IFC International Finance Corporation
World Bank Group

GSMA Green Power for Mobile

In partnership with the Netherlands

# GPM Vendor Directory February 2013

# Introduction

## The Green Power for Mobile programme is a joint GSMA and IFC initiative in partnership with the Government of Netherlands. The programme aims to promote green power to the mobile telecom industry.

Extending mobile beyond the grid is one of the biggest challenges for mobile operators in developing countries. Without the right partner, the objective of deploying financially viable green solutions will never be possible. As there are hundreds of solution providers in the industry, the objective of this vendor catalogue is to bring the industry together and make profiles available to mobile operators in order to provide them with a primary understanding of different vendor competencies, availability and solutions.

The Green Power for Mobile (GPM) programme released a Request for Information (RFI) to seek information on the capabilities, products and services of:

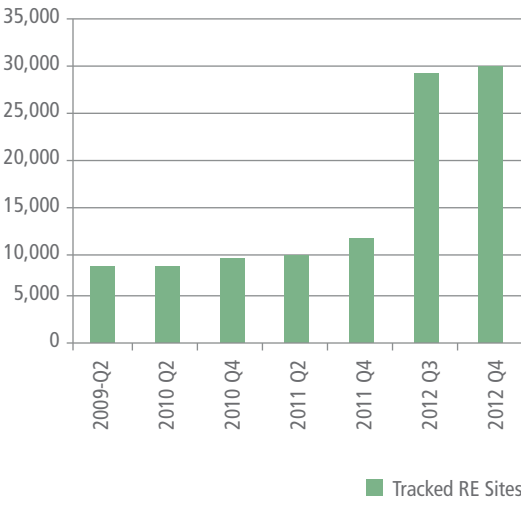
- Equipment manufacturers of renewable energy equipment selling into the telecoms sector at commercial scale
- System integrators deploying renewable energy systems on behalf of mobile industry clients
- Telecoms equipment vendors with renewable energy solutions
- Energy service companies (ESCOs) providing Power Purchase Agreements (PPAs) for base stations
- Small Off-grid Energy service companies (ESCOs) which provide Power Purchase Agreements (PPAs) for base stations in parallel to providing power to the local community
- Pay-as-you go solutions for energy access that utilize mobile payments, scratch cards or embedded technology and seek to distribute products with the support of mobile operators
- Last-mile distribution companies which can support product suppliers and mobile operators distribute phone charging solutions

A significant growth in green solution deployments has been seen over the last few years in the telecom, as can be seen in Figure 1 (right).

This was possible because of good interest from Mobile industry and strong penetration from equipment vendor or solution providers. The overall progress so far brought an investment of approximate $1.06 Billion to deploy what we achieved so far, which eventually saved 1.67 million tons of CO2 emission every year[1].

Through this vendor catalogue the GPM wants to create closer relations between service providers and mobile operators so that the green deployment can become scaled.

Figure 1: Tracked Renewable Energy Sites




1 GSMA Market research

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# Alta Energy

ALTA-XinTong's Solar/grid Power system in a grid deficit location (no DG)

## Company Background

ALTA-XinTong is the leading provider of 3rd Generation, fully Integrated Solar hybrid power systems for telecom towers. We set the standards for "All DC" solar power systems for solar telecom towers in China and have a track record of more than 9,000 autonomous solar telecom systems. Our patented MPPT controllers are designed and produced in-house.

We offer "All DC" solar power systems customized for the India telecom industry. Our customized solutions come with remote monitoring capabilities and web based night vision surveillance system. Our solutions eliminate the use of diesel and reduce operating expenses by 90%. We don't just offer clients a solar System; we provide a turn-key solution that is sustainable and economically viable.

- The 1st to Supply All DC Solar Power Systems to Chinese Mobile Operators.
- Developed Technical Specs for All-DC Solar System for Communication.
- Equipment.
- National Patent -MPPT (Max Power Point Tracking) Solar Controllers.
- ISO9000, CE and National Electrical & Electronic Inspection.
- 14 years hands on experience in integrated solar control systems.
- 9,000 Solar Telecoms Power Systems in China.

Our potential clients are major mobile operators and tower companies in emerging and developed economies.

**Solar/Grid system Flash presentation:**
http://www.webdesignpis.in/flash/
Press release: http://altaenergy.in/news.html

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Technologies Pvt Ltd
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2nd Cross, HAL 2nd stage
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+91 9620211240
+91 9620058110

# Ameresco Solar

AMERESCO SOLAR
Green • Clean • Sustainable

## Company Background

Ameresco Solar is the world's most experienced off grid and poor grid renewable energy solutions provider, whose core personnel have collectively 300+ years global experience in the design, engineering and project management of solar, hybrid and cycle charge power systems, with many working in the industry for over 20 years.

With tens of thousands of successful installations worldwide since the 1980's, ranging from simple standalone solar systems to complex hybrid power solutions with extensive remote monitoring and control capabilities, our experience in providing reliable and economically feasible renewable power solutions for the global telecom industry is unsurpassed. Ameresco Solar power solutions offer the network operator a strategy to significantly lower OPEX while providing a quick return on investment (ROI).

## Product and Services

Renewable energy power solutions are offered to the global telecom industry including standalone solar, solar/diesel hybrid, solar/diesel/wind hybrid, solar/fuel cell hybrid, and cycle charge (CDC) system solutions.

Our services include the design, engineering, integration, installation, and training of solar, hybrid and cycle charge power solutions for sites without access to the utility grid, access to poor utility grid, as well as retrofitting existing telecom sites operating primarily off diesel generators, resulting in significantly lower OPEX.

## Geographic Footprint

**Worldwide:** Africa, Asia, SE Asia, Middle East, Americas.

**Client List**

Angola Telecom
Tigo DRC
Indosat Indonesia
Telkomsel
Mobitel Cambodia
Wataniya Maldives
Telesur Surinam
AT&T USA
Tigo Guatemala
Verizon USA

"Ameresco Solar has supplied multiple photovoltaic and hybrid power systems to QTEL Group OPCOs. Their engineering knowledge and experience of the renewable power systems are commendable and their after sales support to the Group has been excellent so far. We look forward to continue working with Ameresco Solar."
Qtel International

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# Apollo Solar

## Company Background

Apollo Solar provides the total power solution for pure solar or hybrid solar/diesel systems including Real Time Remote Monitoring. We make the complete Power System for any size off-grid Telecom tower. Apollo is the primary source for the hardware and software which allows us to offer Service Level Agreements to keep your systems running.

Beginning in 1971, the Apollo team at Apollo Solar established a reputation for reliable power electronics. Today Apollo Solar is a leading supplier of solar power electronics to the telecom industry, including Remote Monitoring. Apollo Telecom Systems, designed to meet the technical requirements of global telecom leaders are deployed on every continent. Telecom companies depend on Apollo for the performance and reliability in all environments. The highly regarded Apollo PV for Telecom (PVT) systems are made in the USA and available globally to Telecoms, Tower Operators, Energy Service Companies, Power Providers, and Solar Integrators worldwide.

## Product and service description

Apollo Solar builds on the T80HV MPPT 80A High-Voltage Charge Controller, the 4kW TrueSineWave Inverter/Charger, Combiner Boxes, and all required circuit breakers and connectors to provide reduced-cost installation and operation of BTS and DAS Telecom sites. For 4.2kW to 33.6kW of PV input, Apollo supplies the benefits of optimized MPPT PV energy harvest, sophisticated thermal design for reliability, unique charging protocols for extending battery life, advanced lightning/surge protection, and integral real-time remote monitoring in IP66 cabinets sealed against water and dust. Instant alarm reports and charts showing history of all key parameters with detailed diagnostics result in maximum uptime, optimized system efficiency, and reduction in diesel fuel expense. System performance and alarm monitoring makes Apollo the only supplier providing the complete electronics solution from one source. Apollo PVT Systems solutions carry a standard 5-year warranty and Service Level Agreements with 24/7 monitoring, rapid on-site service, and warranty extensions are available.

## Geographic footprint

Apollo Systems are installed and operating on every continent.

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# Applied Solar Technologies (AST)

## Company Background

Applied Solar Technologies ("AST") is green and renewable power solution company in India. During last three years of operations in India AST has acquired expertise to deign, deploy and operate green energy solution based on solar PV and HFC for variety of off grid applications in telecom, oil, banking and community power sector.

AST has deployed solar PV panels of more than 10MWp. AST provides off grid solar power currently to telecom towers which often rely on diesel based generation for 50 – 100% of their power requirements. AST builds and operates these solar installations and takes over the power supply management of each site. It uses a combination of solar PV, battery back-up and diesel generator making it a hybrid energy solution that optimizes the usage of various sources through a controller. The optimal usage of these sources results in decreased diesel consumption, increased battery life and reduced diesel generator maintenance and replacement costs resulting in savings for AST's consumers.

## Product and services

We offer a complete range of services covering energy survey, solution design, supply, installation and power supply management for renewable hybrid energy systems based on solar PV and HFC for telecom towers, community power, petrol stations / GAS stations and bank ATMs.

Our solutions offer superior remote monitoring functionality for efficient system control with our proprietary network management system providing solution performance information, data logging and alarm management.

## Scale/Maturity of enterprise

- AST has installed and is managing solar hybrid passive power infrastructure at more than 2100 telecom towers, Gas stations and Bank ATMS.
- AST completed successful pilots of HFC on telecom tower sites and is readying for commercial deployment.

## Geographic footprint

Currently in India – Bihar, UPE, UPW and MP states. Plan to expand to Africa and ASEAN countries.

