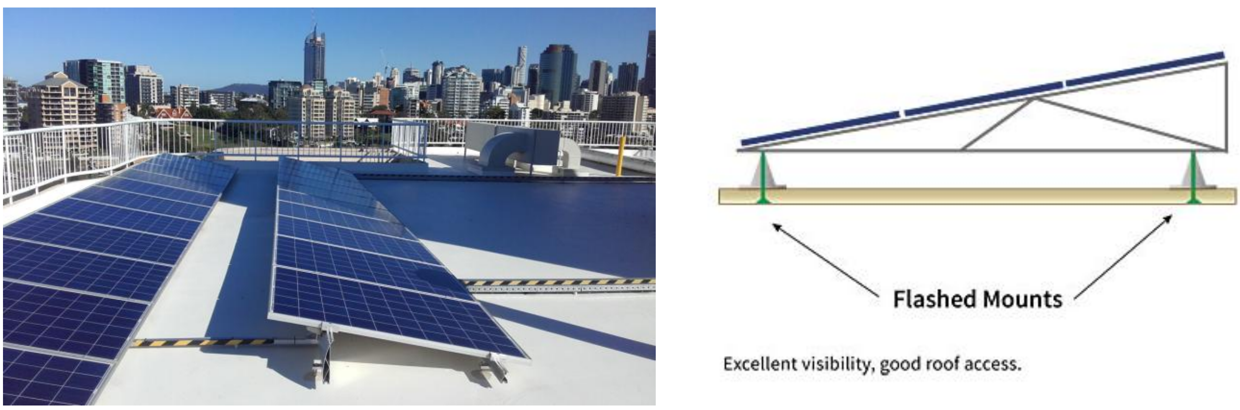

Figure 9: Flash mount solar system (Roofing Contractor, 2014)

The benefits are listed below:

- Lighter system and reducing the load bearing of the roof.
- Installer can design sufficient space under the array to allow for inspection.
- Allow roof to be serviced under the array. Otherwise the whole system needs to be removed if any water leakage problem arises.

The disadvantages include:

- Waterproofing on built up flashings may be a challenge and increase water leakage risks.

Ballast Mount Installations

Ballast mount installation does not require any penetration to the roof. Concrete blocks are placed throughout the system to secure an array and prevent wind lift.

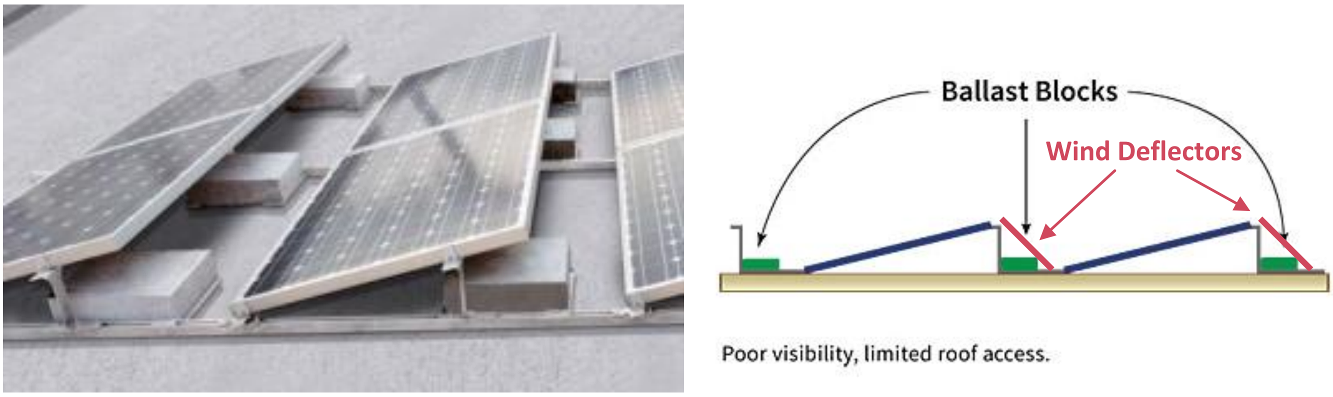

Figure 10: Ballast mount solar system (Roofing Contractor, 2014)

The benefit of the system includes:

- Avoid drilling holes.
- Available with integrated 'wind deflectors'

The disadvantages of a ballast mount system are listed below:

- Roof inspection is more difficult as the concrete blocks cover the roof. Minor leaks that can be easily identified and repaired will often progress to a point of structural water intrusion when hidden under a ballasted array.
- Repairing any water leakage requires the removal of the whole solar system, increasing the chance of damage to the panels and wire insulation.
- Higher maintenance costs over the life of the system.
- A structural engineer needs to sign off on the ballast system, given wind speeds in the local area.

As mentioned above, XXXXXXXXXXXXX has recently invested in a new water proof membrane which improves the suitability of the roof surface for solar installation. In addition, since they have a flat concrete roof the ballast mount is the preferred option for solar installation as water drainage is more pertinent. With a ballast system there is no need for drilling which would penetrate the water proofing.

5.2 Common Area Solar System

The study first looks into a solar system for common area only. Following energy efficient lighting projects, the common area power consumption has been reduced to an average daily usage of 140 kWh. The daily energy loads for the common areas at XXXXXXXXXXXXX consist of lighting, lift, garbage exhaust fans, carpark ventilation and water pumping. The energy generated from the solar system will be used to offset these energy loads.

5.2.1 System Sizing and Design

Wattblock obtained an authority from the Owners Corporation to access interval data from the energy retailer’s web portal. The interval data enabled Wattblock to analyse daily energy usage patterns for the common areas in 15 minute intervals and across seasons. Usage peaks occur in the mornings and afternoons when residents are most likely leaving and returning to the building. This creates the highest loads on the lifts. Throughout the day energy usage is moderately higher than overnight. There is minimal seasonal variance, most likely associated with lights. There is no air conditioning or heating for the common areas.

Using the interval data provided, a 10kW solar system with 39 solar panels is suitable for the supply of solar power to common areas. The system is sized such that a minimal amount of solar energy will be exported back into the electricity grid as the financial benefit of grid export is minimal. It is estimated that 92% of the solar energy generated would be consumed by the common area and 8% would be unused and exported back into the grid. The energy export would occur during summer when there is more sunshine and it is unlikely to happen during winter. The average daily solar generation and grid import for the common area post solar installation is shown below.

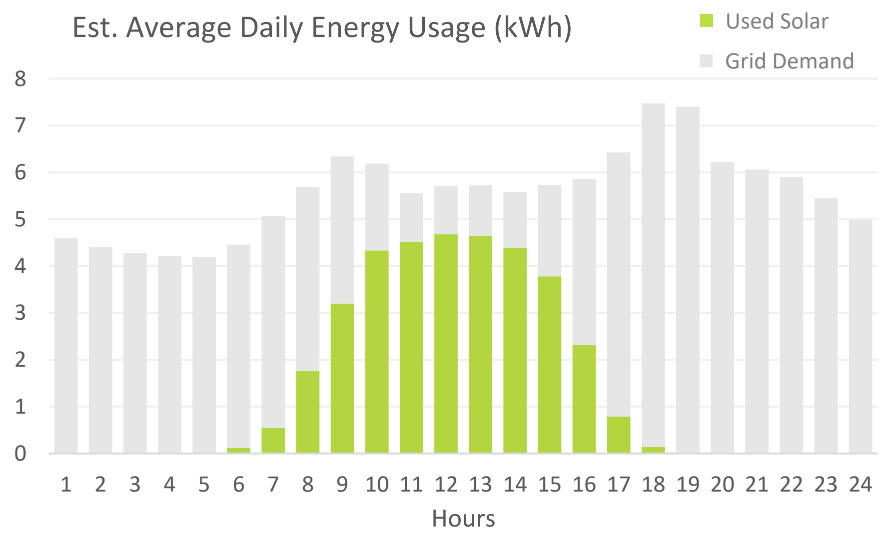

Figure 11: Energy Usage of Common Area with 10kW Solar

Wattblock estimates the total project cost for a 10kW solar system for common area supply would be approximately $14,500 to $17,500 and the breakdown of system components are shown below. Additional consideration has been made for provision of crane services to lift panels to the rooftop. Wattblock has allowed for $4,000 - $7,000 for additional crane costs. Roof access was deemed to be too difficult without use of a crane, although some solar panel installers may form a different view. In particular, it may be worth investigating the possibility to hoist solar panels from the balcony of a top floor resident on the northern side of the building.

Common Area Solar Photovoltaic Project Financials		
Product Description	Units	Total Price
260W Solar Panels	39	
10kW Inverter	1	
Ballast Mounting System	1	
Design Assessment	1	
Third Party Testing	1	
Web-based Monitoring	1	
Meter Upgrade Cost	1	
Crane Uplift	1	$4,000 - $7,000
Net Price After Rebates inc GST		$14,500 - $17,500

<u>System Design</u>

The following conceptual layout makes use of the northern half of the available rooftop area. This allows for easier access for trades people to air conditioning units on the southern side and easy access along the full length of the roof. The positioning of the panels has been assessed to have minimal shading impacts from trees or other buildings. Panels can be pitched at 20 degrees facing north to maximize the solar energy output over the seasons of the year.

[redacted]

Figure 12: Conceptual layout of 10kW solar energy system for common areas

Connection of panels for powering common areas is relatively straightforward. The system connects into a single main switch for the common area power. An inverter will be located in the main switch room which converts the DC power from the rooftop panels to AC power for usage. Cabling will be run from the inverter up to the roof connecting the solar panels.

