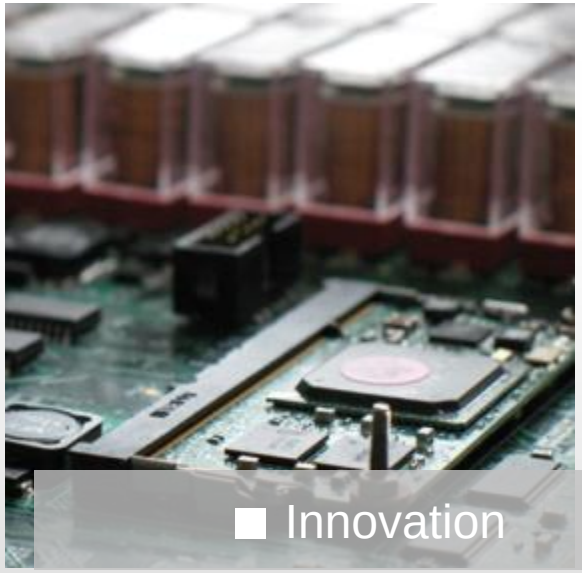
Heliocentris

Power for the 21st Century







Heliocentris‘ Way to the Power for the 21st Century

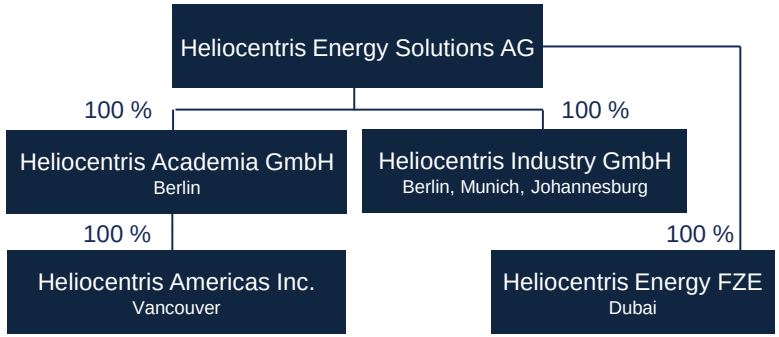
Michael Kutschenreuter, General Manager Heliocentris Middle East / North Africa
Islamabad, August 2013

Company overview

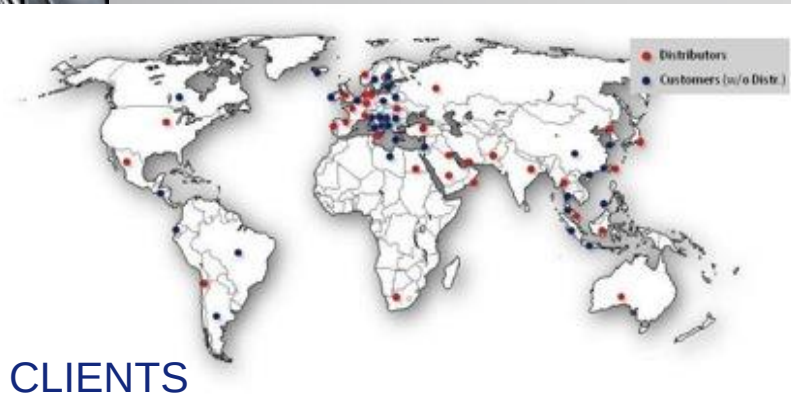
OVERVIEW	
Foundation	1995
Acquisition of P21	2011
Business	Energy Management Systems Clean Energy Training & Research
Markets	> 70 countries Export ratio 60-80%
Locations	Berlin, Munich, Vancouver, Dubai, Johannesburg
Group HQ	Berlin
Main shareholders	Bmp AG Conduit Ventures, UK NTEC, Kuwait (KIA) Ruffer European Fund, UK



GROUP STRUCTURE



CLIENTS



Heliocentris

From Genset Efficiency Solutions today to complete Zero Emission Solutions tomorrow

TOMORROW

Zero emission genset replacement

3

Zero Emission

Energy Manager, Battery, PV, Wind, Fuel Cell, Electrolyzer

Integration of renewable energy sources

2

Renewable Hybridization

Smaller Diesel Generator, Energy Manager, Battery, PV, Wind

TODAY

Genset Efficiency Solution

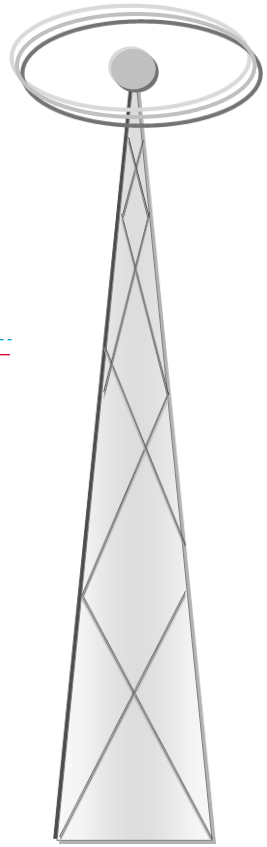
1

Battery Hybridization

Diesel Generator, Energy Manager, Battery

Conventional Setup

Diesel Generator



Customer Focus through Portfolio Structure

Heliocentris

Comprehensive portfolio allows tailor made solutions

Planning | Implementation | Care & Operation | Professional Services


Batteries

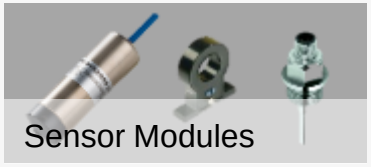

Wind


PV


Fuel Cell


Power Electronics


AC/FCU


Sensor Modules

HW + SW


Energy Manager

HW + SW


Remote Management SW

SW

Energy Management Systems

Clean Energy Solutions

Services

Lifecycle Services

Heliocentris

PLANNING

Expert Consulting
- Power Expertise
- Project Management

Site Design & Engineering
- Site Power Analysis
- Power Solution Design
- Engineering Energy Solution

