

GSMA / ZAIN CURRENT INITIATIVES

A wonderful world

Introduction

- ZAIN Wind Power and Solar Power
- GSMA / ZAIN Feasibility Study Tanzania / Uganda
- ZAIN Diesel Battery Hybrid Solution

ZAIN Wind Power Project

ZAIN currently has Wind Turbines installed in the Southern Coastal Area in Madagascar. (3 x 5KW and 1 x 1.5KW)

The Results are positive and as per the design, based on the site locations, and site loads.

A Simple design on an Outdoor Site of Wind Turbine to Charge Controller direct to the BTS/RBS battery bank
Battery Voltage is monitored by a site asset management monitoring tool with the generator in standby mode.

ZAIN is currently exploring deploying additional units in Madagascar in 2010 – Pending approval of ROI.
(ZAIN is currently looking at funding through GSMA/IFC)

ZAIN Wind Turbine Project results

Sites Name	Start date	End date	On Battery %	Comment
Fort Dauphin QMM	1/1/2009	1/31/2009	86%	5KW Wind Turbine -1000AH Cyclic Batteries
Fort Dauphin QMM	2/1/2009	2/28/2009	96%	5KW Wind Turbine -1000AH Cyclic Batteries
Fort Dauphin QMM	3/1/2009	3/31/2009	92%	5KW Wind Turbine -1000AH Cyclic Batteries
Mandena	1/1/2009	1/31/2009	85%	1.5KW Wind Turbine -1000AH Cyclic Batteries
Mandena	2/1/2009	2/28/2009	92%	1.5KW Wind Turbine -1000AH Cyclic Batteries
Mandena	3/1/2009	3/31/2009	89%	1.5KW Wind Turbine -1000AH Cyclic Batteries
Amboasary Sud	1/1/2009	1/31/2009	41%	5KW Wind Turbine -270AH Float Charge Batteries
Amboasary Sud	2/1/2009	2/28/2009	74%	5KW Wind Turbine -270AH Float Charge Batteries
Amboasary Sud	3/1/2009	3/31/2009	47%	5KW Wind Turbine -270AH Float Charge Batteries
Amboasary-1	1/1/2009	1/31/2009	42%	5KW Wind Turbine -270AH Float Charge Batteries
Amboasary-1	2/1/2009	2/28/2009	81%	5KW Wind Turbine -270AH Float Charge Batteries
Amboasary-1	3/1/2009	3/31/2009	62%	5KW Wind Turbine -270AH Float Charge Batteries





Challenges Faced in the deployment of Wind Turbines

Functional understanding of the products by the field technicians and maintenance vendors remains low.

A Wind turbine is a frightening piece of equipment when it needs to be lowered or erected, (Rotor Dia 5m) and the lack of understanding of the procedure to do this type of work often results in no work being done at all.

Fault resolution by field technicians, and maintenance vendors results in an immediate bypass of the system. System remains off line until the Product Vendor is able to visit the site and rectify.

Maintenance vendors and fueling vendors do not support the deployment of these initiatives.

ZAIN's Solar Power Projects

ZAIN is currently exploring this avenue, due to the High Capex Investment requirement.

ZAIN is in the process of surveying and rectifying 13 Solar Solution delivered to Congo B and 2 Trail Solar Systems in Gabon.

ZAIN is Currently studying Solar Solution that shall provide RBS power only from 10H00 to 16H00 (25% OPEX Saving) as this route looks feasible in terms of ROI.

GSMA / ZAIN Feasibility Study Tanzania / Uganda

GSMA has recently kicked off a Green Power feasibility study with ZAIN for Tanzania and Uganda.

GSMA are providing a technical and financial feasibility study of ZAIN's Off Grid network installed base to identify priority sites for alterative energy technology, forecast CAPEX and ROI and assist with vendor identification and implementation planning.

ZAIN's Diesel Battery Hybrid Solution Introduction

ZAIN has Purchased a number of Diesel Battery Hybrid Solution over the last 3 years, and the presentation to follow, shall give some feed back and some achieved results from the solutions deployed across the ZAIN Africa Installed Base

ZAIN has approximately 10,000 Sites across Africa, of which approximately 55% are "Off Grid"

The Solution

The Various types of Diesel Battery Hybrids range from a simple battery replacement from standard float charge batteries to cyclic batteries together with the installation of a site asset management monitoring tool* or a dedicated customized power solution

The ROI on this solution is generally positive.

* With DC Cooling and Hybrid functionality.



