



# The Ultimate Off-Grid Solar Guide

The essential research tool before you go off-grid

## Company Profile



# Solar Integrity

**Solar Integrity** is a trusted solar power and battery installation company based in Albury-Wodonga.

Our focus on solar energy and storage goes back over 15 years, in the industry we are one of the most experienced operators in the region. We have installed thousands of solar systems on homes, businesses and community buildings throughout the area and pride ourselves on quality workmanship and product choice.

Solar Integrity is proud to offer a great range of solar power systems for use both on grid, off grid and also hybrid systems with battery and generator backup. We are happy to travel up to 2 hours from our base to residential or commercial projects.

All Solar Integrity installations are carried out by our teams of in-house installers and recently we added EV charging station installation to our range of services. We also offer affordable solar and battery repair and post-installation servicing, repairs and maintenance, and are signatories to the NETCC (New Energy Tech Consumer Code) with all the required licenses, certificates, and qualifications, we also have memberships to peak industry bodies – Smart Energy Council, Clean Energy Council and NECA (National Electrical and Communications Association).

We will also be able to assist commercial, residential, or government customers with energy audits and suggestions with how they can reduce their electricity bill significantly.

If you go with Solar Integrity – you get access to an extensive range of long-lasting renewable energy solutions with strong local after sales service.

A handwritten signature in black ink that reads "Bobbi McKibbin".

**Bobbi McKibbin** - Solar Integrity







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## Why choose off-grid solar

Living off the grid has gained immense popularity in Australia as individuals seek greater freedom from traditional fossil fuel power sources. Sometimes there is also no choice as the cost of running powerlines to a remote property can be prohibitive. Key advantages include:

**Grid unavailability or high connection costs** - In many regional and rural areas, connecting to the grid can be prohibitively expensive, with costs exceeding \$50,000 plus. Additionally, some grid access cannot be obtained easily or quickly. Going off-grid becomes a practical and cost-effective solution.

**Financial freedom & energy independence** - One of the motivations for going off-grid is the desire to eliminate ongoing electricity bills. By generating your power at home without the grid, you free yourself from the constraints of fluctuating power bills, creating financial certainty.



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When the traditional electricity grid is down, an off-grid solar system owner still enjoys the comforts of an electrified home.

**Environmental sustainability** - Adopting an off-grid solar system contributes to a reduced carbon footprint. Solar power is a clean and renewable energy source that minimises environmental impact, helping individuals live more sustainably and contribute to the global effort to use less fossil fuels and combat climate change.

**Protection against electricity price increases** - Traditional grid-tied systems are susceptible to large electricity price increases. As we all know electricity costs have increased above the rate of inflation for some years. Going off-grid shields homeowners from unpredictable grid power price increases and creates certainty.

**Personal choice and philosophy** - Beyond practical considerations, off-grid living often aligns with personal philosophies and lifestyle choices. Many individuals choose to disconnect from centralised power systems as a form of self-sufficiency and to live in harmony with nature.



## How does off-grid solar works?

**Your options of power generation** - Among the off-grid powering options of solar, wind and hydro, solar power stands out for its simplicity, reliability, and cost-effectiveness. The absence of moving parts, the decades of field tested equipment and relative low maintenance requirements make solar energy an attractive choice. Also panels, inverter solutions and even batteries have reduced in price over the past decade.

**Enough energy storage is vital** - Reliable batteries are a major component in ensuring a consistent power supply, particularly during rainy and cloudy days or at night. Reliable battery chemistries include lithium and lead-acid (flooded, gel, and AGM), with lithium gaining popularity in newer off-grid installations due to its efficiency and reliability. For an in-depth exploration of battery chemistry contact us for further information.

**Types of off-grid systems** - Off-grid systems are categorised as either AC or DC-coupled, based on the scale of the setup. Smaller systems typically utilise DC-coupling with efficient MPPT solar charge controllers.



A camel is shown in profile, looking towards the right. It is standing in front of a large array of solar panels. The panels are mounted on a metal frame and are arranged in a grid. The background shows some trees and a clear sky. The overall scene is set in a rural or semi-rural environment.

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Larger residential systems may use either type, depending on the specific off-grid inverter and compatibility with solar inverters or solar charge controllers. The most modern inverters can accommodate both AC and DC coupling, offering a versatile and secure energy solution.

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## Misconceptions and realities

It's a common belief that assembling an off-grid solar system is straightforward. This may hold some truth for smaller setups like caravans or cabins.

However, larger systems, designed to energise homes and businesses, not only involve a substantial financial investment - often tens of thousands of dollars - but also demand meticulous planning, design and execution to avoid complications.

Expertise in considering factors such as household energy requirements, peak demand, solar exposure, and potential system losses is paramount.



**Make sure the size is right** - It is also very important to size the solar and battery system appropriately. This is where experience and excellent off-grid design skills come into play. If you design the system too small, then you will rely on back up generators too often. If on the other hand you design the system overly generous, than you could be wasting money.

Therefore estimating all your likely loads all year round is the 1st step to getting a perfect and reliable solution.