Energy Consulting
- Analyse Energy Landscape
- Design Optimal Energy Solution
- Calculate Business Case

IMPLEMENTATION

Site Implementation
- Rollout Management
- Site Installation



CARE & OPERATION

Premium
incl. Preferred
- Power Operation
- Monitoring
- Dispatch
- Reporting

Preferred
incl. Basic
- On-Site Care
- Emergency Support
- Preventive Care

Basic
- Technical Assistance
- Software Updates
- Repair and Return

RMS Hosting
Setup – Enabling – Operation

PROFESSIONAL SERVICES

Software Update & Upgrade Installation
- Rollout Preparation
- Software Installation

Customization
- Feature Implementation
- Reporting

Training
- Planning
- Implementation
- Care & Operation
- Pre Sales / Sales Enabling

Site Infrastructure Optimization
- Re-Optimize Power Solution after change
- Leverage Operation Experience

Heliocentris

A key subset of our capabilities

SOH/SOC
Are interlinked, we measure both of them and operate the batteries for optimized battery life-time.

Battery lifetime control
Allows us to understand and design battery lifetime for different business cases to the point.

Bad Cell Detection
Automatic battery failure detection with automated recovery procedures.

Battery Care
Boost Charge, extended boost charge, equalization charge and further measures.

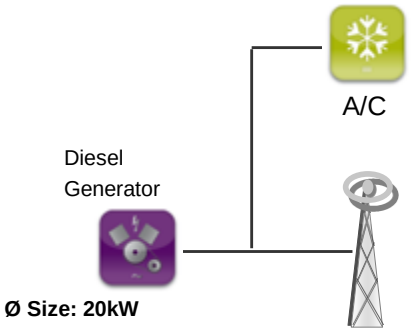


Savings Potential on Bad Grid and Off-Grid Sites

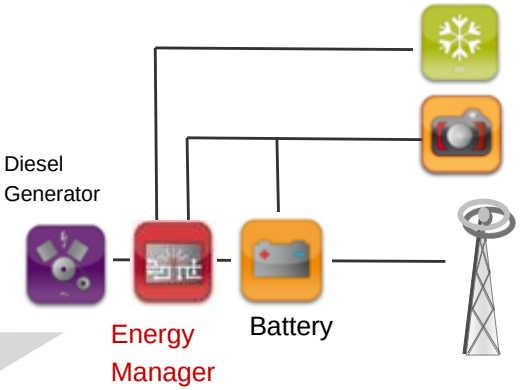
A comparison of conventional and energy efficient setup.

CONVENTIONAL SETUP

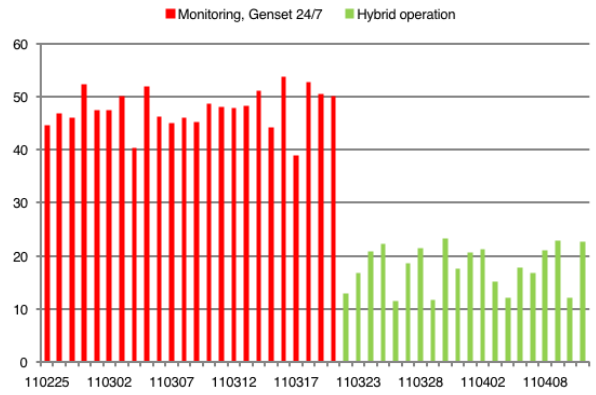
Ø Load: 1-4kW



HELIOCENTRIS SETUP



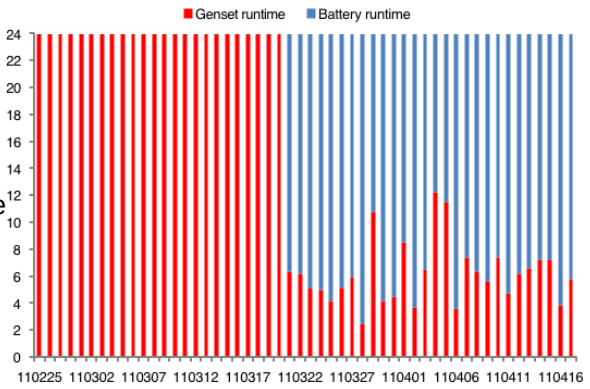
FUEL CONSUMPTION



Up to **75%** reduction of diesel consumption

GENSET RUNTIME

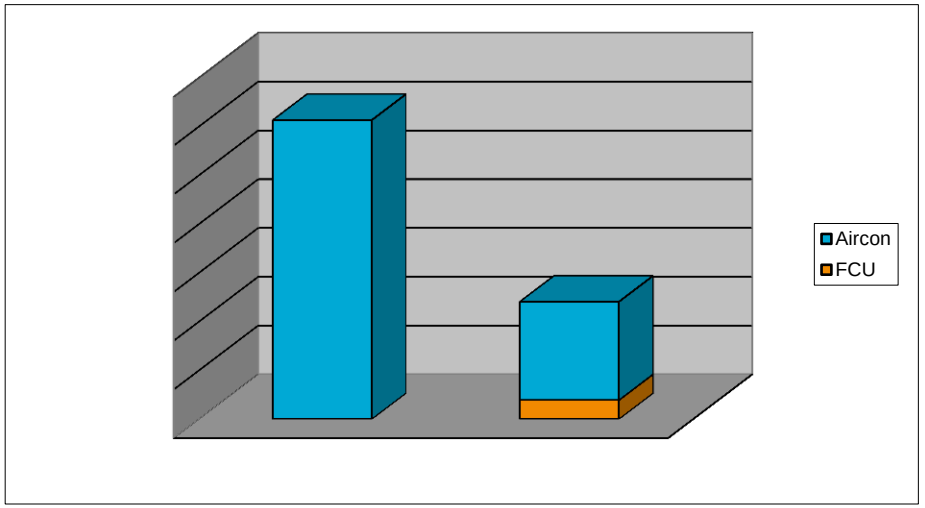
Up to **75%** reduction of genset runtime and maintenance cost