**Client List**
Bharti Infratel
Indus Tower
Idea

"Applied Solar Technologies India Pvt Ltd. (AST) introduced its 'Hybrid Solar Power Systems' in India in August 2009. Concept of solar solution at tower site was conceptualised by Infratel and Solar DG hybrid model was co-developed by Infratel & AST and it was 1st implemented at 500 Infratel sites in Bihar (India) by AST. After successful implementation, this model was accepted by the entire telecom tower industry in Bihar, UP East and UP West states.

Bharti Infratel

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# Ballard Power Systems

Ballard ElectraGen™- ME Fuel Cell System for Backup Power

## Company Background

Headquartered in Burnaby, British Columbia, Ballard Power Systems Inc. (TSX: BLD; NASDAQ: BLDP) provides clean energy fuel cell products enabling optimized power solutions for a range of applications. We are recognized as the world leader in design, development and manufacture of zero-emission proton exchange membrane (PEM) fuel cells and are focused on accelerating commercial adoption. Ballard's products and solutions deliver tangible improvements over incumbent technologies across a range of stationary power and motive power applications.

In addition to delivering improved business results for system integrators, OEMs and end-users alike, our fuel cell products afford major environmental benefits. With our proven technology, comprehensive range of fuel cell products and services, unsurpassed field experience and teams of highly-skilled people we have what it takes to create smarter solutions for a clean energy future.

## Product and service description

For telecom service providers, power outages can be devastating. Fuel cell backup power solutions for telecom offer numerous compelling advantages over conventional lead-acid battery and diesel generators in backup power applications.

Ballard offers a comprehensive portfolio of backup power systems, scalable from 2kW and up, to meet a range of application requirements.

Ballard's fuel cell systems for backup power are designed for high reliability, long life, minimal maintenance and provide extended runtime at an attractive lifecycle cost.

The ElectraGen™ family of fuel cell power generation systems, fuelled by either methanol or compressed hydrogen, provides backup power for both 'short duration runtime' and 'extended duration runtime' requirements. Ballard's ElectraGen™ systems offer proven financial and environmental advantages in comparison to lead acid batteries and diesel generators.

Ballard and our global network of partners provide complete, proven solutions that can be implemented rapidly and easily, providing end-to-end support for a range of application requirements.

## Geographic footprint

North America, Europe, Africa, India, China, Indonesia, Japan, and Australia.

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**Client List**

China Mobile
Idea Cellular
Motorola
Nokia Siemens Networks
Orange
SINE Network
PT Hutchison
CP Telecommunications
Telstra
Vodacom
Wind Mobile

"Integrating fuel cells with our base stations can significantly increase the resilience of the mobile networks we provide."

Nokia Siemens Networks

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# Cell & Sat

## Company Background

Cell & Sat develops innovative products to optimise the Total Cost of Ownership of remote GSM sites. Cellular coverage of rural areas, in particular in emerging countries, is crucial to reach the "Bottom of the Pyramid" users. New technologies allowing to reduce CAPEX as well as recurring OPEX can ensure that this demand is met in a cost-effective way.

Cell & Sat has developed a system optimizing combined cellular, solar power and satellite backhauling operations. This system is designed as an add-on to remote site operations and is independent of the GSM and satellite vendors' equipment.

## Product Description

Building on its generic system architecture Cell & Sat has made available on the market the agama© product line. This system is specifically designed as a solar only charge controller suite for small sites (less than 300-500 W) with remote management and central supervision and control. Further the agama© Phone Well™ application provides Mobile Network Operators with a tool to flexibly tune the power consumption of remote sites and therefore reduce the number of solar panels they require, enabling alternative site designs and considerably reducing the otherwise prohibitive costs of logistics and site building. In the case of satellite backhauling, the agama© Phone Well™ application allows to share the satellite bandwidth amongst several sites, a significant OPEX reduction factor.

Through its focus on remote cell sites, Cell & Sat has acquired a strong expertise in their business case and technical aspects and can also provide consulting advice to Mobile Network Operators, Satellite Operators or Service Providers as well as System Integrators.

## Geographic Footprint

Worldwide.

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# Clean Power Systems

## Company Background

Clean Power Systems ("CPS") was established to address the diesel consuming power issues within the mobile network infrastructure space. Unlike traditional renewable product companies, CPS systems, including delivery, installation and maintenance, typically provide payback periods of less than 1 year based on the extremely inefficient and highly pollutant nature of the power systems within the markets we serve.

**Client List**

- All Major Tower Leasing Co's in Africa
- Telecom operators customer's are not public information – confidential until officially authorized for release of information
- LeBLANC Group

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CPS provides end-to-end power solutions that dramatically reduce diesel generator runtimes, diesel fuel consumption and overall operating expenses for mobile network operator ("MNO") tower sites in developing markets where power is unreliable or unavailable.

The technology has been proven and tested in CPS core markets of Middle East & Africa. CPS provides system audits, designs, equipment, delivery, installation and ongoing support services for all of its solutions

## Product and Services

Our systems are engineered to the highest levels of quality and performance and have been proven on 1,000's of site deployments in the most challenging power environments.

CPS Solutions serve 2 primary types of sites:

- **Off-grid sites** where diesel generators are primary source of power, running 24/7
- **Poor-grid sites** where grid power fluctuates in voltage or has phase failures, causing the diesel generator to power the site

CPS SolSite Systems provide solutions with total OPEX savings in excess of 70%

- SolSite Hybrid Generator/Battery Platform for off-grid sites
- SolSite Line Conditioning Platform for poor-grid sites
- SolSite Renewable Platforms for solar/PV & Wind turbines

All SolSite Systems:

- Renewable Ready for upgrades to Solar or Wind at any time
- Include our Remote Monitoring & Management System: "SolSite Manager"
- Full System Performance Monitoring & Management System

## Financing

OPEX financing models are available through our banking partners.

## Geographic Footprint

**Africa:** Kenya, Uganda, Tanzania, Sudan, South Africa, Namibia, Ghana, Burundi, Congo, DRC, Niger, Mali, Gabon, Senegal, Mauritius
**Middle East:** UAE, Saudi Arabia, Pakistan, Afghanistan, Iraq, Egypt
**Latin America:** Bolivia, Panama, Costa Rica, Peru, Argentina, Brasil, Chile, Ecuador, Colombia, Haiti
**Asia Pacific:** Malaysia, Indonesia, Australia
**Europe:** Spain, UK, Czech Rep

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# Delta Group

## Company Background

The Delta Group is the world's leading manufacturer of switching power supplies and DC brushless fans, as well as a major supplier of power management solutions, components, visual displays, industrial automation, networking products, and renewable energy solutions. Our mission is to provide innovative, clean and efficient energy solutions for a better tomorrow.

**Client List**

Vodafone Turkey
Mail.ru
Orange Poland
Togocell
Etisalat MISR
Saudi Telecom
Motorola/NSN
MTN Networks
Maroc Telecom
Mobilink Pakistan
Qtel Group
Zain Group
Mobinil Egypt
Mobily Saudi (Etisalat Saudi)
Saudi ITC

Energy Management

We revolutionize telecom power market standards by bringing energy efficiency to the system level. Our cutting-edge control and monitoring solutions include the most efficient power conversion modules, cooling options and renewable energy sources in the market. Thanks to our broad product portfolio and global resources, we can provide our telecom customers with highly efficient, total power solutions.

RenE solutions use renewable energy or a combination of renewable and other energy sources, such as mains power or diesel generators. Renewable energy sources ensure reliable telecom services in areas where mains power is unreliable or unavailable.

Delta's EnergE rectifiers are an efficient and sustainable solution to power conversion. They set a new standard in energy efficiency: many models meet the highest energy-efficiency standards of up to 95% or more. The plug-and-play EnergE rectifiers can also be installed as an upgrade to your existing system.

DELTA

Available in different configurations, Delta OutD cabinets are designed to protect equipment from external threats in all climates from the tropics to the arctic. In addition to traditional cooling methods, Delta's new hybrid cooling options revolutionize the cost structure of thermal management. For systems designed for EMEA and SA, Delta has developed two new hybrid solutions. Both hybrid systems, a combination of AV+AC and a combination of HEX+AV, lower operational as well as capital expenditure.

In the EMEA region, Delta is headquartered in the Netherlands and has operations in 17 countries.

## Geographic Footprint

Worldwide.

"The key reason for choosing Delta was its wide product range. A total solution not only makes life easier but also enables significant cost savings."
Vodafone Essar.

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# EGG-energy Tanzania Ltd.

## Company Background

For many in Sub-Saharan Africa, the missing link to electricity access is last-mile distribution. In Tanzania, 80% of the population lives within five kilometers of a transmission line, but only 10% has access to electricity (only 2% in rural areas). This infrastructure gap results in a large market opportunity.

EGG-energy offers its customers a source of energy that is safer, cleaner, and more convenient than currently available alternatives (e.g. kerosene, dry cell batteries, car batteries, and generators used to light homes and power small electric appliances).

EGG-energy offers its customers a source of energy that is safer, cleaner, and more convenient than currently available alternatives (e.g. kerosene, dry cell batteries, car batteries, and generators used to light homes and power small electric appliances). We target three Bottom of the Pyramid segments: rural households, small businesses and low-income urban homes. Building a modern, efficient distribution system in this context will open a variety of opportunities to EGG-energy.

Founded by Engineering PhDs and MBAs from MIT and Harvard, EGG-energy brings together a unique combination of management, engineering, and development expertise to the business of providing power to local communities.

