1. Technical Energy Specifications Sheet, Cluster 4D

This information is compiled for Witchcliffe Ecovillage Cluster 4D lot owners and their builders and electricians. It contains important information that must be followed by all lot owners/builders.

2. Strata Cluster 4D Microgrid Features

This strata cluster features:

- 9 residential/short stay lots
- Energy efficient, passive solar homes with heat pump hot water systems
- 6kW hybrid inverter on each home
- 167A - 120kW micro-grid connection to Western Power grid
- Individual household batteries provided to each lot
- Single point connection to WP grid for sale of energy

A detailed analysis of the Cluster 4D energy budget is provided in Table 1 below.

Cluster 4D	Number of Lots	Min Inverter* 3 Phase	Allocated Max * Inverter size (kW) 3 Phase	Total inverter (kW)	Battery kWh hour per lot	Total battery (kWh)
Short Stays	9	6kw	6kW	54	11.04	124.2
Total	**9**			**54**		**124.2**

Table 1. Cluster 4D Energy Budget

The solar array size connected to your inverter will vary depending on inverter size, available roof area and budget. Your solar installer will advise you of what they recommend. As the government STC rebate program uses the solar array size to calculate your eligible rebates it is recommended to install the largest array possible to fit on your roof.

* The "Allocated Max Inverter size (kW)" is the max inverter than can be used at your property. This is a function of the cluster's Western Power connection size and the differing lot types within each cluster. A 6kW inverter is required in all homes in cluster 4D.

Cluster 4D is estimated to collectively:

- Produce ~ 260kWh / day of renewable energy (based on the maximum allowable installed PV & Inverters)
- Use ~108kWh / day (excluding owner occupier EV charger)

3. Cluster 4D Household Energy Connection Requirements

Connection Process

Electrical power domes have been installed on each lot to enable direct connection to the builder's temporary power board. A NMI meter (see below) must be installed before energisation of the temporary power board. Once your home is constructed, your builder's electrician will then move your NMI meter to your home's meter box.

Phases

All homes at the Ecovillage need to be wired for 3-phase power.

3-phase power allows for a more balanced distribution of loads across the three phases, which means that each phase carries a relative equal amount of power. A balance of power across phases reduces the risk of overloading and helps improve micro-grid power stability. 3-phase power can enable higher power loads than that of single-phase power making 3-phase power more suitable for use in houses with large solar arrays, residential batteries and EV chargers. It is essential that electricians balance loads as much as possible across the 3 phases in each home to enable the support of larger loads in the cluster.

Power Revenue Meter

Each household must install a 3 phase NMI certified meter. It is not legal in Australia to trade energy across meters that are not NMI certified. Your NMI revenue meter needs to be SwitchDin Droplet (see below) compatible. Our 2 recommended Droplet compatible NMI meters are the SATEC and CET meter. All Households must purchase and have their NMI meter installed by their electrician, in their builder's site power board, before they connect to the micro-grid.

Droplet

To ensure Western Power approved energy management optimisation within our microgrids, residents are required to have SwitchDin "Droplets" installed at their property if their cluster exceeds the total allowable export limit imposed by Western Power (generally 100kW in the Ecovillage).

Integrated Electrical Contracting (IEC) are a SwitchDin certified installer, and they provide competitive pricing for the installation of these Droplets. If you'd like to engage IEC to undertake this work please contact their office at 0488 007 978. Alternatively, please contact your electrician for a quote for installation (they will need to have SwitchDin certification and understand how to link the droplet to the microgrid controller).

The Droplets will also read the household NMI meter and inverter and send this data to the Clusters SwitchDin Stormcloud, which enables residents to view their energy use (import and export) and their Strata manager to see the overall cluster energy use. Both residents and strata managers can download CSV files (meter data), which will enable strata/energy managers to produce energy bills for each household/strata.

If the sum of the total allowable inverters in a cluster/strata is going to exceed the Western Power export limit, Droplets must be installed and connected when the NMI is transferred to the home's meter box. Solar systems cannot be turned on prior to droplets being installed. More information is available in the Energy Handbook.

