

GPM Vendor Landscape – Afghanistan & Pakistan



Contents

Company	Page
Introduction	3
AEG	6
Ameresco	7
Ballard	8
Caterpillar	9
Eltek	10
Ericsson	11
Fluidicenergy	12
GE	13
Heliocentris Industry GmbH	14
Hisel	15
Huawei Hybrid Power – PowerCube	16
LCC	17
MESEC	18
Narada	19
Nazim Energy	20
NorthStar Battery	21
Pheasun	22
Saft	23
Saltec	24
Trojan Batteries	25
VNL	26
ZTE	27

Introduction

The Green Power for Mobile (GPM) programme is a joint initiative of the GSMA and the International Finance Corporation (IFC) in partnership with the Government of Netherlands. The programme aims to reduce the telecom sector's dependence on diesel usage through different activities:

- Technical advisory services
- Research and knowledge sharing
- Market assessment of green power potential

GPM works at developing an eco-system for operators through various initiatives including region-specific green vendor catalogues and best practice procurement guides.

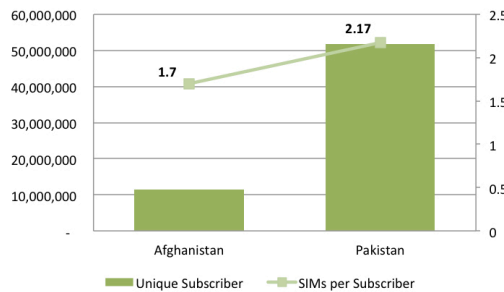
The purpose of this Afghanistan and Pakistan Vendor Landscape is to support mobile operators in their green power initiatives by providing them with a directory of green power vendors/service providers operating or interested in operating in the region. The document also provides a snapshot of the current market including the status of green power adoption in these two countries.

Telecom Market

GSMA identifies that 38,452 tower sites¹ are serving a total of 205 million people in both countries and the mobile market penetration is of 33.92% and of 28.51%, respectively in Afghanistan and Pakistan².

The Average Revenue per User (ARPU) in Afghanistan is higher than in Pakistan, reaching USD7.13 for the former and approximately USD4.77 for the latter, based on 2012 figures. The unique subscribers and number of SIMs per subscriber are shown below³.

Figure 1. Unique Subscribers and SIMs per Subscriber



The number of unique subscribers in Afghanistan has reached 11.5 million, with 1.7 SIMs per subscribers, while Pakistan has 51.7 million unique subscribers, with 2.17 SIMs per subscriber⁴.

Telecom Infrastructure in Afghanistan and Pakistan

By 2016, GSMA estimates that the network will grow from 38,452 tower sites to 73,289⁵.

Figure 2. Network Growth



Today, Afghanistan, with 5,292 towers, has about 24% of the sites in off-grid area and 14% are in unreliable grid locations (i.e. with power outage of more than 8 hours a day).

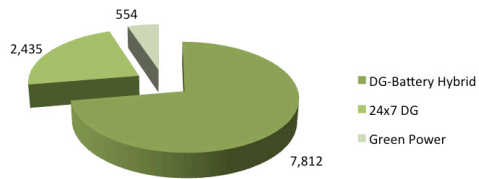
1 GSMA GPM Research
 2 Wireless Intelligent
 3 Wireless Intelligent
 4 Wireless Intelligent
 5 GPM Research
 6 GPM Research

Green Deployment and Powering Telecoms

The electrification rates in Afghanistan and Pakistan are of about 30% and 67% respectively. Considering the current power situation in both countries, MNOs need to find a solution to power up their base stations and at the same time reduce their dependence on fossil fuel.

GSMA identifies 10,801 problematic sites out of 38,452 tower sites in Afghanistan and Pakistan. Here is the detailed power configuration deployment for problematic sites.

Figure 3. Current Deployment for Problematic Sites



Based on current deployments, DG-battery hybrid solutions are the preferred choice for MNOs, followed by 24x7 DG solutions. Less than 2% of the 38,452 sites are powered by green energy, which highlights the opportunity for renewable energy vendors and service provider to offer their solutions in both countries.

A combined 554 green power sites are using solar energy, while other green choices such as fuel cell and wind technology are still being trialled by MNOs in the region. Solar radiation in Afghanistan and Pakistan is about 4.0-5.3 kWh/m2.as the sun shines on average between 8-8.5 hours daily.