## Product Description

EGG-energy links electricity sources to customers through a battery subscription service:

- Electricity from a grid connection or from an off-grid power station is packaged into portable, rechargeable, and affordable batteries that are owned and maintained by EGG-energy.
- For an Installation Fee, trained EGG-energy electricians install lighting systems for customers.
- For a Subscription Fee, a customer purchases the right to swap a battery for a pre-specified period of time. In addition to powering lights, customers can also use their EGG-energy batteries to charge cell phones and power radios.
- Customers can exchange their depleted battery for a fully charged one at any time, by paying a small swap fee at an EGG-energy charging station or distribution point.

This versatile and mobile battery-based power distribution system is the first step to realising EGG-energy's vision of becoming a large-scale distributor of clean and affordable power in Sub-Saharan Africa.

## Geographic Footprint

Tanzania.

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"EGG-energy has helped me increase income for my phone charging business. I've also decreased my monthly electricity expenditures."
Local Mobile Phone Charging Entrepreneur

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Tanzania

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# Electro Power Systems

## Company Background

Founded in January 2005, headquartered in Torino and production factory in Aosta – Italy Electro Power Systems (ElectroPS) is a leading designer and manufacturer of innovative fuel cell systems for back-up power applications.

Making fuel cells accessible to everyone is the core concept behind our product strategy and our goal is to help eliminate the use of lead-acid batteries and diesel gensets.

Lead by co-founders, VC-backed, ElectroPS has won several Awards (among others: 2005 Italian National Award for Innovation; 2009 we won the GSMA's Mobile Innovation EMEA as "Most Innovative Product Enabling a Greener World"; 2009 "Global Cleantech 100"; 2010 GP Bullhound's "Top 25 Cleantech European Companies") and shows solid growing revenues while hundreds of its products are installed in Europe, North and Central America, Africa and Asia.

## Product Description

ElectroPS successfully developed and commercialized ElectroSelf™: the first no-emission, self-recharging fuel cell system specifically designed for mobile operators looking for significant savings and enhanced reliability. ElectroSelf™ can produce its own hydrogen from water and can therefore guarantee power generation in the most remote locations. It makes fuel cells largely adoptable since it doesn't need any logistics for cylinder replacement and can work both parallel to the grid or off-grid (using renewables to self-produce hydrogen). During power outages it generates power by combining Hydrogen (H2) and Oxygen (O2), producing only water as a by-product. The power system engages automatically whenever external power fails. Whenever power is available it generates its own hydrogen fuel by electrolysis of the de-mineralized waste water from the power generation phase. It does this automatically whenever there is external power available, keeping the H2 tank full. Thanks to its high efficiency and the no-need of fuel replacement, ElectroSelf™ is characterized by a very low OPEX. When compared to legacy technologies (Diesel+Batteries) and Fuel Cells competitors, ElectroSelf™ reveals a better performance on the Total Cost of Ownership evaluation mainly because it consumes electricity and not diesel fuel with its expensive logistics.

## Geographic Footprint

Europe, America, Asia and Africa.

**Client List**

Telecom Italia
3 Hutchinson
MTN
France Telecom
China Mobile
Teliasonera

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# Eltek

## Company Background

Eltek is a high efficiency power electronics expert with more than 40 year experience with DC power systems for the telecom infrastructure. With a revenue of USD 565 million we are number 2 in the market in terms of revenue, but stands out as the technology leader with a drive towards energy efficiency and OPEX saving.

Eltek is a truly global company with more than 2200 employees worldwide, located in more than 30 facilities and delivering to more than 100 countries.

**Client List**

Viettel
Beeline
Millicom
China Telecom
Etisalat
GrameenPhone
Indosat
Maxis
Globe Telecom
Vodafone

Since launching the Flatpack 2 HE (High Efficiency) series of rectifiers, more than 200,000 (Jan 2011) have been installed, demonstrating an impressive field performance. Our telecom heritage together with an intensive focus on renewable energy has put us in a position to create hybrid solutions that are unmatched with regards to efficiency, system power density and level of integration – all 100% according to Telecom standards and expectations.

## Product Description

ELTEK'S pure solar and hybrid power solutions are based on industry-leading building blocks, fully integrated into coherent, complete and flexible solutions – with one single controller overlooking all energy sources, flow and storage. The entire installation is easily and efficiently monitored and controlled over the Internet by means of advanced, yet user friendly monitoring software, with relevant system data fed from the Smartpack controller which at all times oversees critical parameters and general system performance.

With the market leading High Efficiency (HE) technology the solution from ELTEK is maximizing the contribution of the renewables without compromising telecom specifications. When a diesel generator is part of the solution advanced monitoring and control maximizes its energy output as well. All modules including solar converters and wind converters have galvanic isolation, separating any input from the telecom load. In the solution one single controller controls all the passives.

**Finance:** Our financial structuring experience enables operators to acquire full solutions with no upfront capital expenditure, instead paying from savings generated or increased income. We structure transactions to suit the individual cash flow and budgetary requirements of our clients. We can demonstrate a positive ROI from Day 1.

## Geographic Footprint

Worldwide.

"Vodafone Greece collaborates with Eltek to implement hybrid operation at the majority of rural sites operating continuous generators. The project which started on Jan 10 and is currently more than 300 sites which operate as "hybrid" using the functionality of Eltek's Smartpack controller."

Head of Network Deployment and Operations for Vodafone Greece.

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# Emerson Network Power

## Company Background

Emerson Network Power provides innovative infrastructure solutions that maximize reliability, deployment speed and efficiency for communications networks. We are experts in leveraging hybrid technology to minimize OPEX costs and reduce the carbon footprint associated with GSM in areas with limited access to grid power.

Emerson's infrastructure solutions keep telecommunications and IT networks up and running regardless of whether the content is voice, data or multimedia.

## Product Description

Hybrid energy solutions from Emerson offer smart integration of renewable and traditional energy sources for indoor or outdoor environments in off-grid or on-grid peak shaving applications. Our reliable DC power supply systems in combination with hybrid power sources such as solar, wind, diesel and batteries, provide intelligent site management and integrated control.

**Hybrid energy solutions from Emerson:**

- Reduce energy consumption significantly with integrated energy optimization and temperature control technologies
- Minimize carbon footprint by an average of 30% utilizing hybrid energy solutions
- Maximize energy savings with eSure™ high efficiency rectifiers
- Leverage modular enclosure designs that enable flexible expansion and easy maintenance in the field
- Achieve significant OPEX savings through remote monitoring and comprehensive battery management capabilities

An integral part of our hybrid energy solutions is the eSure™ high efficiency rectifier. When compared to traditional rectifiers in the market today, eSure™ DC power technology significantly reduces CO2 emissions and operational costs, offering the highest efficiency in the industry at 97 percent. Efficiency can be boosted even further with ECO mode, a patented technology in our advanced controllers. By running only the number of rectifiers required for normal load conditions, maximum energy optimization can be achieved.

## Geographic Footprint

Worldwide.

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Trust and enlist Emerson to manage all aspects of your critical infrastructure needs.

**Company**
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# Ericsson

## Company Background

Ericsson is a world-leading provider of telecommunications equipment and services to mobile and fixed network operators. Over 1,000 networks in more than 180 countries use Ericsson's network equipment, and more than 40% of the world's mobile traffic passes through Ericsson networks. Ericsson is one of the few companies worldwide that can offer end-to-end solutions for all major mobile communication standards.

**Client List**
Worldwide

## Energy Efficient Portfolio

We offer a variety of energy-efficient products, solutions and services to help our customers reduce their environmental impact and also reduce the footprint of our own activities. Ericsson's solutions on node, site and network level are helping to minimize the power consumption while maximizing traffic. By drawing upon Ericsson's global consulting and technical capabilities, we can assist operators in every stage of the project, from initial baseline analysis through to implementation and final reporting and measurement of solutions deployed.

**Products:**
- Energy Efficient Radio Technology
- Site Power & Cooling Equipment
- Alternative Energy Sources
- Power Saving Features
- Remote Site Management
- Automated Network Power Management
- Energy Efficient Network Layer

**Professional Services:**
- Environmental Consulting
- Energy Assessment & Optimization
- Active & Passive Energy Management
- Lifecycle Assessment
- Data Center Efficiency
- Managed Rural Coverage
- Smart Energy Management

We work with efficient materials management to avoid hazardous substances and use resources more effectively and reduce environmental impact of manufacturing, use and end-of-life treatment. We offer free take back of decommissioned equipment in all the countries in which we operate

## Geographic Footprint

Worldwide.

"For every site where we have made Ericsson recommended changes, we can reduce power consumption by between 22% and 30%."
Mike Wright, Executive Director of Networks, Telstra

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# Evance Wind Turbines Ltd

## Company Background

Evance Wind Turbines, a world leading manufacturer of small wind turbines, has been designing and supplying small wind turbines for more than 12 years. Today over 1,500 turbines are installed around the world.

The 5kW R9000 small wind turbine, which is MCS and SWCC certified, has been designed to produce maximum energy yield, starting to generate energy at 3m/s and continuing to generate at high wind speeds. The turbine has a proven record of delivering class leading performance and reliability.

The R9000 is a versatile system for on-grid, off-grid and hybrid solutions. The Evance team, together with an extensive network of resellers and installers around the world, provide application advice and customer support.