The Solution

The Diesel Battery Hybrids solutions ZAIN is currently engaged with incorporates the following Technologies, Products, and suppliers

Batteries

- Enersys OPzV & EON monoblocs
- Exide Adsolyte 11 OPzV
- SEC OPzV & 12FTG monoblocs
- Fiamm OPzV1

DC Plants

Emerson
Battery Technologies
Eltec
Delta
Saab - Grintek
And Major Telecom Vendors

Site Monitoring tool with Hybrid Functionality

Inala SAM
MastMinder

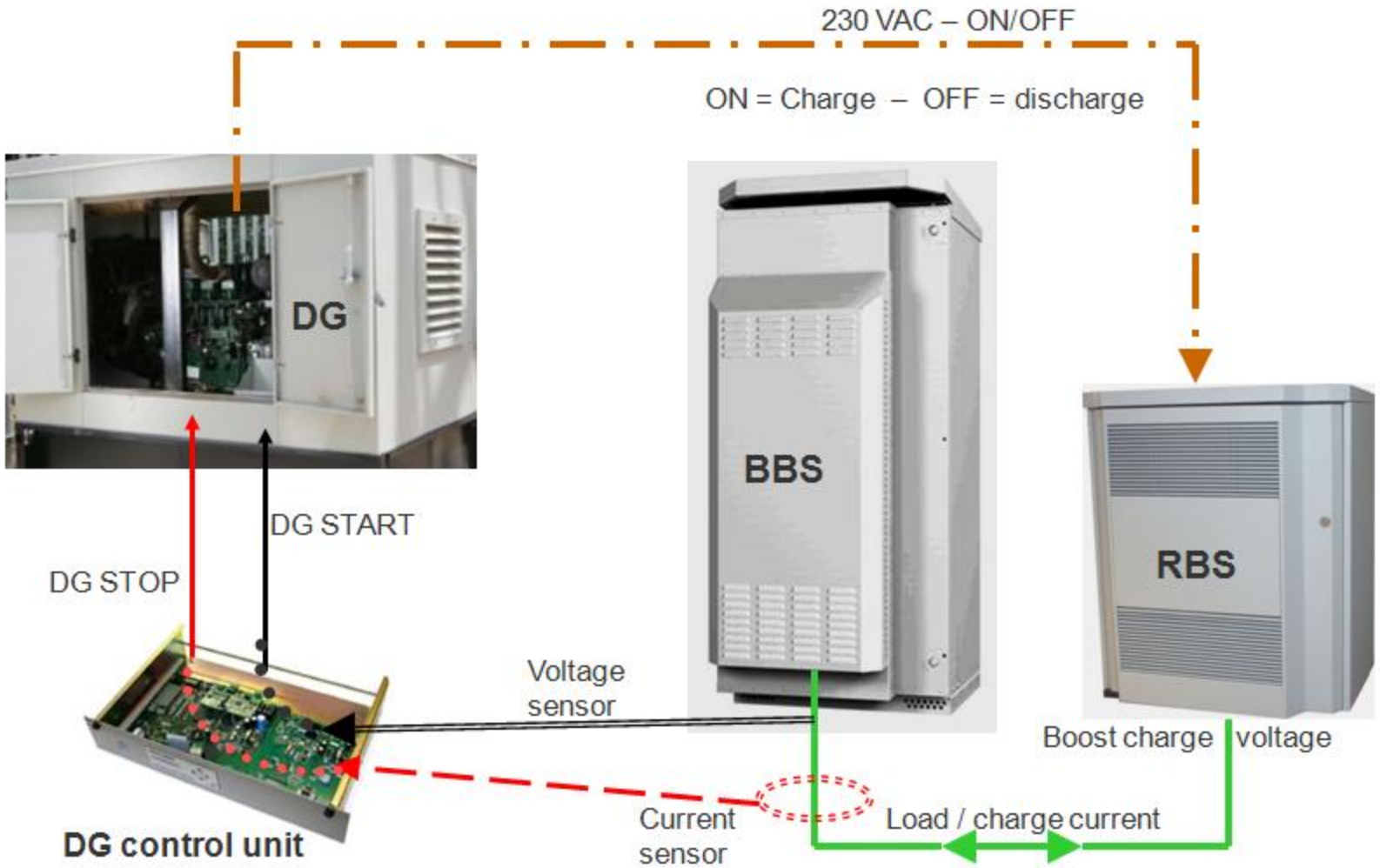


The Solution

The combination of the Diesel Battery Hybrid with the site asset management monitoring tool gives full remote visibility from the NOC to the following areas, (But not limited too):

1. Hybrid cycles (Number and % vs. Gen run times)
2. Fuel Consumption and fuel levels
3. Site temperature and Humidity
4. Battery status and voltage
5. Generator run times and alarms
6. Access to start / Stop the generator remotely
7. Other general environmental and specific alarms