Heliocentris

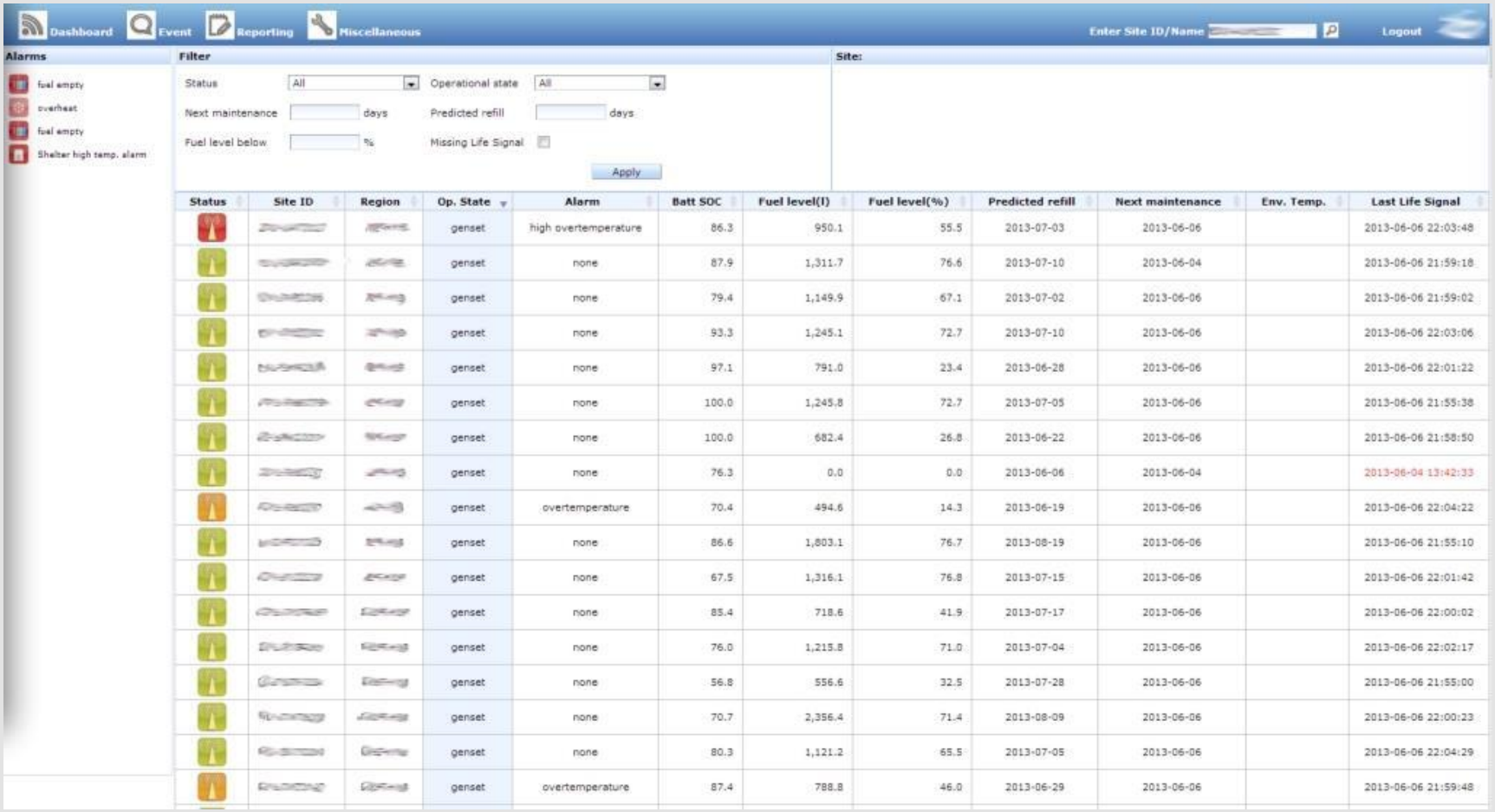
A business solution

Required Equipment and Business Case			
Required Equipment	Price USD	Units	Price per site
Energy Manager with Modules & SW	x.000	1	x.000
Free Air Cooling incl shipping and installation	x.000	1	x.000
Shipping, Project Management, Installation & Com.	x.000	1	x.000
Total up front cost			x.000
Savings through Free Air Cooling Unit			**x.xxx**
Savings through Performance Monitoring			**xx.xxx**
CapEx recovery (break even) after months…			**3**



