

Tips by Topic



These short notes summarise findings and thoughts during the operation of the Latrobe Valley Community Power Hub between 2017 - 2020. They are correct as of April 2020, but as this is a fast changing environment they should be verified by your own research.

Chris Barfoot, LVCPH Project Manager.

Microgrids

In the course of operating the Power Hub we have been involved in a number of projects based around the concept of microgrids.

A microgrid is technically described as a group of properties that can trade or share energy between themselves and who can operate as a stand-alone grouped unit disconnected from the grid if needed. It is important to note that these properties retain their individual grid connection.



Detailed analysis demonstrates several issues:

- 1) **As they are connected to the grid all Ausnet charges remain in place**
- 2) **To trade directly you must have a retailing licence that costs a minimum of \$4M**
- 3) **Alternatively, you can trade via a retailer that has a licence**
- 4) **Selling to a neighbour across a boundary incurs Ausnet charges (DUOS and TUOS)**

So, let us assume a situation where a group of properties wish to establish a microgrid in a small township.

First, members will need to share a transformer so that the criteria of isolation from the grid can be met. This restricts participants to a very defined area.

Secondly, they all remain grid connected so incur daily charges to Ausnet – no reduction in bill

Thirdly, they will sell to the grid (not each other) and achieve the standard feed-in tariff for solar generation.

Fourthly, to meet the criteria of standalone operation they will install batteries at a significant cost.

Finally, to measure any transfers of power a metering system is required.

Thus, it is not unreasonable to assume that all homes will ideally have solar and batteries, as well as a connection system to the microgrid. Even using the lowest cost battery this would be an expense of up to \$6,000 per household.

Thus, in the first scenario where all sell power to the grid with a choice of retailer:

- 1) **There is no reduction in the daily charges from Ausnet**
- 2) **Power is sold at feed-in rate**
- 3) **Sale of that power to a neighbour incurs DUOS and TUOS charges**
- 4) **A retailer must sell the power and thus impose their charges**

So the solar is sold at 11c/kW, 14c/kW is added in DUOS and TUOS and the retailer margin added to that thus a final sale price of 30-35c/kW is not unreasonable.

For most people this means that their \$6k investment will show no better return than when they were connected only to grid and the buyers achieve minimal benefit also.

The concept of a solar garden where community members can share power from a small local solar farm is also affected by these issues.

A second scenario is where all use the same retailer. This may allow for reductions in the retailer's charges and achieve a small saving. However, in restricting the choice of retailer you can run afoul of the Australian Competition & Consumer Commission (ACCC) in restriction of trade by denying the customer choice of retailer creating a monopoly.

A similar issue arises if the group is interconnected with a single connection to the grid. This is called an embedded network. This offers advantages as the daily charge per household is dropped and trade or sharing between members is possible.

This is not without its catches. First all properties connected must be on a single title and the owner of the embedded network takes responsibility for the maintenance and operation of the network.

More importantly the owner of the network sets the prices and as such becomes the de facto retailer. This opens opportunities for abuse and price gouging as the customer has no choice of provider.

These types of systems are currently the subject of review by DELWP and I would hesitate to recommend that any such system be considered until the review is completed and the recommended changes known.

Off-grid Systems



An off-grid system is as the name suggests an energy system with no back up from the main electricity grid. In such a system a failure can result in a total loss of power. This can have devastating consequences if lives rely on the operation of certain powered items.

As such the design of these types of systems is critical. And should never be undertaken lightly.

In the Licola system renewable energy and battery systems were added to the design to supplement the existing diesel generators.

This served multiple purposes first the solar replaced the need for the generators to run during the day. The batteries were there to provide night-time power and support the supply on overcast days.

The diesel generators were resequenced to run when the batteries dropped below a set point and at that time accelerate to their optimal run speed and charge the batteries. Once charged they shut down again and the battery again becomes the main source of power.

Such changes have resulted in a reduction of diesel used by over 90%. This has made the camp more viable as costs have dropped.

Bulk Buys



As part of the operation of the Hub we have completed one Bulk Buy and are about to start another.

There are a number of lessons to be learned from this. First for those who undertake such a project on their own there is a significant amount of work in advertising, collecting enquiries, arranging quotations, collecting deposits, scheduling work, verification of standards and documentation.