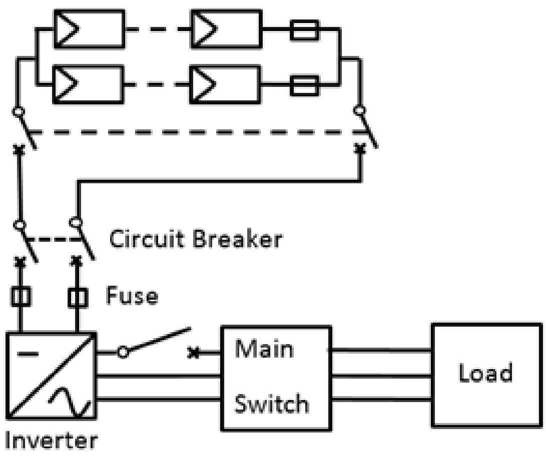

Figure 13: Electrical diagram showing propose configuration on common area power

This system will require upgrade of the common area meter to a solar meter. A solar meter manages power usage between the solar panels and from the grid via a supply agreement with an energy retailer. An energy supply contract may also need to be negotiated which allows for feed in credit for excess solar power.

5.2.2 Financial Analysis

Wattblock estimates the annual energy output of the 10kW solar energy system to be 14MWh, resulting in a 26% reduction from baseline energy usage from the grid. The estimates are based on the assumption that the solar panels will be facing North with a 20-degree pitch and there are no significant shading losses. Historical solar radiation data have also been used in the analysis.

The financial benefits resulting from the reduction in grid energy usage has been calculated based on the common area electricity tariffs below. These rates reflect the current retail tariff for the building following analysis of recent energy billing data.

Common area electricity tariffs (inc GST)

Peak	26.5c/kWh
Shoulder	19.7c/kWh
Off-Peak	11.8c/kWh

The system is expected to reduce common area electricity billing by $2,640 per annum. A small portion of benefit comes from exporting excess solar energy back into the grid, which is estimated at $123 per annum based on an assumed feed in rate of 6c/kWh. The combined cost savings is estimated to be $2,763 p.a., representing a 23% reduction in common area energy cost.

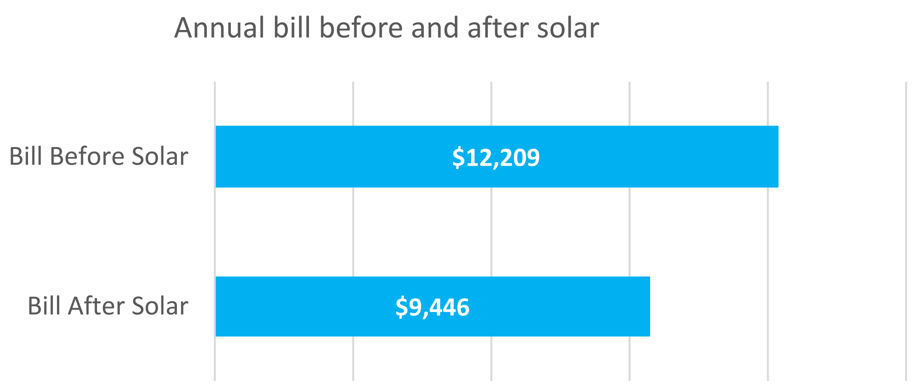

Figure 14: Annual common area energy billing before and after solar

Taking a midpoint of $16,080 for the upfront capital cost range guidance, a 10kW solar system is estimated to deliver a 5.7 year payback.

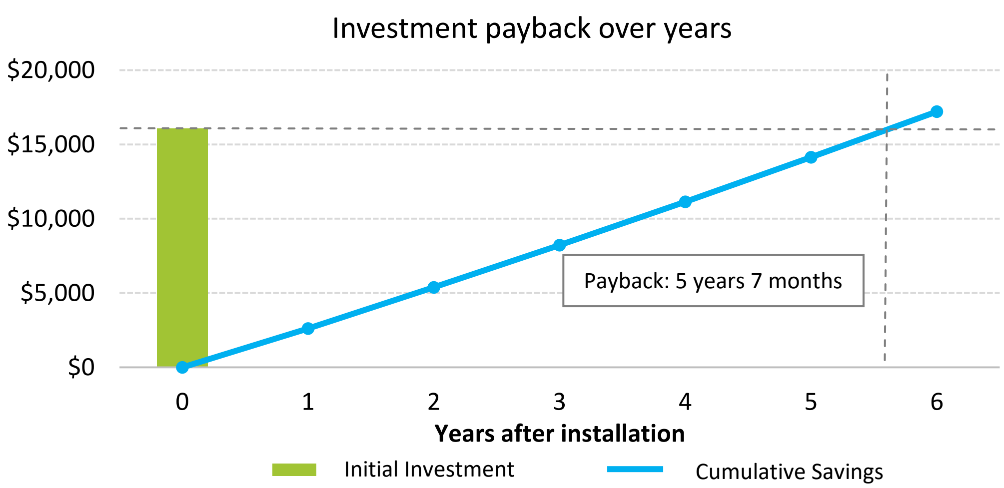

Figure 15: Payback on 10kW solar energy system for common areas

5.2.3 Financing Options

There are several options for financing rooftop solar for strata buildings. For a 10kW system it is most likely that upfront purchase of the system will deliver the best financial results. However, in the case that sufficient funding is not available the Owners Corporation can consider several options including Power Purchase Agreements (PPA) and energy leasing arrangements.

Power Purchase Agreement

A Power Purchase Agreement is a solar financing arrangement where the Owners Corporation pays $0 upfront for solar equipment and installation in return for a contractual agreement to purchase energy from the system over a set period of time. Where available these arrangements are typically made with energy retailing companies that will own and maintain the rooftop solar on your behalf during the contract period.

Where a Power Purchase Agreement is offered over say, 10 years:

In the first 10 years:

- Energy Company (PPA service provider) owns the solar system
- Owners Corporation pays a defined amount for each kWh of solar power generated off solar panels
- External maintenance contract covers anything which goes wrong with the system
- Remote monitoring provides alerts if anything goes wrong

From year 10 onward the Owners Corporation takes full ownership of the solar equipment:

- Ownership of the solar energy system transfers to the Owners Corporation
- Owners Corporation pays nothing for solar power generated
- Takes on maintenance responsibility

For a 10kW solar energy system, a power purchase agreement results in a net cashflow of -$2,845 p.a. during the first 10 years and $3,704 p.a. savings after year 10. This is based on an assumed purchase rate of 16c per kWh during the PPA term of 10 years.

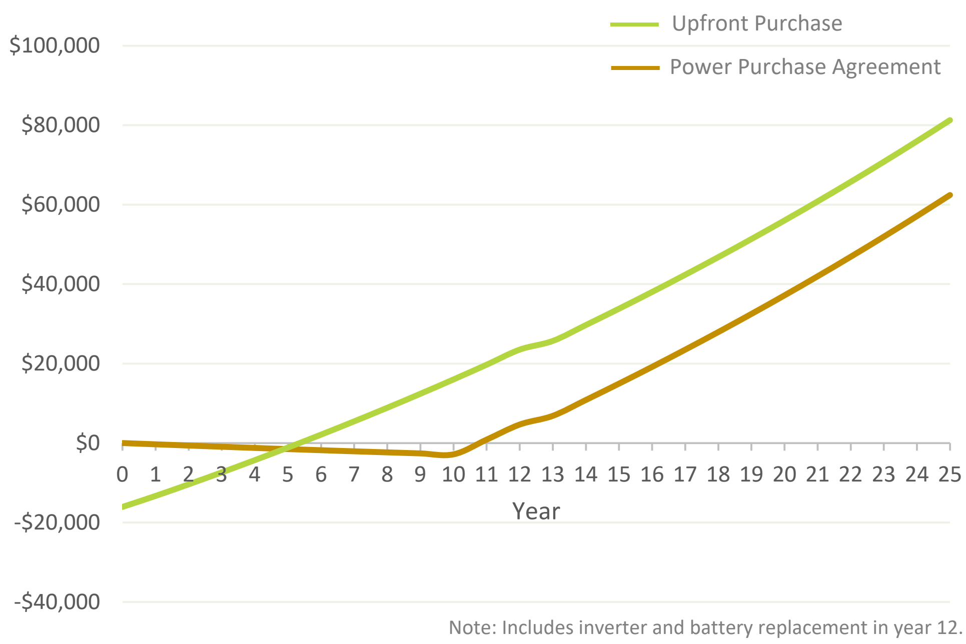

Figure 16: Cashflow impact of power purchase agreement vs upfront purchase

Recently PPA providers have been increasingly reluctant to enter contracts with strata buildings for smaller sized systems. While we have seen PPA offers for strata solar rooftop systems as low as 10 kW we were unable to secure a quote for XXXXXXX at the time of writing. One of issues raised has been on-going site access where the energy retailer needs to performance maintenance or cleaning over time.

Today's solar systems are estimated to have a usable lifespan of over 25 years. However, inverters typically need to be replaced every 10-12 years.

<u>Energy Leasing Arrangement</u>

An energy leasing arrangement for solar is different from a Power Purchase Agreement. An energy leasing arrangement is similar to an operating lease. Under this model, the Owners Corporation is leasing the solar equipment at a defined interest rate for an agreed term e.g. 5 years. At the end of the lease arrangement, the Owners Corporation can typically make a balloon payment to take full ownership of the solar system. The energy leasing arrangement only covers the upfront costs of the solar system and does NOT involve any payments for energy generated off the solar panels.

