

IFC International Finance Corporation World Bank Group

GSMA Green Power for Mobile

In partnership with Netherlands

Green technology Adaptation

29-May-2014

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Facts & Figures



Is the situation better than what we think?

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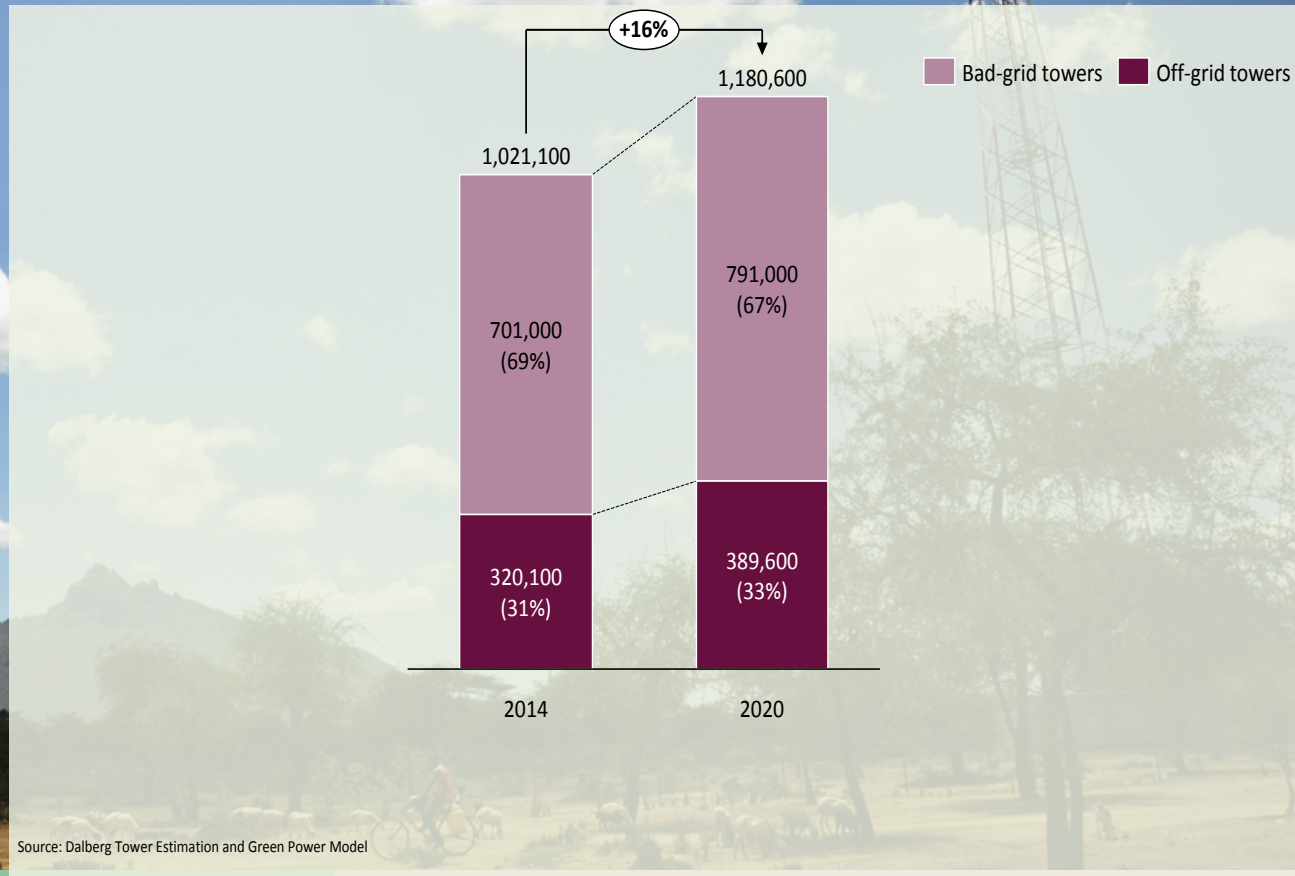
The World at night: Indicative



