



Report on the Yallambee Aged Care Services Solar Installation

LVEGF Round 2 May 2023

Abstract

A report on the installation of a 276kW solar installation at an Aged Care centre

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Acknowledgements



The Yallambee Village renewable energy installation project was made possible thanks to the Latrobe Valley Energy and Growth Program – Stage 2 through The Department of Environment, Land, Water and Planning within the Victorian Government. We would especially like to thank the Senior Project Officer, Harry Smyth, for his assistance and guidance.

Acknowledgement and thanks also needs to be given to Project Manager, Chris Barfoot of Gippsland Climate Change Network and the team at Yallambee Aged Care Service, Corporate Projects Manager, Ross Tully and Business Services Manager, Peter King-Church for the support, enthusiasm and positivity. Together, with the team at RACV Solar, they completed the successful installation process.

We would like to especially thank the staff and residents of Yallambee Aged Care for their good humour and patience. We hope you enjoy the benefits of going solar for many years to come.

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Executive Summary

This report covers the investigation of supplying and installing renewable energy at the 120 bed Margery Cole residential aged care facility as part of the Yallambee Village for the Aged. This Village also comprises 96 Independent Living Units (ILU) which have not been included in this project. The centre and it's ILUs are all located on a single land title in Traralgon in the Latrobe Valley.

Within the first 110 days of the successful installation of 276kW rooftop PV system by local company RACV Solar has produced 108,568kW of power, with (a revenue) cost saving of \$27,809.29 and a CO2 reduction of 108.24 tonnes.

The cost of the project was \$355,200 ex GST with \$317,368 being provided through funding from the Latrobe Valley Energy and Growth Program – Stage 2 through The Department of Environment, Land, Water and Planning within the Victorian Government. The facility is also expected to receive a Victorian Energy Efficiency Certificate (VEEC) rebate of approximately \$105,000 after 12 months of operation for CO2 savings due to solar and energy efficiency measures.

Taken without the grant funding and rebates, the installation would be expected to pay for itself after approximately 7.4 years with the VEEC rebates the installation should pay for itself after 5.2 years.

This project is a template for solar installations for approximately 57 other aged care facilities within Gippsland that are looking to develop renewable solutions and for further investigations at Yallambee around the Independent living units (ILU) on site.

Project History



Yallambee management began discussion with Gippsland Climate Change Network (GCCN) in 2017, looking for a solution for a growing electricity expenditure of over \$120,000 per year for he 120 bed Margery Cole facility. They previously had a diesel generator for emergency use in a blackout, but no solar or battery storage system. With tight cash reserves and financial constraints of a small not for profit aged care enterprise, the Board were looking for a grant to achieve their desired solar installation which led to several unsuccessful attempts over many years.

In 2022, Yallambee was successful at receiving a grant of \$317,368 through the Latrobe Valley Energy and Growth Program – Stage 2 through The Department of Environment, Land, Water and Planning within the Victorian Government which is the basis of this report.

It is the authors opinion that grant funding for straight solar arrays is unlikely to be common in the future as the technology becomes more mainstream and the benefits more obvious. However, there are rebates that can lead to substantial savings that will be explored further in the report.

Project Analysis: Battery or Solar



Initially a 100kW Solar PV system was considered as this leads to the greatest amount of Small Scale Technology Certificates (STC's) that can be claimed however it was appropriate to review whether it was more appropriate to model whether it was better to increase the size of the array or to add a battery.

The analysis of the data showed the best value and return for Yallambee would be achieved by extending the solar array from the initial 100kW design to a 276kW system and not include a battery at this stage. This predicted a reduction of the energy used by 39.1% with 21.4% of solar being exported (the current actual reduction is closer to 42%). A battery would provide further savings but not as much when compared to the benefits of the additional solar.

Rebates

Federal Rebates



The Clean Energy Regulator (CER) provides Small Scale Technology Certificates (STC's) project at the point of sale for systems under 100kW. Systems beyond this amount can claim Large Scale Generation Certificates or LGC's through a nominated distribution company. Using these certificates at the time would have led to a discount at point of sale of \$71,888.

