

Move with the SUN
"All DC" Solar Systems

Green Power Outsourcing

GSMA SEA working group

July 24-25, 2012

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Back ground ALTA ENERGY

- First to supply “All DC” Solar Telecom Systems in China & India
- 14 years experience in fully integrated Solar Telecom Systems
- Design & Installed more than 9,000 Autonomous Solar Telecom Systems

Green Power Outsourcing

- How to go about doing it?
- Renewable Power Systems
- Evaluating Green Power Systems
- Calculated Cost / kWh

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How to go about doing it?

- Start with cost Audit
- Define objectives & timeline
- Develop an execution plan
- Evaluate renewable power systems
- Evaluate Outsourcing Companies
- Find the right partner

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Green Telecom Power Systems

Grid Deficit Sites:-

- Solar /Grid / Battery
- Wind / Grid / Battery
- Solar / Wind / Grid / Battery
- Grid / Battery / Fuel Cell
- Grid / Battery

Green Telecom Power Systems

Off-Grid Sites:-

- Solar / Battery (Autonomous)
- Solar / Wind / Battery
- Solar / DG / Battery
- Solar / Fuel cell / Battery
- DG / Battery
- Biogas / Battery

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Evaluating Green power systems

- Integrated system
- Built-in redundancy and quick change concepts
- Remote monitoring of power system & battery
- Individual client's power consumption (ITC)
- 24 hours surveillance system (3G)
- Customized Power Conditioning Unit (GDS)
- Min. 5 years warranty - Power system plus Battery

Schematic - Conventional DG base Power System



Grid supply

Auxiliary load

PIU

SMPS



Diesel Generator



Battery Bank



BTS



Telecom Tower

Issues with DG Base Power Systems

- **Escalating Diesel price**
- **Wide spread diesel theft**
- **High DG maintenance cost**
- **High diesel transportation cost**

Schematic - “All DC” Solar/Grid Power System



Solar Array

Auxiliary DC loads

RS232 Port

Camera

Site lights

Main Control Module With LCD display

MPPT Solar Control Module

SMPS

Battery Management

DC Distribution

BTS 1

BTS 2

BTS 3



Grid supply

Power Conditioning Unit





Battery Bank

IP65- Outdoor Cabinet



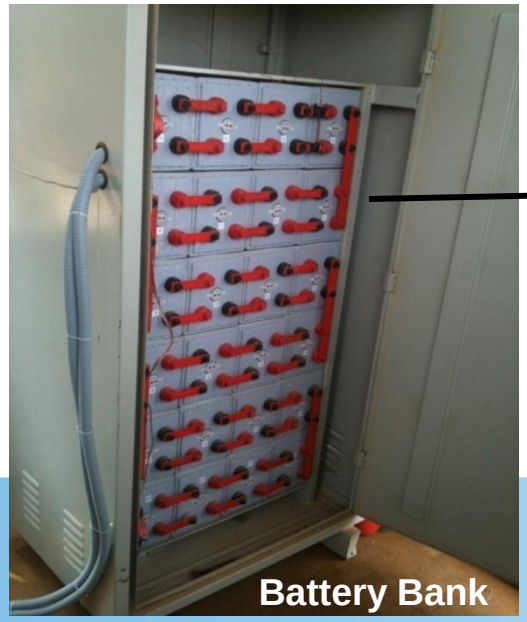
Telecom Tower

Patent pending: 2832/CHE/2011

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Schematic - “All DC” Autonomous Solar System