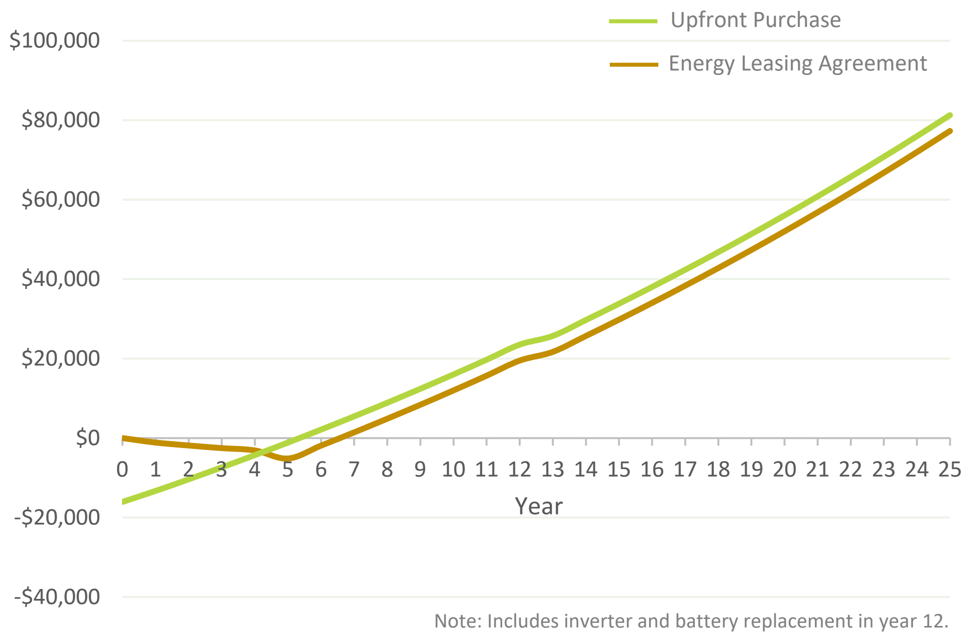

Figure 17: Cashflow impact of energy leasing arrangement vs upfront purchase

For a 10kW solar energy system, an energy leasing arrangement extends the payback period from 5.6 to 6.6 years versus upfront purchase. This is based on an assumed 9.5% interest rate on the lease and $5,197 balloon payment in year 5.

5.3 Community Solar System

In recent years, rooftop solar has become popular for residents living in stand-alone houses. However, solar energy has been difficult to access for residents living in an apartment block.

In the technical aspect, the solar system design for common area only is simple. There is a single user of solar energy and the unused amount will be exported back into the electricity grid.

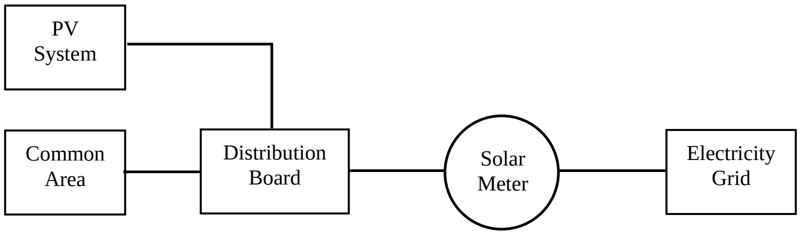

Figure 18: Standard solar system

However, in a community solar system both the common area and all internal units became the user of solar energy. As a result, the billing system becomes more complicated in terms of identifying who has used the solar energy generated and additional equipment is required to facilitate the billing system.

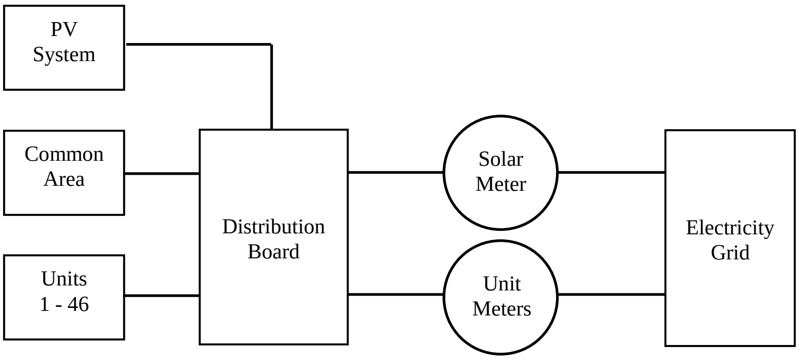

Figure 19: Community solar system

Apart from the technical challenges, there are also regulatory barriers. Technically speaking, most apartment buildings have separate energy meters for each individual apartment and one or more separate meters for common area facilities. These are not connected and energy supply contracts are negotiated separately for each meter.

Embedded Electrical Networks

An embedded electrical network is an arrangement whereby energy is supplied through a gate meter for the whole building with a single energy supply contract negotiated at more favourable supply rates. The common area and apartments are then sub metered to enable purchase of energy from the Owners Corporation or an Embedded Electrical Network Operator (ENO) on behalf of the Owners Corporation. Owners Corporations in strata need to have an individual retail exemption that enables them to sell electricity to residents. Because an embedded electrical network has a gate meter, it makes it possible to connect solar energy such that all apartments and common areas would be able to benefit from the solar energy produced.

The costs and regulatory challenges of installing an “embedded electrical network” or localised “microgrid” as a retrofit for an existing strata building are usually prohibitive. The benefits of installing an embedded electrical network are two-fold. Firstly, residents can benefit from dramatically reduced energy supply rates from energy retailers. Secondly, where a solar energy system is installed, any solar energy generated can easily be used by either the common areas or individual apartments. The embedded Electrical Network Operator (ENO) is responsible for issuing all the energy bills to the common area and individual apartment owners. However, in NSW the requirement to essentially have 100% of owners vote yes to proceeding with installation of an embedded electrical network and applying for an individual retail exemption is almost impossible to achieve in a typical residential strata.

Digital Metering Solution

The community solar solution which this study has investigated for XXXXXXXXXXX attempts to share the solar energy generated between common areas and individual apartments equitably and legally, without the need to install an embedded electrical network. It achieves this through digital metering of all the meters within the complex. This study has investigated digital metering solutions currently available in NSW to understand how they work and applicability for community solar in Strata.

5.3.1 System Sizing and Design

According to 'Digital Solar and Strata' (Prideaux, 2016), the main components of the digital metering solution are described below:

- **Wireless Mini-CT Meter:** These components collect the primary usage information from the different users of solar energy. The meters take the form of a CT clamp and are capable of sending data wirelessly to the gateway for processing. Wireless meters have a range of up to 10 meters.
- **Digital Solar Gateway:** The key processing unit that collects meter data, aggregates this information and feeds this to the cloud platform. One gateway can collect data for up to 256 meters. However, for the systems examined for this study, each gateway had been coded to handle 3 meters.
- **Cloud Processing Platform:** Responsible for performing data analytics and computation to track solar energy usage of common areas and individuals. This data is used to create solar consumption bills specific to each user.

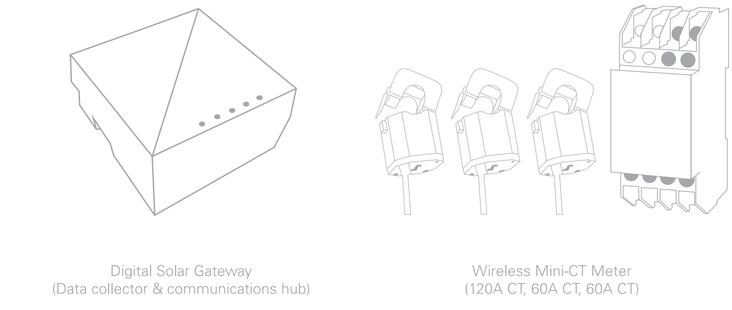

Figure 20: Major components of digital metering

This new technology allows solar energy to offset common area usage and then on sell any excess generation to internal apartments. This enables reduced energy usage and increased savings for all participants. The digital metering technology does not itself facilitate the use of solar power by the apartments or common areas. The solar energy system still needs to be separately hooked up to the common area power and each individual apartment that is interested in using solar power. The digital metering system then monitors the usage of each connected customer and provides a means of quantifying and billing for the use of that solar energy. This naturally offsets grid power usage, but requires more cabling work to set up that just connecting to the common meter.

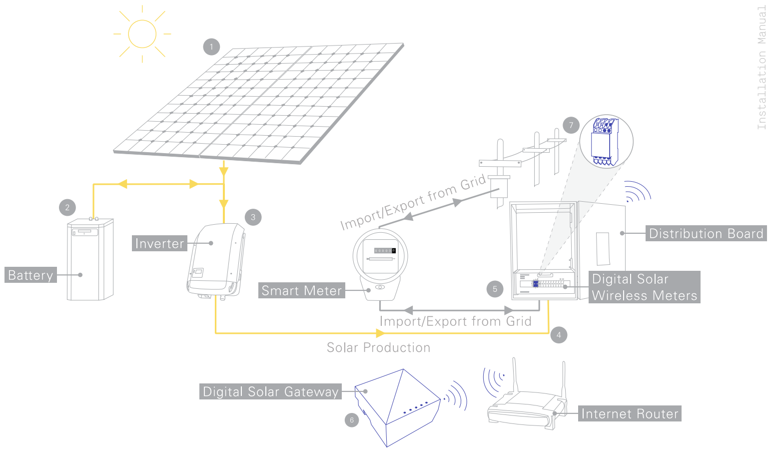

Figure 21: Schematic diagram of digital metering

<u>System Sizing</u>

The sizing of the community solar system is based on daily energy loads for both the common area and internal apartments combined. Within each apartment, the solar energy generated can be used to power residential appliances such as air-conditioners and refrigerators. Figure 22 illustrates the expected split of residential energy usage based on statistical averages.