VEEC's Victorian Energy Efficiency Certificates are now deemable for Solar embedded energy generation systems. Generated via the Clean Energy Regulator the VEEC's scheme is registered at the start of the project with a process post installation of measurement and verification which is best carried out by a nominated consulting company. A full report of performance of the system is provided at the end of a 12 month operating period to the CER at which point the VEEC quantity is validated and funds are transferred back to Yallambee. The downside is that the funding can take up to 18 months from commissioning of the system. The upside of the VEEC program is currently the value of certificates makes the proposition favourable.

The project used Northmore Gordon consulting to undertake the initial energy usage audit and submit the rebates which anticipates a \$105,000 rebate for Yallambee. (See **RACV Solar Proposal for Yallambee** from page 18, for project quote and detailed rebate discussions.)

State Rebates



Solar Victoria provides rebates for residents and businesses through the Solar Homes Rebate Scheme. Currently as of May 2023 the maximum rebate is \$1,400 for a resident and \$3,500 for a business.

Conversations with Solar Victoria were had regarding the adaption of the scheme to consider multiplying the resident rebate by the number of residents (120), potentially leading to a rebate at point of sale to the amount of \$168,000. However, this idea was sidelined as it would require the demonstration of direct and continual benefit to each resident of the energy savings created by the solar installation.

Whilst some benefits could be demonstrated to residents through cheaper overall costs or additional staff for residents activities, Yallambee Aged Care is a not-for-profit organisation, and the benefit was of a general nature and difficult to show a direct benefit to individuals. Also, it was our understanding that the strict legislation around the residents' payments for Aged Care centres made this benefit hard to register.

We recommend that Solar Victoria be contacted as the rebates and rules do change periodically and it may become possible to include these rebates into your system. We are investigating this for the individual ILU's as it is possible to demonstrate electricity savings as these units are currently individually metered.

Energy Audit

The facility was subjected to an initial energy audit by Lucinda Flynn of Green Solutions, including an energy efficiency workshop with residents. (See Energy Efficiency Opportunities Report from page 15)

It is our opinion that a properly conducted energy audit is a very worthwhile first step, which can lead to upgrades such as more efficient equipment, draft or insulation cover, window coverings or charges to energy use practices, producing significant energy use savings.

Summary of the Solar PV system installed at Yallambee Aged Care Inc.

NMI/Meter No.	3114405369/ 251061886
Solar PV module brand and model	Trina Vertex - TSM-500DE18M(II)
Solar PV module dimensions	2187 X 1102 X 35 mm
Solar PV module power class	500 Wp
No. of Solar PV modules installed	552
Total PV capacity (kWp)	276kWp
Solar Grid-Tied Inverter brand and model	1 x SUNGROW SG110CX
	2 x Sungrow SG15RT 15 kW
	1 x Sungrow SG50CX
	1 x Sungrow SG30CX
Solar Grid-Tied Inverter Power-class	110kVA
	15kW
	50kW
	30kW
No. of Solar Grid-Tied Inverters installed	5
Total Inverter capacity (kVA)	220kVA
No. of PV Distribution Boards (PVDBs)	1
Estimated Annual Energy generation from	~ 361.7MWh
PV system (kWh)	

Financial Benefit

The installation of the 276kW PV solar array on the Margery Cole facility of Yallambee Village for the Aged has had an immediate and positive impact on the amount of power drawn from the electricity grid.

In January 2023, prior to the installation, the facility has consumed 59,829 kWh of power. Following the installation in February, the consumption of grid energy reduced to 29,832kWh.



There has been a sharp reduction of approximately 30,000kwh and over \$3500 per month since the solar installation.



A comparison of energy consumption compared to 2022 (Prior to) and 2023 (after) the installation reveals:



As you would expect the solar impacts the peak time most significantly as this represents the most solar active part of the day.