Principle diagram - overview



Diesel Hybrid Results

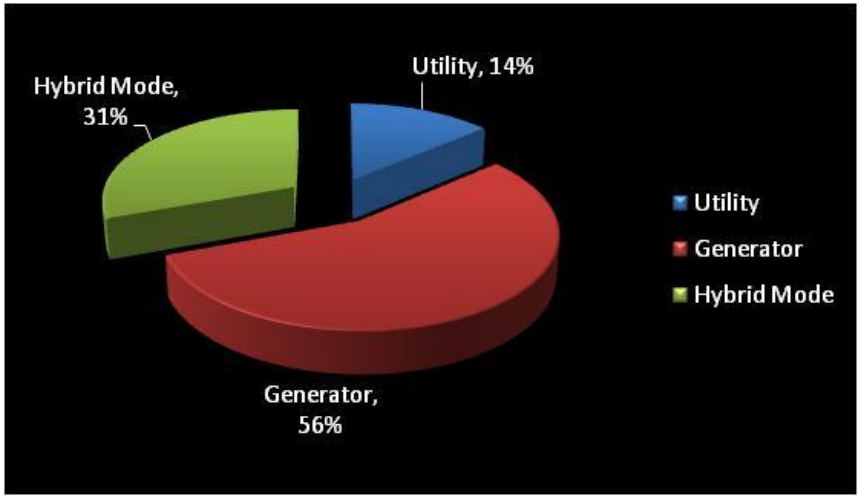
•ZAIN has an estimated 25% of the African site base installed with a site asset management and monitoring tool - Roll out on going

•Of this 25% a number of the sites are not fully functional diesel hybrid solutions, but some OpCo's are cycling the existing float charge batteries with the plan of swapping them out at the end of life with cyclic batteries

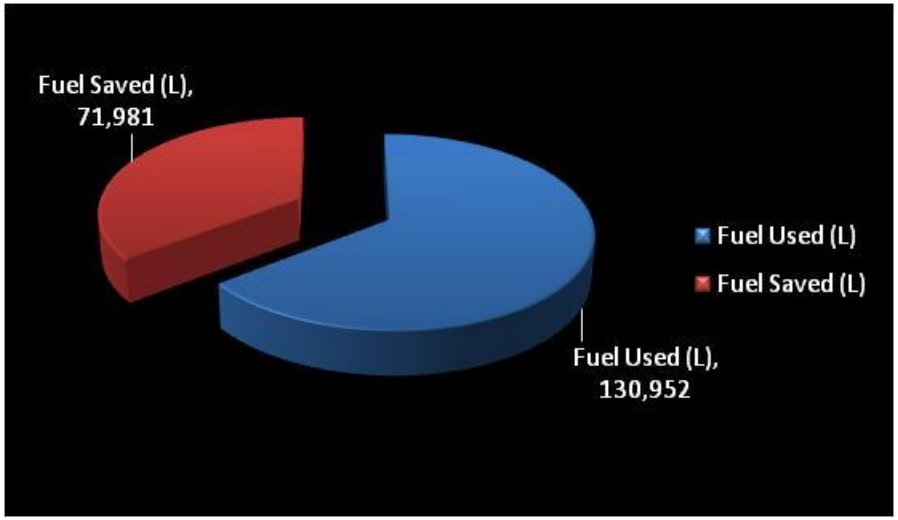
•Various results / savings are achieved based on the type of active technology deployed; and type of Passive equipment deployed.

April 2009

Uganda 153 Active Operational Site Information April



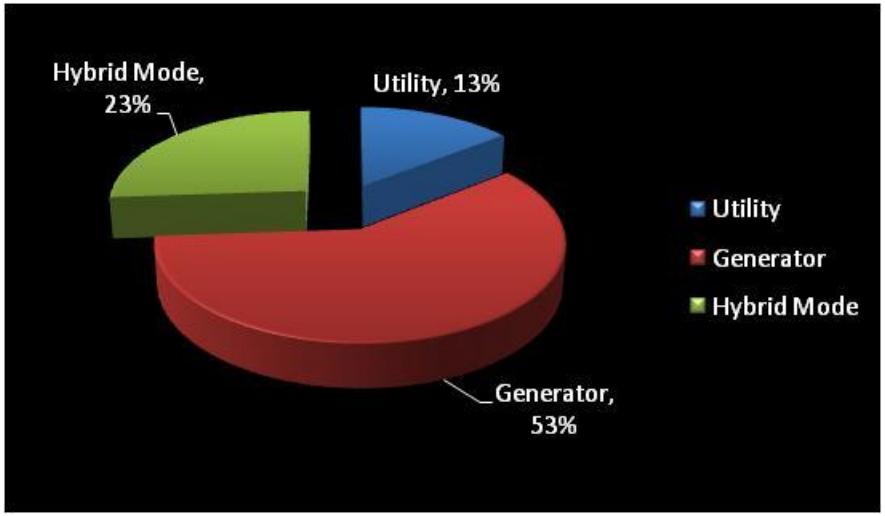
72,000L x 2.5kg / L CO2 = 180,000 kg CO2 Saved