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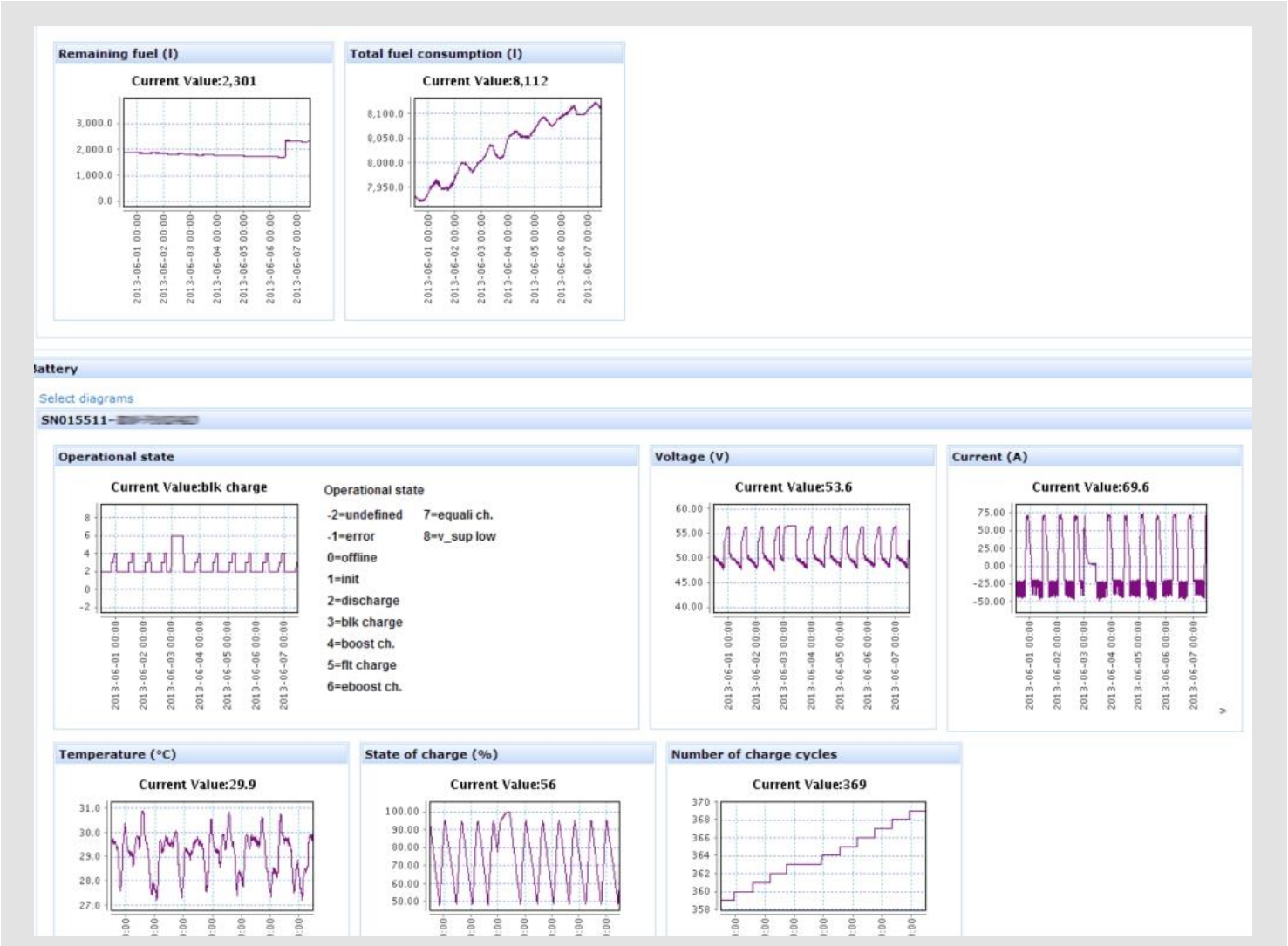
DAHSBOARD SITES OVERVIEW



Status	Site ID	Region	Op. State	Alarm	Batt SOC	Fuel level(l)	Fuel level(%)	Predicted refill	Next maintenance	Env. Temp.	Last Life Signal
			genset	high overtemperature	86.3	950.1	55.5	2013-07-03	2013-06-06		2013-06-06 22:03:48
			genset	none	87.9	1,311.7	76.6	2013-07-10	2013-06-04		2013-06-06 21:59:18
			genset	none	79.4	1,149.9	67.1	2013-07-02	2013-06-06		2013-06-06 21:59:02
			genset	none	93.3	1,245.1	72.7	2013-07-10	2013-06-06		2013-06-06 22:03:06
			genset	none	97.1	791.0	23.4	2013-06-28	2013-06-06		2013-06-06 22:01:22
			genset	none	100.0	1,245.8	72.7	2013-07-05	2013-06-06		2013-06-06 21:55:38
			genset	none	100.0	682.4	26.8	2013-06-22	2013-06-06		2013-06-06 21:58:50
			genset	none	76.3	0.0	0.0	2013-06-06	2013-06-04		2013-06-04 13:42:33
			genset	overtemperature	70.4	494.6	14.3	2013-06-19	2013-06-06		2013-06-06 22:04:22
			genset	none	86.6	1,803.1	76.7	2013-08-19	2013-06-06		2013-06-06 21:55:10
			genset	none	67.5	1,316.1	76.8	2013-07-15	2013-06-06		2013-06-06 22:01:42
			genset	none	85.4	718.6	41.9	2013-07-17	2013-06-06		2013-06-06 22:00:02
			genset	none	76.0	1,215.8	71.0	2013-07-04	2013-06-06		2013-06-06 22:02:17
			genset	none	56.8	556.6	32.5	2013-07-28	2013-06-06		2013-06-06 21:55:00
			genset	none	70.7	2,356.4	71.4	2013-08-09	2013-06-06		2013-06-06 22:00:23
			genset	none	80.3	1,121.2	65.5	2013-07-05	2013-06-06		2013-06-06 22:04:29
			genset	overtemperature	87.4	788.8	46.0	2013-06-29	2013-06-06		2013-06-06 21:59:48

