

CASE STUDY

POWERING OFF-GRID TELECOMMUNICATION- BASE STATIONS



UNINTERRUPTED
CONNECTIVITY



SUSTAINABLE
ENERGY SOLUTION



RELIABLE POWER
ANYWHERE



BUILT FOR REMOTE
ENVIRONMENTS



Powering Off-Grid Telecommunication Base Stations using Innovative Diesel Generator Technology with Solar and Wind Power



Key Features

- Conventional constant speed diesel generators are typically oversized – has higher fuel consumption and maintenance if run at light loads over extended time period. Engines that are lightly loaded build up carbon around the valves and exhaust lines (wet stacking), this creates additional engine maintenance.
- Hybridgen is designed and optimized to deliver the high currents at low voltages required for 48 V-battery charging and operating DC loads. No battery chargers or power supplies are required.
- When the battery is charged, the engine automatically shuts down. On the other hand, when the battery discharges below the set minimum, the engine restarts.
- Variable Speed Operation to improve fuel efficiency Reduces Fuel Consumption (typically by 50 - 80%)
- PV and small-scale wind generators can be easily incorporated to supplement the system and saves on fuel consumption.
- Remotely monitors engine, alternator, battery, solar, PV and wind parameters and sends an alert in the event of a problem.

"Nearly 639,000 off-grid base stations, the pieces of equipment which provide cellular network coverage, will be rolled out by 2012 across South and South East Asia, Middle East and Africa where grid availability is among the lowest in the world."

Why Telecom Base Stations?

communications industry estimates that "nearly 639,000 off-grid base stations – the pieces of equipment which provide cellular network coverage – will be rolled out by 2012 across South and South East Asia, Middle East and Africa where grid availability is among the lowest in the world". Energy accounts for up to 60% of network operating expense. Corporate policies are also in place to reduce carbon footprint.

Until now, the only solution has been to install and run diesel generator sets, with all the inherent problems associated with fuel cost, fuel delivery, maintenance, servicing and reliability demanded of these installations. Recognising this problem, Regen Power has developed a range of professionally designed renewable energy power solutions incorporating an innovative variable speed diesel generator, Hybridgen, solar (PV) modules and small wind turbines.



Hybridgen - variable speed diesel generator

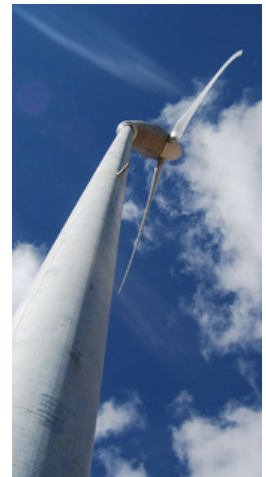
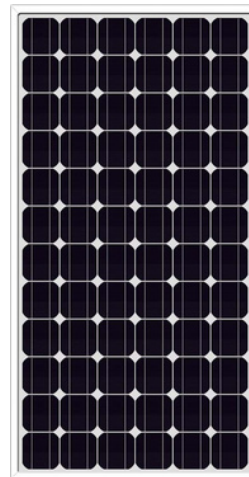
Hybridgen consists of the following:

1. Diesellengine
2. Alternator
3. Rectifier and LC filter
4. Digital controller
5. Battery monitoring system
6. Engine monitoring / protection system
7. Base plate, coupling & Acoustic enclosure
8. Fuel tank capacity 100 ltrs
9. Electronic governor / Actuator for variable speed

The Hybridgen system for base stations makes use of solar PV, and / or wind generators to produce electricity that can be supplemented by the innovative load following variable speed diesel generator. Hybridgen has three components: (1) An Engine Management Controller, (2) a Battery Management Controller and (3) an efficient Battery Charge Controller

The charge controller operates by running the engine at the optimum speed at which the fuel consumption is minimised. In addition, it safely protects the battery from over-charge and over-discharge when using multiple sources of energy (solar PV and wind). The engine speed is automatically controlled depending upon the state of charge of the battery, the load and the power from the PV panels. The main objective of the hybrid system is to provide uninterrupted power at minimum diesel runtime and fuel consumption. The engine is automatically started when the

battery reaches a preset discharge level and is then run to charge the battery to a float level and supply the load.



Solar PV and small-scale wind generators can be easily incorporated to supplement the system to save on fuel consumption.