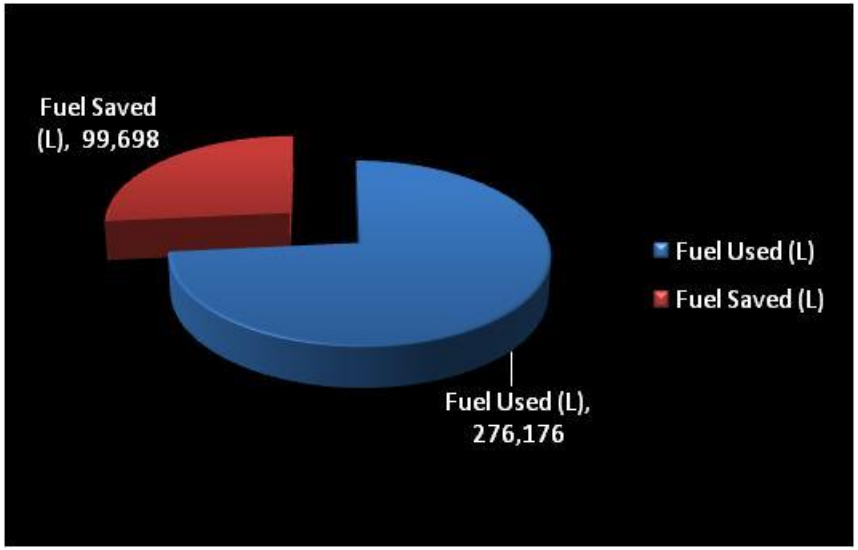
Network 388 Sites >> 157 on Grid >> 231 off Grid

April 2009

Tanzania 282 Active Operational Site Information April



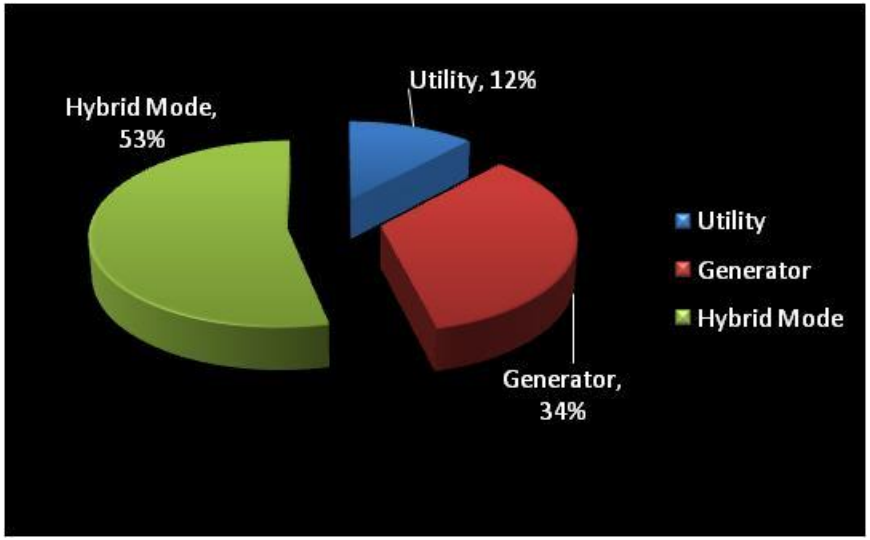
100,000L x 2.5kg / L CO2 = 250,000 kg CO2 Saved



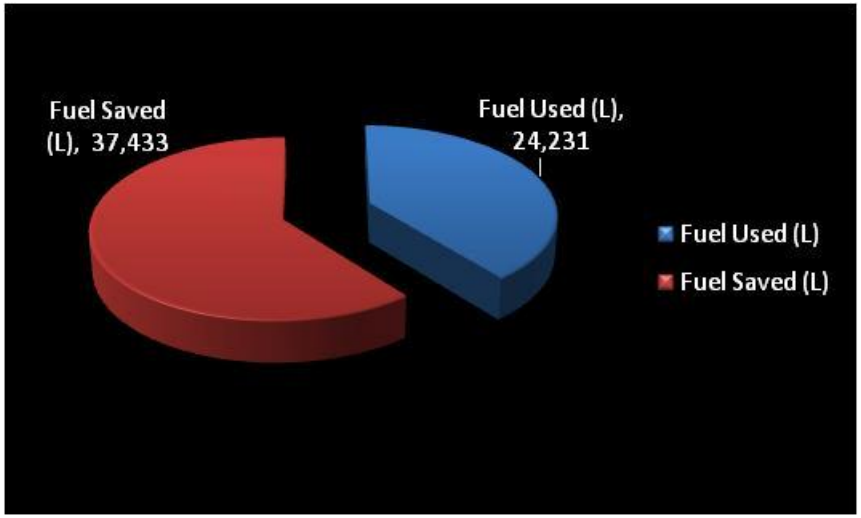
Network 1,237 Sites >> 688 on Grid >> 548 off Grid

