

Powering Profit: Leveraging Alternative Energy for Sustainable Business Success

1. Introduction

In today's unstable energy environment, businesses are increasingly turning to sustainable energy solutions to reduce operational costs, enhance environmental credentials, and prepare for a more sustainable future. This session explores the use of solar energy, batteries, and hybrid inverters in your business operations. We will also delve into the economic benefits, ROI calculations, financing options, and the fundamental workings of these systems.

Please take note that these systems are designed to handle a myriad of use cases. It is not generic, and a consultation process needs to happen before any hardware is installed. It can't be stressed enough that a professional should be involved.

2. Solar Energy Basics

How Solar Panels Work: Solar panels harness sunlight to generate electricity through the photovoltaic effect. This process involves the conversion of sunlight into direct current (DC) electricity.

Solar Panel Installation: Proper installation is crucial for optimal performance. Panels should be positioned to receive maximum sunlight exposure throughout the day.

3. Batteries for Energy Storage

Batteries in Solar Systems: Batteries store excess electricity generated by solar panels during the day for use during the night or on cloudy days, providing uninterrupted power supply. The most common battery type in Solar Systems is Lithium Iron Phosphate batteries, known for their longevity and deep cycle capabilities without significant degradation.

4. Super Hybrid Inverters and How They Work

Understanding Super Hybrid Inverters: Super hybrid inverters are advanced energy management systems that integrate solar panel power generation, energy storage, and grid interaction into a single unit. They offer a wide range of capabilities to optimize energy usage. These units can typically be interacted with via an app.



5. Solar system Calculation

To calculate the size of a Solar System for a business one must understand the following limiting factors:

- Panel Constraints: The amount of space available, shading, annual weather data, panel inclination and orientation, budget.
- Battery constraints: Space available and budget.
- Economic constraints: Finance available to fund a Solar project.
- Current generation available: Generators are typically present on commercial properties. The role of a generator must be determined. The following
 - Base load generation, if a solar system cannot produce enough to supply all the energy needs of the business.
 - Backup generation during load shedding or bad weather.
 - Time of day use e.g., evening loads, early morning.
- Determine the role of the Solar System:
 - Completely Off Grid, no generator backup.
 - Off grid augmented by generator.
 - Partially off grid: Can handle load shedding with limited evening consumption.
 - Cost saver, use solar to shave Eskom bill.
 - Load shedding solution.

The following example illustrates how a Solar System will be sized to get a commercial client completely off grid with generator backup.

1. *Gather usage information:*

- An energy logger should be used to gather usage data. This is important as the company's energy consumption profile throughout the day needs to be determined.
- Electricity consumption: How much energy your business consumes is a big deciding factor in how much electricity you use. Generally, most solar panel suppliers will review your existing energy consumption through your bills, half-hourly data, or any other consumption data. This typically tends to be in the total Kilowatt-hours (kWh).
- The size of your roof and available ground space: This is a key factor as it determines the number of panels that can be installed. It's also important to consider your roof stability: whether it can withstand the weight of the panels and how they'll be angled. Ground mount systems can take the shape of shaded car ports, awnings, or linear arrays.
- Solar availability: The amount of energy that solar panels can generate is dependent on the hours of sunlight you get in your area. The varying number of hours of sunlight will affect the number of solar panels that you'll need. Compare Cape town and Pretoria. Cape Town has long, dry summer days and miserable, rainy winters. Pretoria has dry winter days and summers with mostly afternoon showers.



2. *Analyse data and work out a load management plan.*

- A load management plan is one of the most crucial steps in alternative energy systems. In most cases, if this is not done, it will be to the detriment of the customer.
- Loads need to be identified during the data gathering exercise. It is important to know when loads are running, when they should be running, and if they are necessary at certain periods. An example can be a compressor switching on and off during the evening to keep the tank pressurized, geysers running at night, types of lighting and when they run, computers and borehole pumps.
- The way motors start up is also crucial.
 - Motor startup circuits include the following:
 1. Direct online: Very high startup current will influence Inverter sizing.
 2. Star/Delta: Common for large motors, outdated.
 3. Soft Starters: Gradual startup of motors, programmable.
- Planning needs to be done to determine how the loads can be reduced.
 - Employ star/delta or soft starters on motors. Employ motorized gates/louvers on the output of centrifugal fans.
 - Reduce/inhibit unnecessary loads at night: Put geysers on smart breakers, automatically inhibit compressors, lights, and borehole pumps with smart circuit breakers. Switch off computers.
 - Audit lighting, employ LED technology, use motion sensors to automatically switch lights on and off.

3. *System Calculation Considerations*

- *Inverter Type:* An Inverter should be chosen according to the results of the load management process. Hybrid Inverters come in various sizes and can typically be connected in parallel. The size of the inverter should be about 30% more than the average power consumption. Depending on the make, some inverters can handle spike loads of 20-50% of rated capacity for 5-10 seconds. This will be perfect for motor start up spikes.
- *Batteries:* Batteries are expensive and careful consideration should be made when planning your system. The primary function of batteries is to store energy when there is solar/Eskom/generator available, and then to release the energy when the primary source is absent.