**Backup generation** - While designing an off-grid system without a backup generator is technically feasible, this approach has trade-offs that may not align with your preferences of reliability and comfort.



**Power constraints in bad weather** - Homeowners may encounter power limitations during adverse weather, risking power shortages despite reduced usage. Avoiding this scenario is crucial.

**Oversized systems for extended weather** - For long periods of poor weather, a large solar array and battery bank are needed. This can significantly increase off-grid system costs.

**Economic considerations in cloudy regions** - In areas with frequent cloudy weather, an excessively large solar and battery system may not be cost-effective. Combining solar, battery, and backup generators is often a more viable solution.

**Importance of personal consumption and location** - Your power usage and home location are critical in designing a reliable off-grid system. Our off-grid solar designers possess specialised skills beyond those of standard grid-connected installers.







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# Should I get an off-grid system?

Off-grid solar power offers a reliable and efficient way to generate electricity independently. The specific benefits are:

**Self-sufficiency and reduced reliance on the grid** - By generating your electricity, you become less dependent on the grid, increasing self-sufficiency and avoiding traditional electricity bills.

**Feasibility in remote regions** - The availability of grid connections does not limit off-grid solar. It is a practical solution for homes in remote areas, where grid connections are often less reliable.

**Weather resilience** - Contrary to concerns about power loss on rainy days, a well-designed off-grid system will power your home regardless of weather conditions. Days of autonomy ensures continuous power supply.



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### Considerations and cost estimates

Understanding your energy needs, considering scale, and factoring in associated costs are crucial steps in determining the viability of off-grid solar for your home.

The investment for a residential off-grid solar system can vary widely. A basic setup for essential electrical needs might range from \$15,000 to \$25,000, while more comprehensive systems for small, efficient homes may cost between \$25,000 and \$55,000.

As we see home electrification rising, customer needs are changing. All our off grid systems are custom designed to suit our customers needs and lifestyles.





**Energy usage and system size** - Understanding your energy needs is critical. That's why the first steps for designing your system include a detailed conversation with our inhouse designers and completing a load profile so we can understand what your needs will be.

**Economies of scale** - Larger systems benefit from economies of scale. For example, a 30kWh/day system would start at approximately \$75,000. These estimates exclude a backup generator and also depend on the Peak load capacity (how much power the system can release as a peak), the remoteness of the location, the sophistication of the monitoring system and the quality of the components.

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When evaluating the suitability and efficiency of an off-grid solar system for your home, pay attention to several crucial factors:

**Assessing energy needs** - Start by examining your energy consumption and usage habits. Look at your electricity usage, considering hot water systems, cooking appliances, temperature control, and household size. Understanding your energy needs ensures your chosen off-grid solar system meets your requirements and provides consistent, reliable power.

**System size determination** - After understanding your energy needs, decide the right size for your solar and battery system. Collaborate with our expert off-grid staff and design the PV system based on household size, consumption patterns, and desired level of independence. Our friendly staff will help calculate the solar array's kilowatt-hours and the batteries' required storage capacity.







**Sunlight and panel placement** - Assess sunlight availability, considering shading from structures or trees and your area's climate. Our specialists will identify the best location, orientation, and tilt for solar panels to optimise efficiency. If your roof is small, consider a free-standing/ground mount array.

**Future-proofing** - Think about your property's long-term plans, including potential expansions. Plan for a system that can handle future energy needs to avoid future retrofitting costs. For example, oversizing the system can be beneficial if you plan to add an electric vehicle soon.

**Days of autonomy** - Consider how many days you want your system to run independently during poor weather or low sunlight. This 'days of autonomy' affects battery storage needs. Including a backup generator that can provide support during extended bad weather, potentially reducing battery costs.

Each home is unique, so consult with our experts to assess your needs and find the best off-grid solar solution.

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## Getting off-grid solar

Here's a step-by-step guide to understanding the process:

### Step 1 - Load profile

In the initial phase, experienced and accredited off-grid designers collaborate with you to create a detailed load profile. This involves understanding your power needs by hour, day, and season.

The team ensures the system is designed to harness solar power for daytime needs while efficiently managing nighttime usage through battery storage. Heavy-use appliances may also be considered for generator power, especially when budget constraints come into play. It is also important to purchase energy efficient appliances when considering the off-grid solution.





A desk setup for engineering or design work. In the foreground, a solar panel is partially visible. Behind it, a rolled-up blueprint or architectural drawing lies on the desk. To the left, a black calculator is visible. In the background, a laptop keyboard is partially seen. The scene is set against a bright orange background with a curved white overlay containing text.

## Step 2 - Site assessment

For existing sites, on-site visits are conducted to determine equipment locations, shading factors, and roof sizes. Our designer works from site plans and aerial images for new builds or remote sites to gather the necessary information for the next steps.

## Step 3 - Design

With a comprehensive understanding of your energy requirements and site details, specialised design software is utilised to create a detailed system design.

This includes determining the optimal solar, battery, and generator capacity for your power needs and budget. Our staff walks you through any necessary compromises, providing clear advice on trade-offs between cost and functionality.