500 million mobile subscriber globally without having grid access

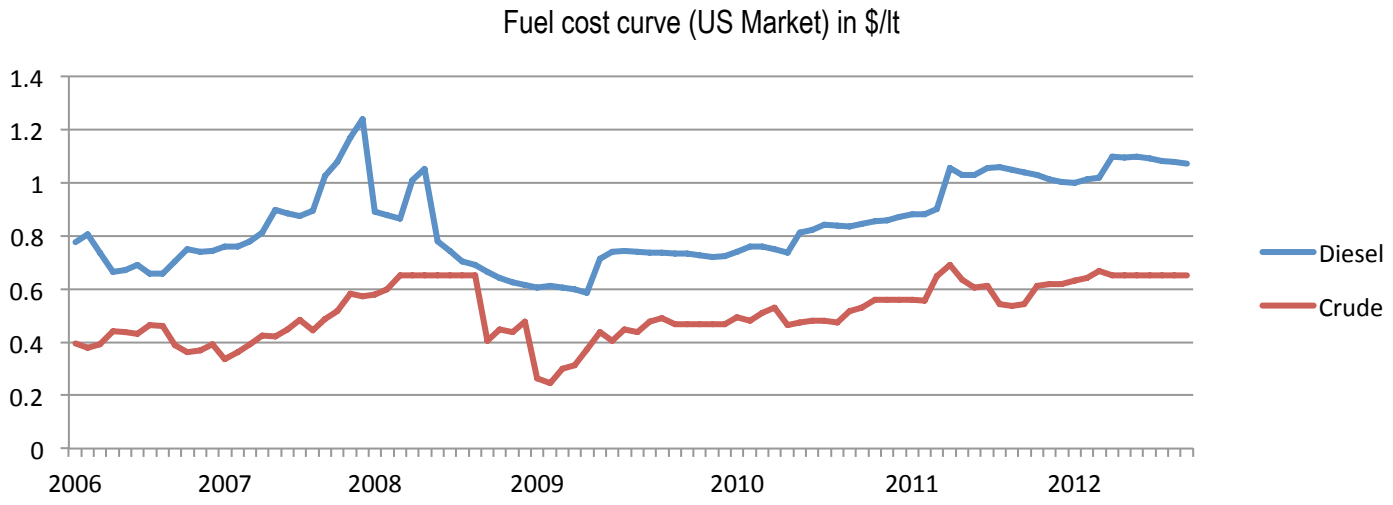
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It is expected to see 16% global growth problematic telecom BTS in next 6yrs with