## Product and Services

Evance work closely with Mobile Operators and their Infrastructure Providers to develop flexible and robust green energy solutions. Focusing on reducing OPEX and CAPEX through integrated BTS and power delivery platforms. Evance is assisting in making previously uneconomical sites viable, reducing not-spots and helping to meeting regulatory requirements.

With few moving parts and no gearbox, Evance turbines are designed for durability and low maintenance, making them suitable for the high reliability required. Flexible solutions using hybrid green energy sources, with remote monitoring, and battery / diesel back up options, make the Evance solutions ideal for off-grid locations, reducing reliance on fossil fuels in remote sites. For both on-grid and off-grid ocations, Evance can be a valuable partner in reducing the carbon footprint of network operations.

Most customers choose to purchase our solutions outright, however we have flexible finance models suited to the industry to support creating distributed wind energy.

## Geographic Footprint

Worldwide.

**Company**
Unit 6 Weldon Road
Loughborough
Leicestershire UK
LE11 5RN

**Website**
www.evancewind.com

**Email**
enquiries@
evancewind.com

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+44 150 921 5669

# Fenix International

## Company Background

Fenix International is a renewable energy company that produces affordable power solutions for mobile network operators and the millions of subscribers living off the grid.

Our products deliver clean and reliable power to subscribers and authorized resellers in electricity-challenged environments, enabling operators to increase ARPU and provide services to underserved and new customers. Fenix is a for-profit corporation based in San Francisco, California with customers across multiple frontier markets.

## Product Description

The Fenix ReadySet is a plug & play, portable power station that charges multiple phones simultaneously and powers appliances ranging from lights and fans to netbooks and Wi-Fi hotspots. The ReadySet's intelligent battery charges from many sources including the Fenix Solar, the Fenix Velo, as well as grid/mains power. The Fenix Solar is a rugged 15 watt solar panel that charges the ReadySet in one day. The Fenix Velo is a sturdy 100 watt peak bicycle generator that installs in seconds and charges the ReadySet in one hour. Fenix also offers a variety of ReadySet compatible accessories and appliances for phone charging, lighting, health and entertainment.

## Geographic Footprint

**Field trials underway in:** Angola, Ghana, Kenya, Mali, Papua New Guinea, Rwanda, Tanzania, Uganda and Yemen.

"Top 11 companies to watch on 2011."
Africa Telecoms Magazine.

**Company**
82 2nd Street
San Francisco,
CA 94105 USA

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Luke Filose

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lfilose@fenixintl.com

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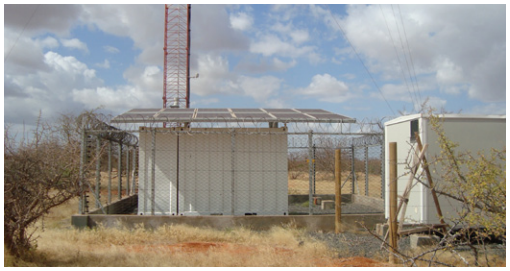
+1 510 761 5593

# Flexenclosure



## Company Background

Flexenclosure is a specialist provider of intelligent and "green" site power management solutions that have been especially developed for off-grid markets in developing countries. The company's revolutionary E-site base station site solution, with the Community Power option, has the proven ability to bring both communications and power to rural people in remote areas that previously had access to neither.

**Client List**

Safaricom
Airtel
MTN
Emtel
Millicom

Flexenclosure develops and deploys modular energy solutions that enable mobile operators to serve old and new, often rural, markets in an efficient and cost effective way. Flexenclosure's turn-key modular "green" energy solutions are based on renewable energy sources and are flexible, prefabricated, adaptable to local conditions and quick to install. Flexenclosure's product range contains solutions from power systems to complete data centers.

## Product Description

E-site is an energy solution that enables base stations to be powered mainly by renewable energy (sun and wind). There is a battery bank for storage of generated energy and the wind turbines have been modified and perfected for this particular purpose. The key ingredient is Diriflex, the real-time control system used to optimize the performance of the solution.

The E-site solution has proved to reduce base stations' diesel consumption and CO2 emissions, by as much as 90 percent when they are running on a 24/7 basis, and to reduce energy related operating expenses by over 80 percent. The ROI is high and the long-term TCO low. This enables operators to profitably roll out base stations in areas that have so far been unprofitable to operate in due to low average revenues per user, lack of access to the electricity grid and high costs for diesel fuel and maintenance.

Community Power is an E-site product developed together with Ericsson. It also comes as a standalone system. The system provides the possibility to share the power produced by E-site with the surrounding local communities to power e.g. mobile and battery chargers, street lights, clinics, schools etc.

The complete Community Power solution allows for full integration with the operator's messaging and billing systems, including central management of energy distribution to local outlets and appliances based on end-user energy purchases using their mobile phones.

"On E-site solution we believe the product is very good and a step in the right direction in making GSM sites more power efficient. We particularly like the intelligent power monitoring system and the innovation to have wind turbines designed for telecoms. The great reduction in generator running hours is a welcome move towards a green economy."

Samuel Mugo Kimani, HoD Regional NW Dep, Safaricom.

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SE-534 50 Vara
Sweden

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annlouise.johansson@
flexenclosure.com

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+46 702 260 774

# Heliocentris Industry GmbH

## Company Background

Heliocentris. Multi-Hybrid Energy Solutions for Telecom.

Heliocentris is specialized in autonomous energy supply and energy efficiency solutions with the aim of replacing diesel generators with "zero-emission" products.

The company, which was founded in Berlin in 1995, develops and markets innovative and sustainable systems in power and energy generation as well as turnkey solutions for customers in industry and the academic field.

## Solutions

Heliocentris provides Energy Management and Clean Energy Solutions for wireless networks at off-grid, bad-grid and on-grid locations. With services during the entire life cycle, from consulting, planning, implementation and lifetime optimization services, Heliocentris guarantees a customer oriented and optimized offering.

**Client List**
du (Emirates Integrated Telecommunications Company)
Telesite Ltd (Mozambique)
Telecel (Zimbabwe)
HCPT/Hutchison (Indonesia)

"Heliocentris is the only supplier to meet and even overachieve contractual performance requirements."
(CTO HCPT Indonesia).

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12489 Berlin
Germany

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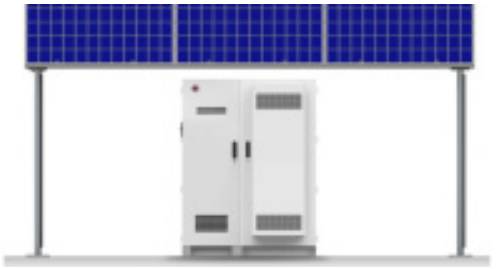
# Huawei Hybrid Power – PowerCube



## Company Background

Based on the professional accumulation of ICT network over 20 years, Huawei launches PowerCube: the innovative hybrid power solution for telecommunication sites.

PowerCube focuses on saving energy and reducing OPEX through maximally improving energy transferring efficiency. Over 22,000 PowerCube have been deployed all over the world, serving more than 85 operators in 80 countries, including MTN, Zain, Airtel, Vimpelcom, Vodafone and so on.

## Product Description

PowerCube is a new generation hybrid power system. With the newest energy controlling and transferring technology, it makes full use of energy sources such as solar, diesel and grid. Diesel hybrid, grid hybrid and solar hybrid series can be selected to meet different scenarios.

The core concept of PowerCube is "Saving, Single, Smart".

**Key Characters:**

- **Saving:** fuel 40%-60%, footprint 30%-70%, maintenance up to 90%
- **Single:** single platform, modular design, smooth expansion & evolution
- **Smart:** intelligent NetEco system achieves highly efficient operation & maintenance management

PowerCube realizes the maximally saving for customers by using Bit Managing Watt Technology to achieve high efficiency of energy conversion and utilization.

As for solar hybrid solution, SolarMax technology achieves high tracking accuracy, high sensation of light, high conversion efficiency and high temperature adaptability. As for diesel hybrid solution, DieselMax technology improves efficiency in each procedure of energy flow from end to end. As for grid hybrid solution, GridMax technology maximizes using gird with fast chargeable energy storage system.

Through advanced operation support system – NetEco, PowerCube helps the operators greatly improve energy management efficiency for reducing OPEX.

## Geographic Footprint

Worldwide.

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ICT network energy efficiency specialist Reliable partner for customer

**Company**
Huawei Industrial Base
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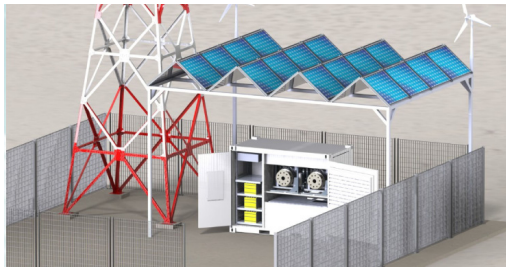
Shenzhen 518129
P.R. China

**Web**
www.huawei.com

**Telephone**
+86-755-28780808

# Hybrid Energy Solutions Limited



## Company Background

Hybrid Energy designs and manufactures state of the are DC Hybrid energy stations for cell-tower and Community Power applications. Utilizing the latest renewable energy Technologies Hybrid assists operators in reducing costs as well as CO2 emissions whilst delivering the most reliable and robust power solution to off-grid and grid-connected sites.

Hybrid Energy has 130,000$^2$ meters manufacturing facility in China, R&D facilities in Ireland whilst Hybrid Energy International provides full managed services contracts including energy on a $ per hour basis. Hybrid Energy International is headquartered in Dubai and supports projects across Middle East, Africa & Asia.