Inverter

In **Cluster 4D**, the microgrid compatible inverter brand and capacity required is the Fronius Gen24 Symo + (Hybrid) with a required 3-phase 6kW inverter capacity. Hybrid inverters are required when installing household batteries, which will ensure homes can supply power from your battery when the Western Power grid goes down. The advantage of using the Fronius Symo is that the size of rooftop PV arrays can be increased considerably while still maintaining eligibility for STCs (Small-Scale Technology Credits)

- 3 phase 6.0kW (Required) for Short Stay Lots

Smart Meters

As all homes in 4D have household batteries they will also require a Fronius smart meter to be installed by their solar installer when installing the homes solar and battery system.

Electrical Meter Box / Switchboards

Because the houses and solar systems are 3 phase with battery back up it is recommended that an external meter box be installed that will have the metering and solar equipment installed within it. The solar equipment will require 12 free poles within the meter box and the revenue meter requires 7 poles with a 3 pole main isolator/SPD. For this reason it is recommended that an internal switchboard be installed for the house general electrical circuits to connect to.

Internet

All Ecovillage households are supplied with NBN fibre to the premises and are required to provide an NBN connection to their home for metering purposes.

Households that specifically do not want to connect to NBN must still provide a suitable microgrid control by providing an alternative internet connection for the Droplet via a suitable 4G wireless modem (not dongle);

The Droplet hardware requires at least a 4G modem with 2 free ethernet connections. WIFI connectivity via a dongle will not provide reliable enough coverage for accurate metering and monitoring, and for controlling the output of the solar system in peak times (as required by Western Power).

Solar systems

To provide an Ecovillage wide net neutral renewable power supply, all Ecovillage homes require the installation of a minimum of 6 kW solar PV. To maintain peak performance and efficiency of the overall cluster energy system, individual solar PV systems need to be installed and connected evenly across the cluster microgrid and careful consideration has been given to the servicing of each home and its permissible solar PV. The distribution of the systems over the network is critical to create a balanced network.

We strongly recommend buying good quality PV's, with a minimum 25yr warranty.

Your solar installer will need to allow for:

- Fronius Symo Gen24+ solar system with battery back up.
- Installation of the provided BYD batteries.
- Freight of the batteries from a Perth based warehouse, ideally at the same time as your solar system, as we don't have storage or forklift on site.
- Supply and installation of the Switchdin Droplet (generally installed within the meter box).
- PQA coordination and costs.

Power Quality Assessment (PQA)

Unless an Embedded Energy Exemption has been granted, Western Power deem all solar connections over 30kW as commercial size systems. As such, they require PQA's on all solar systems that are installed after the first 30kW of systems that are installed in each cluster. This means that the first five homes to install solar don't have to do PQA's on their systems. Integrated Electrical have provided a quote to do PQA's in the Ecovillage for $1000 + GST Please confirm price with I.E. as pricing may change). This expense can be shared by several homes at a time (no limit on number of homes that can be included in this one off fee), so long as each home has their solar system installed and is ready for the PQA. Please contact Integrated Electrical to schedule your PQA when your solar system is installed.

Please contact the Ecovillage electrical engineer, Jey Shivakumar at CosWeb on jeys@cosweb.com.au, to determine if your cluster has had an exemption approved, and whether a single PQA can therefore be completed once all homes are constructed.

Batteries

The developer supplies household batteries to all homes in 4D that commence construction within the Commencement Date specified in the original land sale contract with the developer. Households are required to inform and provide the WEV office with 4 months notice for supply of battery, via info@ecovillage.net.au.

Our battery of choice at present is the BYD Premium HVM (Tesla could not provide a 3 phase battery). This battery is modular and includes a base that can enable up to 8 x 2.76kWh battery cells = 22.08kWh, so households can add cells if they require more battery storage (you shouldn't require extra). 4D short stay lots receive 4 cells to enable 11.04kWh of storage. The BYD Premium has a 10yr warranty.

It is highly recommended that you ensure your solar installer allows to install the grid backup controls so that your system will still operate during a black out.

The cost of installation of your battery is the household's expense. We strongly recommend getting a quote from Integrated Electrical for the supply and installation of solar and battery systems as they are a competitive local company with extensive experience with all energy systems in the Ecovillage.