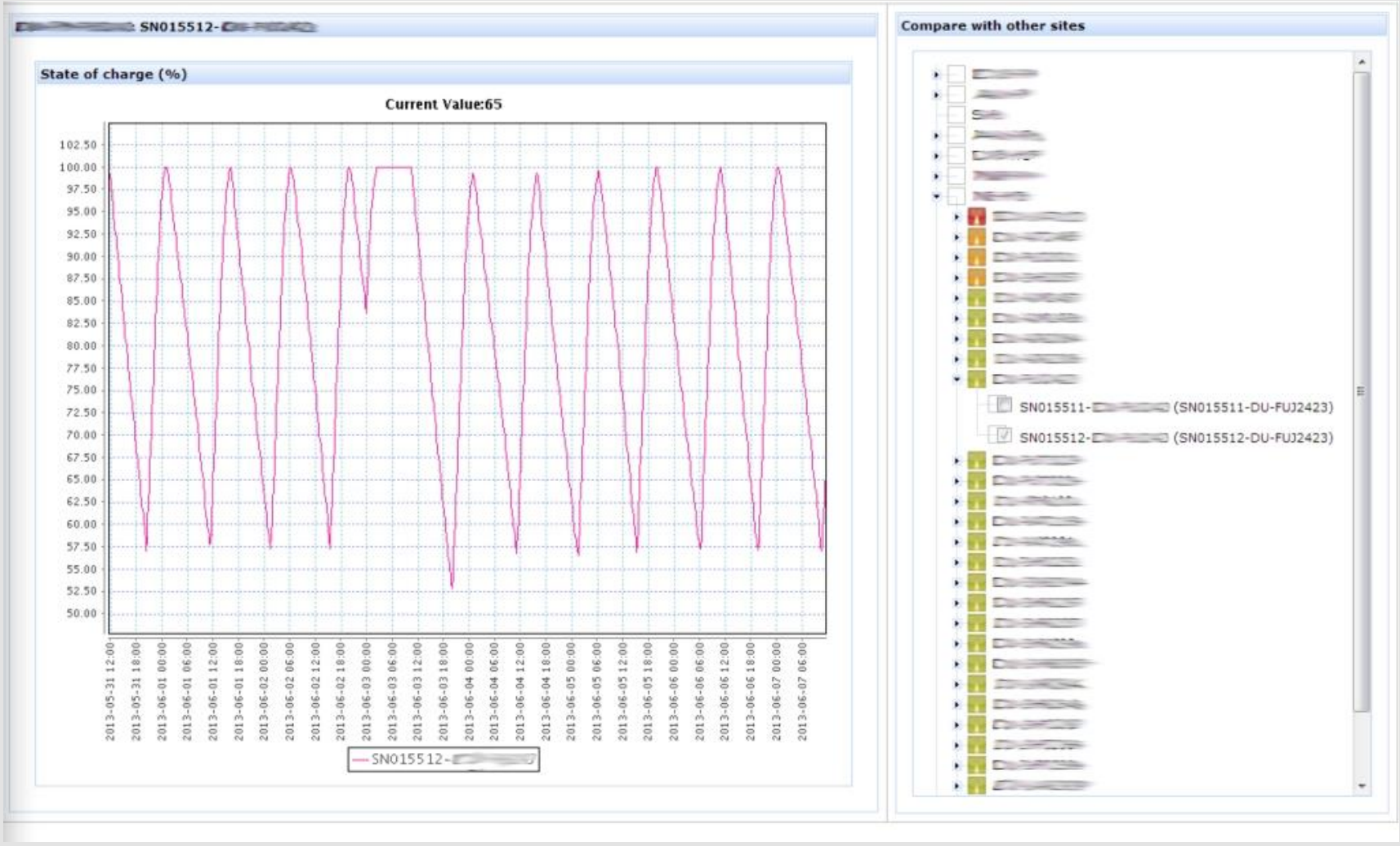
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ANALYSIS VIEW SITE