To power the telecom networks, the CAPEX based model is available in both countries whereas the OPEX based model is still early stage in Pakistan; although the CAPEX model requires a significant investment from the MNOs to deploy green power sites. However, the transition has just begun as some vendors/ service providers are now offering appealing OPEX models to MNOs.

The OPEX business model concept shifts MNOs’ cost of investment as well as the responsibility on power management to Energy Service Companies (ESCOs). The ESCO will provide the power solution to the site and as compensation MNOs will pay for energy consumption based on agreed tariffs.

One of the OPEX business models is the Power Purchase Agreement (PPA) model. With a PPA model, MNOs pay the ESCO based on the energy consumption on a pay-per usage basis. The other OPEX model is the fixed fee model, which requires the MNO to pay the ESCO based on a monthly fixed rate. The benefit from this model is that the MNO energy expenditure will not vary from month to month.

Vendor/ESCO Landscape

This document lists the green vendors/ESCOs that work or have an interest in working in the Afghanistan and Pakistan markets. Each profile provides accompany background, a product brief and product footprint as well as a testimonial from past projects. The list comes from local and international vendor/ ESCO companies.

Table 1. Afghanistan and Pakistan Renewable Energy Vendor/ESCOListing

Company	Core Competencies
AEG Power Solutions	Power Equipment
Ameresco Solar	Solar
Ballard Power System	Fuel Cell
Caterpillar	Power Equipment
Eltek Power	Power Equipment
Ericsson	Telecom Equipment
Fluidicenergy	Energy Storage
GE Energy Storage	Energy Storage
Heliocentris	Energy Management
Hisel	System Integrator
Huawei	Telecom Equipment
LCC	System Integrator
Mesec	System Integrator
Narada	Energy Storage
Nizam Energy	Energy Storage
Northstar	Energy Storage
Pheasun	Solar
Saft	Energy Storage
Saltec	System Integrator
Trojan	Energy Storage
VNL	Telecom Equipment
ZTE	Telecom Equipment

AEG Power Solutions Sdn Bhd

Company Background

AEG began working on large scale industrial electrification projects and always leading from the fore, AEG soon developed a globally respected name leading the world in the fields of AC and DC generation and Switching Technology.



Outdoor System



Indoor System

AEG
POWER SOLUTIONS

Product and service description

Manufacture of DC Power (Rectifier), Solar Inverter (Hybrid, Off Grid and On Grid), Inverter, Power Controller, UPS.

Geographic footprint

With Subsidiaries in 17 Countries Worldwide, AEGPS designs, Manufactures, Sells and Services AC and DC Power Solutions for a wide variety industrial and communications applications and for the renewable energy sector.

Client List

PT. Primatama, Konstruksi/Telkomsel/CDC, Tata-BSNL/Solar, GTL/Solar, Shanti Electricals/Solar, Tower Vision/Solar, Emmvee/Solar, Lanco/Solar, Power Box/Solar, Getesa/GE Cycling, Winfield/Solar, AlcatelLucent/Solar/GE Cycling, OPT Noumea/Solar, BNP/Solar

Company

14th Floor,
Menara Safuan,
80, Jalan Ampang,
50450 Kuala Lumpur,
Malaysia

Contact

Chandran Mohan

Email

mohan@aegps.com

Telephone

+60122327101

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, 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



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.

Company

2202 West Medtronic Way
Suite 101, Tempe
AZ 85281 USA

Web

www.amerescosolar.com

Email

info@amerescosolar.com

Telephone

+1.480.760.2500

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

BALLARD®

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 services

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, Idea Cellular, Motorola, Nokia Siemens Networks, Orange, SINE Network, Hutchison Telecommunication, 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

Company

9000 Glenlyon Parkway
Burnaby
British Columbia
V5J 5J8 Canada

Web

www.ballard.com

Email

marketing@ballard.com

Telephone

+1.604.454.0900

Caterpillar

Company Background

Caterpillar has been manufacturing gensets and electric power systems for more than 80 years. Supported by the worldwide Cat® Dealer network, Caterpillar offers generator sets, systems, and rental units for industry applications including telecommunications, healthcare, manufacturing, commercial, construction and residential.



Caterpillar has expanded its expertise and global service network to offer hybrid power solutions for telecommunications applications, which includes high efficiency advanced products, technical expertise, Customer Support Agreements, maintenance contracts and dealer support.

