

# GPM Vendor Landscape – West and Francophone Africa June 2013



# Introduction

The Green Power for Mobile (GPM) programme was launched in September 2008 by the GSMA Mobile for Development in partnership with International Finance Corporation (IFC) and with the support from the government of the Netherlands.

In mid-2012, the GPM had started Africa specific programme activities and embarked on a new set of objectives specific to the African market in an effort to further catalyse adoption of green power to reduce the dependence on diesel power by telecom operators and tower companies.

Besides the on-going technical engagement with the operators and tower companies, the goal of the Africa specific programme is to research and assess the potential for green power in the key focus markets as well as to develop the eco-system through various initiatives including region-specific green vendor catalogues and best practice procurement guides. (See here: [GPM resource](#))

The purpose of this vendor landscape document is to support mobile operators in their green power initiatives by providing them with a directory of brief profiles of green power vendors and service providers operating or having focus in the West & Francophone African region. The document also provides a highlight of the current market snapshot including powering scenario and green power adoption in the four key focus countries – Ghana and Nigeria in West African region, and Senegal and Cameroon in Francophone African region.

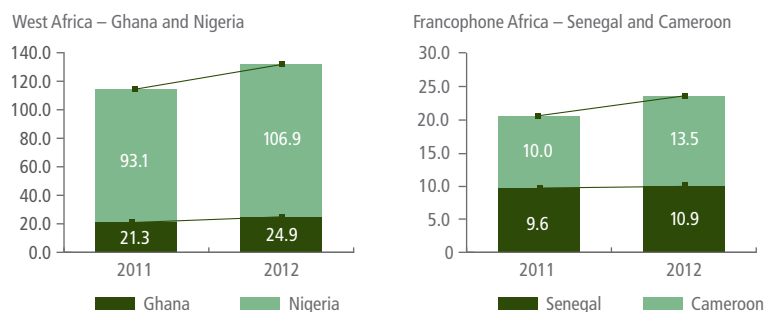
# Market Overview

Below are some of the key findings and insights from the GPM market analysis reports published for West and Francophone Africa.

## Telecoms Market

- **Mobile Subscribers:** Nigeria with over 107 million mobile subscribers is a leading market in the region. Ghana has a subscriber base of nearly 25 million while Cameroon and Senegal in the Francophone region have 13.5 and 10.9 million subscribers respectively.<sup>1</sup>
- **Mobile penetration<sup>2</sup>:** Ghana has the highest level of mobile penetration at nearly 100% of the population while Nigeria has a mobile penetration level of 85% in the West African region. Senegal and Cameroon have 85% and 67% mobile penetration respectively.<sup>1</sup>
- **Mobile network coverage<sup>3</sup>:** The mobile network coverage in Ghana and Nigeria stands at 80% of the population. Senegal and Cameroon have mobile network coverage of 87% and 85% respectively. Majority of the uncovered population is rural and lives in remote off-grid locations.<sup>1</sup>

Figure 1: Mobile Subscribers and Growth



Source: GPM Market Analysis Report – West and Francophone Africa

## Mobile Network and Power infrastructure

- **Network size:** Nigeria and Ghana in West Africa have a total base of 29,835 telecom tower sites. The size of the network will grow to 43,917 sites by 2015. Senegal and Cameroon in Francophone region have a total of 4,990 telecom tower sites as of March 2013 and the size network will grow to 6,589 sites by 2015.<sup>1</sup>
- **Off-grid network:** A total of 13,198 sites in Nigeria and Ghana are off-grid and are expected to grow to over 18,972 by 2015. The number of off-grid sites in Senegal and Cameroon stands at 1,383, which is expected to grow to 2,500 off-grid sites by 2015.<sup>1</sup>
- **Unreliable grid:** More than 38% of the total 11,478 on-grid sites in Nigeria and Ghana have unreliable grid power supply with power outages of more than 6 hours a day. The number of unreliable grid sites in Senegal and Cameroon is 746 which accounts for 15% of the total on-grid sites.<sup>1</sup>

<sup>1</sup> GPM Market Analysis reports – West and Francophone Africa

<sup>2</sup> Mobile Penetration: number of mobile connections as a percentage of the total population of the country