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### Step 4 - Build

While there are now do it yourself off-grid solar system kits available, please consider that you will be with limited after sales support if you choose this option. The initial savings will evaporate quickly in later years, when off-grid specialists have to go out to fault find and fix a system, that might not have been ideal from the start.

We construct and install our systems to best suit your needs and site.

### Step 5 - Installation

Complete installation services are provided by us and carried out by accredited and qualified staff. Depending on the complexity of the off-grid system it may take a few days for the installation and hand-over.





### Step 6 - Service & monitoring

Beyond installation, we offer additional services including monitoring and remote support capabilities. These minimise call-out fees and travel costs. Ongoing system servicing and maintenance are also provided to ensure continued optimal performance for many years to come.

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### Key benefits of living with off-grid

- ✓ Energy self-sufficiency – no more bills
- ✓ Monitoring and control over energy production
- ✓ Environmental responsibility
- ✓ Energy freedom

## What to watch out for

**Careful planning required** - Off-grid living demands meticulous planning, considering energy needs and consumption patterns. Proper sizing of the solar system and ensuring sufficient battery storage for energy reserves during low sunlight are crucial factors for success and an auto start generator that will allow you all the comforts of continuous power you are accustomed to on those dreary winter days/nights.

**Conscious energy usage** - Adjusting to off-grid living involves a heightened awareness of energy usage. Lifestyle modifications, such as employing energy-efficient appliances, turning off lights when not in use, shifting loads to daytime use when feasible, and reducing wasteful energy consumption become integral to a successful off-grid experience, without sacrificing comfort.

While off-grid living presents its challenges, the rewards are substantial. The autonomy, environmental benefits, and financial savings allows you to shape your energy future and positively impact the world around you.







Some old off-grid system have panels that are over 20 years old

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### Key components for off-grid success

Selecting the appropriate equipment and components for your off-grid solar system is essential to ensure optimal performance and long-term success. Given the multitude of options available in the market, making informed decisions that align with your specific needs and goals is crucial.

**Solar panels** - When it comes to solar panels, prioritise high-quality options from reputable manufacturers. Look for panels with high-performance ratings, low degradation rates, and extended warranty periods. A product warranty of no less than 25 years is recommended to safeguard your investment, ensuring that your solar panels operate efficiently over an extended period.

**Inverter solutions** - Choosing a suitable inverter is very important. The inverter converts the DC electricity generated by solar panels into usable AC electricity for your home. Opt for a high-quality, efficient special off-grid inverter such as for example Selectronics (Australian made) that aligns with your solar panel system. We can assist you in assessing capacity, reliability, and warranty details to ensure compatibility and longevity.

**Battery storage** - For off-grid solar systems, battery storage is critical for storing excess energy during periods of low sunlight or at night.

Historically, lead-acid batteries were the go-to option for off-grid systems due to their reliability and longevity. However, in recent years, lithium-ion batteries have gained popularity for their higher efficiency, lighter weight, and scalability. Each type has its advantages and considerations, from lead-acid's stability in emergencies to lithium-ion's rapid charging capabilities and compact form. We like the Australian made Power Plug batteries.

Enhance your off-grid solar system by selecting top-notch components for increased efficiency and longevity. Consult our specialist to find the right parts for your specific needs, ensuring optimal performance and long-lasting success.







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### Doing it right the first time

When considering off-grid solar systems, prioritising quality is fundamental, regardless of the specific provider. Ensuring the proper system sizing and selection of equipment and components plays a pivotal role in the performance and durability of your off-grid solar system.

Investing in high-quality components may entail a higher initial cost, but the long-term benefits far outweigh the upfront expenses. Quality components contribute to:

- ✓ Optimal performance and efficiency,
- ✓ Durability and longevity,
- ✓ Ongoing comfort and no surprises



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### **Safety and reliability are non-negotiable**

Off-grid solar systems involve the storage and distribution of electricity, making safety a critical consideration. You are now managing your own power station. Therefore quality components from reputable manufacturers are a must. They will lead to higher safety standards and stronger reliability.

### **Warranty protection and peace of mind**

Opting for quality components often comes with additional warranty protection, providing peace of mind for your investment. Key points to consider when picking the components include:

**Longer warranties** - Reputable manufacturers offer longer warranties, showcasing confidence in the quality and durability of their products.

**Strong coverage for malfunctions or defects** - A reliable warranty ensures coverage for necessary repairs or replacements in the rare event of a malfunction or defect.



Addressing concerns about upgradability is crucial for those planning to expand or modify their off-grid solar systems over time. Key considerations include:

**Plan for upgradability from the beginning** - It's advisable to plan an upgradeable system from the outset rather than attempt to upgrade later.

**Considerations for battery banks** - Lithium systems are generally more adaptable, allowing for expansion more easily than older technology.

**Preferred brands and upgradability** - Off-grid systems using preferred brands often come with upgradability options, ensuring compatibility with future models.

In summary, cutting corners on quality can compromise your off-grid solar system's long-term viability and effectiveness. Whether starting small or planning for future expansions, investing in quality components and working with reputable manufacturers ensures that your system operates at its full potential. Don't compromise on quality—it's an investment worth making for your family.



# Contact us for free advice or an obligation free quote

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