## Products & Services

Hybrids core technology platform is based around low voltage DC power generation and Energy Storage. Utilizing state of the art Lithium Ion battery technology together with high efficiency photovoltaic arrays and wind turbines Hybrid can eliminate or reduce engine run time. If an engine is needed Hybrid Energy DC generator will start automatically to ensure Power is never lost. The fully integrate systems can be dropped on site and installed within Minutes.

## Community Power Model

Hybrid Energy micro grid and community power model can open up access to affordable Energy to 1.2 billion people who currently don't have access to electricity. Hybrid Energy has deployed systems in Europe, Africa, Middle East, and Central America and has recently established partnerships in Malaysia and Indonesia.

**Client List**

Telefonica
BT
3
Vodafone
Meteor
Shared Access
Airtel
Sigma Wirless
Tasc Towers
Seder Telecom
Future Communications
Company Ltd (FCCI)

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Shared Access is a developer and owner of shared wireless infrastructure, specifically for the use of mobile & broadband operators. "We meet many challenges securing network power due to, planning requirements, time pressures, site locations that are often remote, and local community issues. We have deployed HYbrid Energy stations asan alternative in some instances to grid power, their DC systems have enabled us to fulfill our operational and design standards, providing cost effective and reliable alternatives to grid supply."

Niall Clyne, Director of Rollout, Shared Access Ltd.

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**Nigeria** +234 802 051 8512 or +234 704 515 0003
**Saudi Arabia** +966 1 460 6666 or +96 6500520842

**Website**
www.hybrid.ie

# M-Field Energy Ltd.

## Company Background

M-FIELD is committed to a clean sustainable energy business by providing green power solutions with deep involvement in Fuel Cell technology since 2000. Due to the fossil fuel depletion and climate change resulted from Greenhouse gas emission, M-FIELD is devoted to delivering the cutting-edge Fuel Cell solutions and replacing the pollutant carbon economy with hydrogen era.

## Product and Service description

M-FIELD provide outstanding back-up power systems seamlessly during blackouts for industrial and residential used. The systems are available either AC power backup or integrate with other renewable energy generator such as solar power, wind power, etc. M-field offers carbon emission free products with only pure water as exhaust, pursuing environmental friendly as well as reach safety certification on CSA , UL & CE.

## Geographic Footprint

Asia, North America, Europe.

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Rolly Liu
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Zhutung
310 Hsinchu
Taiwan

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**Telephone**
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# Narada Asia Pacific Pte Ltd

## Company Background

Narada Asia Pacific has been established since 2005 offering the supply, distribution, service and installation of all Narada valve regulated lead acid (VRLA) batteries. Narada Asia Pacific is a 100% owned subsidiary of Narada Power Source and is responsible for all business within the Asia Pacific region.

Narada equip with the most advanced technologies and equipments in research & development, and is one of the most potential manufacturer for storage batteries in the fields of telecom power source, environment friendly power source, storage application and motive power system.

Our Asia Pacific distribution hub is located in Singapore; which is the one of the leading global port for quick and easy shipments across Asia, Europe and the Americas. Narada Asia Pacific holds stock of all the high volume battery types used in the Telecoms and renewable energy market allowing for delivery within days anywhere in Asia.

## Product Description

Narada is a global leader in stored energy solutions with a First class VRLA R&D center with more than 10 million RMB investment qualified as National Independent Laboratory (CNAS).

Our Chief Scientist Mr Herbert Giess (The Chairman of TC21, the battery division of IEC

standards) manages a team of 50 engineers includes 18 masters degrees holders to create innovation products for the market places.

The company has got ISO9001&TL9000 certificate from TUV Germany, becomes the first storage battery firm which got TL9000 certificate of quality management system standards in telecom trade in China.

Narada wide range VRLA Battery products

- Front Terminal 12V battery
- 2V AGM batteries up to 3000AH
- Premium Solar Cyclic Battery
- High Rate
- Tubular GEL OPzV battery (DIN Standard)
- Tubular OPzS battery (Flood battery)
- Top Terminal Telecom battery
- High Temperature
- Polymer GEL battery

## Geographic Footprint

Worldwide.

"Narada batteries were easy to install, the documentation was excellent, and the batteries have performed exceptionally well in these harsh environments. I will certainly continue to specify and recommend Narada to my clients."

Director - International Operations AMERESCO Solar

**Company**
No.65 Ubi Crescent
#04-03
Hola Centre
Singapore 408559

**Contact**
James Wong

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james@narada-ap.com

**Telephone**
+65 6848 1191

# NorthStar Battery

NorthStar®

www.northstarbattery.com

## Company Background

Established in 2000, NorthStar designs and manufactures premium, high performance lead-acid batteries and energy-saving battery cabinets. NorthStar products deliver longer battery life and a reduced environmental impact, at a lower total cost of ownership. Truly a global company, NorthStar has state-of-the-art facilities in the USA, Sweden, China and India, with products used in more than 120 countries worldwide.

All NorthStar high performance batteries are proudly manufactured in the USA, using the latest automated robotics technology and environmental control systems, to deliver the best consistency and reliability in the battery industry. NorthStar battery cabinets are designed and manufactured in Sweden on a fully automated production line, ensuring a low thermal conductivity, maintenance free design.

## Product and service description

NorthStar's premium telecom products include the SiteStar™ Cabinet, which is the world's most efficient battery cooling system, as well as a range of high performance long life AGM batteries. OPzV batteries are also available.

The SiteStarTM Cabinet uses active compressors and advanced airflow, ensuring optimal battery operating temperature and extended life. SiteStar™ Cabinets have ingress protection class IP55, with CE and UL approval, and a range of optional kits.

The NSB *Blue + battery* is a high-cycling battery developed for use in areas having unstable power grid conditions. It has been extensively deployed in Indonesia, Bangladesh and in African countries. It is a true uPSOC (uncontrolled partial state of charge) battery, discharge cycles may be started without the battery being fully charged without adverse effect on life. It is suitable for UPS applications.

The NSB *Red battery* uses pure lead grid developed to provide exceptionally long float life at elevated temperatures under stable AC power grid conditions.

The NSB *Yellow battery* is a high quality battery designed to compete with products manufactured in Asia.

NorthStar batteries have an impressive operating temperature range of -40°C to 65°C because of their innovative design and PPO (high modulus polyphenylene oxide ) cases.

## Geographic Footprint

Worldwide.

**Company**
4000 Continental Way
Springfield
Missouri 65803
USA

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Menara BCA, 4515
Jl. M.H Thamrin No. 1,
Jakarta 10310, Indonesia
+62 811 8822 395
asia@northstarbattery.com

**Email**
info@northstarbattery.com

**Telephone**
+1 417 575 8200

IFC International Finance Corporation World Bank Group
GSMA Green Power for Mobile
In partnership with the Netherlands

# Novergy Energy Solution Pvt. Ltd.

## Company Background

Novergy is your reliable Solar energy partner.
We are manufacturer of HIGH Efficiency Solar Photovoltaic modules (Suitable for Telecom application), DC and AC Electrical parts, Electronics Like Hybrid integrated All in One controller & High efficiency Inverter.
Through our sub-vendors we are also able to offer Mounting structures and Battery bank.

**Client List**

Tata-Quippo (Viom networks), India
Safaricom, Kenya
Tunisie telecom, Tunisia
Nepal telecom, Nepal
Idea Cellular, India
Exicom Telesystem, India

**Company**
1, Navlok Navratna Comp,
Bedla Road
Udaipur (Raj.)
India

**Email**
enquiry@novergy.net

**Telephone**
+91 294 2415487
24504672415488
24504672415488

## Certifications / accreditions

Novergy / it's products are certified by leading organizations like :

- TUV Rheinland, Germany
- Clean Energy Council, Australia
- VDE, Germany
- MNRE, India
- DNV

## Product and description

1. **Different Options Of Solar Modules**
   - **High efficiency** Solar Photovoltaic Modules (cell efficiency of 19.4% and module efficiency of 16.8%)
   - High efficiency Modules in BLACK Color (Suitable for Aesthetically pleasing solar installations) Can be offered with complete black color of Structure, cabling, J. Boxes.
   - Flexible Light weight Solar modules can be fixed on various types of curved roofs / wave shaped roofs and also for roofs which can not take much weight.
2. **Telecom INTEGRATED All-in-One system:** This product is designed for telecom applications and has following special features:
3. **Complete System And The Balance Of System Components:**

COMPLETE SYSTEM including:

- High efficiency Solar Inverters (Upto 98.7%)
- DC and AC Protection boxes / panels
- Mounting structures
- Other Items required for completing syste

4. **Other Solar Product:** Solar Aviation lights

**Novergy Services:** Our company is headed by very experienced technocrats having handled large scale projects upto USD 400 million and we have in home team of different branches like electrical, electronics, mechanical.
Our teams are capable to design, procure & commission projects up to mw scale.

## Geographic Footprint

These systems are sold to nearly 20 countries worldwide including :
India, Germany, Italy, Spain, Kenya, Nigeria, Senegal, Australia, Oman, UAE, Togo, Tunisia, Sri Lanka, Nepal, Mozambique, etc.

# Off.Grid:Electric

## Company Background

Off.Grid:Electric is a distributed clean energy utility headquartered in Arusha, Tanzania and serving the East African market.

We build, own and operate small-scale home solar systems serving populations and businesses that suffer from an unreliable, expensive, or non-existent grid.

Off.Grid:Electric's M-POWER service represents an innovative approach to the market, whereby customers pre-pay for energy services.