<sup>3</sup> Mobile Coverage: % of population covered by mobile network signals

# Market Overview

Figure 2: Sites by On/Off-grid status

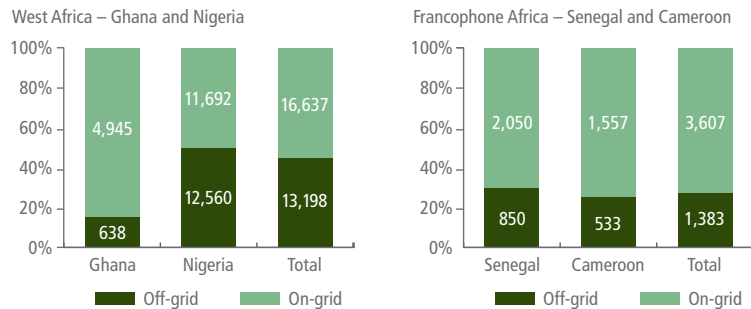
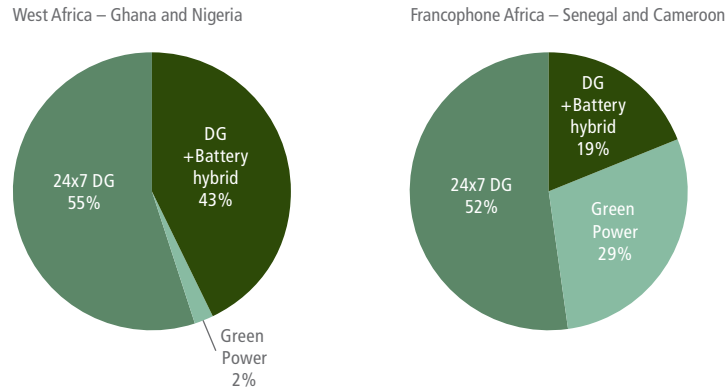


Figure 3: Power Solutions Deployed (off-grid)



## Powering of Telecoms and Green deployments

- Nearly 55% of the off-grid sites in Ghana and Nigeria are powered with 24x7 diesel generators while ~43% are deployed with DG-battery hybrid solutions. Senegal and Cameroon have 52% of the sites being currently powered by 24x7 diesel generators while around 20% of the sites have DG-battery hybrids deployed.
- Just over 2% of the off-grid sites in Ghana and Nigeria are implemented with green power alternatives. Whereas, nearly 29% of the off-grid sites in Senegal and Cameroon are deployed with green power alternatives.

## Technology and Deployment Models

- The MNOs and Tower Companies are more inclined towards CAPEX model for green deployments with partners for operations and maintenance of equipment.
- OPEX based energy outsourcing model is yet to gain relevance due to the lack of vendors with a proven business model and results.
- Solar PV technology is the dominant choice for green power deployments in both the regions.

# Market Overview

Solar technology has long been tested in the telecom industry and tops the list of preferred green technology choice owing to the availability of knowledge and technology. The adoption of other green technologies including wind, fuel cell etc. is in very early stages due to limited knowledge of supply factors and availability technology vendors and local support.

## Tower Sharing and Energy Outsourcing

- The Tower Company model enabling the outsourcing of critical passive infrastructure is prevalent in both Ghana and Nigeria in the West African region.
- Cameroon in the Francophone region has gained momentum in tower outsourcing with the recent entry of IHS Towers Africa acquiring and managing the assets of the two major operators in the country. However, Senegal is yet to see the adoption of tower outsourcing model in the industry.
- Energy outsourcing model is in early stages of trial in the West African region and is expected to gain adoption once the model is proven in the local context.

## Vendor/ESCO Landscape

Ghana and Nigeria in West Africa present an excellent opportunity for green power deployment with a potential of nearly 11,000 sites feasible for green power adoption. However, only 2% of the total sites in the region are currently deployed with green power alternatives.

On the contrary, Senegal and Cameroon in Francophone region have been very active in adopting green power for their telecom networks. Currently, 29% of the total sites in the region are deployed with green power solutions, while another 793 sites present a potential opportunity for green power deployment.

The availability of technology and local implementation partners is very critical to scale the adoption of green power and is quoted as in a major barrier to adoption by MNOs and Tower Companies both West and Francophone regions.