Auxiliary DC loads

RS232

Camera

Site lights

Main Control Module With LCD display

MPPT Solar Control Module

Battery Management

DC Distribution

BTS 1

BTS 2



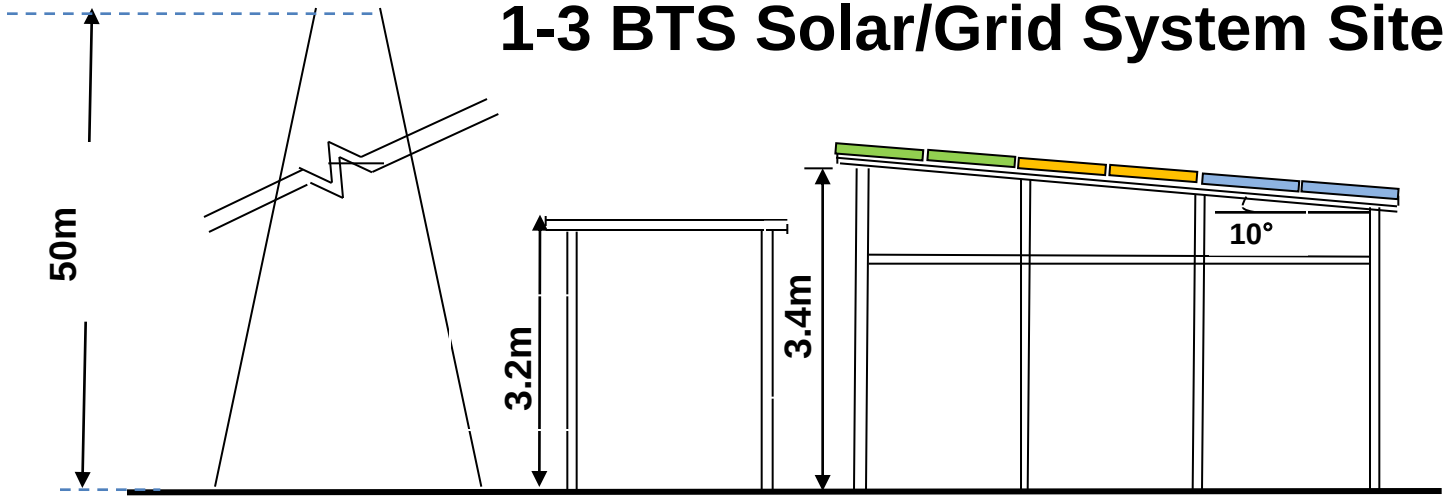
Telecom Tower

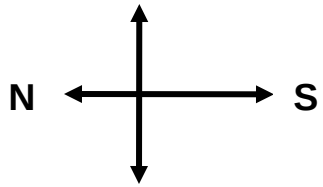
IP65- Outdoor Cabinet

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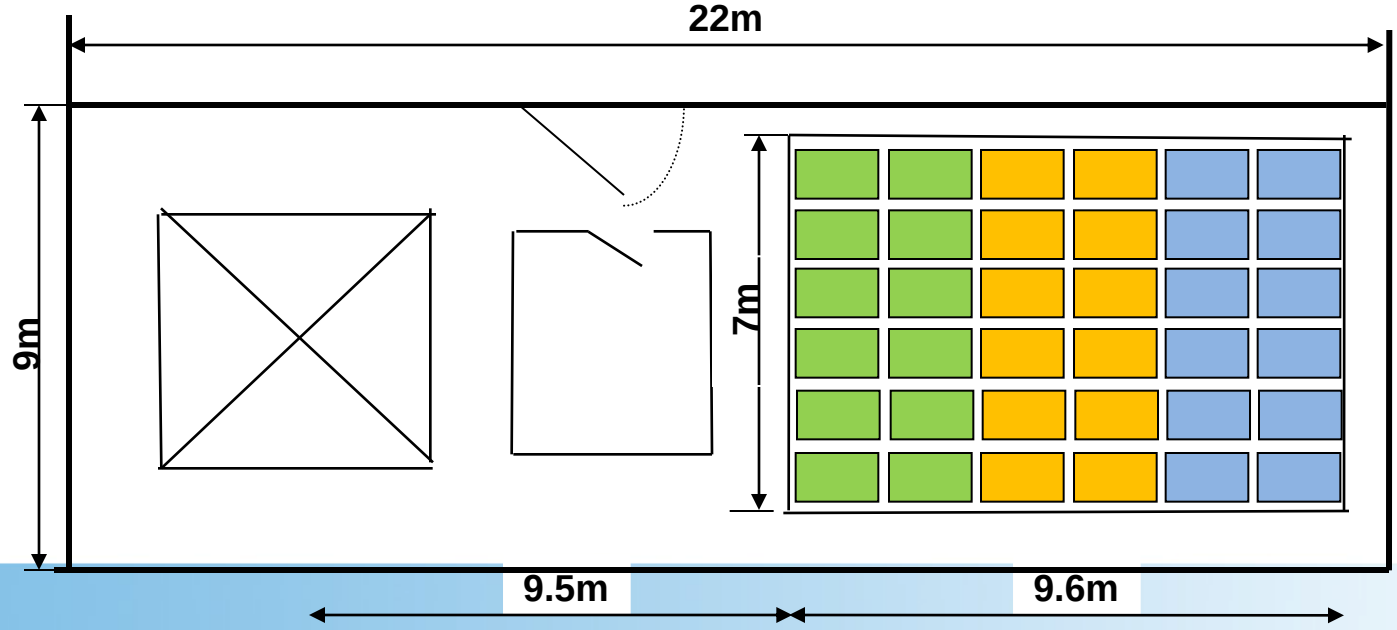
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1-3 BTS Solar/Grid System Site Layout