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SoC VIEW ANALYSIS



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SITE OVERVIEW REPORT

Site Overview

Showing page 1 of 1

Report infomation

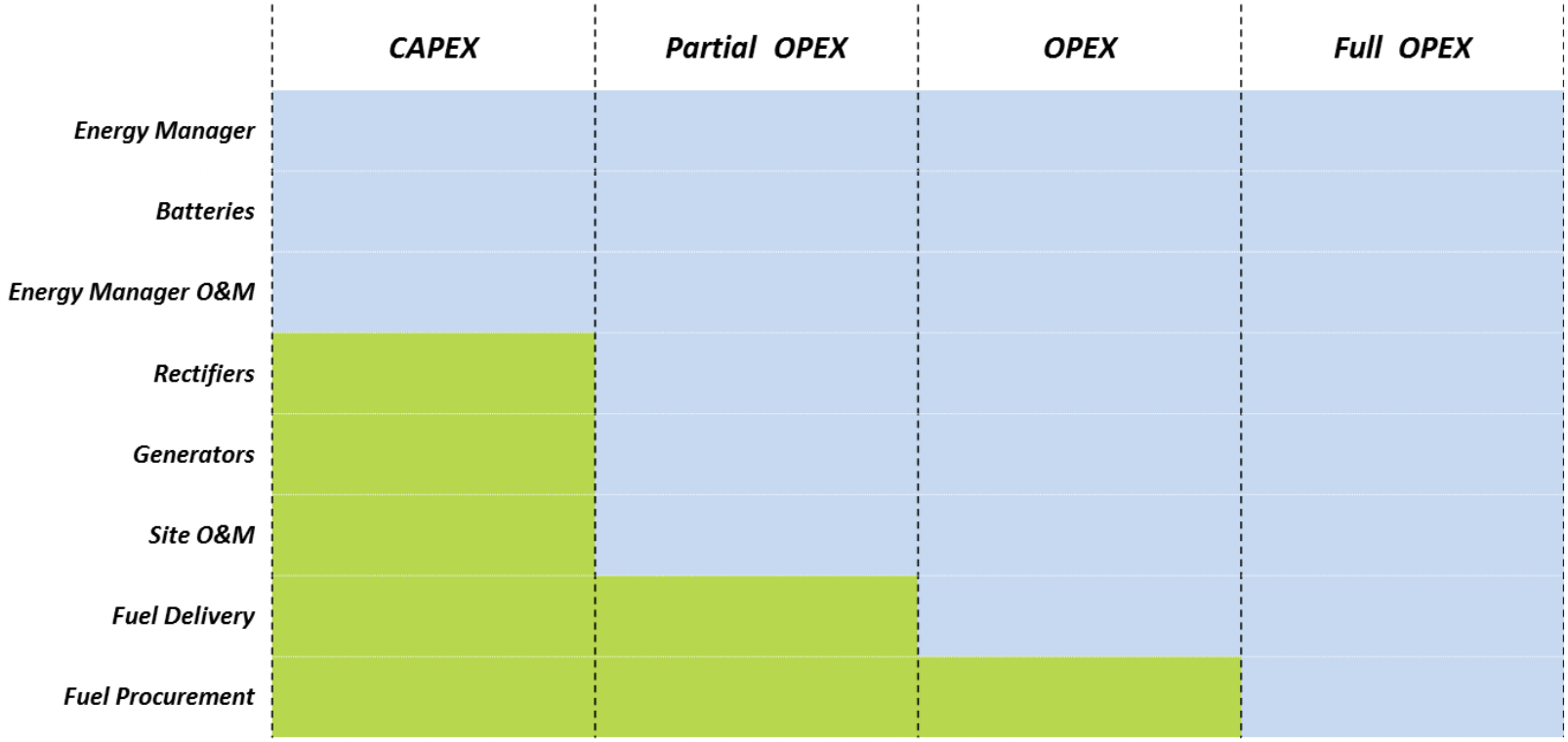
Heliocentris

Name: Sites Overview Report
Period: 2013-05-01 00:00:00 - 2013-05-31 23:59:59
(Time at Energy Manager Location)
Customer: [redacted]

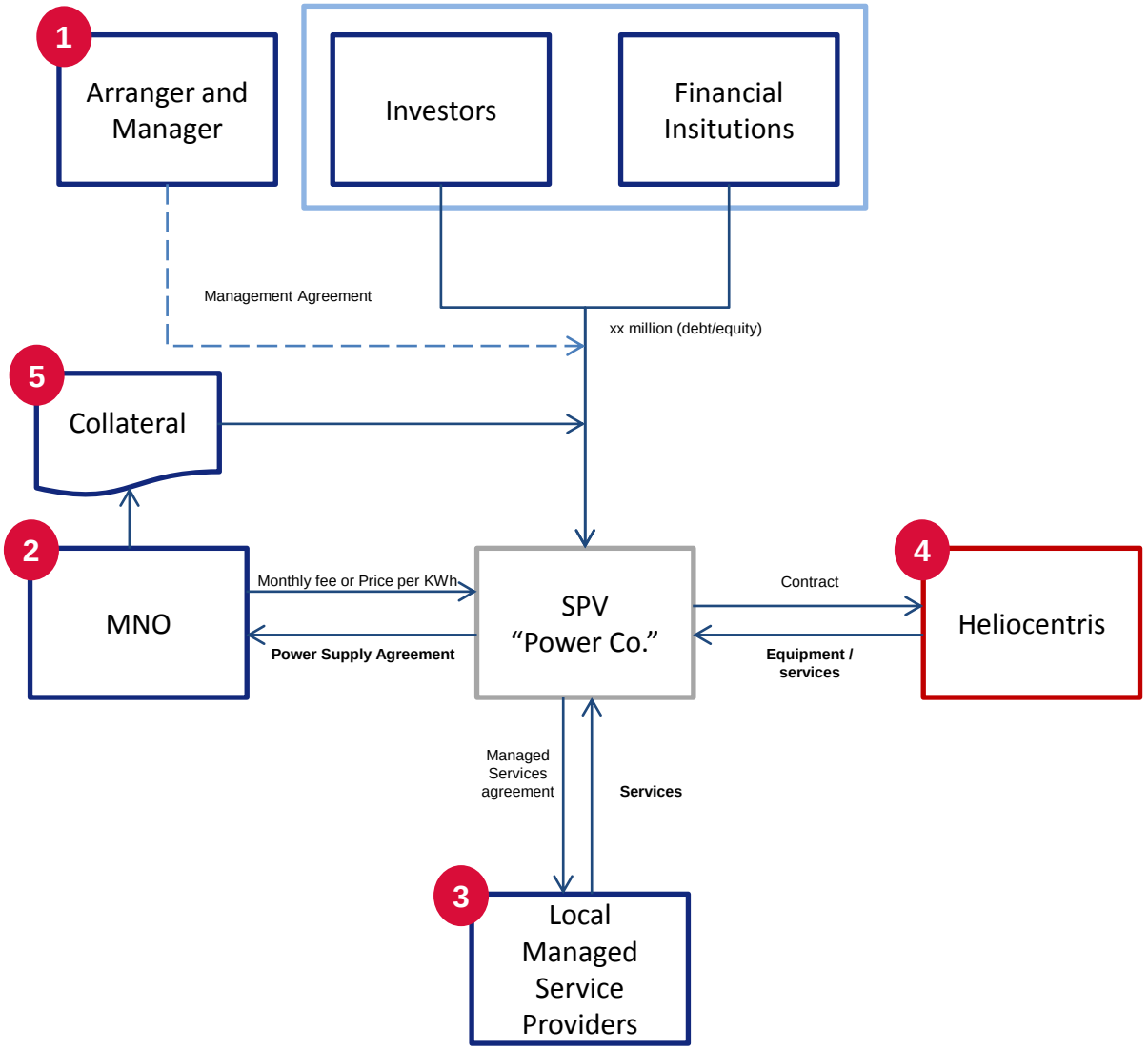
Region	Load	Energy Distribution			Fuel		
Site	Avg	Grid	Genset	Battery	Consumption	Refill	Lost
[redacted]	kW	hours	hours	hours	litres	litres	litres
[redacted]			261.95	484.50	512.22	852.66	138.85
[redacted]			265.29	480.25	150.59	667.19	159.79
[redacted]			252.26	493.34	778.79	1563.19	
[redacted]			346.42	366.50	878.14	1837.16	409.96
[redacted]			331.10	427.50	1451.35	1131.38	
[redacted]			324.15	420.00	1201.67	1329.21	
[redacted]			250.72	500.87	985.44	1156.53	
[redacted]			276.51	470.88	1014.05	1071.15	
[redacted]			301.55	447.16	992.23	1216.82	126.20
[redacted]			320.13	431.64	1210.72	1181.71	
[redacted]			228.57	256.58	766.45	634.03	
[redacted]			299.64	445.89	1061.45	2091.29	385.27
[redacted]			341.11	404.82	1091.18	1765.40	579.50
[redacted]			319.79	426.44	1048.83	976.44	265.55
[redacted]			315.13	432.11	1110.31	1006.11	
[redacted]			314.68	431.15	1794.66	2036.76	1605.63
[redacted]			235.20	509.52	844.63	1014.46	
[redacted]			241.25	396.40	1049.03	1072.47	
[redacted]			271.25	476.69	1243.94	1178.64	
[redacted]			263.60	482.75	821.88	1156.63	
[redacted]			347.48	398.07	976.30	945.22	