The GPM lists profiles of the vendors and service providers received from across local and global organizations that have focus in the both West and Francophone African region. The profiles have been categorized based on the type of product or service offered to the mobile operators and tower companies in the region.

# Market Overview

*Table 1: West and Francophone Africa GPM Vendor/ESCO Landscape*

Company	Core Competencies	Key Focus Region
Ameresco Solar	Solar	Global
SunPower	Solar	Francophone Africa
Applied Solar Technologies	System Integrator	West Africa
Ballard	FuelCell	Global
Clean Power Systems	System Integrator	Global
Eltek	Power Equipment	Global
Emerson Network Power	Power Equipment	Global
Ericsson	Telecom Equipment	Global
Evance	Wind	Global
Flexenclosure	System Integrator	West & Francophone Africa
GE Storage	Storage	Global
Gildemeister Energy	Storage	Global
Altobridge	System Integrator	West & Francophone Africa
Huawei	Telecom Equipment	Global
Hybrid Energy	System Integrator	Global
Northstar	Storage	Global
Orun Energy	System Integrator/ESCO	West Africa
Phaesun	Solar	Global
PNN	System Integrator/ESCO	West Africa
Power One	Power Equipment	Global
PowerOasis	System Integrator	Global
Saft	Storage	Global
Urban Green energy	System Integrator	Global
Qowosio	Site Monitoring	West & Francophone Africa
Zephyr	Wind Turbine	Global
ZTE	Telecom Equipment	Global

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# Altobridge

## Company Background

Altobridge wireless network solutions reduce network operating costs in the delivery of mobile voice and mobile broadband services. Central to this lie a series of patented and patent-pending technologies namely; Altobridge Data-at-the-Edge™ (broadband data optimization in wireless networks), Local Connectivity™ (local voice switching) and Split Architecture™ (transmission and power optimization), all of which, individually and combined, drive down communications delivery costs for mobile network operators by reducing backhaul and power consumption costs.

### Client List

Orange	Indosat, (Qtel group)	Tonga Communications Corporation
Tigo	Asiacell, (Qtel group)	Mobicom
Vodacom	Oman Mobile	
Maxis	Our Telekom	

“To make this business model work, K-NET needed an ultra-low operating cost, reliable solution that can be rapidly deployed and which is easy to install, maintain and operate. This solution from K-NET and Altobridge provided precisely that.”

Mr. Richard Hlomador, Founder & CEO, K-NET.



Altobridge is headquartered in Ireland and has further bases in USA, China and Malaysia, covering sales, R&D, customer support and manufacturing.

Altobridge solutions are deployed and operational in over 30 countries worldwide.

Altobridge is a privately held company. Shareholders include its employees, Intel Capital, IFC and Enterprise Ireland.

## Product and service description

Altobridge is a leading provider of 2G/3G solutions for remote communities. With over one billion people worldwide not connected to a mobile network or an electrical grid, the solar powered Altobridge lite-site™ enables mobile network operators to deliver cost-effective, commercially viable remote community connectivity. Meeting the needs of up to 1200 subscribers with traffic capacity of 18 Erlang per 2G altoPod™ the Altobridge lite-site™ has been specifically designed to optimize satellite bandwidth and minimize power consumption.

# ALTOBRIDGE™

Combining 2G/3G and VSAT technologies, the Altobridge lite-site™ provides:

- Lowest power consumption: enabling solar-power-only sites (100% renewable energy) or lowering the cost of diesel generation (lower genset CAPEX, lower fuel consumption)
- Lowest backhaul bandwidth utilization: 50 kbps for 2TRX (4kbps per call)
- Lowest site cost: the all-in-1 compact altoPod™ enables a simpler, quicker to deploy and lower site cost than with traditional BTS

## Geographic Footprint

Niger, Ghana, DRC, Malaysia, Indonesia, Iraq, Oman, Solomon Islands, Tonga, Mongolia.

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# Ameresco Solar

## 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.

## Client List

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



**AMERESCO SOLAR**  
Green • Clean • Sustainable

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.