1 BTS :	148m²
2 BTS :	173m²
3 BTS :	198m²

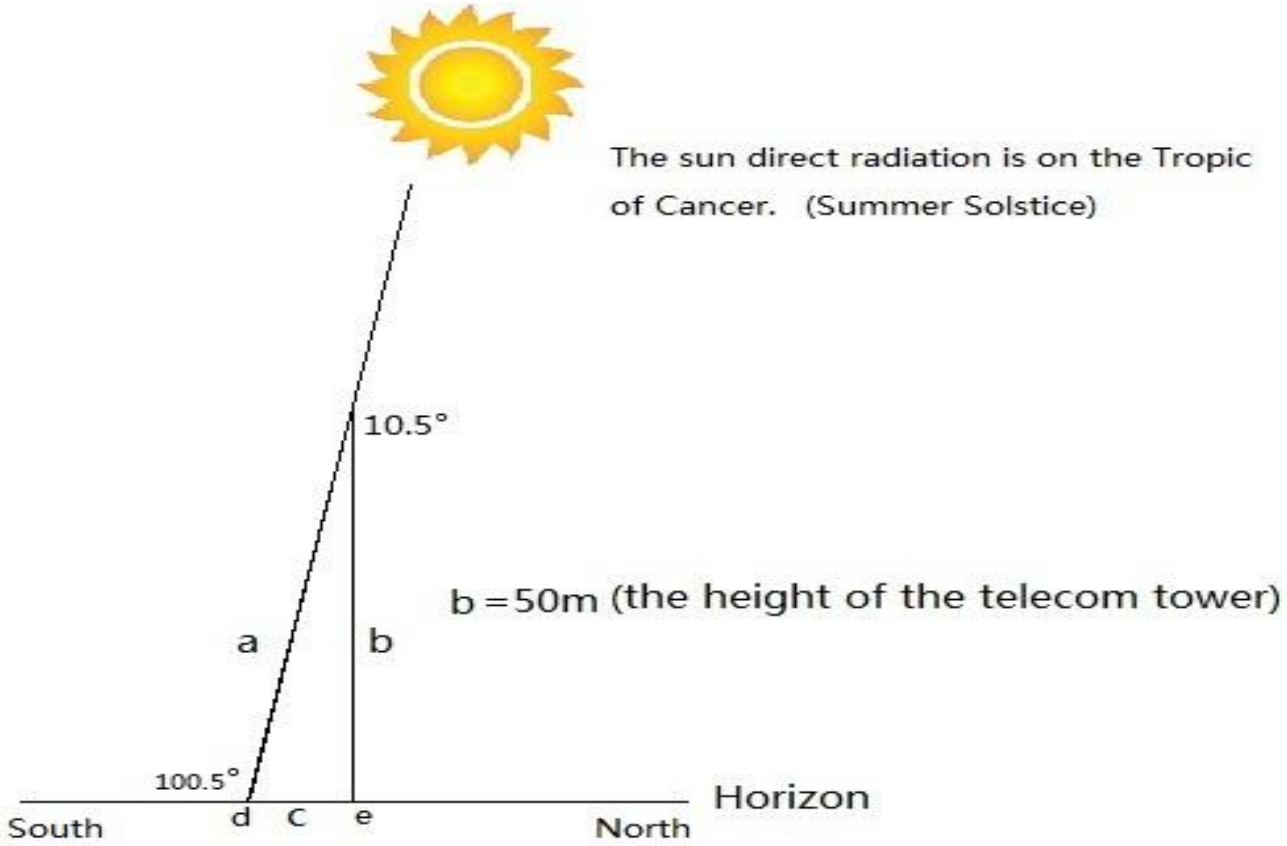


Solar Panels

1 BTS : 12 pcs 250Wp

2 BTS : 24pcs 250Wp

3 BTS : 36 pcs 250Wp



d is the location of the solar array.

e is the base of the telecom tower.

c is the distance between the telecom tower and the solar array.