April 2009

Madagascar 45 Active Operational Site Information April



37,000L x 2.5kg / L CO2 = 87,500 kg CO2 Saved



Network 361 Sites >> 150 on Grid >> 206 off Grid

Challenges Faced

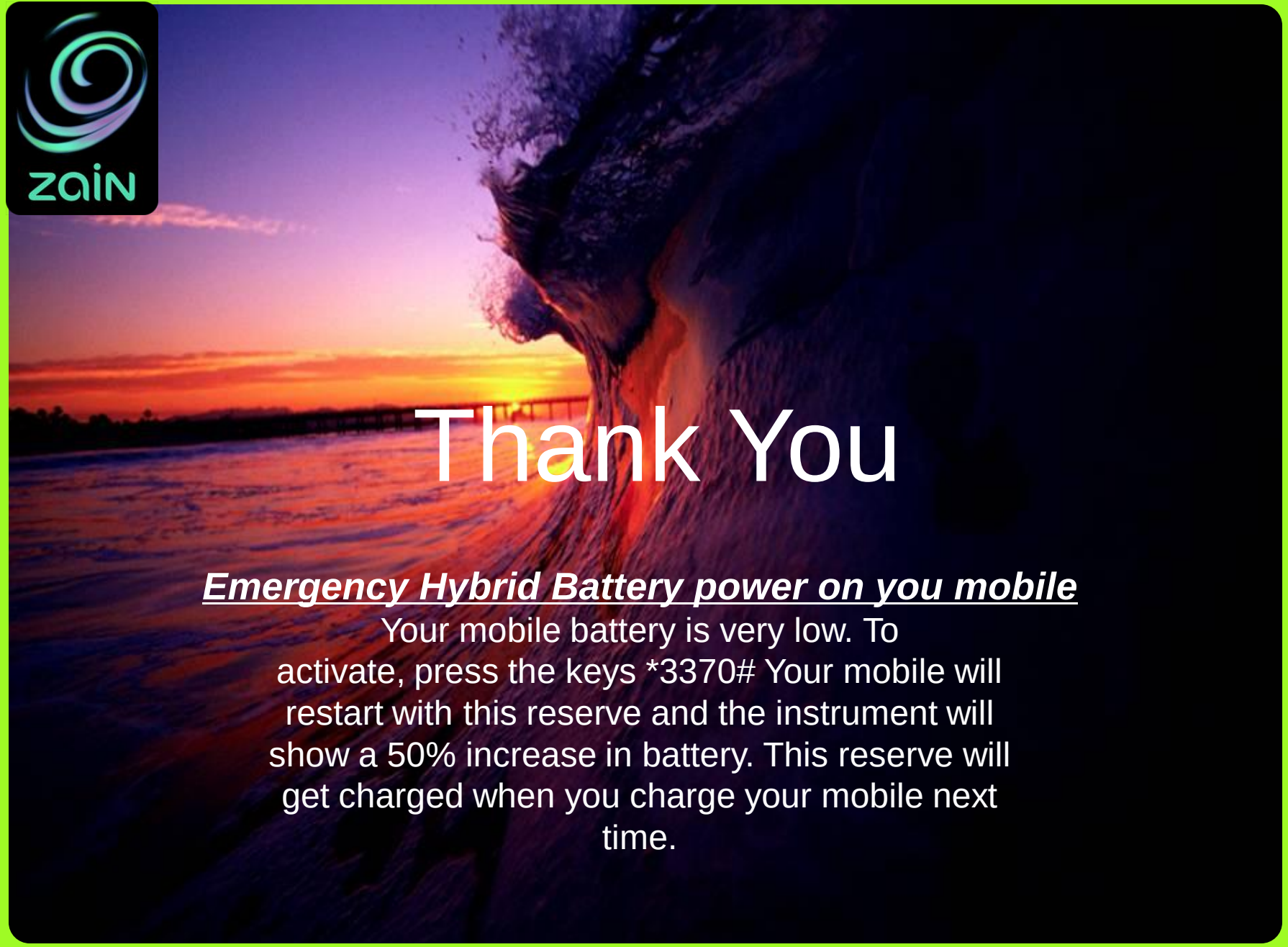
•The technology deployed is only as effective as the on going support of the product – In terms of the “On the Ground team”

•Training and understanding of the product in the local environment and is one of the keys to success (Tech Staff; Maintenance Vendor, Fuel Vendors, field staff)

•Remote Site monitoring via SMS to the NOC server terminals is the most effective means of comms as there are no dependencies on the Network technologies and band width across the ZAIN African installed Base

•Not all Areas in the ZAIN African installed Base are considered for Diesel Battery Hybrids based on the excessive ROI.

•Keeping all solutions simple to install / operate and monitor is essential for positive savings.



Thank You

Emergency Hybrid Battery power on you mobile

Your mobile battery is very low. To activate, press the keys *3370# Your mobile will restart with this reserve and the instrument will show a 50% increase in battery. This reserve will get charged when you charge your mobile next time.

Operation Name .....