"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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# Applied Solar Technologies (AST)

## Company Background

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

## Client List

Bharti Infratel  
Indus Tower  
Idea



AST has deployed solar PV panels of more than 10MWp. Currently, AST provides off-grid solar power to telecom towers which commonly 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 functionalities 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 preparing for commercial deployment.

## Geographic footprint

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

"Applied Solar Technologies India Pvt Ltd. (AST) introduced its 'Hybrid Solar Power Systems' in India in August 2009. Solar solutions for tower sites were 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

## 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.



Ballard ElectraGen™- ME Fuel Cell System for Backup Power



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.

## Client List

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

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"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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# 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

### Company

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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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# 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

"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



## 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.

### Company

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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 locations, 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.

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# GE Energy Storage

## Company Background

Durathon Battery technology originated from a pursuit of a better power source for hybrid locomotives. GE Research evaluated various battery technologies and identified sodium nickel chloride batteries as the most versatile and effective solution for applications demanding high cycle life in harsh environments.



In 2007, GE acquired Beta R&D, a UK-based company that originally pioneered the development of sodium batteries and had already demonstrated the technology's reliability and durability through decades of research and development.

To date, GE has invested over \$200 million in technology and facilities to support its Energy Storage business. A quarter of the investment has supported creation of test facilities in the US, United Kingdom, India and China. Over \$100 million of the investment supported startup of a world-class manufacturing facility in Schenectady, New York. Officially opened in July 2012, production commenced in September 2011 using the latest ceramics, powder processing and welding technologies.

## Product Description

With an energy density of 170 Wh/l, Durathon Batteries provide more energy in less space than traditional batteries. Their tolerance to severe environmental conditions

eliminates the operating costs of external heating or cooling systems, while their charge acceptance and projected lifespan of 10,000 cycles enables a reduction in fuel consumption by applications that use generators to maintain continuity of service. Each battery is equipped with an integrated Durathon Battery Management System (BMS) that provides a complete picture of the status and health of the battery throughout its long life.

## Battery Financing

GE's Capital business has expertise in creating financial solutions customized to the specific needs of telecom operators, from leasing arrangements and payment for energy to simple loans

## Geographic Footprint

Sub-Saharan Africa, Asia, SE Asia, Middle East, North America.

"This is the beginning of a revolutionary technology that will change energy storage as we currently know it throughout the electrical industry, not only for telecom."

Brandon Marcus, Division Manager of Megatron-Federal.

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# Gildemeister Energy Solutions

## Company Background

Cellstrom GmbH, an integral part of GILDEMEISTER energy solutions, is a provider of energy storage systems and solutions for a demand-driven, uninterrupted electrical energy supply. The storage of energy is based on vanadium redox battery technology. In 1999 the company's own developments were started and, in 2008, resulted in the first energy storage system produced in series: the CellCube FB 10-100.



**GILDEMEISTER**  
energy solutions

Cellstrom products are aimed at the sustainable use of global resources and stand out due to their high quality and reliability.

Cellstrom products are system solutions for many different applications, e.g.

- As a cost effective and safe replacement for high maintenance and environmentally damaging conventional and Lithium battery storage systems
- In weak grid with an unstable network
- As an off-grid solution in area with no grid connection
- Suitable for all signal transmission stations
- Scalable for multi operator / colocation sites

## Product and Service Description

Cellstrom's vanadium redox flow-battery is an advanced energy storage system that is safe, environmentally friendly and operates at the lowest cost of any flow battery technology. The energy storage systems are unique: they are efficient, long lasting, low maintenance,

reliable and offer unlimited deep cycling capability to any state of charge.

The CellCube FB 10-40 is a 10kW / 40kWh deep cycling energy storage system, which allows off-grid telecom sites to cycle repeatedly, or integrate in hybrid form with diesel, wind, or solar energy generation. Unlike conventional batteries, life expectancy is over 20 years.

A CellCube energy storage solution will typically yield over 50% opex saving and Total Cost of Ownership saving of 35% over 5 years for an off-grid site running 24 hour generators. The CellCube is available with a power output of 10 to 200 kW and a scalable capacity up to the MWh range.

## Geographical Footprint

Global, off-grid and poor grid installations.