In 2012, Caterpillar has been named to the Dow Jones Sustainability Indexes (DJSI) for the tenth straight year and once again has been recognized as the sustainability leader in the Industrial Engineering sector. Since 2005, Caterpillar has published an annual sustainability report, with detailed performance information and data and highlights about specific projects that support our sustainable development efforts.

Visit Caterpillar.com to view: 2012 Sustainability Report

Products and Services

Caterpillar is powering change by leveraging technology and innovation to enable our customers to become more productive by providing products, services and solutions that use resources more efficiently. Each year our power generation products provide approximately 10.5 million MWh of electricity globally from renewable resources.

Caterpillar is bringing hybrid power solutions to telecommunications customers. To learn more: Cat Hybrid Power Caterpillar powers Telecom Site in Jordan see p65 Sustainability Report 2011

Geographic Footprint

Worldwide network of Cat Dealers.
Presence in more than 240 countries.

“Oman Mobile is very satisfied with the total assistance provided by Oasis. Oasis Trading and Caterpillar could answer Oman Mobile’s requirement; including fuel management.”

Oman Mobile Telecommunications Company LLC

Company
CATERPILLAR Sarl
Geneva –Switzerland

Email
Lentsch_Vincent@
cat.com

Telephone
+41 22 849 47 45

Eltek AS

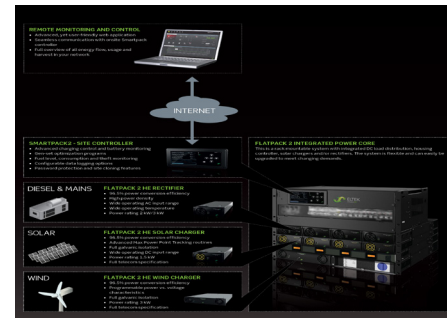
Company Background

Eltek was established in 1971 and has always had its main focus on power solutions for telecom. In the last decade Eltek has been the fastest growing and technology leading company within the niche of DC power systems for telecom. A main focus in our product evolution over the last 5 years has been on operational efficiency gained from high efficiency products and optimal utilization of available energy resources including renewables. Network energy monitoring and optimization software is also an important part of our total offering.

Client list

Ufone, Mobilink, Warid Telecom, Telenor (various subsidiaries), Orange, SingTel, Ooredoo, BT, Etisalat, MTN

Etisalat: "Further, we have been able to cut down our energy bills considerably due to the high efficiency of the Eltek Rectifier systems."



Eltek was the first company in the industry to launch High Efficiency rectifiers with the HE series of which now more than 500 000 are installed in the field and contributing to a massive energy saving.

Today Eltek has a position as one of the largest providers of Power systems for the global telecom infrastructure.

Product and services

Eltek's product range cover systems from a few 100 watts to MW plants powering any telecom / datacom equipment from small routers or base stations to large central office plants or data centers. Most systems provided today are based on HE (High Efficiency) products with an efficiency between 95 and 96,5%.

The HE family also includes converters maximizing the energy output from solar panels and wind generators. All designed according to telecom specifications and integrated into the same system with a single controller.

Eltek systems are delivered in packages from sub-racks for integration into other cabinets or equipment to complete systems in indoor or outdoor enclosures.

Most systems are provided with advanced controllers providing full access, monitoring and control over secure protocols locally or remotely. A Multisite Monitor is also available allowing operators to have full control of all energy usage and to further optimize operational efficiency to save energy, fuel and money. More information: http://www.eltek.com/wip4/hybrid_telecom/

Geographical footprint

Eltek have offices in 32 countries and do business in more than 100.

Company

Gråterudveien 8, PO Box
2340
N-3003 Drammen
Norway

Web

www.eltek.com

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

Company

Telefonaktiebolaget LM
Ericsson
Torshamnsgatan 23
Stockholm 164 83
Sweden

Website

www.ericsson.com

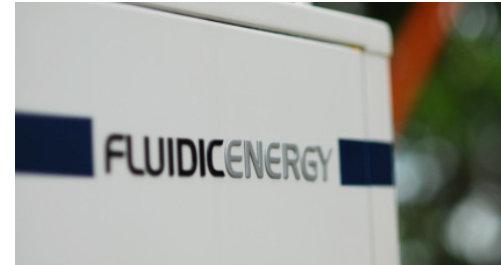
Telephone

+46 10 719 00 00

Fluidic Energy

Company Background

Founded in 2006, Fluidic Inc. is delivering its revolutionary energy storage technology to the forefront of clean energy storage in lieu of diesel generators and lead acid batteries. Fluidic's combination of game-changing technology, strong financial backing and proven company leadership, has enabled Fluidic to bring environmentally sustainable and commercially viable solutions to the market place. Fluidic has filed 80 patents worldwide with over 200 unique claims around its core technology.