Energy is provided by world-class plug-and-play solar systems installed in their homes. M-POWER systems include not just the energy system, but the world's most efficient lights and small appliances. Consumers do not buy hardware, they merely pay for the service.

After systems are installed, customers purchase credit in order to use the system. Payments are sent via mobile transactions, from direct customers, or potentially as a payroll deduction, in the case of employee housing.

Should a system require repair or a customer wish to upgrade, we provide complete support ensuring that no M-POWER customer is ever left in the dark.

## Solution Description

Off.Grid:Electric delivers on a complete technical, operational and financial model that makes incredibly high quality renewable electrical services radically affordable to the world's off-grid poor. It is a model that will scale to millions of homes. We don't sell gadgets or lanterns, we sell electrical services, pre-paid in small amounts. We provide 15 to 50 times more light to our customers for less money than they are already spending on energy substitutes.

We have taken the best ideas and technologies from around the world to come up with an amazing solution for our customers. We've started with world famous German engineering and cutting edge manufacturing technologies from Asia. We've combined it with the wildly effective pay as you go model and mobile money network from the African mobile phone industry. We manage it using software and distribution techniques learned from a decade of experience in e-commerce and Silicon Valley. We've made it profitable through financial and business model innovation inspired by decades in the renewable energy market in the USA. We deliver incredible customer service and operational excellence honed through decades of experience living and working in Africa. We implement it all with exceptional local leadership and world class partners.

## Geographic Footprint

Africa

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**Company**
PO Box 110C
Arusha Tanzania

**Website**
offgrid-electric.com

**Email**
info@
offgrid-electric.com

IFC International Finance Corporation World Bank Group
GSMA Green Power for Mobile
In partnership with the Netherlands

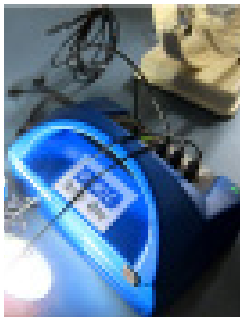
# OMC

## Company Background

Founded in 2011, OMC is a new type of powercompany that offers Micropower – small-scale energy with local generation and distribution – to mobile networks and communities in rural and remote locations.

Our customers are tower companies, mobile infrastructure companies and mobile operators, as well as rural communities, in emerging markets – all requiring reliable, renewable and affordable power with zero Capex.

Micropower Plant



OMC PowerBox

## Products and Services

**Micropower for Telecom**
Grid-replacement 230V from renewable sources, with carrier-class reliability.

**Micropower for Communities**
Packaged power: Lanterns and PowerBoxes that power lights, fans and other utilities.

## Geographic Footprint

Serving Northern India, preparing Africa launch. Our current Micropower Plants power 20+ towers and reach about 150,000 people in 300 towns and villages.

"OMC Power is one of the first RESCOs in India witha very good and innovative model where commercial feasibility is improved by combining the electricity needs of communities and Towercos."

Sairam Prasad, CTO Bharti Infratel and OMC customer

**Company**
406 a, 4th Floor,
Centrum Plaza
Golf Course Road
Gurgaon 122 001
India

**Website**
www.omcpower.com

**Email**
info@omcpower.com

# Orun Energy Ltd

An Energy Solutions & Service Company

## Company Background

Orun Energy Ltd, is a leading developer and innovator of clean technology and remote monitoring solutions for the small distributed generation and captive power markets globally. Orun Energy Global leads a consortium of twelve (12) companies (Battery Management Systems, Battery Manufacturers, Remote Monitoring Solutions, Logistics and Supply Chain, Operations and Maintenance, Efficient Cooling Systems, ERP Systems, DC power systems etc) whom are globally recognised in their respective sectors.

The primary focus of the consortium is to introduce alternative power technology and energy efficiency solutions for the fast growing African and Asian markets. Orun Energy's current focus is the rapidly growing telecoms and financial services market in Africa and India

## Product and Services

The Orun Solution is a Hybrid Power System designed to revolutionise the way power is produced, stored and used in telecom base stations. The combination of advanced battery technology, efficient DC cooling components, remote monitoring and the tight integration of all components with our micro processor based control system has produced diesel savings of above 90% in actual live tests which have been ongoing for over a year in India.

Other benefits of the HPS include improved network uptime due to high redundancy and real-time monitoring; reduced maintenance – due to reduced usage of Diesel Generator, control of fuel theft and false deliveries, central management of sites, Delivered ROI in less than 9 months, Rapid roll out.

## Geographic Footprint

India, Bangladesh, Nigeria, South Sudan, DRC, Ghana, Uganda, Mozambique.

**Client List**
Viom Networks India

"This is in reference to trials & tests of your equipment on two of our mobile tower sites, we are pleased to know that there has been a decent saving on energy expense due the technological intervention done by your organisation"

Bharti Hexacom Ltd India

**Company**
**Registered Office:**
4th Floor
Vieux Conseil Street
Les Jamaiacs Building
Port Louis, Mauritius

**Operations Office:**
17 Okotie Eboh Street
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Nigeria

**Website**
www.orunenergy.com

**Telephone**
+234 802 654 1809
+233 266 040 140

# Pamoja Cleantech

## Company Background

Pamoja Cleantech specializes in innovative biomass technologies for off-grid electricity applications. We offer full service agreements, operation and maintenance which enables telecom operators to outsource their entire energy supply. Thus our customers avoid CAPEX investment in energy infrastructure and allows savings up to 30 % of current diesel supply OPEX.

Pamoja Cleantech was founded in 2010. The company has designed a hybrid energy system that combines solar PV and biomass gasification technologies Implementation of this inclusive energy system in Uganda during 2013 is supported by the World Bank and the Swedish International Development Agency.

## Product and Services

Pamoja Cleantech holds expertise in renewable energy engineering, natural resource management, market and business intelligence, social empowerment and skills training. We provide services and consultancy for the energy supply of telecom companies including feasibility studies, business model elaboration, equipment selection, power plant design, biomass supply implementation, training and system installation. We are a service outreach partner and we work with a range of suppliers in biomass gasification technology.

Through the integration of the local community we build short-cycle operations supplying the energy system with biomass for feedstock. Our approach to energy production creates a local symbiotic system which nurtures sustainable development and strengthens the customer base of the telecom industry.

## Geographic Footprint

Sweden, USA, Germany, France, Spain, Finland, East Africa.

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"Our product is an off-grid platform for Sustainable Energy, ICT and Life Services exciting local entrepreneurship in rural communities."

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Sweden
114 18

**Email**
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pamojacleantech.com

**Telephone**
+46 73 5752243

# Phaesun France SAS

## Company Background

Phaesun GmbH has been specialising in the sales, service and installation of Off-Grid photovoltaics and wind energy systems since it was founded in 2001. As one of the leading system integrators in Off-Grid energy systems on an international scale, Phaesun offers products of the most renowned manufacturers in this trade. International project management, systematic customer training and technical support complete the services offered. Being one of the major companies in Off-Grid solutions for emerging countries its staff can look back on more than 20 years activity in this field.

**Client List**
Dialog Axiata Plc
Telma Mobile
Maroc Telecom
Telecel
Telkom SA
Digicel
Ericsson
Ethio Telecom
MTN
Warid Telecom

Phaesun headquarters are in Germany and its subsidiaries and associated companies are based in France, Eritrea, Greece, Sudan and Panama. They can fall back on a worldwide network of partners and distribution channels.

In France, Phaesun also has innovation activities by investing annually in photovoltaic research and development.

## Products and Services

The Phaesun business activities include two divisions. The "Solar Component and Sales Division" is responsible for the wholesale distribution of selected, high quality Off-Grid-components. Phaesun acts worldwide as an intermediary between manufacturers and wholesale customers. The "Solar Systems and Installation Division" is a service division, realising entire projects for Off-Grid applications (for rural, water-pumping, telecom, oil and gas and leisure segments) including system sizing, design, manufacture, assembly, delivery and support services to its customers.

Through the Phaesun Off-Grid skilled centre for development, design, engineering and implementation of solar power solutions, Phaesun offers both hardware and software. The most important cases are modular pure solar and hybrid solar sites (AC or DC Bus) including data logging software (Phaesoft) and web-based remote monitoring (Phaeweb), array antitheft solutions and project services (FAT, SAT). We notably deployed more than 400 PNGM charge control units since end of 2010.

With various partners, Phaesun is involved in a permanent solar solution development program aiming at technology package improvement (offer development, energy storage) and TCO optimization (CAPEX, OPEX, RoI).

## Geographic Footprint

**Around the world:** Phaesun Group (Phaesun GmbH, Phaesun France SAS, Phaesun Asmara, Phaesun SA Panama) and its network of associated companies have a worldwide presence.

"Our telecom station is now plugged to the sun. This stand-alone energy solution with PNGM energy management is a major step into a future without any grid-disruption. Additionally there is no more noise on site; neighbours will sleep in peace."

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34740 Vendargues
France

**Contact**
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+33 467 04 38 40

# PNN Group

## Company Background

PNN is a pan-African technology service provider that has been in operations for over 14 years with a presence in 9 countries, playing a significant role in the development of the communications and power sectors of the economy.

Over the last 14 years, we have grown into a group of companies focused on the sale, deployment and management of communications and power infrastructure throughout Africa.

PNN currently employs over 250 staff, comprising of both expatriates and indigenous persons, in Nigeria, The Gambia, Ghana, Kenya, Liberia, Rwanda, Sierra Leone, Tanzania, and Uganda, and we aim to expand into a minimum of 20 African countries by 2015.