## Benefits of CellCube

- Reduction of Opex and Total Cost of Ownership
- Eliminating or mitigating constant increase in diesel prices
- Easy integration into DC telecommunication infrastructure
- Elimination of service and maintenance cost of legacy storage system
- Safe, environmentally friendly and reusable
- Simple integration into standard online and remote maintenance systems

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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 grid 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.

ICT network energy efficiency specialist  
Reliable partner for customer

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

**Website**  
[www.huawei.com](http://www.huawei.com)

**Telephone**  
+86-755-28780808



Green Power  
for Mobile

# Hybrid Energy Solutions Limited

## Company Background

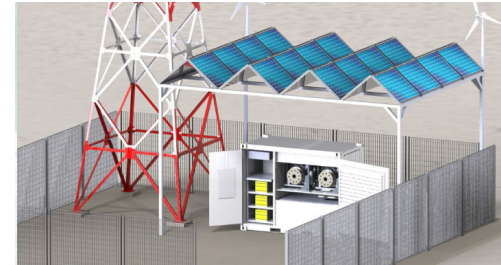
Hybrid Energy designs and manufactures state of the art DC Hybrid energy stations for cell-tower and Community Power applications. Using the latest renewable energy technologies, Hybrid assists operators in reducing costs as well as CO2 emissions whilst delivering the most reliable and robust power solution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

## Client List

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

"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 as an 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.



Hybrid Energy has a 130,000<sup>2</sup> meters manufacturing facility in China and R&D facilities in Ireland. Moreover, 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

Hybrid's 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

The 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.

## Telephone

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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](http://www.hybrid.ie)



Green Power  
for Mobile

# NorthStar Battery

## 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 SiteStar™ 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

### Asia Pacific

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Green Power  
for Mobile

# Orun Energy Ltd

## 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.

## 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

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.



An Energy Solutions & Service Company

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.

## Company

**Registered Office:**  
4th Floor  
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**Operations Office:**  
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S.W. Ikoyi, Lagos  
Nigeria

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## Telephone

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Green Power  
for Mobile

# 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.



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."

### Client List

Dialog Axiata Plc  
Telma Mobile

Maroc Telecom  
Telecel  
Telkom SA

Digicel  
Ericsson  
Ethio Telecom

MTN  
Warid Telecom

### Company

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Green Power  
for Mobile

# 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.

### Client List

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



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.

"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

### Company

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Green Power  
for Mobile

# 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	Orange
Ericsson	MTN
Digicel	T-Mobile
Motorola	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

### Company

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Watchfield  
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### Website

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### Email

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### Telephone

+44 1793 784242



Green Power  
for Mobile

# Power-One

## 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.

## Geographic Footprint

Worldwide

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+1.805.987.8741



Green Power  
for Mobile



# Qowisio

## Company Background

Qowisio has been founded by an experienced team of individuals working in the telecommunication industry over the last years. The aim of the company is to respond to a market need for the provision of energy optimisation.

### Client List

Orange	Etisalat
Zain	Airtel
Vodacom	Orascom
Caterpillar	Sotelma



From the beginning Qowisio has invested massively in R&D in order to have a competitive offer adapted to emerging countries.

First months and year were dedicated for R&D using key / strategic customers for product testing.

The unique approach of Qowisio is to have:

- A full wireless solution. Every sensor / equipment is connected wireless to the Qowisio Box
- An automatic detection and tuning of the sensors installed on site (plug and start technology)
- Remote software upgrade and diagnosis
- Embedded application software for detecting and alarming
- A complete reporting solution for energy management and business intelligence analysis

# QOWISIO

Among the immediate benefits from above items, on site installation is very easy and fast.

- Easy = no need to have a team of expert to install, perform cabling and on site configuration
- Fast = huge saving for the customer

## Products and Services

- Fuel Tank Monitoring
- Genset Monitoring
- Hybrid Power (Generator / Batteries / Grid Power)
- Smart Metering (AC and DC consumption / Power)
- Green Power Supervision
- Site Supervision (Site environmental alarms)

## Geographic Footprint

Worldwide.