FLUIDICENERGY

Fluidic Auxiliary Power Systems (APS) are installed in some of the world's harshest environments and, in areas with poor, very poor, or even off-grid infrastructure with no need for cooling systems. With discharge capabilities of more than 15 hours daily, multi-year performance warranties and attractive terms, Fluidic is the first real viable alternative to the lead acid and diesel generator combination.

Product and Services

Fluidic offers cutting-edge energy storage technology capable of ultra-long run times at the lowest possible cost, remote site management and innovative terms to provide best-in-class APS. Fluidic's solution offers customers improved cash flow through significant operating expense savings and lower capital expenditures. Beyond the compelling economic benefits, Fluidic's solution offers operational advantages over traditional batteries including improved up-time, significantly increased runtime, no DOD limitations, negligible self-discharge,

no cycle count impact on lifetime, long shelf life, non-hazardous materials and comparatively insignificant theft value. The units can operate within a wide range of outdoor environments (up to 50°C) eliminating the need for air-conditioned space. Integral to the Fluidic system is its FluidicIQ auto-diagnostics and remote monitoring, which provides real-time assessment of system health, grid availability, diesel fuel savings, CO2 reduction, outage frequency and discharge profile. FluidicIQ is available via a web interface, allowing for the optimal management and maintenance of remote sites.

Geographic Footprint

Serving telecom operators across Asia and Latin America.

Financing Models

Fluidic offers its APS, which includes multi-year performance warranties, guaranteed power availability, and multi-year vendor financing. Terms can be structured either as Capex or Opex arrangement according to a customer's needs.

Company

8455 North 90th Street
Scottsdale, Arizona 85258
USA

Contact

Katie Avila

Email

contact@fluidic
energy.com

Telephone

+1(480) 966-0242

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.

Company
1 River Road
Schenectady, NY
12345-6000

Website
www.geenergystorage.com

Email
ganesh.balasubramanian@ge.com

Telephone
+1 (518) 348-3467

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.

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).



Solutions

Heliocentris provides Energy Management and Clean Energy Solutions for wireless networks at off-/bad- and on-grid locations. Services throughout the life cycle guarantee a customer oriented and optimized offering.

Energy Management Systems

The Energy Manager with its modular architecture, proprietary software, sensors, control modules and a Remote Management Server Platform - is specially designed to manage and protect telecommunication sites. Remote monitoring and control solutions provide transparency, increase site availability and security and reduce costs.

Clean Energy Solutions

The Genset Efficiency Solution including an intelligent energy management optimizes the operation of diesel generators on site. Installations of the Heliocentris technology achieved over 50% fuel savings and 75% generator runtime reduction.

Furthermore, innovative and renewable energy concepts including PV, wind generators and Fuel- Cell Solutions are key competences of Heliocentris.

Services

Heliocentris offers a set of Professional Services ranging from Energy Consultancy, Energy Audits, Planning, Energy Design & Engineering, Implementation, Project Management and Technical Support.

Geographic footprint

Europe, Middle East, Africa, Asia Pacific and Americas.

Company

Heliocentris Industry
GmbH
Rudower Chaussee 29
12489 Berlin
Germany

Email

info@heliocentris.com

Telephone

+49(0) 30 340 601 500



HiSEL Power Pakistan (PVT.) LTD.

Company Background

HiSEL power corporation is a canadian renewable energy company that provides solar, energy backup, and conservation solutions to customers all over the world. We develop high-quality solar inverter technologies, integrated solar systems, energy saving & energy backup products, and solar power generation projects.

We have established an extensive supply chain base in china with leading manufacturers of photovoltaic (PV) modules, batteries, led lights and other related products. We have engineering teams working on product innovation, research and development in collaboration with top canadian and chinese universities.