Operation to fill

		Unit	Indoor Low Capacity		Outdoor Low Capacity	
	Without Hybrid solution					
1	Network total number of sites required Hybrid solution	No.	0	50	0	0
3	Network average Diesel Consumption - per site per month	Liter	0	1,300	0	0
2	Network total Diesel Consumption - per month	Liter	0	65,000	0	0
4	Total number of planned sites to be equipped with Hybrid solution	No.	0	50	0	0
6	Cost of Diesel consumption per site per month (delivered to site)	$	0	1,560	0	0
7	Cost of Diesel consumption per site per month (4 years averaged)	$	0	1,794	0	0
8	Average Cost of Diesel Generators (DG - including all logistics up to integ	$	0	17,500	0	0
10	Cost of DG Maintenance per site per month	$	0	1,000	0	0
11	Cost of DG Maintenance per site per month (4 years averaged)	$	0	1,150	0	0
	With Hybrid solution *(8hrs solution >> 33% savings & 10hrs solution >> 40%*		**8hrs**	**10hrs**	**8hrs**	**10hrs**
	Capex Benefit		**33%**	**40%**	**33%**	**40%**
13	Saving in Capex of DG Set (50% and 60% of DG Capex)	$	0	-7,000	0	0
14	Cost of Hybrid solution Solution (integrated to commercial service - Turnk	$	0	31,000	0	0
17	**Net Capex (Choose appropriate Capex in row 14 for 3/5 year warra**	$	**0**	**24,000**	**0**	**0**
18						
	Opex Benefits					
19	Saving In Diesel Consumption per month	$	0	538	0	0
20	Saving in Cost of Generator Maintenance per site per month (4 years	$	0	460	0	0
21	Cost of maintaining Hybrid solution per month 4 year averaged (consi	$	0	55	0	0
22	Other Cost per month per site	$	0		0	0
23	**Net Saving Per site per month**	$	**0**	**1,053**	**0**	**0**
24	**Total net Savings per type of Hybrid solution system per month**	$	**0**	**52,660**	**0**	**0**
25	**Grand Saving for all hybrid sites per month**	$				
26	Project Duration in Months (Extended DG Set Life in months)		**40**	**42**	**40**	**42**
27	Capital Cost Discounting Factor		**12%**	**12%**	**12%**	**12%**
28	**Payback Period in months**		**#DIV/0!**	**23**	**#DIV/0!**	**#DIV/0!**
29	**Net Present Value**		**$0.00**	**$11,975.32**	**$0.00**	**$0.0**
30	**IRR**		**#NUM!**	**3%**	**#NUM!**	**#NUM!**

Note;

Local Opcos to select the Opcos required type and quantity of hybrid systems.

Selected type of hybrid should take into consideration site configuration, dimensioning and the heat dissipation of the batteries inside the container.

Local Opcos to report the prices/costs based on turnkey (cost + delivery + installation + commissioning + integration +.....)

Local Opcos to fill in the data related to their selected type of Hybrid system (columns) and leave the other columns empty.

Local Opcos to fill in the yellow shaded rows

Diesel Generator (DG) assumed daily operation is 24hr.

Saving & costs have only been calculated for the sites to be equipped with hybrid solution.

Clauses 2, 3 & 4; are about the planned hybrid sites & the data for these clauses is required only for the sites to be equipped with hybrid solution

Diesel and Maintenance costs - assuming 10% average increase per year, and are calculated as follow

Averaged price for 4 years = (Average price of 08 + 1.1*Average price of 08 + 1.2*Average price of 08 + 1.3*Average price of 08)/4

Life time of the Diesel generator is

2.5 years (30 month) without Hybrid

Increase by 33% (to 3.3 years - 39 month) with 8hr hybrid solution

Increase by 40% (to 3.5 years - 42 month) with 10hr hybrid solution

Assumed averaged battery life time of the hybrid is 4 years

Payback is calculated for 3 years warranty (as worst case scenario)

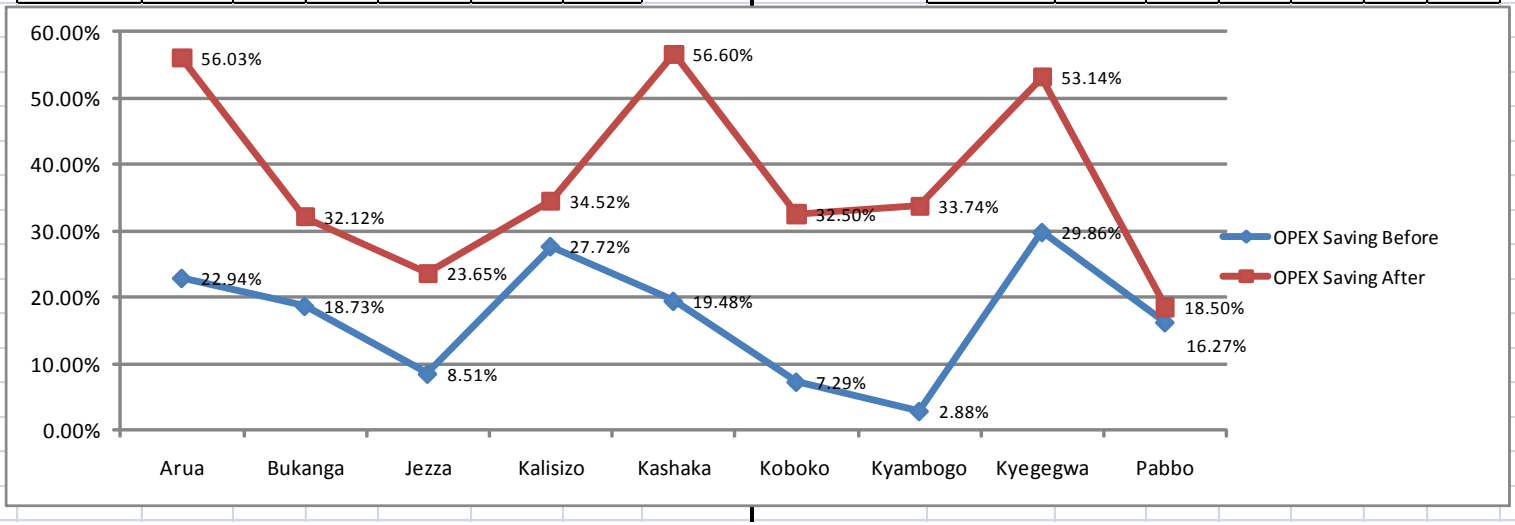
Prior to approve the required number of Hybrid systems, the return on investement for the reuired quantity must not exceed 24 month.