Here are a few use examples:

- Release stored solar energy at night to run essential equipment like servers.
- When clouds obscure the sun, it will release stored energy to ensure stable supply.
- Load shedding, ensure essential loads are serviced.
- Release energy in the mornings and afternoons when solar is not available.



- **Solar panels:** The number of solar panels must be calculated to be able to achieve the required loads.

The time-of-day usage can also influence the orientation of the panels. If there is a requirement for early morning or late afternoon energy, some of the panels can be orientated east and west, with the bulk facing north. Motorized trackers can also be used where the panels are kept facing the sun through the day.

A typical calculation will look like this:

$$\text{Panel amount} = (\text{Daily Power Requirement}) / (\text{Panel Output} * 5.5)$$

The result must then be adapted to suit the input or MPPT profile of the specific inverter.

Load profiles can consist of the following:

- Grid tied cost saver: The panels will replace a component of Eskom /Generator usage. This will increase profit margins.
- Grid tied cost saver with battery backup. Excess solar can be used to charge batteries, this energy can then be released as required when solar is low.
- Grid tied with excess solar: When available, excess solar can be exported to the municipality or Eskom. This can be for profit or to use the utility as a virtual battery. You can export during the day and then import at night, making the net meter reading zero.

As you can probably see, these calculations must be done by a professional with intimate knowledge of the hardware.

6. Economic Benefits

- **Savings on Electricity Costs:** Solar systems can significantly reduce your electricity bills, helping your business save money in the long term.
- **Reducing Dependence on Diesel Generators:** By using solar energy and energy storage, you can reduce or eliminate the need for costly and polluting diesel generators.
- **Managing Energy Inflation:** Solar Systems insulate your business from rising electricity and diesel prices, providing stability in the face of inflation.
- **Optimized Self-Consumption:** Maximize the use of solar and stored energy, reducing reliance on grid electricity.
- **Energy Independence:** Ensure uninterrupted business operations during power outages without backup generators.
- **Grid Feed in:** Solar systems can feed back into the grid when there is excess energy available. Imagine a company that is closed on a Sunday, selling electricity to Eskom, increasing your profit!
- **Section 12B**
What is the section 12B incentive?



National Treasury is proposing to expand, for a limited period, the tax incentive available for businesses in terms of section 12B of the Income Tax Act.

Section 12B(1)(h) provides for a deduction in respect of the cost of machinery, plant, implements, utensils, or articles used in the generation of electricity through renewable sources.

The qualifying renewable energy assets must be:

- Owned by the taxpayer or acquired by the taxpayer in terms of an instalment credit agreement, as defined in the Value-added Tax Act; and
- Brought into use for the first time as part of the taxpayer's trade.

The deduction also applies to any improvements (other than repairs) to the abovementioned renewable energy assets and to any "foundation" or "supporting structure" that is deemed to be part of them.

The capital allowance for the cost of the renewable energy assets is spread over three years: 50% of the cost in the first year, 30% in the second, and 20% in the third. However, an exception is made for PV solar energy not exceeding 1MW, which is fully deductible in the first year of expenditure.

7. Return on Investment (ROI)

The current return on investment per annum on R100 000 is around 5.5% for property, 6.89% for SATRIX and around 6.25% in a call account. Now, thanks to Eskom's devastating price increases and rising fuel costs, you can invest that same R100 000 in a PV solar system (enough for a 5kW grid-tie) and you're looking at returns of 40.7%! Simply put, there is no other investment that offers this return plus the security of knowing you will have electricity.

Energy costs cut directly into your company's profit margin.

With the extra cash flow that a Solar system generates, company growth will be directly impacted.

Back feed to the grid will also have an impact on the ROI.



8. Financing Options

- **Bond Increases via Banks:** You can explore the possibility of increasing bonds to raise funds for your renewable energy project, facilitated by financial institutions.
- **Bank Loans and Other Funding Sources:** Traditional bank loans, as well as alternative financing sources, can be used to secure funding for your solar energy and super hybrid inverter projects.

These financing options can help you realize your renewable energy goals, reduce electricity costs, and enhance the overall sustainability of your business operations.

9. Environmental Benefits

- **Reducing Carbon Footprint:** Solar energy with super hybrid inverters reduces greenhouse gas emissions, contributing to a cleaner environment.
- **Promoting Corporate Social Responsibility:** Embrace sustainable energy to demonstrate your commitment to corporate social responsibility and environmental stewardship.
- **Meeting Sustainability Goals:** Achieve your sustainability goals and enhance your business's reputation by transitioning to renewable energy sources.

10. Conclusion

Incorporating solar energy systems into your business can lead to substantial cost savings, environmental benefits, and long-term sustainability. Embrace the power of solar energy to secure a brighter, more sustainable future for your business.

It is of the utmost importance that your investment in a solar system be done with a professional installer. It should be designed to your specific needs to ensure that there are zero interruptions and that you can experience an optimal ROI.

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