- PV system integration and solutions
- Inverter and micro-grid technologies
- Energy backup solutions
- Energy conservation solutions
- Solar power development

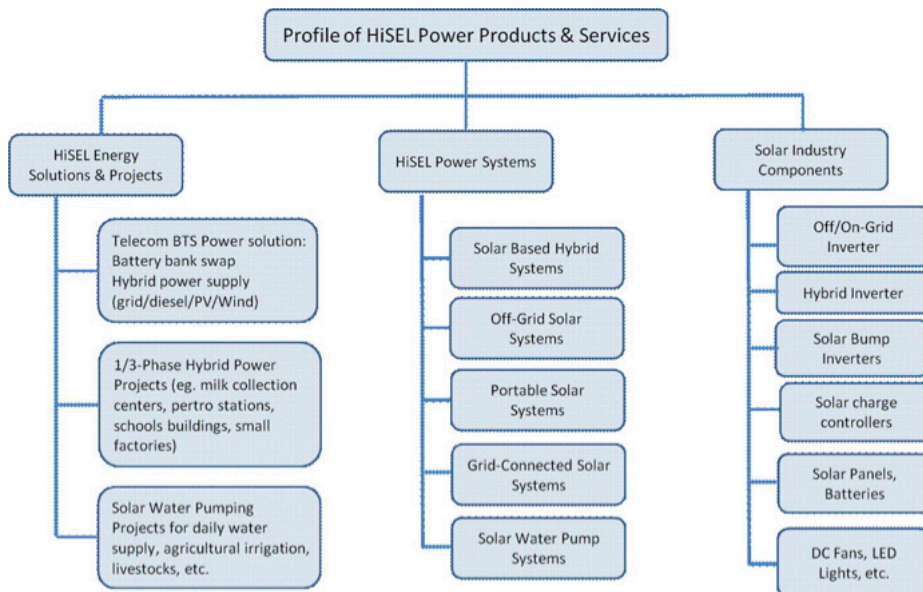
Geographic footprint

Asia, America, Europe, Middle East, and Africa.

Our head office is located in Toronto, Canada, with business divisions in China, the U.S., and Pakistan.

Products and service description

HiSEL Power Corporation aims to become an independent power producer and PV system integration company by utilizing its management expertise, technological innovations and diverse supply chain agreements to provide cost effective and sustainable PV systems globally. HiSEL has five core business lines:



Client list

Telenor Pakistan

Company

35-Ahmed Block,
 New Garden Town,
 Lahore, Pakistan

Website

<http://www.hiselpower.com>

Email

pak@hiselpower.com,
info@hiselpower.com

Telephone

+92 (42) 3594 0088-89

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.

Client list

STC, T-Mobile, AT&T, Etisalat, Telenor, KPN, Vodafone, Zain, Huawei, Ericsson

ICT network energy efficiency specialist
Reliable partner for customer



Product

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.

Company

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

Web

www.huawei.com

Telephone

+86-755-28780808

LCC Pakistan (Pvt.) Ltd.

Company Background

A pioneer in the industry since 1983, LCC has performed technical services for the largest wireless operators in North and South America, Europe, The Middle East, Africa and Asia. The Company has worked with all major access technologies (including LTE, WiMAX, HSPA, EV-DO, CDMA, EDGE and GSM) and has participated in the success of some of the largest and most sophisticated wireless systems in the world.

We bring local knowledge and global capabilities to our customers, offering innovative solutions, insight into cutting-edge developments and delivering solutions that increase business efficiencies. Our service offering includes consulting, design, deployment, performance and operations and maintenance services and training through the world-renowned Wireless Institute.

In 2011, LCC launched its own product line by the name of CEMOCS Telemetry, which essentially is a Remote Site Monitoring and Control System. Because of its indigenous design, modular approach, open source software platforms, state of the art technology and features, quick customization and vast support network, CEMOCS has received an overwhelming response from International Telecom Operators.

Client list

STC, T-Mobile, AT&T, Etisalat, Telenor, KPN, Vodafone, Zain, Huawei, Ericsson



Product & Services Description

CEMOCS Telemetry's current solution offers the following Remote Power & Energy Management OpEx Reduction features, specifically designed for Telecom BTS Sites;

- Optimized Rectifier Battery Utilization to Prevent Diesel Generator from Running
- Complete Fuel Management (Consumption, Refilling, etc)
- Cell Level Rectifier Battery Health Analysis
- Commercial Power Quality & Energy Consumption Analysis
- Tariff Optimization by selecting the cheapest power source between Commercial Power, DG & Batteries
- Solar Hybrid Solution
- Power Line Conditioning
- Auto Phase Selection

Geographic footprint

LCC has a global footprint with over 40 registered offices in Americas, Europe, Asia Pacific and Middle East.

