Hybrid Power

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Energy whenever, wherever
The actual estimation of people who do not have access to the main power network in developing countries is estimated to be in the billions.

In such cases, photovoltaics, diesel/alternators, co-generation are solutions used to provide local electrical energy, in addition with batteries.

Per Watt AC power from an inverter is generally more expensive than a generator. So why would one add an inverter to an AC generator system?

Apart from the obvious advantages of "silent ac-power", there are major considerations why it is attractive to add an inverter/charger and an additional solar charger to a system with an AC generator:

- **Fuel Savings due to lower fuel consumption**
  A typical 7.5kW generator will consume about 1.5l/h diesel at low loads and 2.3l at 75% load. So the "generator only" configuration requires high consumption of diesel per day, whereas the "generator with an off-grid inverter & PV power" configuration requires a lot less diesel to provide the same AC power.

- **Cost and time savings as a result of reduced maintenance / Extended generator life**
  Generators based on a fixed speed diesel engine will last longer when they are run under load compared to being run at no or low loads. Some manufacturers recommend operation at a minimum of 30% load to prevent premature failure. By adding an inverter/charger, the load on the generator can go up and will offer a considerable longer life, than may be expected running purely on the load required. This method of activating the generator in an optimised method will reduce the maintenance due to a lower running time.

- **Environmental Impact**
  The result of reduction of running hours will reduce the harmful exhaust and oil waste from the AC generators significantly.

  Using intelligent bi-directional inverters, which makes use of a power demand control function, can improve the efficiency of a hybrid system by under dimensioning of the generator size. Under dimensioning of a generator compared to the peak load required and operating it at a more constant power allows gain in efficiency. Choosing a smaller generator will of course reduce noise, size, weight, fuel consumption and initial investment.

- **Smaller Battery Size**
  The battery size needed is smaller than what may be expected due to the fact that the energy is supplemented by alternative energy elements active in the system.

Features of our complete Hybrid Power solutions:
- Simple Operation
- Easily transported to the site
- Completely engineered as a turn key solution
- Temperature regulation for longer component life
- Includes mountings for PV array.
- Can be shipped and installed anywhere in the world
The **perfect off-grid power solution** for small and medium Hybrid power solution requirements

Say goodbye to noisy and energy inefficient fuel only powered systems. With engines that run around the clock. Bid farewell to wasting vast amounts of energy, polluting the environment. And the expenses of high maintenance due to frequent service intervals. Welcome to the future of Hybrid Power Solutions. Our solutions produces continuous power to any required load with the least amount of maintenance and fuel required.

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The system derives most of its energy through the solar Photovoltaic (PV) array. The PV array supplies DC power to the inverter during the day and at the same time charges a bank of batteries. The inverter converts the DC power into 220 VAC, as required to operate appliances, tools, office equipment and more. At night time the batteries supply power to the inverter thereby providing reliable power 24 hours a day. There is an AC generator in the system to charge the batteries via the Inverter/charger during heavy energy usage or for periods of poor sunshine. This solution is engineered and programmed to fully interact with one another. Therefore there is no operator required to operate the system.

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There are potentially huge benefits and cost savings to be made when an inverter/charger is added to a hybrid system. However there are many inverter/chargers on the market that cost a lot less than a bi-directional inverter, however the state of technology for these smart inverters used in hybrid systems and mini grids have gone further in the last few years. This is marked by the investigation toward new power electronic topologies, but mainly by more intelligence added with the use of digital control. It allows the use of sophisticated algorithms at every level to build smarter systems. The new control possibilities also give a lot of flexibility and allow building new system topologies where PV, wind, generator sets and batteries are mixed. The battery inverter device is integrated in a system where all DC and AC coupling are possible.

The inverter is ideally placed to control the power flux, being at the interface between the different AC-source (inverter input/output), AC-loads and between AC and DC.

It is now well accepted that the hybrid systems offer a suitable solution for the rural electrification. Standard configurations are now the use of a DC bus, or an AC-bus or a mix of DC and AC bus. Every single system tends to be a unique mix of elements that can be used to optimise the requirements.

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1. **Grid Tie Inverter** *(Green Energy source)*
   Power is generated by the Grid-Tie inverter and supplies power to the load up to 97.8% efficiency. (Effectively reducing the power required by the inverter to supply the full load).

2. **Grid Tie Inverter** *(Green Energy source)*
   The Grid-Tie inverter can also be used to charge the batteries via the bi-directional inverter under low load conditions.

3. **MPPT solar charge controller** *(Green Energy source)*
   Power is generated by the MPPT solar charge controller and will supply power to the input of the inverter. (The inverter is programmed to use the solar input power first, before cycling the batteries).

4. **The generator (DC charger)**
   Batteries are charged or kept in a float condition using diesel or petrol as a source.

5. **The generator (AC power source)**
   The generator supplies the AC power to the load via the bi-directional inverter. The generator will automatically be started or stopped depending on the state of charge of the batteries.
The perfect off-grid power solution for large Hybrid Power solution requirements

Supplying energy to facilities is a major challenge for their operators. A frequent reason is the disproportionately high costs of connection to the existing grid, not to mention logistic and approval hurdles and the time-consuming task of setting up the physical connection.

Given the scalability of our hybrid energy sources, the independent and semi-mobile power solution, provides an economical, readily available alternative to grid-tied electricity.

Even after erection of the plant you can keep an eye on energy availability. Besides we offer you remote monitoring of system component performance data. Be it as a temporary or permanent solution, in Africa or anywhere else in the world – we guarantee that your technical infrastructures and systems are powered up fast.

Sunny boy AC grid inverter
The Sunny Boy is ideal for the most common island connected solar power systems. The wide input power range enables a diversity of combination options with all current cell technologies and the extensive display and communication options make the Sunny Boy the perfect choice for your system.

Sunny Island hybrid power systems based on AC-bus line
- Flexibility by coupling all consumers and generators on AC bus line
- Different local renewable and conventional energy sources are suitable to form a Hybrid grid
- Simple expandability
- Extension of a wind based power systems
- Use as a backup solution in weak public grids
- Upgrade flexibility with all modular components

The hybrid power solution, can provide consumers not connected to the conventional power grid with electricity (preferably generated from sun and wind) 24 hours a day, 365 days a year. Other energy sources like a small hydro-electric power station can be optionally integrated.