Heliocentris

Different steps to a full OPEX model

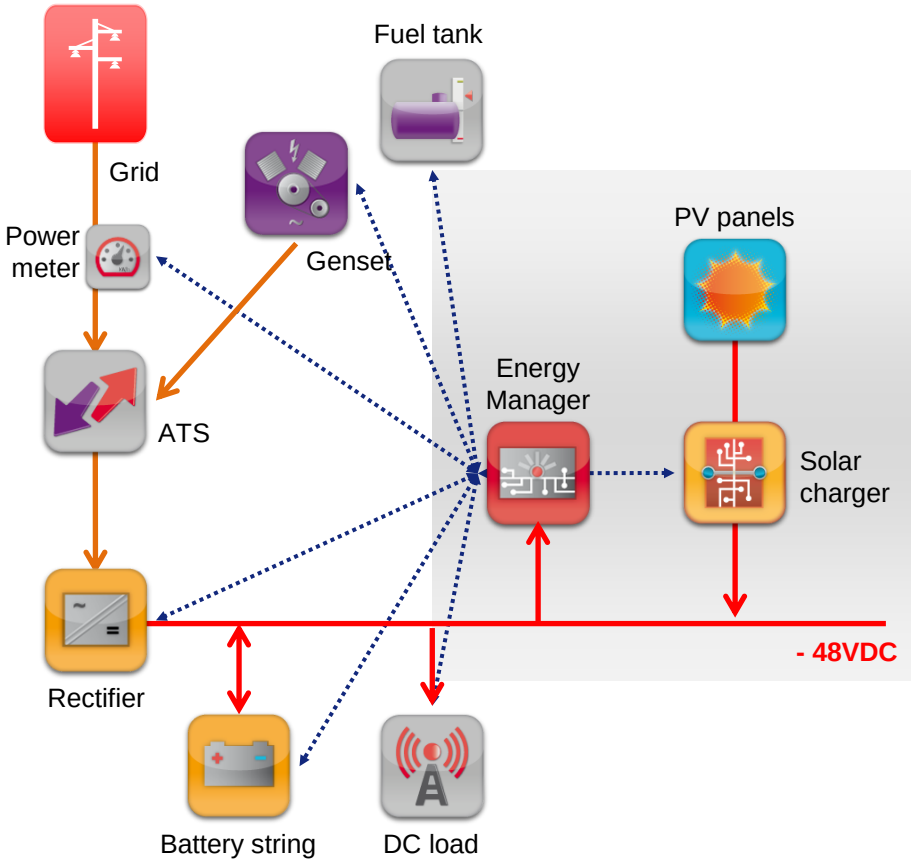


Business Model



- (1) A financial advisor arranges and structures the deal related to the Power Co. (including debt / equity financing) for an amount of US$ xx million.The financial advisor could also act as an asset manager of the Power Co.
- (2) MNO signs a contract with Power Co. to purchase Managed Power services for the order of a defined no. of off-grid sites as per the Power Supply Agreement
- (3) Power Co. contracts with a Managed Service Provider a managed service agreement for the maintenance of the off-grid sites
- (4) Power Co. contracts with Heliocentris for the purchase and procurement of the CAPEX required by the Power Co.. Heliocentris also provides services (Project Management, Solution Design, 3rd level maintenance) related to the EM
- (5) Depending on the political and financial risk environment different collaterals might be required from Investors and Financial Institutions

Solution Layout for Bad-Grid and Off-Grid Sites



1. Fuel measurement
2. Genset control and monitoring
3. Grid power consumption
4. Rectifier control and battery charging
5. Battery current, voltage and temperature monitoring
6. Load monitoring
7. Solar charger monitoring

Monitorng and control

- 48 VDC

220 VAC

Scope of offer (including optional)

Heliocentris Strenghts

For countries like Afghanistan & Pakistan

- Local presence through our subsidiary in Dubai
- Local, Pakistani employees who provide our customers with quick reaction times and on-site presence.
- Good understanding of the local challenges in these countries.
- Strong local partners

AFGHANISTAN & PAKISTAN



For bad-grid & off-grid situations:

Our solutions fit to regional prerequisites:

- Bad grid/off grid
- Request for solar and/or wind
- Site security
- Theft prevention
- Increased uptime through real time monitoring and control (RMS)
- Reduction of CAPEX and OPEX
- Proven trials in local environment
- Cooperation with leading Genset manufacturers for green field solutions

Clean Power Site Demonstration System



KISR
Kuwait Institute for Scientific Research,
in partnership with KIA.