Company

314, East Service Road,
F-11/4. Islamabad.

Web

www.lcc.com

Email

salman_khalili@lcc.com

Telephone

+92-345-8566713

M/S MESEC Group of Companies (Pak Wind Energy Pvt Ltd)

Company Background

MESEC established in 1990. Pak Wind energy PVT LTD is sister concerned of M/s MESEC. Have office, display centre, training centre, service centre and metal fabrication workshop.



Products and Services

Wind Energy, solar energy, Wind solar hybrid energy solutions for telecom, Micro hydro power, Biogas. Supply, Designing, installation, technical services and support. OPEX is possible with support of financial institutions.

Geographic footprint

MESEC offer supply, installation and services to all over the Pakistan and Afghanistan.

Client list

Telenor Pakistan PVT LTD, Warid Telecom Pakistan PVT LTD, Wateen Telecom, PTCL, Zong Telecom, Rehlacom, Moblink, AKPBS, AEDB, PPAF

Company

Mr. Muhammad Sarwar,
M-3 Akbar Paradise,
Gulshan-e-Iqbal 10A,
Karachi-75300. Pakistan

Email

Mesec786@hotmail.com

Telephone

Phone PTCL office.
0092-21-34837609-11
Mobile: 0333 2109318

Narada Asia Pacific Pte LTD

Company Background

Narada is a global leader in stored energy solutions for industrial applications. We complement our extensive line of renewable energy, motive power, telecommunication reserve power, and specialty batteries with full range of integrated services and system. Narada's main product is valve regulated lead acid battery. And export its products globally; to more than 100 countries including Europe, America, Asia and Africa. Narada R&D Centre with an investment of more than USD1.5 million in high tech testing equipment, and qualified as a National Independent Laboratory for battery research and testing.



Narada

The centre is responsible for new product development, technical improvement, process management, product test and knowledge property management.

Today we have successfully developed deep cycle storage battery, high-rate battery, high temperature battery, motive power battery, and renewable energy battery. Narada has exploited more than 130 types of new generation VRLA battery and has obtained more than 50 patents.

Product

Narada manufactures wide range VRLA Battery products for Telecom application; 2V and 12V AGM, Hybrid-Gel, Tubular Gel & Lithium-Ion LiFePO4 batteries. For Renewable energy and Energy storage application we have created an innovative range of High Temperature (HTB) and REX batteries to cope with the most extreme temperatures and environments condition with capable of deliver at least twice the cycle life of conventional lead acid batteries.

Our people are the foundation of our success and we have formed a wide network of dedicated and highly experienced teams, armed with many years of experience and each having their own field of specialization.

We provide technical trainings and consultancy for our customers and partners to understand the concept and the chemistry about our products and services. Our technical specialist team helps you to carry out fault analysis, maintenance support and services contract program according to customer requirement.

Geographic footprint

Singapore, Cambodia, Malaysia, Philippines, Thailand, Indonesia, Vietnam, Myanmar, Australia, NewZealand.

Client list

Vodafone, Optus, Singtel, Telkomsel, Indosat, Globe, True Move, TM, Maxis, Airtel

Vodafone – Narada as Vodafone global approved battery supplier and strategic partner have developed the High Temperature Battery (HTB 313K series) per Vodafone's request. 2V 600AH HTB have been tested in 3rd party Lab with good performance. We're looking for site application opportunity to use Narada HTB to achieve potential Opex saving.

Company

Narada Asia Pacific
Pte LTD

Contact: James Wong,
Blk 9 Kaki Bukit Road 1
#02-10, Eunos Technolink,
Singapore 415938

Email

james@narada-ap.com

Telephone

+65 6848 1191

Nizam Energy (Private) Ltd.

Company Background

Nizam Energy is a subsidiary of Nizam Group working in the field of Renewable Energy since 2010, with a focus towards Solar Energy.

We are a leading integrator, System Solution provider and Wholesaler of PV Components Across Pakistan / Afghanistan with a nationwide Footprint.