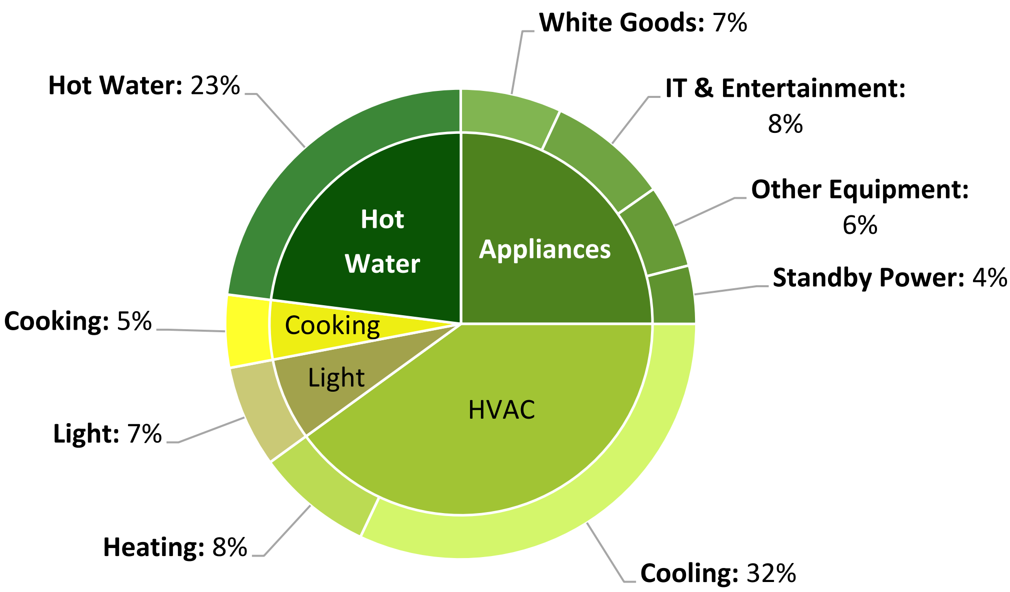

Figure 22: Breakdown of residential energy usage.

The first step in sizing a community solar system is to build a load profile of the common areas and internal apartments combined showing average daily energy usage patterns. The common area load profile was generated from detailed interval data as discussed above. However, in order to have an accurate load profile for the energy consumption of internal apartments, data loggers would need to be installed to monitor the usage of all the apartments in aggregate. This would be an expensive exercise. For the purposes of this study the load profile of the apartments has been estimated using national averages. This profile reflects expectations that apartment energy usage would be skewed toward energy usage in the late afternoon and evenings.

The usage distribution profile was further combined with sample data on quantum energy usage of the apartments. With the assistance of the chairperson at XXXXXXXXXXXXX, energy bills were collected from a one-bedroom unit and a two-bedroom unit. This provided an indication of the daily energy usage between units of different sizes. In addition, the chairperson advises that there are 38 one bedroom units, 6 two bedroom units and 2 three-bedroom units. It is noted that gas is used for hot water heating for XXXXXXXXXXXXX, thus the total electricity consumption for all internal apartments would be lower in comparison to a block which uses electric hot water heating.

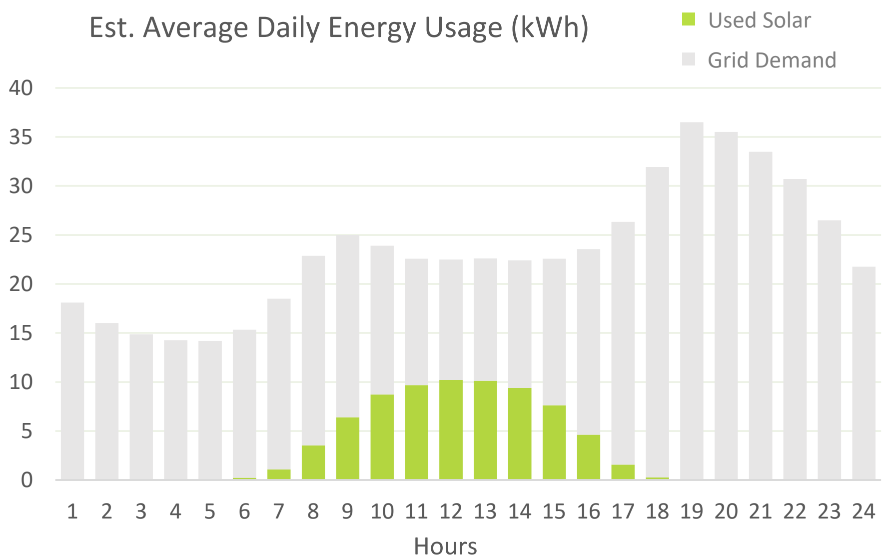

Figure 23: Combined apartment and common area daily load profile

The resulting model shows that a 35kW solar energy system is possible with minimal export to the grid. However, due to the limited available roof space at XXXXXXXXXXXXX the maximum solar energy system that can be installed is 20kW. The average daily solar generation and grid import for both the common area and internal apartments post solar installation is shown below.

System Design

The following conceptual layout makes use of the full available rooftop area with a total 63 panels. Panels are arranged in long rows for connectivity and to allow service people to access the panels and other facilities on the roof such as air conditioning units. The positioning of the panels has been assessed to have minimal shading impacts from trees or other buildings. Panels can be pitched at 20 degrees facing north to maximize the solar energy output over the seasons of the year.

Figure 24: Conceptual layout of a 20kW solar energy system

Connection of panels for powering common areas and apartments is more complex. The system would need to connect to the main meter for the common area power as well as to every participating apartment meter. An inverter will be located in the main switch room which converts the DC power from the rooftop panels to AC power for usage. The apartments and common area would connect into the inverter via the distribution board. Cabling will be run from the inverter up to the roof where panels will be connected in strings of 18 modules.

This system will require upgrade of the common area meter to a solar meter. A solar meter manages power usage between the solar panels and from the grid via a supply agreement with an energy retailer. An energy supply contract may also need to be negotiated which allows for feed in credit for excess solar power. Furthermore, a grid protection device is required where solar power would be feeding into the grid.

Project Costing

The total project cost of the 20kW community solar system is estimated at $41,000 - $44,000 and the table below shows the breakdown of system components. Wattblock was able to obtain some quotations which are provided separately. Additional consideration has been made for provision of crane services to lift panels to the rooftop. Wattblock has allowed for $4,000 - $7,000 for additional crane costs. Finally, a costing for the digital metering system installation itself has been added to provide indicative guidance on total solution cost.

Community Solar Project Financials		
Product	Units	Total Price
Solar System		
320W Solar Panels	63	
15kW & 5kW Inverters	1	
Ballast Mounting System	1	
Design Assessment	1	
Third Party Testing and	1	
Commissioning	1	
Web-based Monitoring	1	
Meter Upgrade Cost	1	
Subtotal		**$23,130**
Digital Metering		
Electricity Meter Board Upgrade	1	
Digital Meter Readers	47	
Gate Way Meter	1	
Cabling to apartments	47	
Digital Metering Subtotal		**$13,912**
Crane Uplift		**$4,000 - $7,000**
Net Price After Rebates inc GST		**$41,000 - $44,000**

Roof access was deemed to be too difficult without use of a crane, although some solar panel installers may form a different view. In particular, it may be worth investigating the possibility to hoist solar panels from the balcony of a top floor resident on the northern side of the building.

Ongoing Operating Costs

Apart from the software and hardware costs for the community solar system, a billing service fee would be charged by the Digital Metering service provider for each participant using the solar energy, which would either be paid by the Owners Corporation or by each individual participant. Indicatively Wattblock was able to obtain a quote for billing service fees of $119 inc GST per annum. This would be charged in addition to the energy usage charges. The billing service allows individual residents to pay the Owners Corporation for the amount of solar energy that they have used.

5.2.2 Finance and Ownership Model

Wattblock estimates the annual energy output of the 20kW solar energy system to be 28MWh. The model assumes that the solar generated would first offset common area energy usage, then supply the rest for internal apartments. As a result, it is estimated that approximately 50% of the solar energy generated will benefit common areas and 50% would be sold to the internal apartments. The financial benefits of the reduction in energy use is based on the electricity tariffs below. These rates are based on analysis of the current energy bills for common areas and sample energy bills for the apartments.

Common area and sample residential electricity tariffs (inc GST)

	Common Area	Internal Apartments
Peak	26.5c/kWh	53.1c/kWh
Shoulder	19.7c/kWh	21.3c/kWh
Off-Peak	11.8c/kWh	11.8c/kWh

The table above shows that the financial benefit for using solar power to offset internal apartment energy usages is a lot greater than common area due to its higher electricity tariffs. The Owners Corporation benefits from being able to sell the excess solar power to the tenants at a competitive rate to the above retail tariff. In this analysis Wattblock has assumed that no discount would be given to residents for purchasing solar energy from the community solar system. This is for illustrative purposes and serves to maximize the return on investment for the Owners Corporation on the community solar project. However, the Owners Corporation may choose to offer a lower rate to residents to share the benefits.

The community solar system is expected to reduce common area energy costs by $2,640 per annum, while offsetting $3,479 of energy costs for internal apartments. However, as mentioned in the previous section additional billing service costs are involved with a community solar system.

<u>20 kW Community Solar for All Apartments</u>

The billing costs become significant when there are 46 participants at a total of $5,474 per annum. The total net benefit of the community solar system in year 1 is subsequently reduced to $717 as shown in the table below.