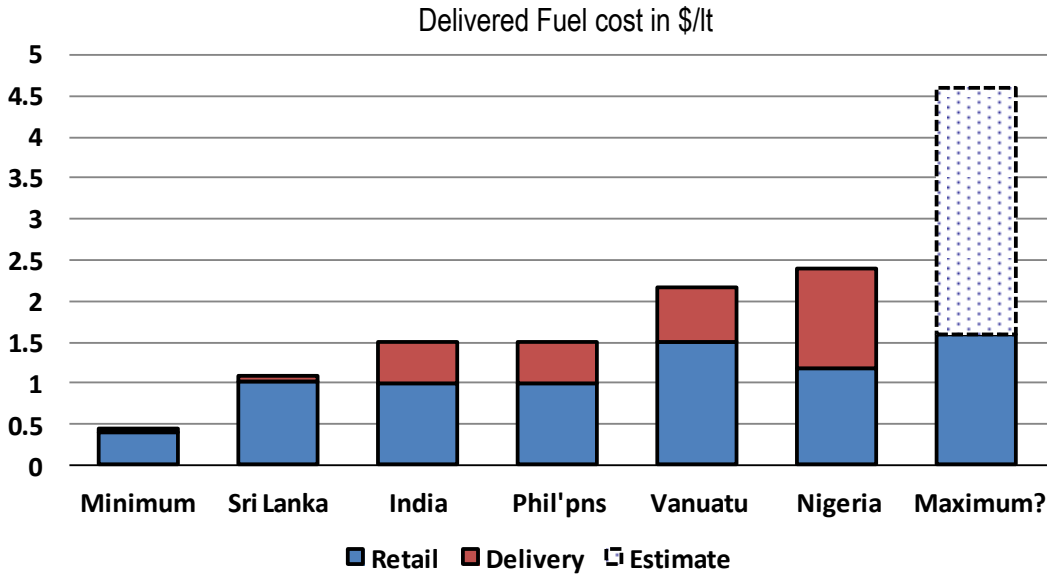


Source: Dalberg Tower Estimation and Green Power Model

Source: GSMA analysis



Source: IEA

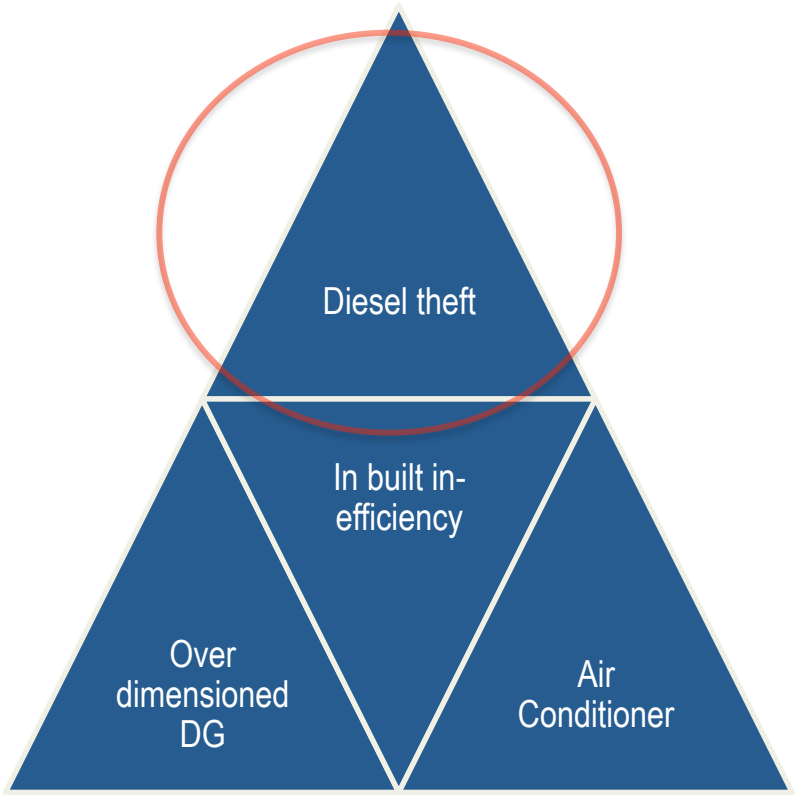


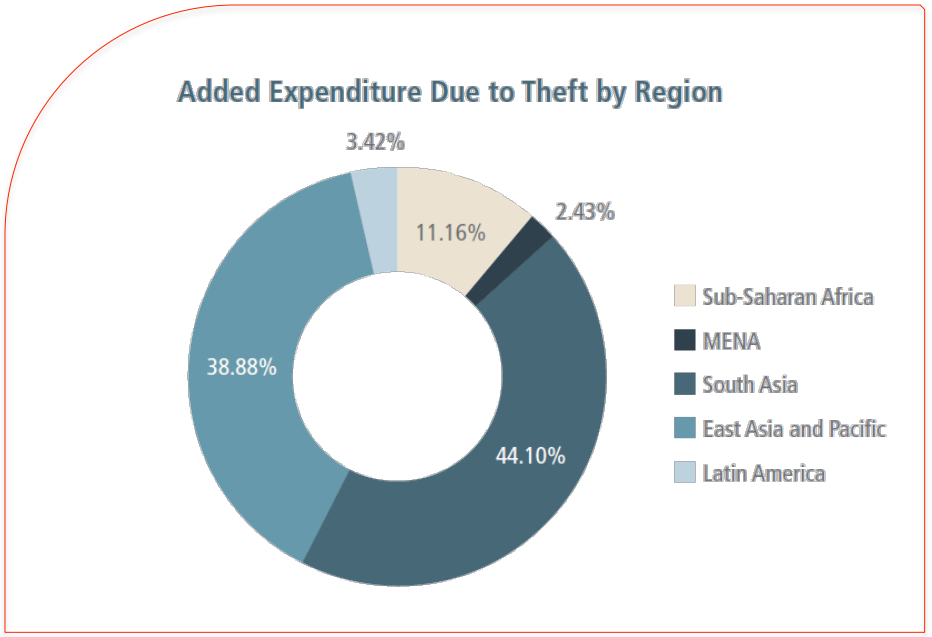
Source: GSMA research

Yearly $14.6 Billion diesel bill !!