Design concept and build up of a Renewable Energy Management Demonstration System.

Solar and wind electricity.
The Energy Manager coordinates the different energy sources.
The battery is used during short-term fluctuations and supplies power in the night.
The fuel cell system ensures energy supply during all daily and seasonal circumstances.
The excess energy of the primary power sources will be converted into hydrogen by an electrolyzer. The hydrogen will be used by the fuel cell to provide power.

References – Monitoring & Control Systems

500 Energy Manager for M&C

Name
Moçambique Celular („mCel“)

Country
Maputo, Mozambique

Description
mcel is Mozambique’s largest mobile operator and the only company providing mobile broadband services in the country. Ambitious programs to modernize technical infrastructure result in implementing energy management systems to decrease diesel consumption and increase visibility.

2011

Project Description

Customer Requirement
Reduce diesel consumption and O&M costs for off-grid sites. Improve site services of gird connected sites.

Solution
Genset hybridization to increase efficiency and decrease runtime along with O&M costs. Site monitoring to reduce service costs for our partner.



116 Energy Manager for M&C

2011

Name
PT Hutchison CP Telecommunications (HCPT)

Country
Jakarta, Indonesia

Description
PT Hutchison CP Telecom is a well established telecommunications company providing mobile services to 16 million customers in Indonesia; operating approx. 12,000 cell towers. With implementing innovative energy efficiency concepts they are significantly contributing to the reduction of CO_2 emissions.



Project Description

Customer Requirement
Increase site uptime; reduce energy consumption for grid connected sites.

Solution
Implemented innovative power outage bridge to increase site uptime.
A sophisticated cooling management decreases energy consumption and extensive site monitoring reduces service costs.

Genset Efficiency Solution in Mobile Networks

Heliocentris

- 200 Turnkey Genset Efficiency Solutions
- 150 Energy Management Systems

2011

Name
Emirates Integrated Telecommunication Company PJSC („du“)

Country
Dubai, UAE

Description
du is an innovative, dynamic telecommunication services provider. With a rapidly increasing market share and a total of 4,993,600 active mobile subscribers it is the fastest growing telecom company in the UAE.

Project Description

Customer Requirement
Reduction of diesel fuel consumption and genset maintenance costs.

Solution
Genset hybridization to increase efficiency and decrease runtime along with O&M costs. A separate battery shelter with an independent cooling solution was customized to fit the UAE environment.



37 Turnkey Genset Efficiency Solutions

2010

Hutchison Telecom

Name
PT Hutchison CP Telecommunications (HCPT)

Country
Jakarta, Indonesia

Description
PT Hutchison CP Telecom is a well established telecommunications company providing mobile services to 16 million customers in Indonesia; operating approx. 12,000 cell towers. With implementing innovative energy efficiency concepts they are significantly contributing to the reduction of CO_2 emissions.



Project Description

Customer Requirement
Outsource of power supply for off-grid base stations to MSP; reduction of diesel consumption and CO_2 emissions.

Solution
Developed power selling model and implemented first complete solution to reduce O&M costs and enable entire site management. Have achieved an uptime and LA performance better than contracted (>98.5% up-time).

Heliocentris: Award-Winning Technology

Heliocentris

14 July, 2013

du wins The Green Award at Asia Communication Awards

Dubai, UAE: du is proud to announce that it is the recipient of The Green Award from the Asia Communication Awards, in recognition of its extensive green initiatives – particularly the success of the hybrid solutions installed in 137 of its base transceiver station (BTS) sites. The award was received by AbdulMajid Harmoodi, Director of Electro Mechanical Division, du, during a ceremony held at the Conrad Centennial, Singapore.

“We are thrilled to have received this recognition from the Asia Communication Awards. Sustainability is a core pillar of our company, and we are dedicated to reducing our environmental impact in line with our leaderships’ vision of a greener future for the UAE. Our hybrid solutions have given us a significant reduction in CO2 emissions and diesel fuel consumption, and we hope that this provides an inspiration to other companies to venture into similar fields. Achieving sustainability is everyone’s responsibility, and we are proud to be playing our part,” said Saleem Al Balooshi, Executive Vice President Network Development and Operations, du.

Ayad Abul-Ella, CEO of **Heliocentris Energy Solutions**, the supplier of du’s hybrid network technology, congratulated du on the win. “Our congratulations go to du on the occasion of receiving this award. We are proud that our hybrid power and smart energy management solutions have led to this win and we look forward to continue our contributions to du’s green strategy with further energy saving innovations to come. This award is an exciting acknowledgement of the success such initiatives can lead to.”

Amongst its many environmental sustainability schemes, du began converting its off-grid sites to smart energy hybrid solutions in 2011, in line with the UAE Government’s strategy on sustainable energy. The hybrid power solution uses a combination of cyclic batteries and diesel generators, with a smart energy management controller to switch from one to the other upon the depletion of the battery. When the battery is recharged, the controller reverts from the diesel generator to the battery once more.

Since the project’s initiation, du has reduced its annual diesel consumption by 1.8 million litres, and produced 4500 tonnes less of CO2 emissions. The company plans to convert 72 more sites in 2013, with the annual reduction expected to increase to 20% by the end of this year. By the end of 2014, du expects a total reduction in diesel consumption of 6 million litres, and 15,000 tonnes of CO2 emissions.

-Ends-