Costs and benefits of a 20kW community solar system in year 1

	Common Area	Internal Apartments	Total
Solar Benefits	$2,640	$3,670	$6,310
Billing Service Costs	$119	$5,474	$5,593
Net Benefits	$2,521	$-1,804	$717

The main purpose of a community solar system is to allow apartment owners to benefit from using solar energy. However, for XXXXXXXXXXXXX the cost savings from solar energy for all 46 apartments have been outweighed by additional billing service costs, resulting in a net loss of $1,804 p.a. for the apartments. This makes the proposal unattractive for all apartments to participate.

Besides the cost of the metering services, the main reason for the poor economics is that the size of the community solar system is limited by the roof space. In effect, residents would be competing with each other for the use of solar energy generated and those that miss out have to purchase energy from the grid. The number of participants therefore reduces the potential solar benefits for internal apartments. The financial payback analysis below further supports that the digital metering based community solar for all 46 apartments is not financially viable as the system would not achieve payback within the 25 year estimated lifetime of the system.

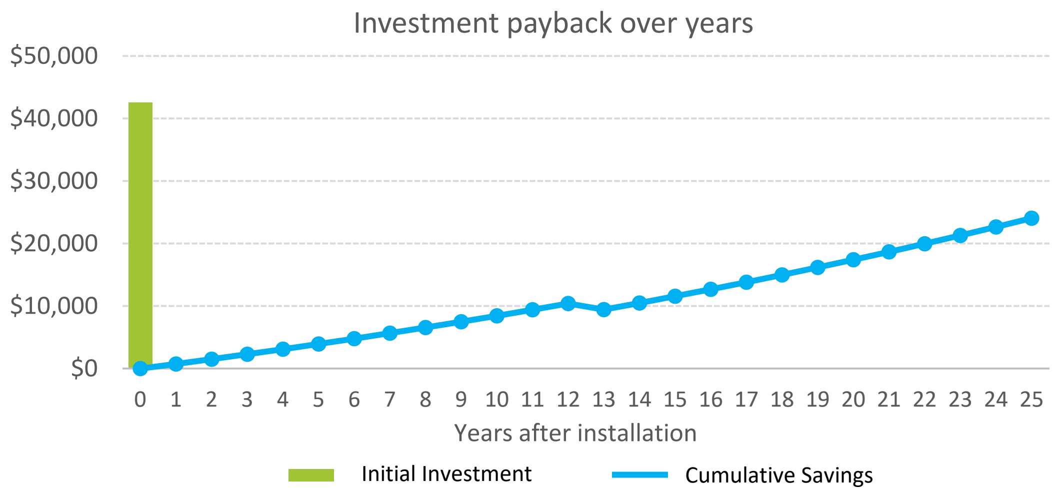

Figure 25: Payback on 20kW community solar with 46 participants

<u>35kW Community Solar for All Apartments</u>

Wattblock has further explored scenarios where a community solar system would be financially viable. A second analysis has been performed with the assumption that there is unlimited roof space at XXXXXXXXXXXXX and a larger community system of 35kW is possible. This would ensure sufficient solar energy to be generated from the system for all residents to use without competition. As a result, the solar benefit to internal apartments is a lot higher in this scenario, resulting in a positive net benefits of $2,945 p.a. for apartments and a total net benefit of $5,466 p.a. overall as in the table below.

Table 2: Costs and benefits of a 35kW community solar system in year 1

	Common Area	Internal Apartments	Total
Solar benefits	$2,640	$8,419	$11,059
Billing Service Costs	$119	$5,474	$5,593
Net Benefits	$2,521	$2,945	$5,466

Moreover, the 35kW community solar system has a payback of 9.8 years proving its financial viability.

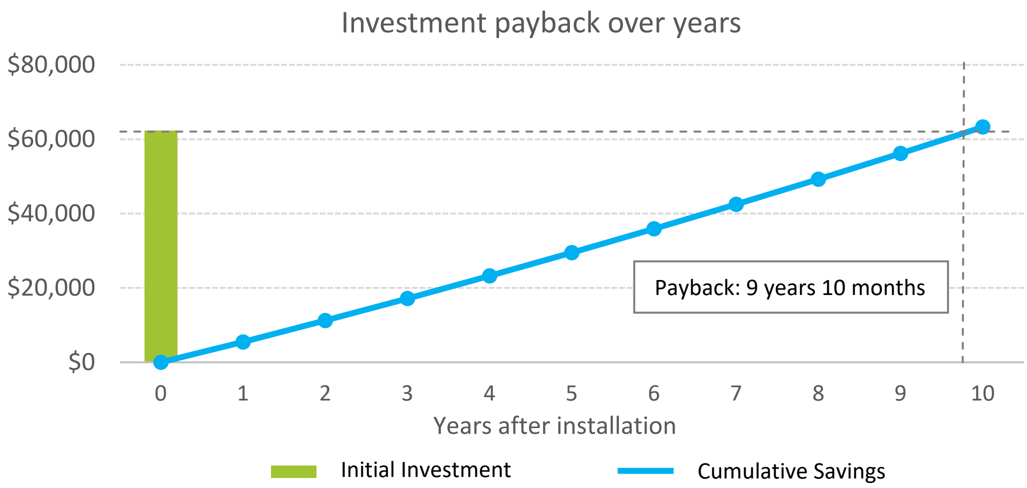

Figure 26: Payback on 35kW community solar with 46 participants

5.2.3 Ownership Model

Several ownership options were considered for the "digital metering based community solar solution". The first option considered was to create a community trust, which could own the solar system on the strata. Such a system would be similar to the Pingala model on the Young Henry's Brewery community solar project, supported by the City of Sydney. The equivalent model for XXXXXXXXXXX would be to create a legal entity e.g. the XXXXXXXXXXX Community Solar Trust. This entity could make the investments required to install the solar system and then sell the solar energy produced to the Owners Corporation.

The second option considered is for a community solar solution without the digital metering investment. Such a model would involve the Owners Corporation paying for all the solar power consumption including common areas and on behalf of the apartments. This would not be classified as a Power Purchase Agreement (PPA) and would not fall under energy regulation for PPA's. The challenge with this model is that any excess solar energy not consumed by the common areas, would not be distributed on a user pays basis to the apartments. The expenses of the Owners Corporation are passed on to lot owners indirectly via strata levies. Therefore residents which received solar power at no charge, were effectively paid for indirectly by all the lot owners on a lot entitlement basis. This split incentive would be further exacerbated by inequitable distribution of benefits favouring residents that are at home during the day, such as retirees, when the solar power is available.

5.2.4 Discussion

The preceding analysis has shown that a community solar system for all 46 apartments is not suitable for XXXXXXXXXXXXX on a user-pays model due to its limited roof space. Insufficient solar output for all residents does not cover the fixed billing costs for everyone.

This problem can be mitigated if the program does not require all owners to participate and only a subset of owners were to be participating. Community solar is more beneficial where residents are at home during the day, such as where the demographic is more retirees, or for larger two or three bedroom units with more residents and therefore higher overall energy consumption.

However, introducing a selection process for which owners can participate and excluding others could also be problematic. An opt-in system would allow higher daytime energy users to self select for participation, thereby avoiding unnecessary costs for residents that would not use energy during the day. On the other hand, the mix of residents tends to change over time, which would introduce future disconnection and connection costs. Furthermore, access to solar arguably increases apartment valuation, in which case unit owners are unlikely to be agreeable to missing out on having a connection to their apartment, whether or not they live there or rent it out.

If a cheaper billing method became available in the future, the implementation of a community solar system on a user-pays basis would become more cost effective. Alternatively an advance in solar power efficiency allowing for 35kW within the same roof area would improve viability. Equally an alternative design that allows for more efficient use of space, such as using the roof space over the hot water boilers might enable a larger sized solar energy system.

As discussed in the prior section, community solar without digital metering offers the greatest overall return on investment. However, the drawback is inequity in the distribution of the benefits. While residents may benefit inequitably from the solar power at the expense of lot owners, it is worth considering other benefits to lot owners. Firstly, such a system may be considered a temporary arrangement on the understanding that the solar energy would be 100% repurposed to common area energy in the future. This will be possible with emerging battery technology and/or electric vehicle recharging facilities, which are both likely to become important considerations in the next 2-5 years. Lot owners may take the view that given the high craning and set-up costs it would be more cost effective in the medium term to maximize the number of solar panels installed upfront. Furthermore, having solar energy available for apartments may increase rental yields and valuations. Free solar power during the day may attract tenants that are willing to pay higher rates or alter behavior and improve retention. There is also evidence that green buildings attract a premium in valuation of 10-14% according to the US Green Building Council.

The community solar solution without digital metering may therefore offer the best outcomes. While none of the alternative systems investigated are perfect, Wattblock suggests taking a medium term view.

6.0 Apartment Hot Water Heating Analysis

Hot water heating cost is one of the main components in residential energy billing. The sections below analyse alternative hot water heating options such as solar thermal and heat pump and investigate the cost saving potential of each. The advantages and disadvantage for the different systems are discussed and the best system for XXXXXXXXXXXXX presented for consideration.

6.1 Existing Hot Water System

XXXXXXXXXXXXX has a common gas hot water system located on the roof of the building. The existing system consists of one 400L storage tank and two Rheem Raypac Gas Boilers with a combined heating capacity of 152kW. These boilers are estimated to be 78% efficient and they are operating towards the end of their useful life. These tanks and boilers were previously exposed to the external environment. However, a new boiler room has been recently built to enclose the existing hot water system.