## Product and services

At PNN, we build biomass, wind and solar hybrid community power plant networks to serve small communities, large cities and everything in between. Our community power system rides on a smart micro grid power distribution (SMGPD) system where electricity is generated from a scalable mesh of energy sources, close to where it is used.

PNN provides turnkey supply and deployment of communications infrastructure that supports our clients' current needs and their expansion plans.

PNN has deployed varied communications solutions using various financial models, which include Build Operate and Transfer (BOT), Build Own and Operate (BOO).

At PNN, we provide several value added services to all our customers. These include: Online services, Premium rated content aggregation services, Mobile content services: ringtones, mobile quizzes, voting & surveys, SMS-based airtime distribution, Software-as-a-service (SaaS).

## Geographic Footprint

Nigeria, The Gambia, Ghana, Kenya, Liberia, Rwanda, Sierra Leone, Tanzania, and Uganda.

**Client List**

Airtel
Visafone
Etisalat
Warid Telecom
MTN
Yu Telecom
MultiLinks
Globacom
Safaricom
Swap Technologies

"PNN managed and maintain communication sites for Airtel in the south west region from 2005 they also did Cell on Wheel (COW) projects for us"
Airtel

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# PowerOasis

## Company Background

PowerOasis is the leading supplier of Telecom Power Solutions for off-grid & unreliable grid telecom sites, providing grid autonomy with a renewable energy option. The solutions are modular, easy to install, flexible for the future and provide the lowest TCO. PowerOasis solutions bring performance and simplicity to a complex environment, all underpinned by a comprehensive network wide power management platform.

**Client List**

Vodafone
Ericsson
Digicel
Motorola
Orange
MTN
T-Mobile
Samsung
Alcatel-Lucent

PowerOasis is a technology lead company with a strong mobile industry background. With a combined mobile engineering experience totaling many hundreds of years, PowerOasis understands the challenges faced by network operators, knows how to deliver network-wide rollouts and possesses unrivalled knowledge of power, battery and renewable integration and management. PowerOasis solutions are proven to deliver:

- Lower operational cost (OPEX)
- Extended battery life
- Extended generator life
- Increased site availability
- Lowest TCO

## Products and Services

PowerOasis designs and manufactures hardware and software products, provides training and installation services for turnkey solutions and can deliver a comprehensive power consultancy capability. The product solutions consist of a modular platform to support a variety of base station power loads and control a comprehensive selection of power sources including generators, grid, fuel cells, PV and wind.

The PowerOasis Hybrid Power Systems (HPS) can be used purely with renewable sources of energy to totally remove the need for a generator or grid connection (weather conditions permitting). However, the most common solution is to use solar as a complementary energy source to reduce dependence on prime energy source. The HPS takes several forms:

- HPS Unreliable Grid
- HPS Off Grid
- HPS Green Power (Solar/Wind)
- HPS CDC Hybrid Cycling
- HPS Power Monitoring

## Geographic Footprint

Europe, SE Asia, N Africa, E & W Africa, S Africa, Middle East, N America.

"I have benchmarked competitive systems but the PowerOasis system is an outstanding solution. They have nailed the product performance, cost, flexibility and ease of installation"

J Parker, Director, GreenArc

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# Power-One

power-one®
*Changing the Shape of Power*

## Company Background

Power-One® designs and manufactures energy-efficient power conversion and power management solutions for renewable energy, routers, data storage and servers, wireless communications, optical networking, medical diagnostics, railway controls, semiconductor test equipment and custom applications. Power-One's evolution into a tier-one supplier, competitive on a world-class level, has been facilitated by a complement of strategies and milestones.

Power-One employs thousands of people worldwide and is certified to ISO standards for all facilities. Customer support, R&D centers, and manufacturing operations are strategically located in the Americas, Asia, and Europe. Corporate headquarters are located in Camarillo, California, USA. Power-One is firmly positioned as number 2 in the global Renewable Energy market.

## Product and Service Description

Combining many years of telecom power systems experience with renewable energy expertise, Power-One has developed a modular and fully integrated hybrid solution for telecom applications. The addition of hybrid controllers to the Guardian portfolio enables optimal battery cyclic operation as well as energy management for grid/genset and solar/wind energy.

The modular approach for indoor or outdoor arrangements allows for a minimum initial investment and also a "pay-as-you-save" solution with the option of adding hybrid building blocks to existing Guardian installations. The solar and wind converters (FPV30.48 and FPW30.48) mark the extension of the Guardian high-efficiency rectifier range into the renewable energy realm. These hybrid core components are accompanied by a range of accessories and along with the Guardian rectifier and DC/DC series it provides a system solution that maximizes the energy efficiency on all aspects of the site performance.

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# Proven Energy

## Company Background

Proven Energy is an industry leader in small scale wind with over 3,500 wind turbines in the field spanning 60 countries and every continent. Proven Energy's high performance wind turbines have been engineered and manufactured in Scotland for 30 years.

Inspiration, innovation and a commitment to development have ensured these wind turbines yield over 30 million hours runtime per annum and contribute between 12% and 15% of global installed capacity in the small wind sector.

**Client List**
Alcatel-Lucent
PowerOasis
Motorola

The Proven Energy range of wind turbines has been designed as downwind machines with passive yaw, pitch and coning control producing maximum yield in a wide range of wind speeds.

## Product Description

The nature of Proven Energy wind turbines means that they perform well in all wind speeds and don't cut out even in the highest winds.

Proven Energy products stand out from other small wind turbines because of its patented blade assembly, which allows the wind turbines to regulate their speed, maximizing output. As the wind gets stronger, the blades pitch and cone to reduce their aerodynamic efficiency. This lets the Proven Energy wind turbine maintain a high output even in the fiercest storms, unlike many turbines which need to be put on brake to protect themselves at high wind speeds.

Proven Energy has a range of products which is tailor-made to meet the challenges of small wind. The Proven 7 has a Referenced Annual Energy of 4,700 kWh per annum and is therefore ideal for telecoms base stations or any other unmanned or remote installations.

## Geographic Footprint

Global company based in Scotland in USA supplying every continent and over sixty countries.

"The collaboration with Motorola was a world first for us, resulting in an innovation that we are all proud of. We are enjoying the benefits of this solution and will be deploying more solar-wind powered base stations to many rural settings to provide cost effective energy solutions to our rural areas."

Albertus Aochamub, general manager, MTC, Namibia.

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Scotland, G75 0QF

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# Renewable Energy Ventures (K) Ltd.

Renewable Energy Ventures (K) Ltd

## Company Background

Renewable Energy Ventures (K) is a provider of renewable energy services, technological solutions and consultancy, based just out of Nairobi, Kenya.

Its activities include marketing solar lanterns as the core part of its activities. This project runs under the title "The Solanterns Initiative."

Goal/Mission: The goal of the Solanterns Initiative is to replace one million kerosene lamps with solar lanterns, to reduce greenhouse gas emissions, reduce health risks and damages (originating from poor indoor air quality and kerosene ingestion) and cut lighting costs/make poor households' money go farther by significantly cutting costs for lighting. It also aims at creating employment for the off-grid communities through provision of an alternative safe energy source for mobile charging as well as household lighting facilities as a business.

## Product Description

Our product is a solar-powered lantern which goes by the retail name Sun King Pro, produced by Greenlight Planet Inc., USA. It is ten times as bright as a kerosene lamp, more economical than the latter, has better value than other solar lanterns in terms of lighting duration, robustness and price and has an efficient mobile charging facility in addition.

Solanterns provides its products through 3 main distribution channels:

- Direct retail to distributors/retailers e.g. supermarkets, electronic stores, energy centers etc.)
- Large scale retail to NGOs for their distribution to schools, off-grid communities in their working area etc.
- Retail to youth-entrepreneurs, who rent the solar lanterns to their customers

The Solanterns Initiative's main financial source is the director's investment.

## Geographic Footprint

Solanterns has an established network of retailers covering most of Kenya. We also have existing distributors in South Sudan, Uganda and Tanzania, where connections to local people and decision-makers already exist.

**Client List**

Jopat Trading
G & G Electronics
Pramtec Chemist
LiokiLoki Shop
Technology Electronics
Al-Fasin Electronics
Angie's Electronics
Kericho Industrial Supplies
High Tech Electrical & Electronics
Embassy Crystal Electricals

"…I'm now able to pay for my college fees…"

Muigai a youth solantern entrepreneur in Juja, a rural outskirt off Nairobi.

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IFC International Finance Corporation World Bank Group
GSMA Green Power for Mobile

In partnership with the Netherlands

# Solarway

## Company Background

Solarway specializes in personalized renewable energy solutions that can enhance people's lives. We aim to confront the challenges of lack of power for communication and lighting with customized designs, reliable and affordable solutions. Mobiles are delivering more and more services worldwide. The mobile phone has become more than just a tool for communication aiding with medical advice, market Information, banking services, education and even voting cards are being delivered by mobile. There are huge social, economic and environmental benefits for people having free sustainable power to allow them to embrace new technologies to improve their lives.

## Product and service description

Solarway is a forward thinking creative think tank that develops personalized and sustainable power solutions for people with limited or no access to power. Our creative development teams design, create and engineer products that can perform in the most extreme conditions bringing the ability to have light at night and to power communication so necessary for localized economies. Our development teams based in Hong Kong ensure the product is made to the highest standards with strict quality control systems throughout the development and manufacturing process.