In our case we chose to hire a provider of this service. In our case the not-for-profit Yarra Energy Foundation (YEF). They do the procurement, provide advertising copy, maintain a website and handle enquires and work with the suppliers and installers.

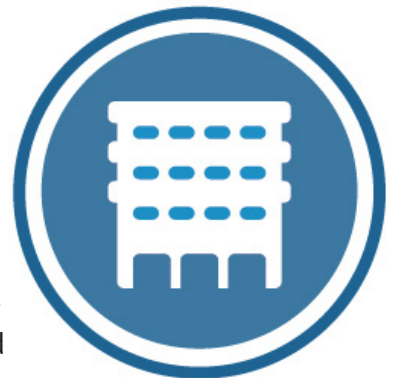
There is cost involved but in our opinion, we did not have the human resources or skills to undertake this ourselves.

Such agreements are flexible. In the first case we insisted on the use of local installers which did prove popular with buyers. For the second round we will be advertising amongst all local suppliers for product supply, as well as for local installers. This has been done after criticism on the first round that profit was going to Melbourne rather than local groups. For this round both Melbourne and local suppliers will have the opportunity to quote.

In relation to YEF, they also provided five information nights in each shire to advertise the offerings and answer questions. Their service was excellent, needing minimal intervention and in the first turn we installed over 350kW of solar and a 4kW system was gifted to the Loch Sport Hall.

The amount sold was less than expected but it coincided with the announcement of the introduction of Solar Victoria rebates which basically put all installations on hold for a few months.

Solar on Community Buildings



A large part of our projects have been about fitting solar onto community buildings.

First you should gain familiarity with ideally both Sunulator and the Frontier Impact Toolkit as expertise in both will provide you with all the data needed to optimise a system and its operating costs.

Our involvement in these have ranged widely. There have been some where we have provided the solar needed calculations and then the group has fundraised, purchased and installed the system.

In other cases, we arranged quotations and then prepared grant applications for the group to submit as opportunities arose.

In other case we have brokered a deal with a revolving fund to fundraise and install systems in conjunction with the building owners.

This shows that such systems are never simple and there is a myriad of potentially complicating things that can occur. What is most important in these

cases are to ensure that you know what your customer wants and work with them to determine the best way for them. To achieve their goals without being saddled with excessive cost or debt.

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Solar for Commercial Gain

Here I am considering where a system is installed for the purpose of gain to the Power Hub and any other partners.

In this case the arrangement will be a commercial agreement between the host site and the investors. This will need to comprise of several documents such as a rooftop leasing agreement and a Power Purchase Agreement (PPA).

If you are using a Special Purpose Vehicle (SPV) which allows for up to twenty investors on a project to a maximum value of \$200,000, you will need a Trust Deed, Operations Agreement and the General Application and Processing documents. They are also annual legal requirements associated with a SPV.

These documents were developed by the Bendigo Power Hub with joint funding from the Latrobe Valley Power Hub at a cost of over \$50,000. These hubs will make these available to interested community groups for a nominal cost however expect that modifications will be needed in conjunction with the legal team to meet individual project needs.

Again, this is a specialist area and even more so if your project exceeds the \$200,000 in which case a Financial Licence is needed to even talk to potential investors.

If you are considering such a project, I would recommend talking to the Bendigo Sustainability Group which has extensive experience in this field or the Geelong Sustainability Group which has also developed significant projects.



Energy Efficiency

This remains as one of the best areas for rapid expansion of services associated with a Power Hub.

Many Australian homes are built to a standard far lower than European due to the warmer climate this often results in homes that are not airtight and as a result heating and cooling costs become excessive. This is not helped by the fact that new homes are not verified as being built to standard instead their energy rating is based on a calculation from a drawing.

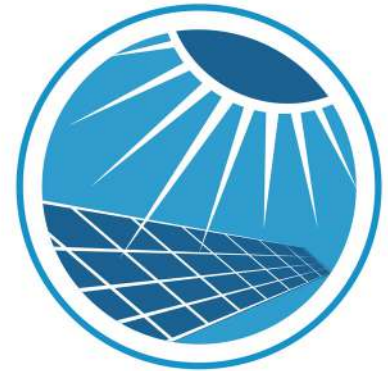
Inspection of new homes has found instances where all the insulation was still in a bundle in one corner of a roof never installed properly leaving what was fundamentally an uninsulated roof.