[redacted]

Figure 27: Rooftop hot water system at XXXXXXXXXXXXX before and after enclosure built

Despite having a common gas hot water system, gas usage of the individual residents is billed directly to the tenants on a user pays basis. The total gas usage of the system is metered and split for individual apartments based on the amount of hot water consumed. As a result, the gas billing is individually billed by the gas company.

6.2 Solar Hot Water System

XXXXXXXXXXXXX is ideal for investigation of solar hot water due to existing gas hot water plant and equipment being located on the roof. Solar hot water involves using solar collectors located on the roof to absorb energy from the sun which heats up water inside an array of evacuated tubes. The heated water is stored in an insulated tank. A gas booster is then commonly used on cloudy days, or when hot water usage is higher than usual. The images below show examples of solar hot water systems.

Figure 28: Examples of solar thermal hot water systems (Enviro Friendly World, 2015)

6.2.1 System Sizing and Design

Wattblock have undertaken an initial evaluation to assess the viability of installing a solar thermal hot water system to boost the existing gas hot water equipment at the site. The flow rate of existing hot water boilers has been modelled based upon the number of apartments and the number of bedrooms per apartment. Based on the number of one bedroom, two bedroom and three bedroom units at XXXXXXXXXXXXX, the hot water consumption load of the whole building can be estimated. We have also accounted for the heat loss from water storage tanks, which is estimated to be 3kWh per day. Furthermore, we have followed guidance that solar hot water systems are typically sized for the summer load to offset about 50% of energy use.

The proposed system includes 8 x 2 kW solar thermal collectors, 5 x 400L hot water storage tanks, additional water pumping and gas boosting equipment. The system would be installed with the tanks and boilers inside the new rooftop enclosure and the collectors situated immediately outside. Collectors would be tilted 30 degrees toward the north side of the building to optimise solar energy capture. The collectors are estimated to take up approximately 51 square meters of the available roof space.

This is an ideal set-up for rooftop solar thermal as minimal piping will be required between the collectors and the tanks improving system efficiency and lowering project costs. Potentially there may need to be alterations to the new enclosure to accommodate the proposed system design. However, such an installation can take advantage of existing gas and water infrastructure to minimize overall project costs. This represents a significant advantage over other strata buildings where the hot water system is not located on the roof.

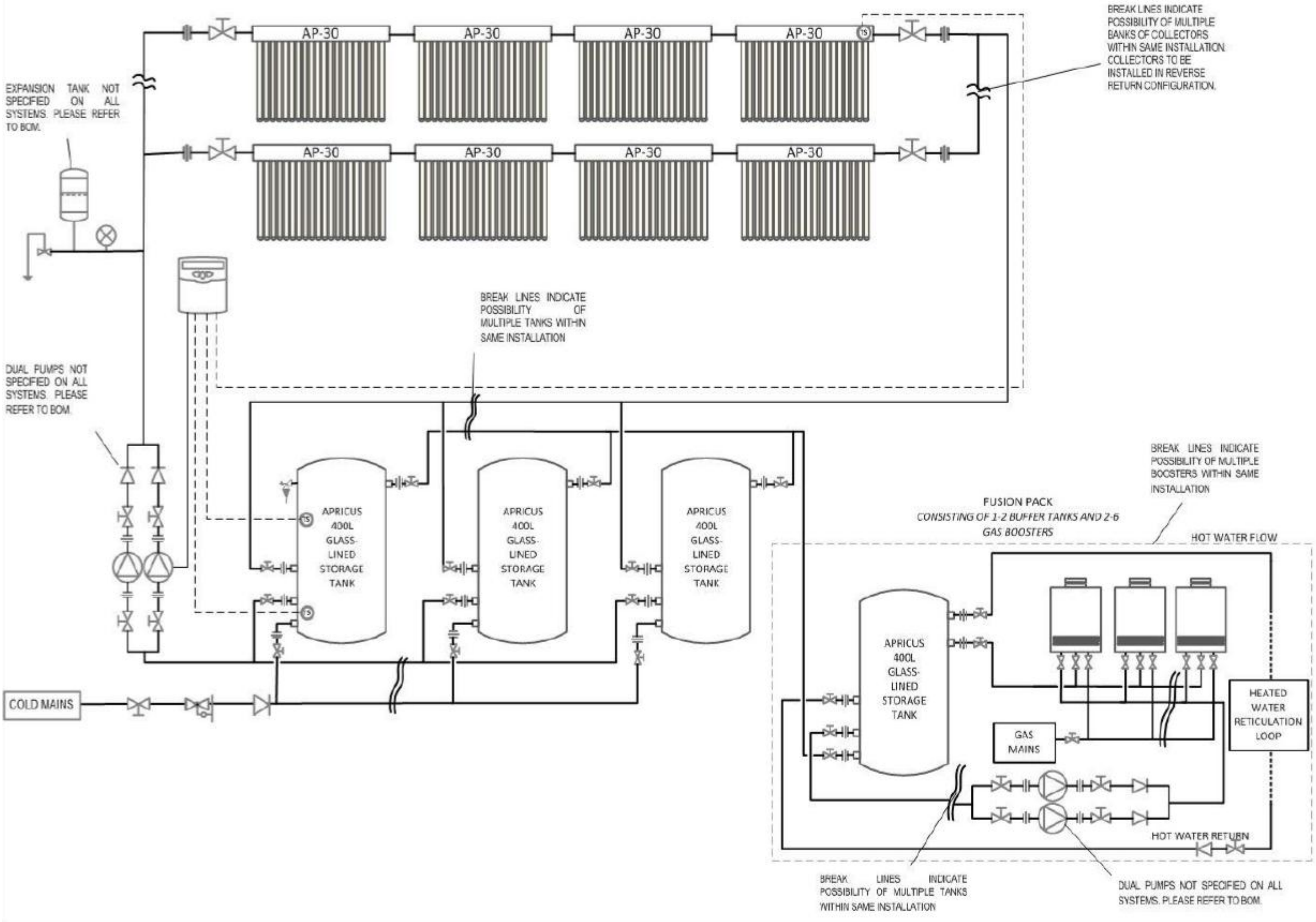

Figure 29: Schematic diagram of gas boosted solar hot water system.

The proposed solar hot water project is estimated to cost between $52,000 and $55,000 including GST. Allowance has been made for structural certification including plumbing and electrical work. Solar thermal hot water systems require allowance for overflow. In addition, it has been assumed that a crane uplift would be required for the new equipment with an allowance of $4,000 to $7,000 including GST.

Solar Thermal Hot Water System Equipment		
Product	Units	Total Price
Gas Boosters	3	
30-tubecollectors (2kW)	8	
400L Storage Tanks	4	
30° Tilt Frame	8	
Circulation& Auxiliary Pumps	4	
Controller	1	
Logistics	1	
Plumbing and Electrical	1	
Safety Equipment	1	
Structural Certification	1	
Engineering and System	1	
Commissioning	1	
Crane Uplift		$4,000 - $7,000
Net Price After Rebates inc GST		$52,000 - $55,000

6.2.2 Savings and Finance

Using historical solar radiation and ambient temperature data, the useful heat gain from the solar hot water system can be estimated. The savings figure can also vary depending on the actual usage profile for hot water at XXXXXXXXXXXXX over the course of the day. Our modeling includes peak usage periods in the mornings and evenings when people are most likely to be leaving and returning to the building. Overall savings would be greater where there is proportionally more hot water used during the day when the solar energy is being captured. Modelling also accounts for estimated flow rates and heat losses of the system.

The generated energy would reduce the amount of gas used for heating up the common hot water system. As a result, the solar hot water system would benefit all residents with a lower gas bill in proportion to their usage. The gas tariff used in the financial calculation is 3.59c/MJ based on sample gas bills collected from XXXXXXXXXXXXX. Based on our system modelling the annual hot water heating cost for the whole block in aggregate is estimated to be reduced by 23%, with an annual savings of $5,896 including GST. In addition, there is an environmental benefit from a 32% reduction in baseline gas usage with a savings of 119 GJ per annum.

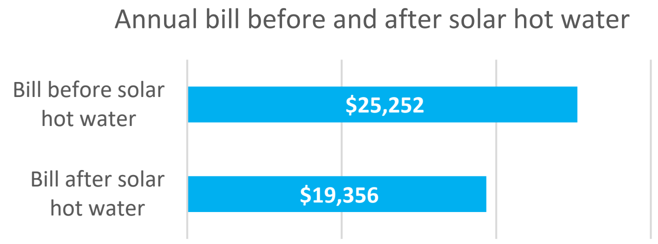

Figure 30: Aggregate hot water costs before and after solar hot water installation

The upfront cost of the proposed solar hot water system is estimated to be $52,000 to $55,000 with a 9.1 year payback. However, it is important to realise that the cost savings accrue to the residents via reduced gas bills for their hot water. For owner investors who do not live in their apartments, benefits may translate to higher rental yields and valuation as the apartments become more attractive to environmental and cost conscious tenants.