c = 9.26m

1-3 BTS Solar/Grid System Site Layout



http://www.webdesignpis.in/flash/

1 Out door BTS - Solar/Grid Power System
(Demo Site - Kolar, Karnataka – Before rain



1 Out door BTS – 1.1kW Peak load
3kW Solar Panels – 48V 600Ah Battery

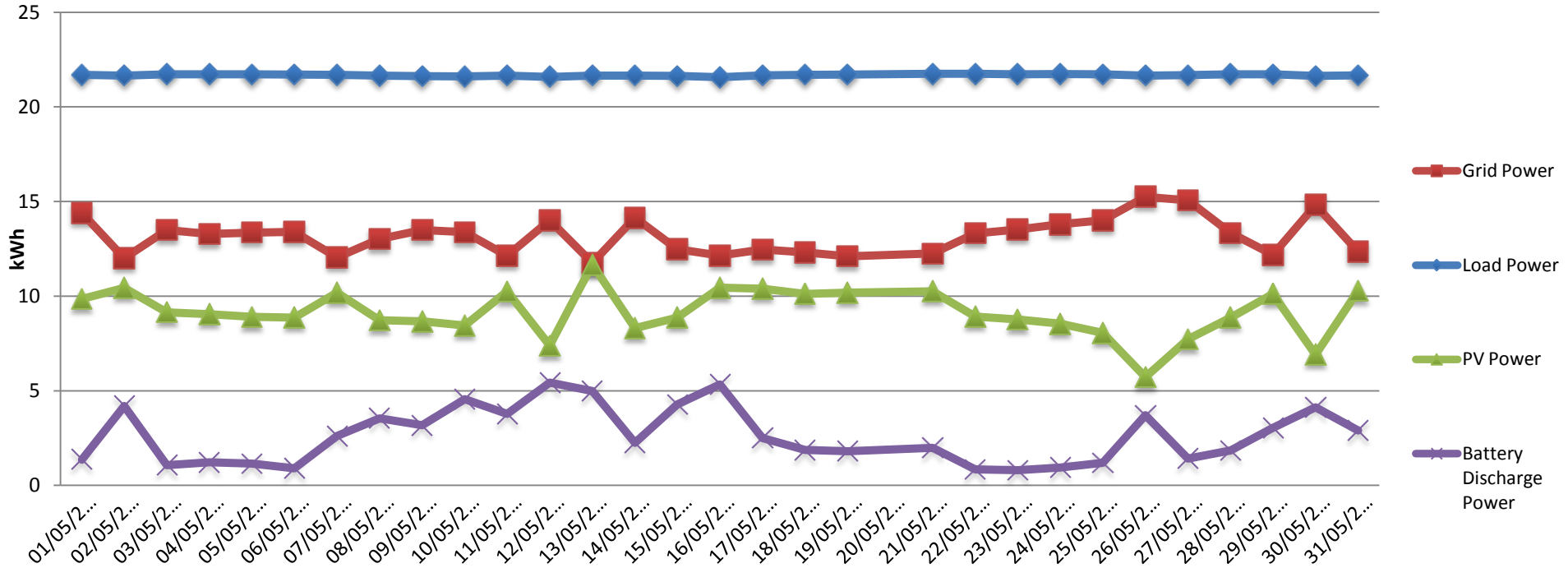


Demo Site - Kolar, Karnataka India

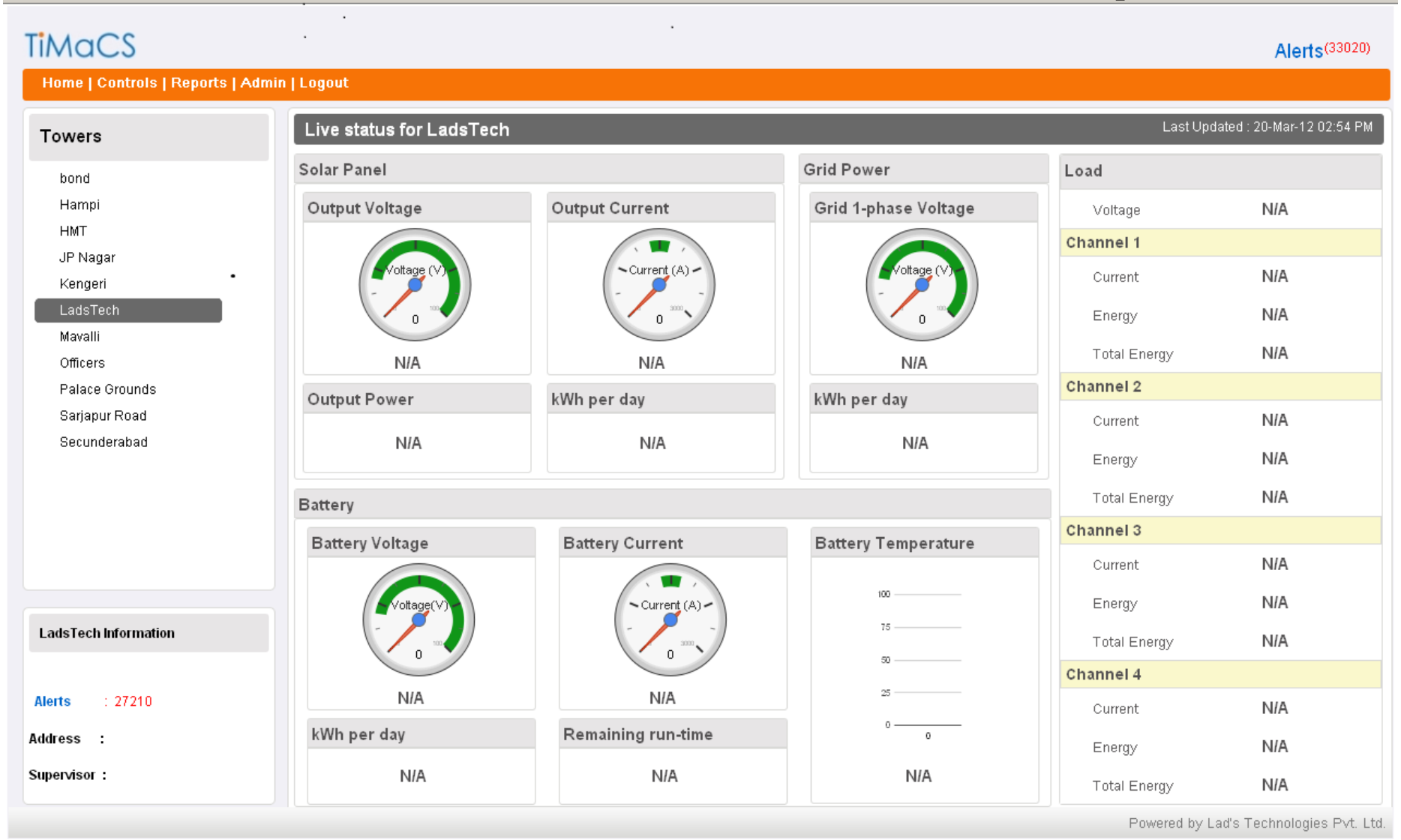
Power produced from PV	**283kWh**
Power consumed from Grid	**408kWh**
Power discharged from Battery	**82kWh**