At the Core of our services is Green Solutions for On Grid / Off-Grid and or Hybrid Solutions for Residential & Commercial Buildings, Telecom, Water Pumping for Irrigation and Utility Power Plants.

Client list

PTCL, NTC, CMPak



Product

We are committed to developing Telecom Solutions for our clients according to individual requirements based on Renewable Energy. We offer off-Grid and Hybrid Solutions for Telecom BTS which are cost effective and optimized according to the local environment. Our Systems are engineered to support and provide Continuous Power where grid power availability is unavailable or unreliable and Scarce. We offer Annual Maintenance Contracts (AMC) to provide a trouble free solutions for our clients.

- Residential and Commercial Solar Systems
- Solar Pumps for Irrigations
- Solar / Diesel Hybrid for BTS Sites
- Off-Grid Solar for BTS Sites
- Utility Scale Solar Power Plants

Components

Solar Modules, Charge Controllers, Battery Banks, DC Air Conditioner Cabinets, Rectifiers and DC Generators.

Geographic footprint

We have a nationwide footprint of 5 offices across Pakistan

Company

Contact: Usman Ahmad
G-30/4 KDA Scheme No.
5, Block-8,
Clifton, Karachi, Pakistan.

Web

www.nizamenergy.com

Telephone

+86-755-28780808

Email

sales@nizamenergy.com

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 services

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
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

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

“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.”



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.

Company

145, rue de la Marbrerie
Boîte aux lettres n°4
34740 Vendargues
France

Contact

Sara Dandrau

Email

sara.dandrau@phaesun.fr

Telephone

+33 467 04 38 40

Trojan Battery Company

Company Background

Trojan Battery Company, founded in 1925, is ISO 9001:2008 certified with U.S.-based operations in California and Georgia. As the world's leading manufacturer of deep-cycle batteries, Trojan Battery Company supplies energy storage solutions for renewable energy and backup power applications. For more information, visit www.trojanbatteryRE.com.



Product and service

Trojan Battery Company is the world's leading manufacturer of deep-cycle batteries, offering a complete portfolio of technologically-advanced deep-cycle flooded, AGM and gel batteries that provide maximum long-lasting performance to meet the requirements of today's advancing renewable energy systems.

Geographic Footprint

Worldwide

Company

Trojan Battery Company
12380 Clark Street
Santa Fe Springs, CA
90670 USA

Website

www.trojanbatteryRE.com

Email

dmiddleton@trojanbattery.com

Telephone

+1 (562) 236-3000
+1 (800) 423-6569

SAFT

Company Background

Saft (Euronext: Saft) is a world leader in the design and manufacture of advanced technology batteries for industry. The Group is the world's leading manufacturer of nickel batteries and primary lithium batteries for the industrial infrastructure and processes, transportation, civil and military electronics' markets. Saft is the world leader in space and defence batteries with its Li-ion technologies which are also being deployed in the energy storage, transportation and telecommunication markets.



Saft offers a range of specialized telecom batteries, based on advanced technologies, that deliver efficient and reliable backup power to ensure continuity of service for a wide variety of applications, such as central offices, remote terminals and cellular base stations for both on-grid or stand-alone sites. Saft's 4,000 employees present in 19 countries, its 16 manufacturing sites and extensive sales network all contribute to accelerating the Group's growth for the future.

For more information, please visit Saft at www.saftbatteries.com

Product and Service Description

Evolion is a new evolution in high energy storage batteries for outdoor on-grid sites, off-grid sites and DPCO installations. The Evolion module has a 48 V voltage and a rated capacity of 77 Ah. Evolion offers a unique combination of float charging capability and high cycling performance. Its key features include: high energy storage in a compact, weight-saving package; high efficiency; long

calendar and cycle life – even when operating in extreme temperatures. Evolion's compact and lightweight design makes it possible to deliver the maximum possible performance from the limited space available within telecom cabinets. Its high volumic energy means that it only needs half the space required by a conventional VRLA battery. For remote installations, the zero maintenance design coupled with intelligent remote supervision eliminates the need for routine site visits. Evolion is four to ten times lighter than conventional batteries, depending on the application. This makes it feasible to collocate the battery system with the active telecom equipment, even on raised floors.

Geographic footprint

Saft's dominant market positioning is based on technical excellence and the largest international industrial and sales presence in the world. Located in 19 countries, the Group has 16 wholly-owned production sites.