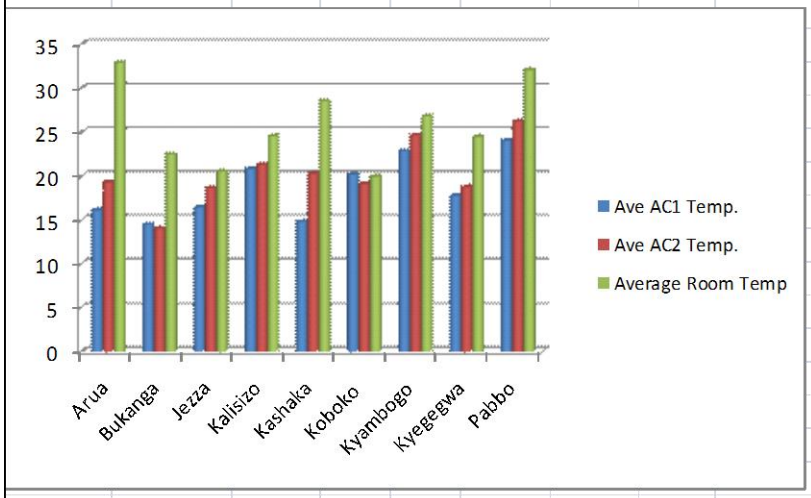
Without Free Cooling System Implemented

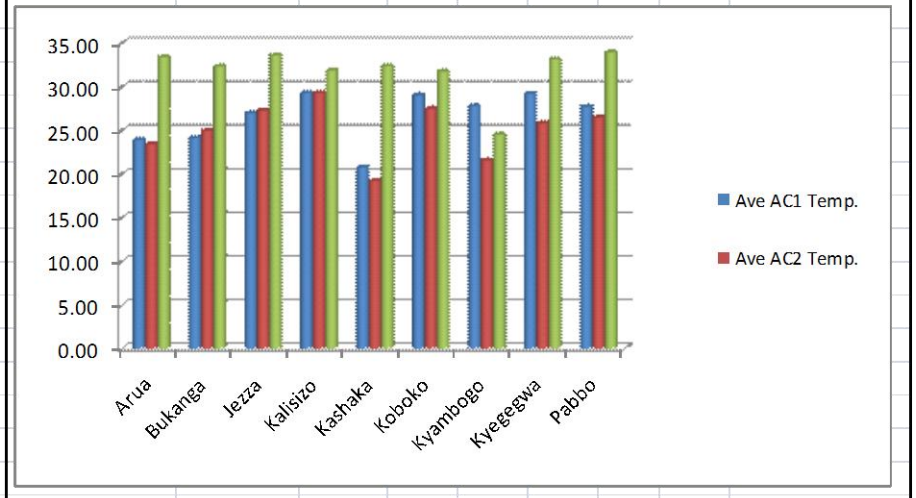
Site Name	OPEX Saving Before	Ave AC1 Temp.	Ave AC2 Temp.	Average Room Temp	Consumption	Average EPCC Cycles per day
Arua	22.94%	16.09	19.29	32.88	1.8	5.5
Bukanga	18.73%	14.5	14.03	22.47	1.49	2.4
Jezza	8.51%	16.44	18.64	20.51	4.13	1.55
Kalisizo	27.72%	20.8	21.29	24.53	1.36	4.06
Kashaka	19.48%	14.79	20.28	28.54	2.45	0.82
Koboko	7.29%	20.16	19.11	19.91	1.61	3.5
Kyambogo	2.88%	22.85	24.66	26.81	4.18	0.15
Kyegegwa	29.86%	17.75	18.74	24.44	1.68	2.5
Pabbo	16.27%	24.03	26.21	32.05	1.84	5.8