In the 4 months since the installation of the system, the energy feed into the grid has been 22.234MwH or equivalent to approximately \$1,200. While there is an estimated annual credit of \$5,000, it is important to note that the prime consideration of the project was the reduction in grid energy consumption and not in creating solar export credits.

The real reduction in costs is estimated to be around 40% or a yearly decrease in costs of approximated \$45,000 (RACV Solar predicted 39%). This corresponds to a payback period of 8 years without the VEEC rebate, or with the rebate it is closer to 6 years.

Feedback



The results of the stakeholder survey showed that 99% of Residents agreed that it is very important and very good that the renewable energy system saves money for Yallambee. While noting that it was "something that needed to happen", one resident stressed the ongoing need for maintenance and stated that "we need to make sure we clean them regularly". Interestingly, over 50% of residents considered that it is important to reduce their greenhouse gas emissions.

It is pleasing to also note that 90% of Residents agreed there were no concerns with the workers or equipment during the installation process.

The Board reiterated that:

"The decision to accept the offer from GCCN was easy – Yallambee Aged Care had nothing to lose and everything to gain. The installation was seamless our facility was not asked to do anything onerous and apart from out small contribution toward the project we were not out of pocket for anything unexpected."

Recommendations

1. **Be clear on what you want to achieve**. Do you want to save money, reduce emissions, install a more stable energy system or create a more comfortable environment for Residents. The project took close to 5 years to complete, in a complex and ever changing energy environment. Success is made easier with clarity of purpose and ongoing support of all stakeholders from the start.

2. **Do an Energy Audit**. The investment of engaging an Energy Specialist will uncover "low-hanging" solutions to energy savings. Reductions in energy consumption can be achieved through curtains and pelmets, filling in insulation gaps, energy efficient appliances, and changes to timing of appliance use, saving on energy bills and creating a more comfortable living environment for the residents.

3. **Get several quotes from local installers**. We recommend a local installer which are more likely to be invested in your facility and are close by to assist with your installation. Things can go wrong and we find a local installer generally provides better after sales service. Get multiple quotes as from a set configuration we found over \$100,000 in variation between quotations, then negotiate with your preferred installer. Don't lock in your mind to have batteries, certain suppliers or complex configurations as every system is different. Let the installers look at your electricity data and suggest solutions. Most experienced installers have done this before.

4. **Consider Victorian Energy Efficiency Certificates (VEECs)**. For this install we would have received \$71,888 using a combination of STC's and LGC's however the VEEC's was calculated to provide a more significant rebate or \$105,000 delivered after 18 months. An audit needs to be done prior to install and at least one year of data before an application can be lodged. We used VEEC's with the calculations and rebate certificates being prepared by Northmore Gordon. It is also worth noting that this can apply to other energy efficiency changes as well e.g. hot water, lighting etc.

Recommendations

5. **Speak to Solar Victoria**. Solar Victoria programs change with State Budgets and election commitments and it may be possible that rebates are available for your system. More often they require there to be a direct link to a benefit to residents however you may be able to justify this in a communal situation under a not-for-profit organisation.

6. Run an education campaign with the Residents. Ensure the residents are aware of what is happening and the times the facility will likely be disrupted by the works. Tell them about your aims for the program and build pride in the installation. Celebrate your successes.

7. **Ensure the system is regularly monitored and checked for performance**. Ensure your installer provides a monitoring platform to assess the ongoing capability of the system. Solar systems need regular cleaning and maintenance to ensure optimal performance.

8. Evaluate your decision and consider the next steps. Energy systems are complex and always evolving. Consider other solutions like batteries or "behind the meter" connections that add value to your install down the track. It may be that your facility can provide energy to the wider community and receive payments through energy "arbitrage" – selling your power to the grid when the network most needs it. Maintain a relationship with your installer and seek advice on next steps.