Please consider the best location to house the battery during the design of your home, as the batteries need shelter from the weather and can't be located within the home. Your electrician, architect/drafty and builder should be consulted during this process.

EV Charging

EV charging in short stay lots is only allowed for permanent homeowners living in the home. EV charging from short stay lots is not permitted for short stay tenants. The reason for this is that short stay tenants visiting with EV's are an important part of the revenue base for permanent residents in residential clusters with EV chargers. If a short stay owner requires an EV charger for their own vehicle, they will need to provide a lockable storage and power supply in their carport, for their personal use only. The benefit of this for Short Stay owners is that their tenants will not be leaving them with large power bills, as filling an EV to return to Perth after a holiday will generally use around $20 worth of energy, not to mention additional charging whilst staying in the home.

4. Microgrid Connection Information

Additional Information / Requirements:

The below information needs to be provided to your builder and home designer.

- Each dwelling requires an externally accessible Western Power approved 450x450mm meter box. The LHS requires a minimum 16pole din kit with 1x 32amp 3 phase breaker.
- 32 Amp 3-Phase connection as per Western Power standard. Changes to the size of this connection are possible but will come at an additional cost.
- 25mm communications conduits need to be extended from the NBN pit adjacent to your green dome on your lot boundary to enter directly into the LHS of the meter box with no more than 270 degrees of long radius sweep bends. This is to enable future microgrid controls.
- During electrical fitout electricians are required to ensure they run a 240v rated cat5e data cable from the internet modem location to the meter box and leave it 'made safe' and coiled behind the LHS panel with a data outlet terminated at the modem. This is to enable internet connectivity for the operation of Energy Management Systems i.e. Microgrid Controls & SwitchDin Droplets.
- Power/Microgrid communications connection points are at the rear of the lot. NBN connections are at the street side of the lots.

Indicative Connection Costs:

The 2023 indicative costs associated with this connection process are outlined below:

Requirement	Responsibility	Cost
3 phase cable from the micro-grid distribution board to your lot boundary – Green Dome	Developer	Provided
NMI meter (Indicative Cost – CET meter)	Home Owner	$506.40 + GST (Approx)
NMI meter installation at temporary power board and transfer to your home	Builder's Electrician	$180 + GST (Approx)
SwitchDin Droplet	Home Owner	$200 + GST (Approx)
SwitchDin Droplet installation – Energy Management	Home Owner	$500 + GST (Approx)
Solar System	Home Owner	Depends on System Size
Battery Supply (size dependent of lot type)	Developer	Developer provides to homes commenced within original contractual commencement date. Otherwise at cost of owner/builder.

Battery installation	Home Owner	Quote Required from your solar installer
Smart Meter (Fronius)	Home Owner	$500 + GST (Approx)

5. Solar system connection

The application process for solar system connections up to 30kW is as per standard residential applications and is relatively straightforward.

The process for connecting solar to the microgrid after 30kW of installed solar capacity has been installed is as follows:

1. Solar systems are installed on residents' roofs.
2. Qualified Electrician will perform Power Quality Testing (PQT) to confirm inverter output frequency stability via the cluster microgrid. The cost of this is to be shared by the first 6 households that connect solar. After which this cost will be shared by owners as required (ideally shared by multiple home owners each time). During testing cluster microgrid power outages will apply, outage times will be communicated to residents in advance. This is a standard Western Power requirement for large solar systems.
3. If required by Western Power, our engineers "Cossill & Webley" will perform "Grid Protection Testing" (GPT) to confirm the switchboard will operate correctly to limit solar export if required by Western Power. Depending on availability this step may be done before or after step 2. During testing cluster microgrid power outages will apply, outage times will be communicated to residents in advance. This service is provided at the developer's expense.
4. "Grid Protection Testing" and "Power Quality Testing" data will then be consolidated and sent to Western Power for "Approval to Operate" systems tested.
5. Once "Approval to Operate" is received you are then able to activate solar systems that were included in that application. As stated above the first 5 homes with solar systems installed can switch solar on before GPT & PQA testing required.



4D Survey Strata Plan