Contact
Marie-Christine
Guiheneuf

Company
12 Rue Sadi Carnot
93170 Bagnolet
France

Web
www.saftbatteries.com

Email
ibg.info@saftbatteries.com

Telephone
+33 (0)1 49 93 19 18

Saltec Powerlink

Company Background

SalTec provides standalone & integrated Power Solutions for On-Grid sites, that ensure maximum reliability, Power OpEx reduction, & fast deployment rollout for communication networks.

With over 20 years of experience in providing Power Solutions to most notorious power conditions in the world, SalTec has the expertise in design, manufacturing, Installation and Services to offer the 'most appropriate' Solution for successful and profitable operations.

Client List

Telenor Pakistan, PTML – Ufone, Warid Telecom, China Mobile – CM Pak, Wataniya Telecom Algiers, Tower Leasing Co's in Africa, Clean Power Systems, Huawei Technologies, Ericsson Pakistan, ZTE, NSN



Products and Services

Being an R&D based company, we truly believe in innovation, reliability and best technical support. Our products include:

- Line voltage conditioning & protection solution.
- Integrated Power System (IPS) for Infrastructure site built.
- Grid Power harnessing solution for max Power availability at poor grid areas.
- Genset/Battery Hybrid for Genset OpEx reduction.
- RMS for complete visibility on P&E, preventive measures, and effective future power planning.

Our services incl. Installation & Commissioning at site, Training & Development of customer specified O&M partner, Application specialist for continuous support & analysis via RMS.

Geographic Footprint

Pakistan, Middle East Asia, & Africa

Company

SalTec Powerlink
18C/5, Khayaban-e-
Tanzeem, Phase-5, D.H.A.,
Karachi, Pakistan.

Contact

Asif Kazi

Email

asif@saltec-powerlink.
com

Telephone

+92 213 5864852

VNL (Vihaan Networks Limited)

Company Background

VNL – Vihaan Networks Limited- was founded in 2004. VNL's WorldGSMTM rural telecom infrastructure solution is the first example of Microtelecom, the re-engineering of telecommunications to meet the needs of rural and remote communities. VNL has over 300 members led by Rajiv Mehrotra, Founder Chairman & CEO and a management team with deep experience of the telecoms business. For their pioneering work, VNL received GSMA's 2010 "Green Mobile-Best Green Programme Product or Initiative" Award, and was named a Technology Pioneer by the World Economic Forum in 2010.

Client List

Entel Bolivia, MPT Myanmar, Bhutan Telecom Bhutan, TashiCell Bhutan, Safaricom Kenya, UTL Uganda, FSM Telecommunications Corp., Micronesia.



VNL is a member of Shyam -India's leading diversified telecommunications group. Since 1974, Shyam has focused on creating value through innovation in telecoms R&D, equipment manufacture, solar powered network infrastructure, integrated network and radio backhaul, security and surveillance solutions, mobile services, broadband services, carrier neutral digital infrastructure services, neutral host indoor coverage solutions, and VSAT media broadcasting services.

Products and Services

VNL makes WorldGSMTM - the solar powered rural telecom infrastructure solution that enables operators to build a sustainable and profitable business model to deliver voice and data services to low ARPU communities. This is in areas with little or no grid power, where networks rely on diesel generators. WorldGSMTM is scalable and provides small, low cost alternatives to expensive centralized communications infrastructure equipment with

substantial savings of CAPEX and OPEX. It is interoperable with equipment of all major telecom equipment manufacturers.

The integrated solution simultaneously supports both GSM and ISP and can be deployed as standalone GSM or high speed broadband and alternatively as a mix of both. Multiple operators can share the complete infrastructure (BTS, BSC, backhaul, power system and antennas) with significant cost savings. Flexible backhaul supported over VSAT can help reach very remote areas in a cost-effective way using local switching from BTS to entire clusters.

Geographic Footprint

India, South Asia, Africa, Latin America

Company

21-22, Udyog Vihar,
Phase IV, Gurgaon, 122
015, Haryana, India

Email

marketing@vnl.in

Telephone

+91 124 3892528

Web

www.vnl.in

ZTE

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 master or above.

Client list

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

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. The electrical diagram of integrated household solar power system is shown in blow figure.

Geographic footprint

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

Company

No. 55,
Hi-tech Road South,
ShenZhen,
P.R.China

Telephone

+86-755-26770000