The Gippsland Climate Change Network (GCCN) is a not-for-profit community organisation that works with organisations to improve their energy profile and reduce emissions. More details on the website at www.gccn.org.au

Energy Efficiency Opportunities Report

The Energy Efficiency of the Yallambee Aged Care facilities was discussed after a visit from Lucinda Flynn of Going Green Solutions and a meeting with Darren McCubbin and Lorraine Bull (GCCN) with Ross Tully of Yallambee Aged Care. This is not an energy audit and it is recommended that an energy audit be completed prior to any large-scale works.

It was noted that there are different challenges to different parts of the facility due to their age, construction and use especially the Independent Living Units (ILU's) as compared to the main buildings.

Heating and Air Conditioning

Any ducted system is always less energy efficient than individual split systems due to losses through the ductwork and it is recommended the facilities move away from these large scale devices to more localised solutions. It is suggested that as the ducted systems wear out they should be replaced by individual split systems. These would also be appropriate for communal areas.

Windows and Blinds

The windows currently have internal blinds which can be lowered during summer however external shading is key to reducing summer because it stops the sunlight before it reaches the glass. It is strongly recommended that external shading be installed as well. These could be adjustable awnings, simple shadecloth roller blinds, shade sails or deciduous vines.

The windows themselves could be investigated for leaks and eventually be replaced by double glazing with either timber or UPVC frames (avoid aluminium frames). It is recommended they be looked at with a thermal camera to determine where there is most heat loss and gain occurring, so that draughts can be sealed if required.

Lighting

The current fluorescent lighting should be progressively replaced by highly efficient LED lighting which provide similar lighting intensity for a lower energy cost. There are companies such as Homelab <u>Home (homelab.com.au)</u> that provide advice about replacements with possible access to rebates.

Insulation

As the buildings are of newer stock it is considered that they would have suitable levels of insulation already however it is recommended to use a thermal camera to check for gaps in insulation coverage around lighting and exhaust fans, which reduced how well the insulation functions.

Additionally, exhaust fans can be the source of significant draughts if they are unsealed – this issue can be easily ameliorated by draught stopping devices (The installation of Draft Stoppas are free under rebates for the ILU's, and cost approximately \$35 each if purchased from a hardware store for the main building). Modern IC4 rated LED lighting allows insulation to be installed around the downlights without danger; an alternative is to add a downlight cover to each downlight which allows safe installation of insulation around each.

ILU's

There is greater opportunity for energy efficiency work for the Independent Living Units and it is recommended that a rolling program for the energy assessment of units with a qualified assessor be considered. Some of the opportunities for these units are:

(a) Hot Water Systems. Generally better to replace aging stock with heat pumps that can have generous Victorian Energy Upgrade Certificate (VEEC) rebates. It is recommended you look at Earthworker systems <u>Solar Hot Water & Energy Solutions</u> <u>| Earthworker Cooperative</u> based out of Morwell and ask for them to process rebates which can be done through Homelab or any approved provider. The rebate is available for anyone replacing a gas or resistive electric hot water system that is at least three years old.

(b) Split system heating and cooling. Use an approved installation company that can process the Victorian Government low income heating and cooling rebate that allows a \$1,000 rebate to purchase and install an energy-efficient reverse-cycle air conditioner to replace a range of less efficient systems. <u>Upgrades for owner occupiers | Solar Victoria (heatingupgrades.vic.gov.au)</u>. There are only limited numbers of suppliers locally listed under Latrobe City at <u>Find an approved supplier | Solar Victoria (heatingupgrades.vic.gov.au)</u>.

(c) \$250 Energy Compare. Consider providing an active service to encourage residents to access the Energy Compare website and claim the bonus.

(d) There are a range of free energy efficiency upgrades available to householders under the Victorian Energy Upgrades scheme. An energy efficiency assessor could identify the opportunities for each of the ILU's and a VEU installer could be requested to do a bulk install. Some of the items that are available FREE are:

- a. Upgrade of high flow shower head to a WELS 3 star rated one
- b. Installation of a Draft Stoppa over all unsealed exhaust fans
- c. Free swap of all incandescent, Halogen and CFL globes to LED globes
- d. Installation of home energy monitor (for residents who would like to monitor their energy use)
- e. Draught proofing of up to 2 x external doors per household.