## Geographic Footprint

**Head Office:** Dubai, UAE
**Other Offices:** South Africa, United Kingdom, Hong Kong, Nigeria, Zimbabwe, Lesotho, Burundi and Botswana

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00971 4 880 6122

# Suntrica Ltd

## Company Background

Suntrica Ltd (est. 2006) in Finland is developing and marketing advanced, high efficient and environmentally friendly solar harvesting technology and products.

Suntrica's mission is to design cost-efficient, universal and easy-to-use solar chargers and integrated solar harvesting technologies that are effective in improving the off-grid operating time of mobile and consumer electronics as well as for the professional devices.

Suntrica cellular fulfillment services provide cost efficient, optimized device + solar charger bundle for cellular, fixed wireless, mifi and tablet computer segments.

Suntrica is committed to facilitate awareness about the importance of using ambient energy sources and environmental-friendly technologies and to make the solar powered future of mobile and consumer devices a reality. Suntrica is committed, from its part, to decrease the carbon footprint thus reducing the effects of the climate change.

## Product and Service Description

Suntrica Ltd is the leader in portable, flexible and high-efficiency solar charging solutions from 0,5W up to 200W. Our ergonomic, durable and lightweight chargers are applied in various consumer and professional applications worldwide. Typical B2C use cases are cell phones, portable mp3/BT/GPS, PMR (Professional Mobile Radio) hand portable radios, tablet and notebook PCs and portable satellite phones.

The product platforms comprise of own charging algorithms, electronics, flexible thin-film photovoltaic panels, battery packs and all packaged to functional, durable and attractive casing designed by leading Nordic designers.

In B2B applications, Suntrica off-grid solar harvesting technology is used to provide reliable energy e.g. for fixed wireless telephones, MiFi –routers, LED lighting devices, community chargers and low power cellular radio base stations.

Our solar chargers are ready to use, splash water proof, reliable power packs for many kinds of environments and for many different devices. Thanks to the flexible solar panels, chargers are extremely durable, recyclable and can be used in harsh outdoor conditions.

## Geographic Footprint

Worldwide.

**Client List**
Check the client list from www.suntrica.com/dealers.php

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# ToughStuff International

## Company Background

ToughStuff has developed a solar panel and mobile phone connectors which allow people living off-grid to charge their phones for free, harnessing the power of the sun. This home-based solution means that consumers don't have to travel to charge their phone, and have no need to leave it at a communal charging station.

This solar charging kit combines durability, high-performance and affordability making it perfect for off-grid mobile users. The solar panel also charges an LED light, radio connectors and a battery pack – this modular approach means that consumers can build their own energy solution with multiple benefits.

ToughStuff operates at scale producing affordable solar-powered energy solutions for the developing world. ToughStuff products are affordable, aspirational and convenient, and very popular with consumers. The mobile charging kit retails at less than $10. ToughStuff sources products from quality-assured manufacturers with substantial production capacity.

## Product Description

In off-grid areas, phones often remain switched off and money (often around 30% of total mobile expenditure) is spent on charging rather than airtime. The ToughStuff solar charging kit provides a way for customers to charge phones for free, meaning that handsets are active for longer. Studies have shown a 10-14% ongoing uplift in ARPU once customers have access to a solar charger – this represents a significant revenue-generating opportunity.

Working with ToughStuff therefore enhances the economic viability of investing in rural base stations. The increase in ARPU that results from customers having a solar charger means that payback time on new infrastructure investments is reduced.

Mobile operators can also benefit from improved customer acquisition and loyalty. Bundling a ToughStuff charging kit with a phone represents a clear incentive to purchase from one provider over another. Co-branding of the product is possible, further improving brand awareness.

## Geographic Footprint

Offices in the UK, Kenya, Nigeria, South Africa, Madagascar and Hong Kong.

"Samchi Telkom, Safaricom's premier retailer in Kenya, is rolling out ToughStuff's solar mobile charging solution nationwide, across all of its outlets. Having started with a small pilot, consumer demand for ToughStuff was so high that Samchi quickly sold out in all eight pilot stores! Samchi is delighted to provide such beneficial products to consumers whilst making healthy margins."

Samchi Telkom

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# WindGen Power East Africa

WindGen
solar and wind solutions for off-grid power

## Company Background

WindGen Power was founded in 2011 with the mission of locally fabricating small wind turbines for use with off-grid renewable energy systems in East Africa. WindGen fabricates small turbines up to 1kW in size in its Nairobi fabrication facility, and also imports larger turbines, up to 10kW, from the USA. Since inception, WindGen has evolved beyond wind and now offers renewable energy solutions that involve solar and other renewable sources.

WindGen specializes in designing and implementing power systems of a broad range of sizes in challenging locations where cost-effectiveness and reliability are paramount. By taking a holistic, customer-focused approach to projects, WindGen is able to offer customized turnkey solutions tailored to the needs of the client.

## Product and Service Description

While WindGen's initial focus was on solar and wind power systems for residential, tourist, and community facility applications, a recent partnership with a manufacturer of high quality 2.5kW and 10kW wind turbines has enabled WindGen to offer solutions for more energy-intensive commercial applications as well. WindGen systems integrate wind, solar, and generator power to create optimized hybrid systems.

As an end-to-end solution provider, WindGen's services include system design, system monitoring and data collection, project advisory, system maintenance, and custom small turbine manufacturing. Complementing these service offerings are a broad range of products including wind turbines up to 10kW, solar panels, deep-cycle batteries, inverters, controllers, and solar/wind mountings and towers.

## Geographic Footprint

Headquartered in Nairobi, WindGen Power serves the East African region.

"WindGen is one of the most reliable companies I have ever come across. The kind of materials and equipment they used to install power in our school are of the highest quality. Their staff and manpower personnel are qualified and customer-friendly."

Head Teacher of Naserian Primary School, Kajiado, Kenya

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# Zephyr Corporation


## Company Background

Zephyr's telecom solutions bring innovation to the energy used in mobile telecommunication operator businesses. Due to its ultra-lightweight design, the small wind turbine Airdolphin can be mounted onto existing towers of base stations. As part of a hybrid power supply system in conjunction with photovoltaic panels, it can greatly reduce not only the cost of energy, but also the operational cost. Airdolphin receives international praise for its effective contribution towards environmental conservation, for which there is increasing social demand.

**Client List**

Turkcell
T-mobile
Vodacom
Vipnet
MTC

Zephyr was established in 1997, and we have installed over 5000 turbines around the world. We entered the telecom market in 2009 after extensive R&D produced a range of turbines specifically for the telecom systems. Zephyr offers thorough support as an industry expert and the most dependable advisor in renewable energy.

## Product Description

**Zephyr Corporation's turbine Airdolphin:**

- Power all types of base stations - GSM, WCDMA, WiMAX, wifi and TETRA
- Can be used as the sole source of power or combined with PV panels, diesel generators, batteries, and/or hybrid controllers
- Can be installed at new sites or used to retrofit existing sites
- Small & Lightweight - diameter of 1.8 m and 18 kg. It can be quickly and easily installed on existing towers = low CAPEX & easy installation
- Able to start deliver energy at very low wind speed - 2.5 m/s = 5.6 mph
- Minimum maintenance required, and can be controlled via internet access

## Geographic Footprint

Worldwide.

"Zephyr Corporation's turbines easily out-performed the others we tested generating reliable power which means a stable supply for the base stations of T-Mobile."

Zvonko Magi´c, managing director at Energyplus.

**Contact**
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of Sales & Marketing

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# ZTE Power

## Company Background

ZTE setup a R&D department of telecom power products in 1995, since the day it was set up the team has gained rapid development with its in-depth understanding on telecommunication technology and become one of the biggest and strongest research team in China telecom power supply industry. There are about 1,200 employees working for ZTE power supply product line now, over 500 are working in the R&D department and 80% of them are with degree of mater or above.

**Client List**

Airtel
CMPak
Ethiopian Telecommunications Corporation
Etisalat
Econet
MTN
Mobinil
Sudan Telecom Company Co. Ltd
Zambia Telecommunications
Zain

Every year, ZTE power invests over 10% total revenue into R&D, with the dedication and innovations spirit to the research and development of new technologies, ZTE Power has obtained more than 192 national patents in power, electricity and electronics, 85% of which are invention patents.

ZTE power has a comprehensive portfolio that includes custom telecom AC and DC power supply system, back-up power products, UPS, green energy solutions and varies power enclosures /accessories.

ZTE power has 10 years experience on renewable energy solution including solar, wind, hybrid solutions. The "Energy Matrix" design system has been playing a very effective way to plan and deploy the renewable energy sites.

## Product and Service Description

ZTE provide two types green energy solution. One is integrated household solar power solution. The other is micro-grid solar hybrid power solution.

The integrated household solar power system converting solar energy high efficiently can help owner access to the electricity life easily. It can be used for various house appliances such as fans, lightings, device which charging handsets, household batteries etc.

The micro-grid solar hybrid power solution adopts the PV module to convert the solar energy into electricity and stores the electricity into batteries which power the load at night. The micro-grid solar hybrid power system can support the energy input from other source such as generator, grid power. It is mini-grids which mainly used for school, hospital, vaccination refrigerators, office building, island, army and residential community.

## Geographic Footprint

Afghanistan, Bangladesh, Congo, Colombia, Ethiopia, Kenya, Mongolia, Nigeria, Pakistan, Sudan, etc.

"ZTE's strong capability of fast construction and deployment, which will help we build more green sites to strongly support our telecom network. We look forward to having further cooperation with ZTE Corporation"
Mobinil

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