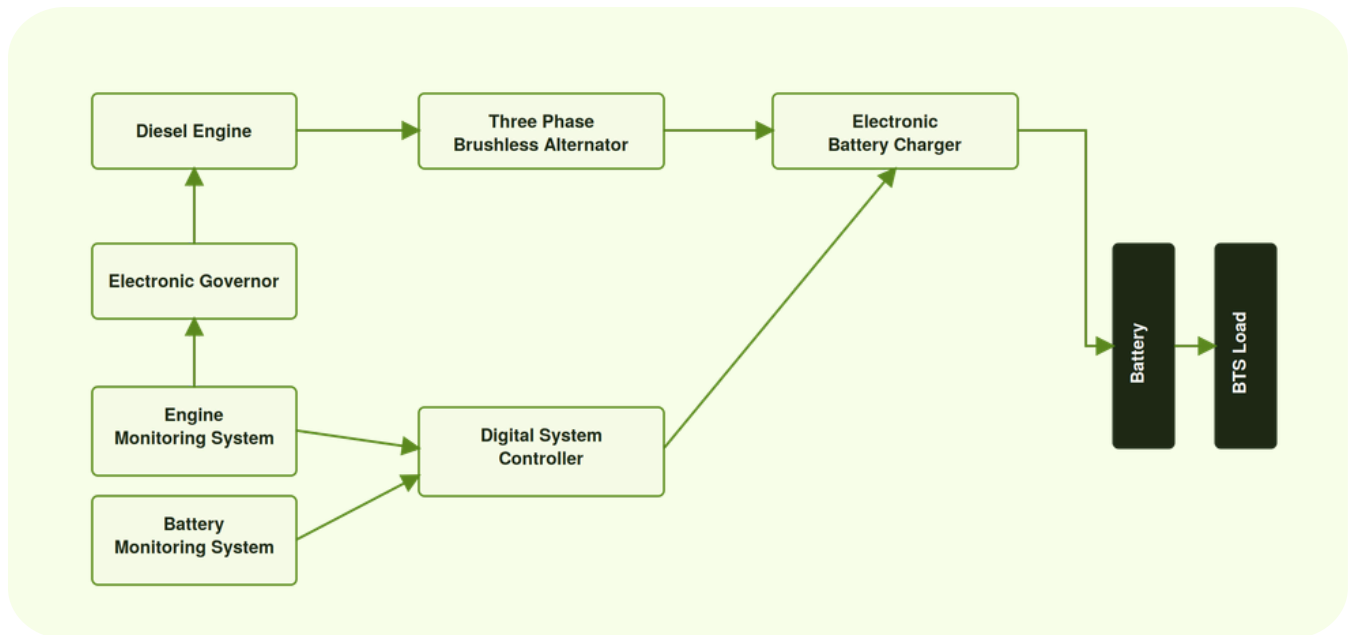
HYBRID GEN
Variable Speed Generator

Community Power

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A significant opportunity exists to provide environmentally sustainable energy to people in the developing world who live beyond the electricity grid. And it is the mobile telecoms industry – which has already brought phones beyond the fixed telecoms grid - which holds the key to this next infrastructure innovation.

~ [GSM Association January 2010, Community Power, Using Mobile to Extend the Grid].



Hybridgen BTS Power System

According to the report, the opportunity exists for mobile network operators to provide electricity beyond the base station and into local communities, a phenomenon which the GSMA Development Fund calls “Community Power”. The consistent power requirements of a mobile base station provide a stable “constant load” demand for a bigger investment in a village energy system, powering both the station and local homes and businesses. Community Power not only provide social benefit to these communities but also is about improving the business case for off-grid telecoms by (a) growing revenue streams, (b) improving base station security, (c) charging mobile phones for increased usage, or (d) outsourcing power provision to third party companies to achieve lower cost of power.

Typically with more than 5 kilowatts (kW) of excess power each, the off-grid base stations can be used to charge a range of devices such as mobile handsets, lanterns and household batteries, and ultimately, to power businesses, clinics, vaccination refrigerators, schools and homes. The off-grid base stations are often physically close to villages which means that communities will no longer have to waste time travelling long distances to charge devices.

Renewable sources of energy such as solar and wind are suitable for Community Power solutions. The GSMA forecasts that there is potential for 200,000 Community Power projects worldwide, which could provide sustainable electricity to 120 million people.

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