It is recommended that the ILU's be considered as a stage two solar program aimed at creating a Virtual Power Plant (VPP) with solar cells purchased under a cooperative program and removing individual connection fees. The ILU's could be linked to a localised battery that would store excess energy created from the units during the day to be supplied to the entire facility at night. As this operation would be "behind the metre" there would be the potential for significant savings on the resident's and Village energy supply.



YOUR ENERGY SOLUTION

Extensions to 276kW Solar Power system - Trina / Sungrow



Yallambee Village for the Aged Matthews Cres Traralgon VIC 3844

RACV Solar. ABN - 82 634 408 398. 485 Bourke St, Melbourne 3000













Why choose RACV Solar?

For over 100 years, RACV has been serving our members and customers in the areas of home, motoring, insurance, solar and leisure, so you can be confident we'll be here to support you for the life of your solar investment too. As a 100% member-owned organisation with over 2.2 million members, our purpose is to deliver outstanding products and services to our members and the communities we live and operate in.

We've installed thousand of solar and battery solutions for homes and businesses, and we're proud to have earned a place as one of Australia's largest and most experienced solar and battery providers.



RACV Solar installations at Wye River and Latrobe Regional Hospital (1.4 MW)

Your proposal contains

• Expected system performance

Terms and Conditions



• Detailed breakdown of your Quote



What Happens Next? page

You can expect much more from RACV Solar

- 1. Top-quality products fully tested in Australian conditions, made by reputable manufacturers with extended warranties.
- A comprehensive 10 year Workmanship Warranty, which is *double* the industry standard. RACV Solar's in-house Service Department monitors your system remotely over this time (refer to Ts&Cs), ensuring it's running optimally.
- 3. Fully licensed, **Clean Energy Council Accredited** electricians. We regularly train and audit our highly experienced teams to ensure their workmanship and OH&S practices are always at the highest levels. RACV Solar is also proud to be one of the longest running **CEC Approved Solar Retailers**.
- 4. With over **100 staff** including engineers, electricians, and administrative staff to handle logistics, rebate and power company paperwork, we make the process easy for our customers.

Not only can you expect a high-quality system, high-quality workmanship and exceptional post-installation service for 10 years, RACV Solar is dedicated to improving the lives of all Australians with **millions of dollars invested into community projects each year**. For example, after the Black Summer fires, RACV Solar has installed dozens of solar and battery systems in regional Victorian community centres to make them more resilient to these extreme risk periods.

For more information about some of our recent community projects go to:

https://www.racv.com.au/royalauto/living/victorian-sustainability/tallangatta-solar-installation.html https://www.racv.com.au/royalauto/living/community/help-wombat-orphanage.html



Ref – Yallambee - Interval Data Analysis

RACV Solar has performed analysis of the data provided for period 2021. This has given sufficient information for RACV Solar to generate an accurate energy reduction and any exported excess to the grid.

Usage for NMI 62037648336 for the period of data indicates a total of 735,093kWhrs/yr represented by the following graphs over the course of the year.



Profile shown in detail weekly and monthly usage below, illustrating a uniform profile across the week and peaks for the winter months.





