

Renewable Energy And The PS System

PV Solar and Wind Turbine

Performance

For an off-grid application Powerguard will supply the PS System. This is a generator control system that will give many years of reliable operation with minimum maintenance. Just as important the PS System will give that service consuming the minimum amount of fuel. We are dedicated to provide the maximum amount of electricity for every drop of fuel burnt.

The Powerguard PS System is the most fuel efficient system available.

Unfortunately many off-grid systems do not perform as expected and the main reason for this is that the extra complexity of an off-grid system is sometimes not appreciated.

The biggest proportion, over 98%, of PV solar installations are connected to the National Electricity Grid. This uses well tried and tested technology with all of the component parts required available in kit form from large companies. A grid-connected system supplies the energy produced to the property with any surplus exported to the electricity grid. Virtually all the power produced can be used because the electricity grid acts as a storage device.

Off-grid systems do not have the option of exporting power to the electricity grid and therefore require more complex power management to maximise efficiency. Many accredited companies with good credentials for the installation of grid-connected systems do not have any off-grid experience.

Powerguard specialise in off-grid installations and will supply a fully automatic and integrated system with all the components designed and manufactured to operate together in the most efficient way.

PV Solar Performance

PV solar gives its highest output during the months of May, June and July. The average output during November, December and January can be less than

25% of the average of May, June and July. Overcast and cloudy days have a lower output than bright sunny days. The good thing is that the power produced by PV solar although variable is still regular and relatively predictable.

Unfortunately the investment required to supply a normal domestic property with electrical power, continuously all day every day, that is solely derived from renewable energy is beyond the financial means of most people.

A PV solar array capable of giving the power required during a short overcast day during the winter months will be large and expensive. Likewise a battery to store enough energy produced during a short winter day to provide power for the rest of the 24 hour cycle would also be large and expensive.

Installations which seek to achieve continuous electrical power from renewable sources have the electricity consumption reduced to an absolute minimum. This can be inconvenient and increase the use of other fuels. Even so these arrangements often still do not meet expectations.

Generator Back-up

Virtually all off-grid systems using PV solar or wind power have to have a generator to guarantee the availability of electricity all day every day. The important question is how the generator is integrated into the system.

In most installations that do not use the Powerguard PS System the generator is controlled according to the state of the battery. When power from the PV solar is not high enough to replace the power going to the property the battery will discharge. When a low level is reached the generator will be started to add charge to the batteries. When the batteries are charged the generator shuts down and the cycle starts again.

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In the peak summer months the generator may only start for relatively short periods but during the remainder of the year will run longer and longer until during the lowest three months when it will run for long periods. This can be inefficient because the primary objective of starting the generator is to recharge batteries. Although on some systems the generator also supplies the load to the property when it is running there is limited control over when it starts or for how long.

During the periods of high renewable energy the generator run time will be at its minimum. However during the periods of low renewable energy the PS System will still manage the generator to reduce run-time and maximise the fuel efficiency as much as possible.

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The result of the lack of control can be an inefficient system for two main reasons as follows:-

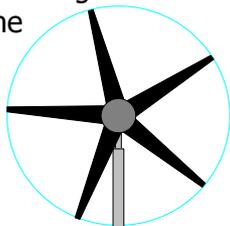
- A large proportion of the power provided to the property has been converted from AC from the generator to DC to charge the battery and then back to AC again using the inverter. This will waste over 22% of the power in the conversion increasing fuel consumption and increasing costs.
- The generator will run for long periods lightly loaded increasing the fuel consumption per kWh and increasing costs.

In a suitable site a wind turbine will produce significant amounts of energy but may not produce any for days or even weeks. For this to provide continuous power an impractically large battery would be needed.

The output from PV solar can be complemented by a wind turbine. This is because the output of the PV solar is higher in the summer when the wind is lower and the output of the wind turbine is higher in the winter when the power from the sun is lower.

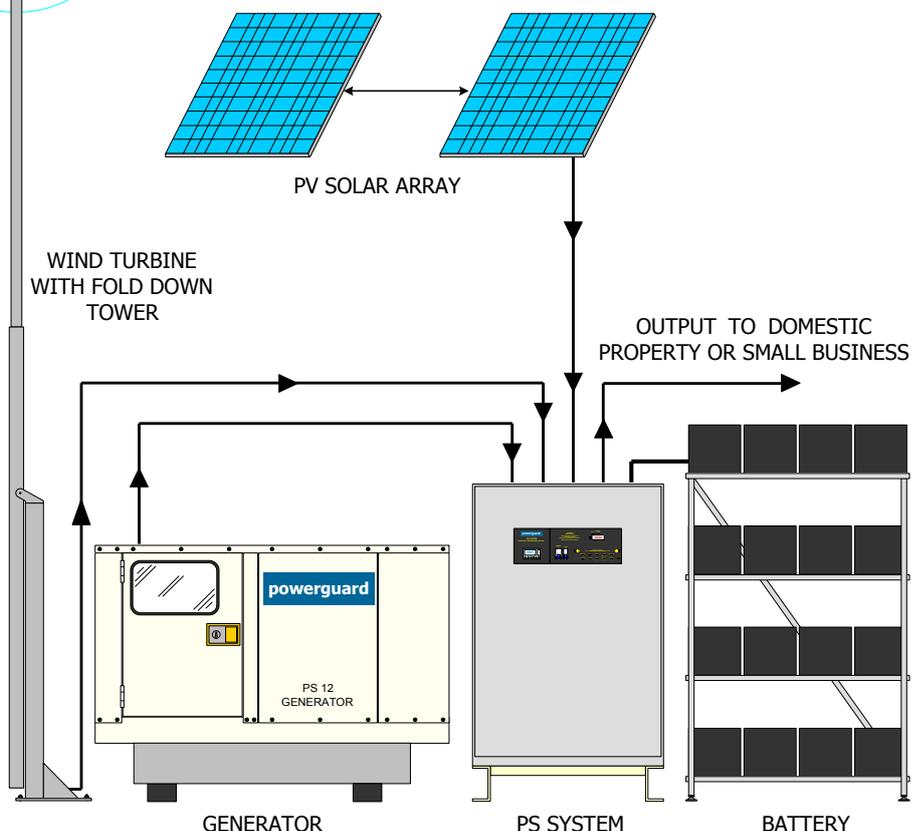
Powerguard are more and more recommending a PV solar solution over a wind turbine. PV solar is reducing in price and there are no moving parts requiring regular service.

On many off-grid installations using PV solar and a generator the annual run-time of the generator and the fuel used will be greater than a Powerguard PS System on its own without the PV solar.



The Powerguard PS System is the most fuel efficient generator control system available. The control manages the generator and battery charging in a sophisticated and efficient way. The run-time of the generator and the fuel consumption is cut to a minimum.

A Typical Powerguard Off-grid System With Wind And Solar Renewable Energy



Powerguard PS System

The Powerguard PS System combined with a PV solar array and/or wind turbine is an ideal off-grid power system. The generator run-time and fuel consumption already controlled to a minimum will be significantly reduced when the contribution from the renewable energy source is utilised.