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Problem Statement



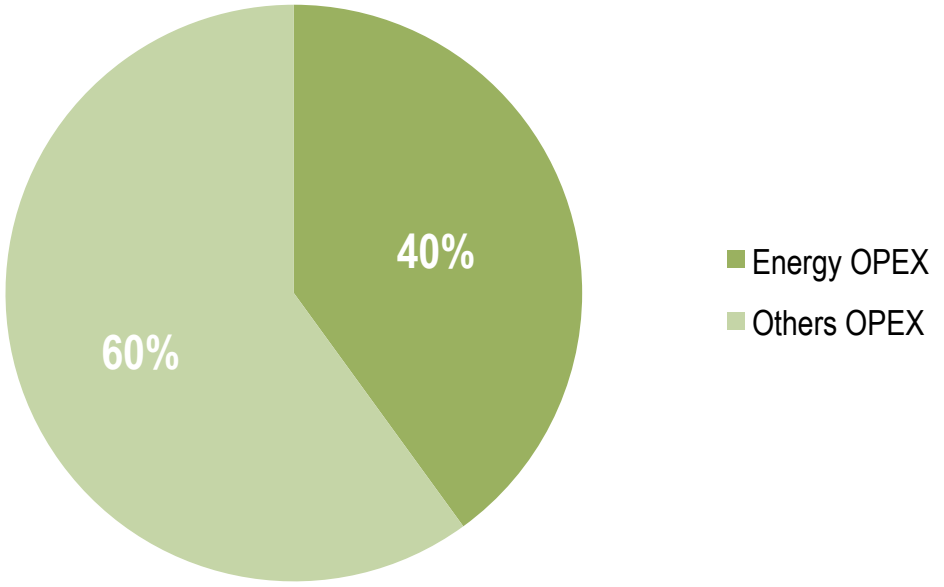


Source: GSMA research

- Estimated US$964 Million per year with most of the theft occurring at rural sites.
- Sub-Saharan Africa and South Asia are the regions the most impacted by the theft issues.
- Countries such as Nigeria face one of the highest theft and vandalism rates