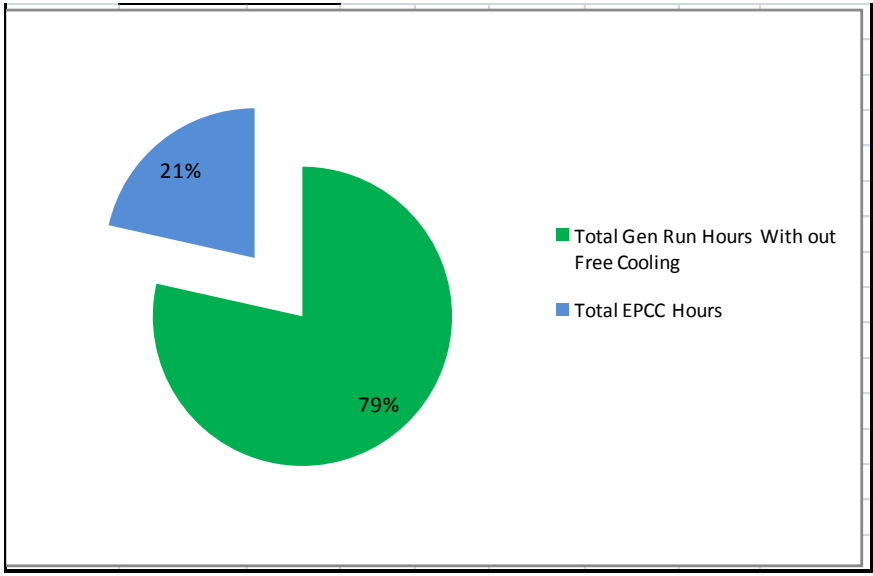
With Free Cooling System Implemented

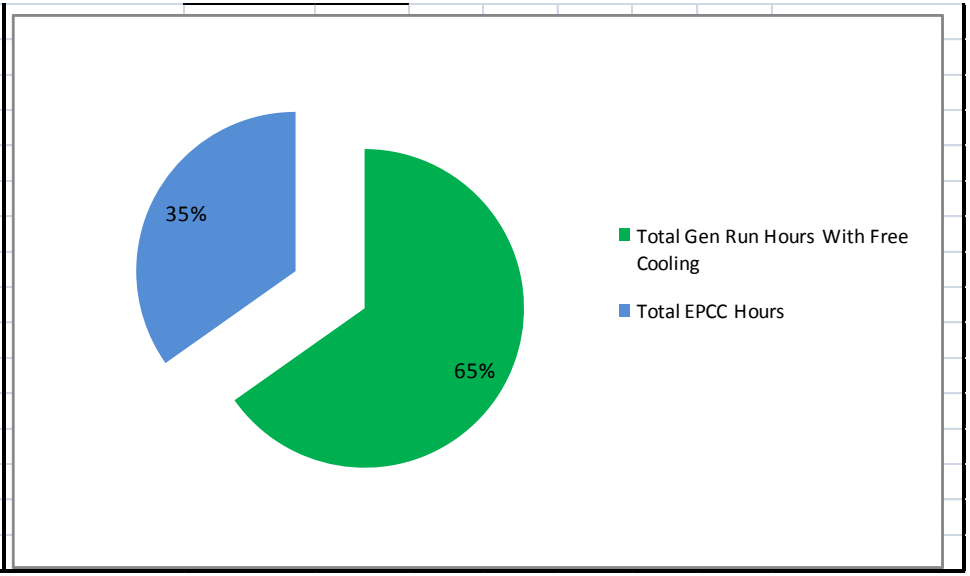
Site Name	OPEX Saving After	Ave AC1 Temp.	Ave AC2 Temp.	Average Room Temp	Consumption	Average EPCC Cycles per day
Arua	56.03%	23.88	23.40	33.38	1.83	3.31
Bukanga	32.12%	24.11	24.94	32.31	1.49	2
Jezza	23.65%	26.95	27.25	33.55	3.12	17.50
Kalisizo	34.52%	29.28	29.26	31.83	1.66	14
Kashaka	56.60%	20.76	19.21	32.35	2.1	0.43
Koboko	32.50%	28.98	27.45	31.70	1.64	5.5
Kyambogo	33.74%	27.78	21.56	24.48	4.18	3.92
Kyegegwa	53.14%	29.20	25.79	33.14	2.77	5.2
Pabbo	18.50%	27.69	26.45	33.93	2.28	4




35
30
25
20
15
10
5
0
Arua
Bukanga
Jezza
Kalisizo
Kashaka
Koboko
Kyambogo
Kyegegwa
Pabbo
Ave AC1 Temp.
Ave AC2 Temp.
Average Room Temp


35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Arua
Bukanga
Jezza
Kalisizo
Kashaka
Koboko
Kyambogo
Kyegegwa
Pabbo
Ave AC1 Temp.
Ave AC2 Temp.


21%
79%
Total Gen Run Hours With out Free Cooling
Total EPCC Hours


35%
65%
Total Gen Run Hours With Free Cooling
Total EPCC Hours