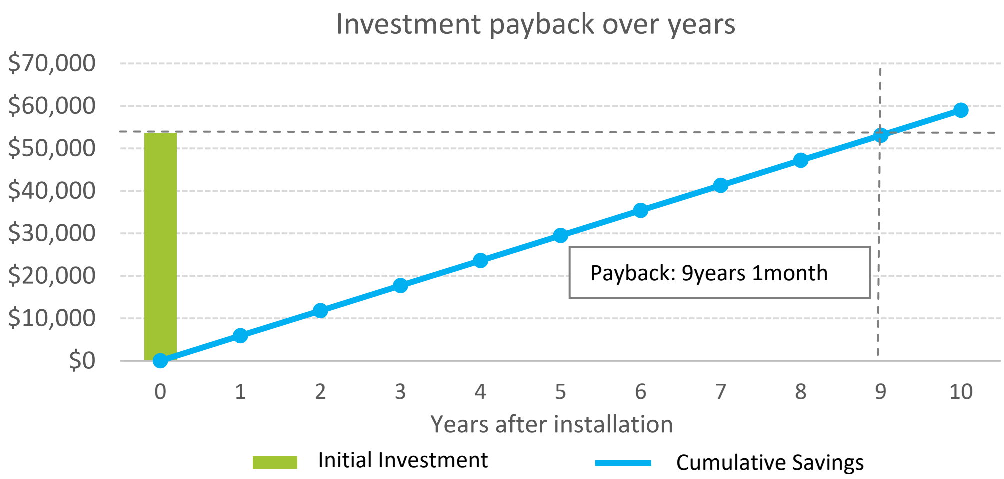

Figure 31: Investment cost and payback on solar hot water installation

6.3 Heat Pump Water Heating

Air-sourced heat pump systems work by absorbing heat from the surrounding air and transferring it to heat water. They run on electricity but are about four times more efficient than conventional electric hot water heating. Heat pumps work on the same principle as a refrigerator, but instead of pumping heat out of the fridge to keep it cool, they pump heat into the water, which is then stored in an energy bank (tank).

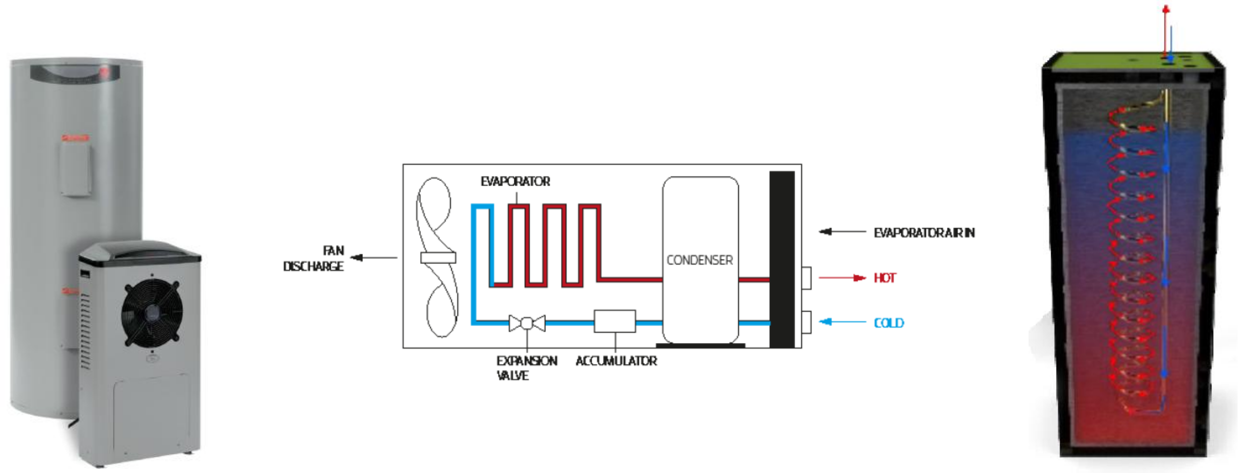

Figure 32: Heat pump hot water system (left), heat pump schematic, energy bank (right)

6.3.1 System Sizing and Design

The system sizing considerations for a heat pump hot water system are similar to a solar hot water system, as discussed in the previous section. In particular, we use the same estimated amount of hot water usage and daily usage profile for the whole apartment block. Differences arise in the energy input modeling which is effected by ambient air temperatures as opposed to solar radiation.

The proposed system includes 5 x 20kW heat pumps and 5 x 420L energy banks for storing hot water. According to our modeling the proposed system will heat mains cold water up to 55°C which would then be boosted by the existing gas hot water system for hot water storage in pressurized energy bank vessels. The heat pump components of the system will be located in the open air outside the new enclosure on the rooftop which houses the existing gas hot water system. The heat pumps are expected to take up approximately 17 square meters of the available roof space.

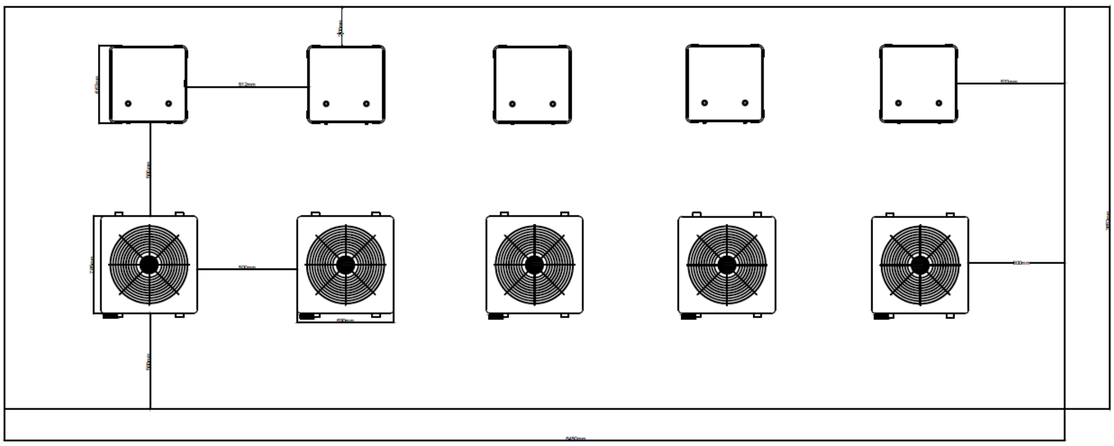

Figure 33: Heat pump hot water system design

The heat pumps operate on electricity, introducing a further operating cost and energy input to the system. The heat pumps would be set up to operate during hours that optimise the cost economics and the efficiency of the system. Considerations include peak usage times of hot water, ambient temperature modeling to optimise heat transfer, and favouring off peak or shoulder periods for electricity usage.

The proposed system is estimated to cost approximately $72,500 - $75,500 including GST. The following table outlines the components. Again allowance has been made for crane uplift of the equipment to the rooftop, estimated at $4,000 to $7,000 including GST.

Heat Pump System Equipment		
Product	Units	Total Price
20kW Heat Pump	5	
420L Energy Banks	5	
Heat Pump Circulation Pump	5	
Thermal insulation	1	
Pipe Support	1	
Logistics	1	
Plumbing and Electrical	1	
Safety Equipment	1	
Structural Certification	1	
Engineering and System	1	
Commissioning	1	
Crane Uplift		$4,000 - $7,000
Net Price After Rebates inc GST		$72,500 - $75,500

6.3.2 Savings and finance

Using historical ambient temperature data and the estimated hot water consumption load of the whole building, the gas usage for the existing and the proposed heat pump systems can be calculated. In order to calculate the energy usage of each, the coefficient of performance for the existing gas heaters and the proposed heat pumps are assumed to be 0.78 and 4.0 respectively.

As discussed the implementation of the heat pump system would result in an increase in common area electricity costs. However, this is more than offset by a significant reduction and gas billing to residents. The overall annual energy cost for hot water heating is estimated to be reduced by 45%, with an annual savings of $11,336 based on sample gas billing rates for apartments and common area electricity rates. The gas usage at XXXXXXXXXXXXX is estimated to be reduced by 339GJ per annum, while common area electricity usage would be increased by 21MWh. This is equivalent to a net reduction in gas usage of 264GJ per annum, representing a net 70% reduction in baseline gas usage. Savings figures can vary depending on the actual level of gas boosting required post the installation of a heat pump system.

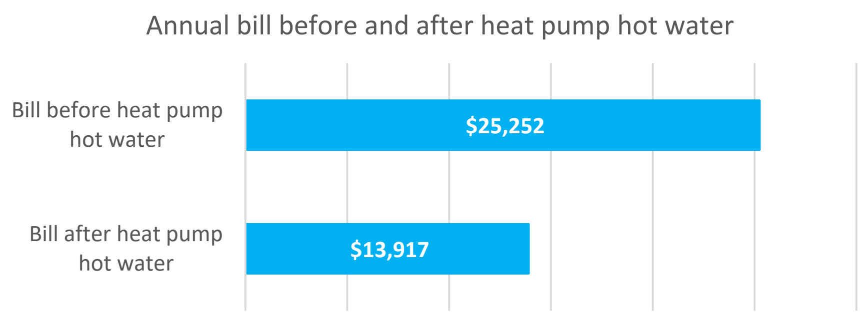

Figure 34: Aggregate electricity and gas billing before and after heat pump project

The upfront purchase of the proposed heat pump hot water system is estimated to be $72,500 to $75,500 with a 6.6 years payback. However, as with the solar hot water project, the benefits accrue to the residents via reduced gas bills for hot water usage. Furthermore, in this case the common area electricity costs are marginally increased. On the other hand, the new system may have reduced maintenance costs. The new water holding tanks come with a warranty of 15 years. Otherwise owner investors might consider how these benefits could translate indirectly to higher rental yields and valuations for their property.