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Average Energy OPEX

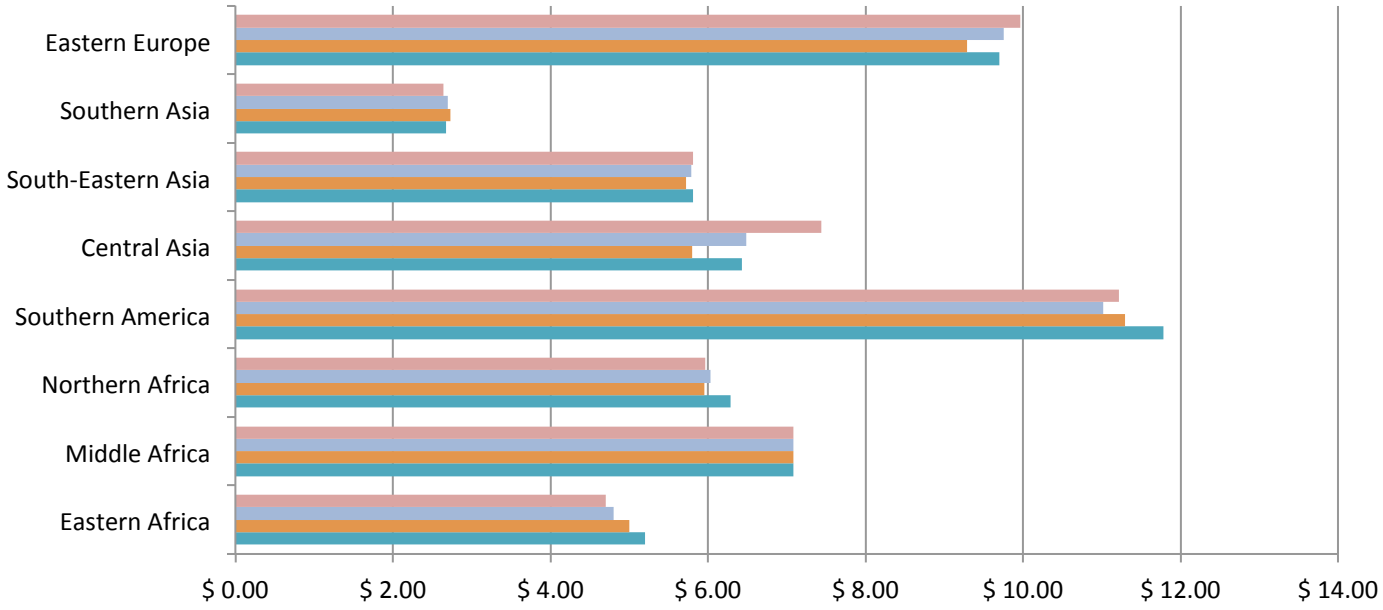


Source: GSMA research

Energy OPEX is increasing every year for about **5% - 15%**

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ARPU scenario



Source: Wireless Intelligence

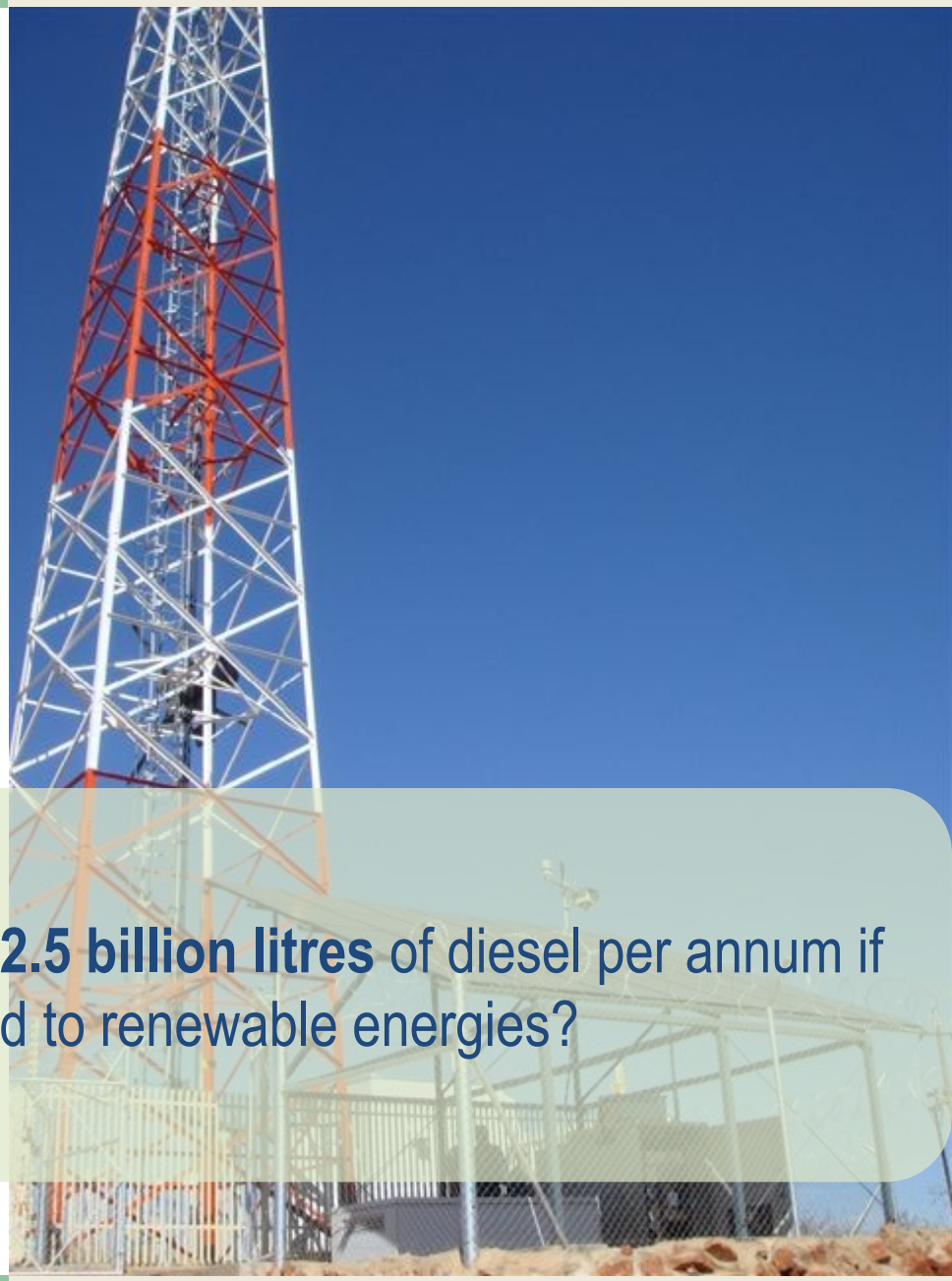
APRU in developing countries are as low as $2.5