Based on the current 200kW solar system originally proposed we are able to provide both textual and graphical representations of current and resultant usage post solar as follows:

200kW

System Size (kW)	Reduction %	Export %
200	32.8%	9.2%

	Current Usage		After Solar			
Month	Peak (kWh)	Off Peak (kWh)	Production (kWh/day)	Export total (kWhr)	Peak Usage (kWh)	Off Peak Usage (kWh)
January	31,653	29,558	1,046	4,027	13,001	19,809
February	30,216	24,462	991	3,121	12,236	17,825
March	32,677	24,904	775	1,947	16,848	18,649
April	32,416	25,611	612	863	19,296	21,246
May	33,557	33,195	387	72	25,648	29,180
June	36,719	29,762	341	12	29,157	27,096
July	36,012	32,229	436	96	26,237	28,591
August	35,288	30,945	549	194	23,815	25,585
September	32,963	26,657	629	773	19,523	21,986
October	29,713	29,191	869	2,938	14,415	20,475
November	32,272	25,733	1,074	5,850	14,114	17,510
December	34,623	24,735	1,032	4,410	13,893	17,886

	Current Usage				Resultant Usage	
	Peak (kWh)	Off Peak (kWh)	Generation	Export	Peak (kWh)	Off Peak (kWh)
Totals	398,110	336,984			228,184	265,838
% Split	54.16%	45.84%			494,021	per yr
Per yr total	735,093		265,358	24,303	241,072	saving per yr
Per day average	2,014		728.51		660	saving per day



Current kWh Usage Resulting kWh Usage after Solar







Following with an extension to this system to a budget we are able to extend by 76kW, with the net affect illustrated in the same way

276kW

System Size (kW)	Reduction %	Export %
276	39.1%	21.4%

	Current Usage		After Solar			
Month	Peak (kWh)	Off Peak (kWh)	Production (kWh/day)	Export total (kWhr)	Peak Usage (kWh)	Off Peak Usage (kWh)
January	31,653	29,558	1,444	12,525	10,764	18,212
February	30,216	24,462	1,365	9,942	9,855	16,536
March	32,677	24,904	1,066	7,144	14,050	17,616
April	32,416	25,611	839	4,025	16,784	20,112
Мау	33,557	33,195	530	835	23,131	28,016
June	36,719	29,762	467	66	26,386	26,149
July	36,012	32,229	596	1,245	23,409	27,604
August	35,288	30,945	753	2,050	20,531	24,423
September	32,963	26,657	865	4,013	16,610	21,066
October	29,713	29,191	1,198	9,306	11,869	19,215
November	32,272	25,733	1,482	14,549	11,888	16,208
December	34,623	24,735	1,424	12,390	10,869	16,722

	Current Usage				Resultant Usage	
	Peak (kWh)	Off Peak (kWh)	Generation	Export	Peak (kWh)	Off Peak (kWh)
Totals	398,110	336,984			196,146	251,880
% Split	54.16%	45.84%			448,026	per yr
Per yr total	735,093		365,137	78,090	287,067	saving per yr
Per day average	2,014		1,002.44		786	saving per day



Current kWh Usage Resulting kWh Usage after Solar







The Design for the additional 76kW coming from roof lines on the southwestern and North Eastern side of the facility as illustrated below. With the southeastern partially using tilt frames, powered by x3 20kW Sungrow inverters.







Price Analysis.

Currently RACV Solar have provided a cost based on 200kW using STC (Small Technology Certificates) for the first 100kW with following 100kW acting as a Large Energy Generation creating large scale generator certificates or LGC's.

We are able via one of our preferred energy trading partners to provide an upfront rebate for the first 5 years of LGC certificates. Noting that LGC's are able to be deemed till 2030.

With STC's and LGC traded value based on installation during 2022, we can provide an upfront discount to the project of; \$57,326 for the 200kW and \$71,888 for the larger 276kW system

VEEC's Victorian Energy Efficiency Certificates

VEEC's Victorian Energy Efficiency Certificates are now deemable for Solar embedded energy generation systems. Generated via the Clean Energy Regulator / Essential Services Commission, the VEEC's scheme is registered at the start of the project with a process post installation of Measurement and Verification.

A full report of performance of the system is provided at the end of a 12 month operating period to the CER at which point the VEEC quantity is validated and funds are transferred back to the client. The whole process is managed by our consultant, Northmore Gordon, which can take 18months from commissioning of the system.

The upside of the VEEC program is currently the value of certificates makes the proposition favourable to the STC/LGC mix. The downside is the process taking 18months prior to rebate being gained.

