

Going Off-Grid on a solar system : A Journey of Liberation

The truth is always hard to swallow, but going off-grid is a risk one must be willing to take, along with anticipating the difficulties that build character and bring true joy. It's not an easy decision, but you must be prepared to face the consequences and costs that come with it however the price paid is liberation.

Choosing off-grid living encourages a cost-saving mindset. Daily, your main concern becomes: "How much power have we been supplied with from the sun, and how much can we use to get through the day and night?", that's the mindset developed.

One of the best off-grid solutions is solar energy. At first, the initial purchase may seem expensive, but in the long run, the total cost is often lower than the accumulated costs of conventional energy supplies over the years. However, the upfront price of solar systems can be higher than traditional energy sources.

I always advise: *"Know what you want, and know why you're doing what you want."* With such a mindset, it becomes easier to access knowledge and grow through it.

Scripture says, *"Despise not the days of small beginnings."* There was a time I knew nothing about solar panels, oh yes a true *city boy*, but when I made the decision to go solar and completely off-grid, that determination fueled my desire to learn. Through understanding how solar systems work, I gained the knowledge I once lacked.

"And God made two great lights; the greater light to govern the day, and the lesser light to govern the night: he made the stars also."
Genesis 1:16-18.

The sun is a gift from heaven. Anyone has access to the sun to use for their own benefits. Upon choosing solar energy is one of

the most remarkable decisions one can make; however, careful and calculated steps must be taken:

- **Consider your needs.**

Determine what you want to power and your daily energy requirements.

- **Consider the size of your farm.**

The scale of your operations will determine the system capacity you need.

- **Consider the activities on the farm.**

Energy consumption varies based on machinery, irrigation, lighting, and other operations.

- **Consider the type and brand of good-quality solar equipment.**

Choose reliable panels, inverters, and batteries with proven durability and efficiency.

- **Consider future expansion.**

Design your solar system with scalability in mind — your energy needs may grow, and planning for that now will save time and money later.

Choosing Solar: A Step Toward Independence

Not everyone is compelled to go solar — first, consider your needs and then decide. The beautiful aspect of solar energy is the *liberation and independence* it offers from the conventional power system in a quicker form.

The initial cost of a solar system can seem expensive, but in the long run, you will have spent far less than the accumulated costs of conventional electricity.

On our first farm, we found an already installed system designed specifically for lighting and not for plug points. The supplied energy source was prepaid, and that setup worked perfectly for us.

We didn't worry much about monthly bills, as we simply paid as we used.

Our current farm, recently purchased was already set up with a three-phase conventional electrical system due to the number of properties it serves. We decided to scrub off the conventional electrical system and install a complete off-grid solar system, therefore on selecting the type of solar setup, we had to choose an inverter powerful enough to accommodate both the farm's size and its existing electrical phase and the agriculture work envisaging. This means all of our electrical components must be compatible with the three phase electricity. For typical homes, i will recommend a single phase electricity which comes with very less costs.

Three-phase electricity is a type of electrical power system commonly used in large farms and factories, while single-phase electricity is typical for most homes. Here's your text with all bold formatting removed:

In our case, we decided to purchase a 12 kVA three-phase inverter, primarily chosen to meet the agricultural demands and power requirements of multiple properties. This setup provides greater power, efficiency, stability, and scalability.

You may be wondering, what is an inverter, panel or battery? A complete solar system primarily consists of solar panels that generate electricity from sunlight, an inverter that transform energy, and batteries that backup the energy. The power produced by the panels is DC (direct current) – the same type of current found in batteries. However, most household appliances, such as fridges and stoves, run on AC (alternating current). The following describes a basic layout of solar powered systems

Sunlight → Solar Panels → DC Power → Inverter → AC Power → Household/Farm Use

Therefore, a solar system requires an inverter to convert the DC electricity generated by the panels into usable AC electricity for the home. The generated energy also needs to be stored for later use, which is why the type and size of the battery are important considerations.

For a typical household without extensive farming activities (e.g., large-scale agricultural production), I would recommend a minimum 5 kVA inverter paired with a single 5 kVA battery. This setup would typically require around 5–6 solar panels rated at 550–560 watts each. Using a 5 kVA system as a benchmark, six panels at 550 W would produce approximately 3.3 kW ($550 \times 6 = 3,300$ W or 3.3 kVA) of power, assuming a power factor of 1. This type of setup is suitable for an average household with moderate energy use.

Solar system setup plan

Farm activities, such as large-scale crop planting, may require a reliable electric water irrigation pump if not using diesel or petrol generator. The selection of an electric water pump (centrifugal or submersible) must match the daily power output of your solar system. It is important to estimate how electricity will be divided between household use and agricultural needs.

A solar system with sufficient panels can generate enough energy to fully charge the batteries while still providing power for irrigation. Water pumps also have voltage and power requirements. For example, a 3 kW pump irrigating a 2-hectare field with sprinklers may require more than 12 solar panels if the system is also powering household appliances.

Some farmers purchase complete solar pump systems, which include a submersible pump, solar panels, and an inverter packaged . This approach allows irrigation to rely entirely on solar energy. Alternatively, a diesel or petrol pump can also be considered for field irrigation.

For other activities that use electricity intermittently, such as carpentry machines, energy demand is usually lower — around 1.1 kW per machine. These machines are often used in stages rather than continuously, so they generally do not threaten your solar power reserves.

However, high-power equipment like welding machines should not be powered by a solar system. A welding machine is essentially an inverter, and running one inverter from another inverter can be dangerous and damage the system. For such high-demand equipment, it is safer to use a diesel or petrol generator.

Choose Quality

“Whatever you do, work at it with all your heart, as working for the Lord, not for human masters.” Colossians 3:23

The essence of quality brings satisfaction when you invest in what you truly deserve. When choosing a solar system, there are certain brands you should avoid and others are designed to meet high standards of quality to choose from. Two panel brands I personally best recommend are Canadian Solar and JA Solar. Both offer high efficiency and advanced technology. Canadian Solar, in particular, is known for its cost-effectiveness and strong overall performance. Always ensure that your panels come with a warranty of at least 20 years. The reasons for recommending is because I've not heard of any injurious cases relating to the brands

mentioned even in poor installations.

When selecting an inverter, the top recommendations are Sunsynk and Deye. Deye is generally more affordable, while Sunsynk is renowned for its superior efficiency.

For your battery backup, the best option is lithium-ion batteries. Be sure to choose a capacity that matches the energy output from your solar panels to ensure a reliable and efficient system

“Cast thy bread upon the waters: for thou shalt find it after many days.” Ecclesiastes 11:1

Before making any solar system purchase, ensure that you conduct thorough research and prayerful. Seek advice from people who are already using solar panels for their off-grid living. One person's experience is never enough, gathering multiple perspectives will help you make informed and confident decisions. Keep in mind that many salespeople and installers are often eager to make a sale, which can influence you to make irrational decisions.