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Technology

How Green power fits energy requirement for Telecom?

Is that financially viable?



The mobile industry could save up to **2.5 billion litres** of diesel per annum if **5%** of the total tower sites is converted to renewable energies?

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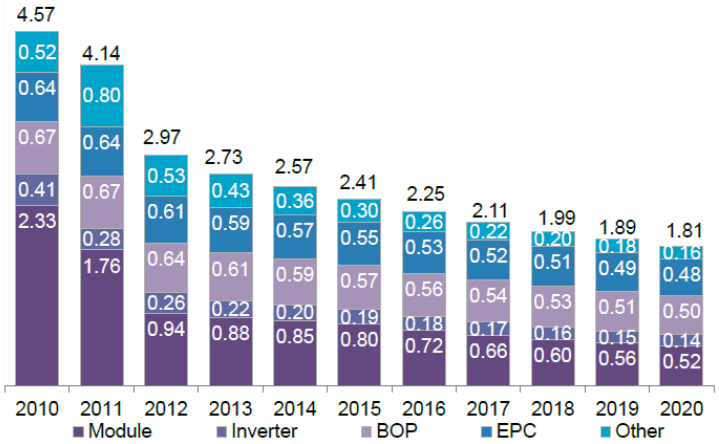
Power Source	CAPEX	OPEX	Reliability	Supplier Availability	Theft Resistance	Supply Chain Simplicity	Resource Availability
Diesel							
Solar							
Wind							
Biomass							
Fuel Cells							
Biogas							



Battery or storage system has significantly increased it's efficiency over the last few years. Though VRLA is still leading, but smart batteries are quickly catching up with market.

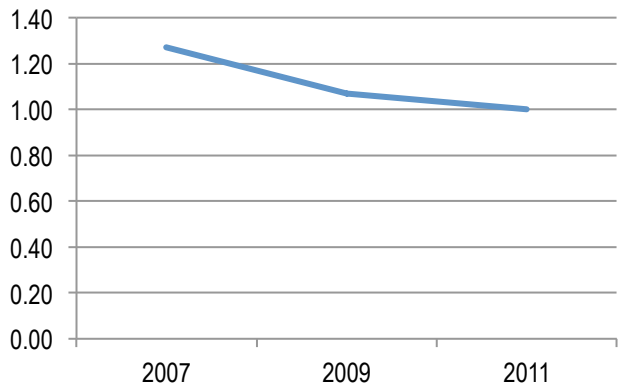
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Solar solution cost



Source: BNEF

Wind turbine Price*



Source: Bloomberg

* Only turbine cost

Fuel Cell

- Bottle Hydrogen 3k-6k per kW
- Methanol 6k-9k per kW
- Electrolyser 8k-10k per kW

- Stack efficiency has increased about 25% in last one year
- CAPEX for fuel cell is going down every quarter
- Fuel supply chain is still in developing phase. More traction to be seen in coming years