May 2012 Grid power cost = $57

1 Outdoor BTS - Grid deficit site



Remote access to Power consumption



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Telecom Tower Calculated Cost / kWh

S/N	Description	DG Base	DG Base	DG Base	Solar Base
		India	SEA	Africa	
		$/kWh	$/kWh	$/kWh	$/kWh
1	1 BTS Grid Deficit Sites	1.20	1.71	2.22	0.17
2	1 BTS Off- Grid Sites	1.90	2.73	3.56	0.19

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1 Out door BTS – Calculated Cost / kWh

DG Run Time per day	12	Hours
Grid supply per day	9	Hours
Battery run time per day	3	Hours
Diesel consumption per year	7,884	Liters
15kVa DG consumption	1.8	Liter/hr
Grid cost / kWh	0.14	$
Diesel cost per liter	0.90	$
DG maintenance cost per hour	0.32	$
Diesel Transportation Cost per liter	0.04	$
Battery cost / month (48V 300Ah-1 Lakh / unit)	83.3	$
1 kW load - Monthly Power Consumption	744	kWh

Existing Opex

Diesel cost / month	Diesel transport cost / month	DG maint. cost / month	Grid cost for BTS / month	Grid cost for Battery / month	Battery cost / month	Opex / month	Opex / year	cost / kWh
$	$	$	$	$	$	$	$	$
603	27	119	39	18	83	888	10,656	1.20

Solar System Cost -Summary

S/no.	Solar System Description	Solar System cost	DG base Power System cost	Payback Capex model	CO2 reduction per year	Cost /kWh Existing	Cost /kWh with Solar	10 years cumulative savings minus capital cost
		$	$	Years	Tons	$	$	$
	Grid Deficit Sites							
1	1kW Load Solar/Grid System	30,200	12,000	3.0	21	1.20	0.166	136,000
2	2kW Load Solar/Grid System	51,600	16,000	3.8	26	0.80	0.162	166,000
3	3kW Load Solar/Grid System	69,000	20,000	4.5	29	0.62	0.160	172,000
	Off-Grid Sites							
4	1kW Autonomous System	63,600	16,000	3.8	35	1.90	0.195	204,000
5	2kW Autonomous System	111,200	20,000	4.7	44	1.26	0.188	232,000

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Telecom Battery Storage Systems

S/no	Description	Nominal Voltage	Avge Cost / kWh $	Cycle Life 80% DOD	Max Temp. Deg. C
1	Sealed AGM VRLA	2	120	1,800	60
2	Lithium Iron Phosphate	3.2	450	2,500	60
3	Lithium Ion	3.7	400	2,000	60
4	Redox flow battery	1.5	1,000	10,000	60









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