Older homes can benefit from draught sealing and light replacement with LEDs. Often wall vent sealing and reduction in air loss. This is an area that opens opportunities for assessment of the housing stock and preparation of a scope of works and then also for the implementation of the retrofit and other works as identified.



Much of the work done is able to claim credits under the Victorian Energy Upgrades Program providing the opportunity to subsidise the costs.

Solar Farms



Over time we have worked with a number of community groups to investigate the possibility of developing a solar farm.

This has been frustrating but there are many lessons to be learned to make your journey easier.

First, if your project will produce more than 5MW you will need to apply to be a generator with AEMO – this process will take at least two years. As such it is more common that many community proposed solar farms are kept to a maximum of 2MW.

The next major issue is the siting of the solar farm in relation to a possible grid connection.

At 2MW it is usually possible to connect at many points for a minimal cost, about \$100,000. As the output grows the line will often need to be upgraded, sometime for many kilometres back to the next connection point. This can cost millions of dollars. Thus, site selection is critical to minimising the cost of the project.

An ideal site is one close to a 66kV line because as a general rule this is most likely to connection space.

Other considerations include the type of mounting systems and it is important to select a cost-effective solution that will suit local atmospheric conditions and winds. A second consideration is whether farm animals are to be allowed to graze beneath the panels which will need a higher mount.

Obviously, a project of this scale will be in the millions of dollars and as a result you will be dealing with a serious financial exercise and again, I recommend passing this to a professional financial advisor.

The major issue that will dog this type of project is ensuring that a Power Purchase Agreement can be reached that shows enough of a return to make the project economic.

Ideally, I recommend trying to co-locate with a behind the meter customer that will ensure that the power is bought at a favourable rate.

Sports and Path Lighting



One project delivered by the Hub was the Yinnar Solar footpath lighting. This was a project which fitted solar powered lights to the verge of a road that connects the town and football ground.

This was the first time these had been used in the council area and as such it was a task to build information on type, reliability, design, lifespan and maintenance in order to collaborate successfully with the council.

Now complete it has demonstrated that use of these systems, without the need for reticulated power, have a definite place in this area. Newer projects being

considered include park pathway lights.

The major cost for most sporting grounds is the operation of the floodlights for both training and games. This area is also complicated and if working with an AFL club there are strict guidelines that set the lumens for each standard of the game and for both training and match conditions. As a result, an incorrect installation may be rejected by the league. As such, ensure that a professional lighting engineer is employed for this design.

There are many LED floodlights that are suitable as a replacement for traditional lighting. Most of these are simple 240v plug in units. However, a second area of concern is ensuring that the lighting towers are of adequate condition to support any increased load if extra lights are required. Again, this is another reason to employ a professional lighting engineer for the project assessment.

Gas Replacement

Surprisingly we expected that most of our work would be in solar installations, but we found that one of the most common requests was from people and companies looking for relief from high gas prices.

One example was a gas fired clothes drier where it was demonstrated that replacement with an electric unit would result in a 300% return on investment.

Similar situations exist in many businesses.

Another example was a council pool complex which uses gas to heat five pools. A comprehensive review of their systems was undertaken, and it was shown that replacement of the gas boilers with electric heat pumps would break even in a three-year period. This could be reduced further if coupled with a solar installation.

These are not a small installation and it would be expected to cost close to \$500,000. This is beyond many community groups and is a project that will highlight the difficulties experienced in trying to fund such a project.

A second pool wanted to extend its summer operating season by two months, and this was also the subject of review with heat pumps providing a cost-effective solution. This is now the subject of a grant application.

Another area of opportunity is in the replacement of gas fired hydronic heating with heat pump-based units.



Second-hand Solar Panels

We have often been asked about using second hand solar panels as it is becoming more common for people to change these after 10 years.

This has been the subject of intensive review by the Hub and it has highlighted several legal concerns that prevent the transfer of Short-Term Certificates which are used to subsidised new panels and issues relating to the delisting of older panels from the Clean Energy Council Approved List.

Until these legal issues are resolved then these panels can only be used in off grid systems.