Northmore Gordon has offered the following worst case and best-case scenarios for value of VEEC's for both system sizes. Their fees as well as the costs for registration and generation are included in the values provided

	Worst Case				Best Case	
System Size	VEEC \$ Quantity Rebate			VEEC \$	Quantity	Rebate
200	\$70	2,001	\$105,872	\$80	2,061	\$130,226
276	\$70	2,381	\$129,785	\$80	2,452	\$158,805

If the VEEC program is accepted the final price for the 276kW will remove the upfront discount of both STC's and LGC's for first five years bringing a cost total of **\$355,200.94+GST**



Battery Options

Further to discussions with Chris Barfoot, we have provided below an alternative to the expansion of the solar in place of a medium size battery system. Current transformer is 500kVA, the 200kW is supplied via 190kW of inverter capacity into the system, meaning for any battery the overall capacity will be limited to what is available at the transformer feed.

The price below includes all associated electrical integration requirements, testing and approvals from SPAusnet. Any form of battery integration will require a separate extension board, which we have suggested would be best suited as part of the Kitchen DB. Noting that batteries at this current time are not registered under the VEEC program.

There are two battery options based on available funds and transformer capacity.



Option 1 is a Sungrow ST101 externally rated cabinet, inverter and battery system.

The 101defines battery capacity kWh with an inbuilt hybrid 50kW inverter.

The system will terminate into the Solar PVDB the system.

Focusing on peak demand reduction, discharging during peak periods using, when available, export from the solar array to charge the battery and off-peak energy to complete a daily charge.

The system has a 10yr warranty and is scalable for an additional 101 battery unit to be bolted at a future date.

Technical data sheets are attached

Cost of the system, electrical upgrades and housed under a RACV Solar lean-to structure near inverter station - **\$156,542.00+GST**

Bringing the total for the 200kW solar and 100kWh/50kW battery system to \$412,763+GST

Option 2 uses smaller battery banks with individual 10kW hybrid inverters (noting that Sungrow changes as of 15th August 2022, defines that you can only install one battery bank per hybrid inverter.)



This application is more cost effective and has same warranty conditions. Using x3 Sungrow HV 25.6kWh batteries for a total of 76.8kWh stored charged and discharged via x3 10kW hybrid 3 phase inverters. Peak demand reduction is controlled via SwitchDIN external controller and terminated into the PVDB. The system will operate in a similar way as the larger more industrial solution in Option 1 for a reduced capital outlay. Cost of the system, electrical upgrades, installed under a RACV Solar lean-to structure near inverter station - **\$96,257.49+GST** Bringing the total for the 200kW solar and battery system less the 30kW Sungrow String inverter to **\$349,605.78+GST**



In Summary.

Solar

The Current 200kW Solar proposition provides a 32.8% reduction for 90% of energy produced. With the upfront costs dramatically reduced with the impact of VEEC's with a potential rebate of between \$106-130,000 post Measurement and Verification process.

The expansion of the solar to the designed 276kW offers additional reduction to a total of 39.1% reliance to the grid power for 78.6% of energy generated. The export is defined as suitable as data set used was for the period of 2021. The following 6months 2022 data issuing greater usage meaning the 276kW will export less than estimated. Similarly, the net affect of the VEEC's provides the project a rebate post MnV validation of between \$130 - \$158,000.

Batteries,

Each of the two scenarios will use a mixture of peak exported solar power and off-peak grid power to charge the batteries. Noting that current rate of \$.10c/kWh for off-peak power should be used for any cost reduction analysis.

Electrical upgrades will be required along with sizable external real estate to house the batteries.

Owing to the low differential of peak and off-peak rates linked to the minimal export of the 200kW solar system it is our conjecture that the current solar battery offer would not be financially viable.

The most beneficial outcome for the facility at this stage is the expansion of the solar array with potential reinvestment of the VEEC's into a battery system at a later date.