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49800 – Andard,  
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+33241456904



Green Power  
for Mobile

# SunPower

## Company Background

SunPower is the global leader in designing, manufacturing and delivering high efficiency solar solutions for homes, businesses, and utilities. Thanks to the recent acquisition of Tenesol, SunPower has been delivering solar energy solutions to telecom companies for nearly 25 years, offering a wide range of applications to meet specific geographic and energy consumption needs. Headquartered in San Jose, California, SunPower has offices in North America, Europe, Australia and Asia.



## Products and Services

SunPower has unparalleled expertise in the design, engineering, installation and maintenance of telecom solar solutions, backed by a proven track record in project delivery and systems installed. SunPower solar systems—fully solar or hybrid—can be implemented to power all types of transmitting base stations and peripheral infrastructures. Building on customer feedback and field experience, we have developed state of the art controller and monitoring systems which, coupled with SunPower world-leading solar technology, maximise energy production and battery lifetime. This ensures uninterrupted power supply and 24/24 tracking of the system's energy performance.

Our long-standing partnership with leading telecom operators such as Orange and Digicel has provided us with a deep understanding of the industry's needs, enabling us to develop customised and cost-effective solutions.

## Geographic Footprint

SunPower is a solar pioneer, installing the first telecom solar systems in Togo in 1989. Since then, a total of 3,000 installations have been deployed worldwide, 90% of which in Africa.

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69890 La Tour de Salvagny  
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Green Power  
for Mobile

# Urban Green Energy

## Company Background

UGE delivers simple energy solutions. With projects in over 70 countries, UGE is the leading name in Distributed Renewable Energy (DRE) solutions at a global scale. We leverage proprietary tools and technology, including our OEM vertical axis wind turbines, to deliver end-to-end solutions aimed at bringing cost savings, reliability, and sustainability directly to end users.

## Client List

Verizon  
T-Mobile  
Claro



Unlike many systems integrators and product suppliers, UGE looks at our clients' energy challenges holistically before recommending an energy solution. By starting with our customers' needs, we do more than just offset the energy otherwise provided by the electrical grid or back-up generators – we provide peace of mind.

## Product and Service Description

UGE Fusion provides telecoms companies with the energy they need for a simple monthly rate. For tower owners and operators who are dissatisfied with expensive and unreliable power supply, UGE Fusion offers a complete energy solution that provides more reliable energy at a fraction of the cost. We accurately evaluate the energy resource, supply the technology, finance the project to reduce investment burden, and operate & maintain the sites, all under one roof.

Unlike other integrated solutions on the market, UGE works directly with end users at every step, from assessment, to planning and design, to financing and implementation to be sure that the solution is tailored to fit every site.

Under the UGE Fusion energy service agreement (ESA), the customer signs an agreement with UGE in exchange for guaranteed energy supply. This includes all assessment, planning, implementation, and site operation and maintenance (O&M) for the duration of the contract period. UGE offers financing where applicable, saving the customer money from day one.

## Geographic footprint

Worldwide

"The UGE Fusion system designed to power our communications tower has saved us \$30,000 per year in diesel fuel expenses."

Chinese Navy

## Company

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Suite 1103  
New York, NY 10018

## Website

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## Telephone

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Green Power  
for Mobile

# 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	Vipnet
T-mobile	MTC
Vodacom	



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 Magić, managing director at Energyplus.

## Contact

Hirohito Yoshida  
General Manager  
of Sales & Marketing

## Website

[www.zephyreco.co.jp/en/](http://www.zephyreco.co.jp/en/)

## Telephone

+81 3 3299 1910



Green Power  
for Mobile

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

"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



Every year, ZTE power invests over 10% of total revenue into R&D. As a dedicated and innovative company, supporting 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 systems, back-up power products, UPS, green energy solutions and a range of power enclosures / accessories.

ZTE power has 10 years of experience in renewable energy solutions including solar, wind, hybrid energies. The "Energy Matrix" design system has been very effective at fostering the deployment of renewable energy sites.

## Product and Service Description

ZTE provides two types of green energy solutions. One is an integrated household system: a solar power solution and the other is a micro-grid solar hybrid power solution.

The integrated household solar power system efficiently converts solar energy and can help the owner access electricity for life. 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 uses the PV module to convert 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 generators or grid power. Micro-grids are 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.

### Company

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Green Power  
for Mobile

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