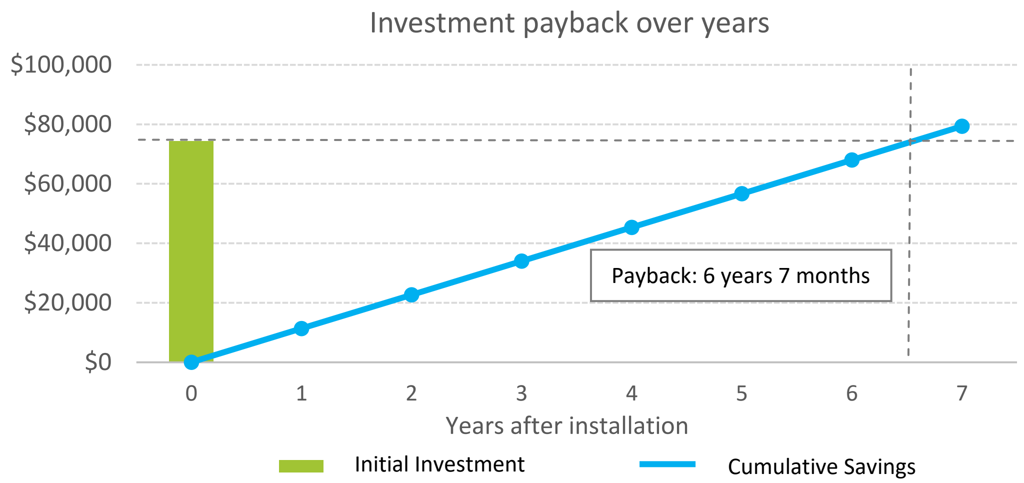

Figure 35: Cost and payback of solar heat pump project

6.3.3 Solar Hot Water vs. Heat Pump Hot Water

Solar hot water systems may have a longer lifespan than electric heat pump systems. However, the main disadvantage for the solar hot water system is a longer payback period. In addition, the solar hot water system requires a much larger roof area to produce the same amount of energy that can be produced with a heat pump hot water system. This becomes an important consideration when an apartment building has limited available roof space.

The advantages and disadvantages of a heat pump hot water system have also been considered. The benefits are summarized as follows.

- Reliable system with a 5 year warranty on the heat pump and 15 years on the tanks.
- Energy efficient and good financial return.
- Heat pumps can be ground mounted or wall mounted to save extra space.

The drawbacks of the heat pump system are listed below.

- System needs to be installed on a well ventilated area.
- The unit can be noisy like an outdoor air conditioner.

The location on the rooftop is ideal for either system. However, overall project costs and benefits favour a heat pump solution. While the split incentive issues raised may reduce the appeal of either project, it is also noted that the existing system is nearing the end of its useful life. As hot water systems age they become less efficient, consuming more energy, and becoming more susceptible to breakdown and maintenance costs. There is also increased risk that tanks can break open with water flowing onto the rooftop. At some point the Owners Corporation should consider replacement of the system and may opportunistically consider implementing the heat pump or solar hot water solutions. Where consideration is also given to a solar energy installation, it might make sense to complete a hot water system upgrade at the same time to benefit from craning cost synergies.

7.0 Summary Analysis

For any apartment building the available roof space for the implementation of renewable energy technologies is fixed. The technologies covered in this study can compete with each other in terms of the required space to install each system. For example, what is the most efficient allocation of roof space if the building wants both solar thermal collectors to supply hot water and solar panels to supply electricity? The following analysis takes into account both the financial payback, as well as the project savings per meter squared of space occupied by the system. The maximum available roof space at XXXXXXXXXXXXX is estimated to be 200 square meters.

Technology	Cost	Savings	Area Occupied (m^2)	Savings/ m^2	Payback
Solar Photovoltaic Energy Systems					
10 kW Common Area Solar System	$16,080	$2,763	95	$29	5.6 Years
20kW Community Solar System (Limited Roofspace)	$42,542	$726	190	$4	>25 Years
35kW Community Solar System (Assumed Unlimited Roof)	$62,277	$5,466	330	$17	9.8 Years
Hot Water Systems					
Gas Boosted Solar Hot Water	$53,585	$5,896	51	$116	9.1 Years
Gas Boosted Heat Pump Hot Water	$74,377	$11,336	17	$667	6.6 Years
Optimised Solution for XXXXXXXXXXXXX					
Common Area Solar and Heat pump hot water	$90,457	$14,099	112	$126	6.4 Years

The table above shows that the gas boosting heat pump hot water system generates the greatest cost savings at $667 per meter squared of roof space used. In addition, it gives one of the best paybacks out of all projects which suggests it as a priority project for XXXXXXXXXXXXXXXXX.

The business case is further improved considering the existing system is reaching end of life and will need to be replaced in the next few years. Since both heat pump and solar thermal are used to supply hot water, solar thermal can therefore be eliminated as a project due to its lower financial performance in comparison with the heat pump.

Although the 10kW solar energy system for common areas has the lowest cost savings at $29 per meter squared of roof space occupied, it gives the best payback of 5.6 years. The return on investment also directly accrues to the Owners Corporation via reduced common area energy costs. For the 20kW community solar energy options as discussed previously, the options explored are problematic and do not represent an attractive return on investment for XXXXXXXXXXXXX.

Combination Projects

It is noted that the building can receive maximum benefit by completing several of the potential projects at the same time. Firstly, a crane is required to lift the equipment to the roof for XXXXXXXXXXXXX for each option considered. Overall costs could be reduced by purchasing the systems with the same supplier and the combined the craning job. The crane service is estimated to cost $4,000 to $7,000 regardless of whether it supports single or multiple projects.

The particular combination of solar energy for common areas and hot water heat pump projects offers operational cost synergies. The heat pump project introduces a new common area electricity cost, which can be offset by the solar energy system. The heat pump timers can be optimized to make best use of excess solar energy substantially reducing or eliminating this incremental operating cost.

In addition, although the current common area energy usage is suitable for a 10kW solar system, this is expected to change in the future. As battery costs come down it will become more economical to have a larger solar system with batteries to store excess energy for night time usage. Consideration should also be given to the likelihood that an electric vehicle recharge solution will be installed in the future. Hence XXXXXXXXXXXXX can consider installing the maximum possible size of solar energy system available on their roof so that any future project set up costs can be reduced.

8.0 Conclusion

This study has reviewed a solar system for common area, a community solar system for both the common area and internal apartments, a solar hot water system and a heat pump hot water system. The projects that provide the best financial returns and optimize use of the roof space are combining the 10kW common area solar system and heat pump hot water system.

The concept of a community solar system could play a major role in the future for reducing carbon emissions of apartment buildings. Community solar allows the roof space of the apartment building to be fully utilised and is not limited to offsetting energy usage in common areas but also internal apartments. It is a great tool to promote solar energy and the relevant environmental benefits as everyone in the apartment block can enjoy the benefit of the solar energy generated. Nevertheless, it is important to identify buildings where it is economical to implement such a system. Although XXXXXXXXXXXXX is not an ideal candidate for a community solar system, solar energy for common areas still makes economic sense.

Heat pump hot water heating has traditionally been expensive and the concept is new to many people in strata. As is the case with many technologies, the costs have come down as it has become more mature. Analysis has shown that heat pump hot water heating is a financially viable and suitable project for XXXXXXXXXXXXX.

The implementation of renewable energy projects not only have financial and environmental benefits. Recently the Office of Environmental and Heritage announced the roll out of a pilot NABERS scheme for apartment buildings in 2017. NABERS is a program through which green buildings are recognised and it thereby supports realisation of property valuation benefits for energy efficiency and renewable energy investments for owners. By using a solar energy system for common electricity supply and heat pump hot water heating, XXXXXXXXXXXXX is estimated to save $14,099 p.a. including GST, 13 MWh of electricity usage, 302 GJ of gas usage and an average increase of $6,130 property valuation per apartment.

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Who is Wattblock?

Wattblock was co-founded by Brent Clark and Ross McIntyre in 2014. They are joined by Scott Witheridge environmental engineer, Jacky Zhong solar engineer plus a team of solar and low energy buildings specialists.
Visit wattblock.com

What is Wattblock's mission?

The energy wasted in Australia's strata buildings has a bigger impact on carbon emissions than the cars driving on the roads. Wattblock aims to **crowdsource** the achievement of Australia's national carbon emission reduction target.

How many strata buildings has Wattblock assisted?

Wattblock has assisted approximately 1,000 strata buildings across Australia to mobilize on energy saving initiatives. Wattblock has also directly project managed the upgrade of 17 buildings in Sydney and Brisbane. To date it has identified over $25m of annual energy waste across townhouses to high-rise residential skyscrapers.

Who is partnering with Wattblock?

City of Sydney, NSW Innovate, Advance Queensland, Microsoft CityNext, Telstra's muru-D, UNSW, Griffith Uni, Queensland University of Technology, University of Queensland.

Who is covering Wattblock in the media?

SBS, North Shore Times, Foxtel, BRW, The Australian, Business Insider, Computerworld, Startup Smart, Startup Daily, Lookup Strata, Technode, Fifth Estate.

Wattblock Awards

Best Social Change Entrepreneur 2015 (Start-up Smart), Energy Winner at 1776 Challenge Cup Sydney, CeBIT Community Support Finalist, Innovation of the Year 2016 (Strata Community Australia – NSW)

Are Wattblock's electrician's licensed?

All electricians engaged by Wattblock have been licensed in the states in which they operate.

Who is backing Wattblock?

Wattblock has received investment from muru-D as part of Telstra's startup accelerator program, Eastern Hill Investments, an Asian-based environmental engineer, a UK-based energy company consultant, a U.S.-based hi-tech investor, a NZ sustainability funds manager, a Sydney-based environmental impact investor, a Sydney-based clean tech consultant and a Sydney-based clean technology finance consultant.

Where is Wattblock located?

Wattblock is based at Michael Crouch Innovation Centre at UNSW in Sydney and at River City Labs in Brisbane.