Source: GSMA research

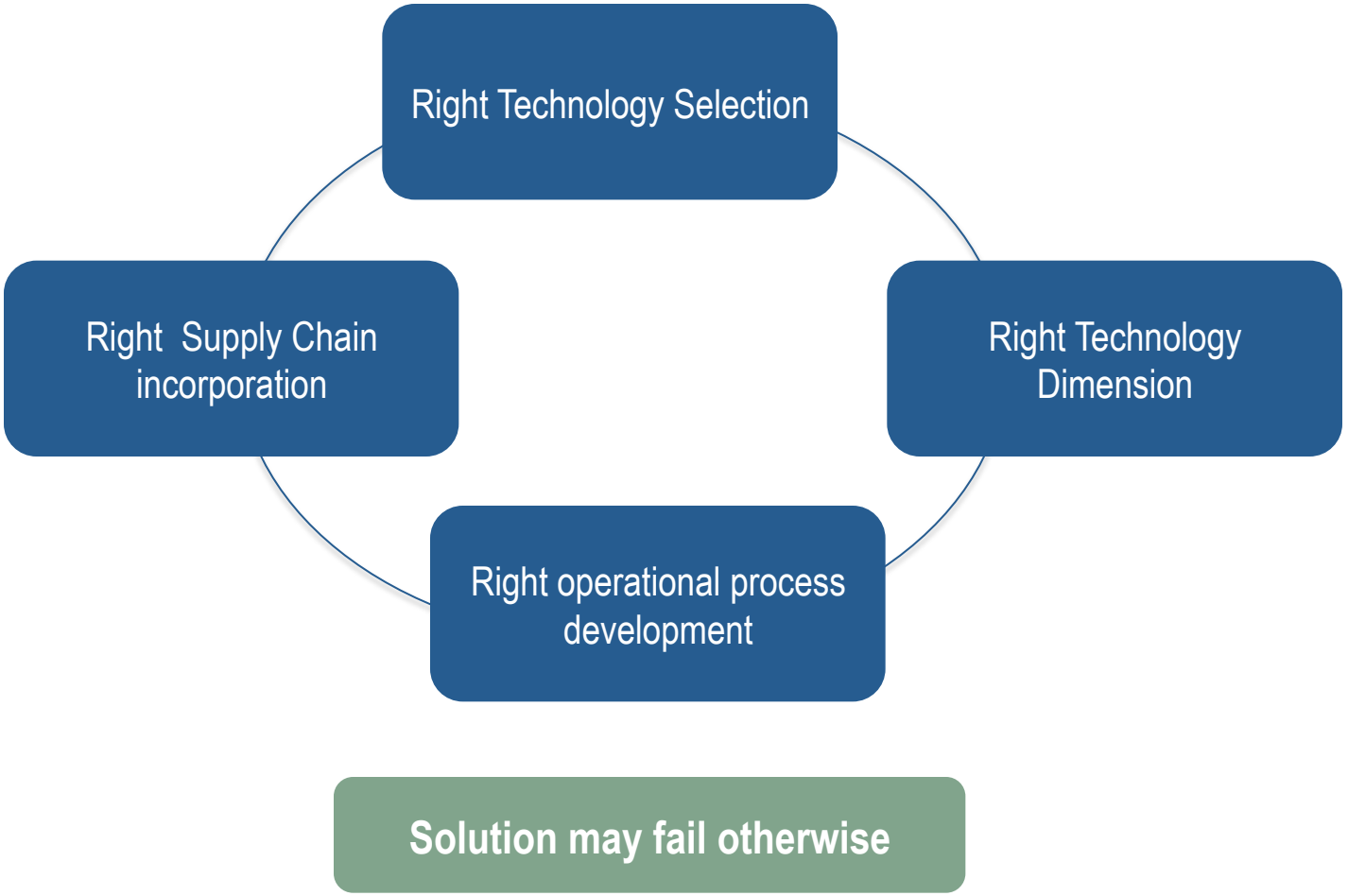
Biomass

- < $1k/kW for lower rating gasifier
- Small compact gasifier for telecom site usage

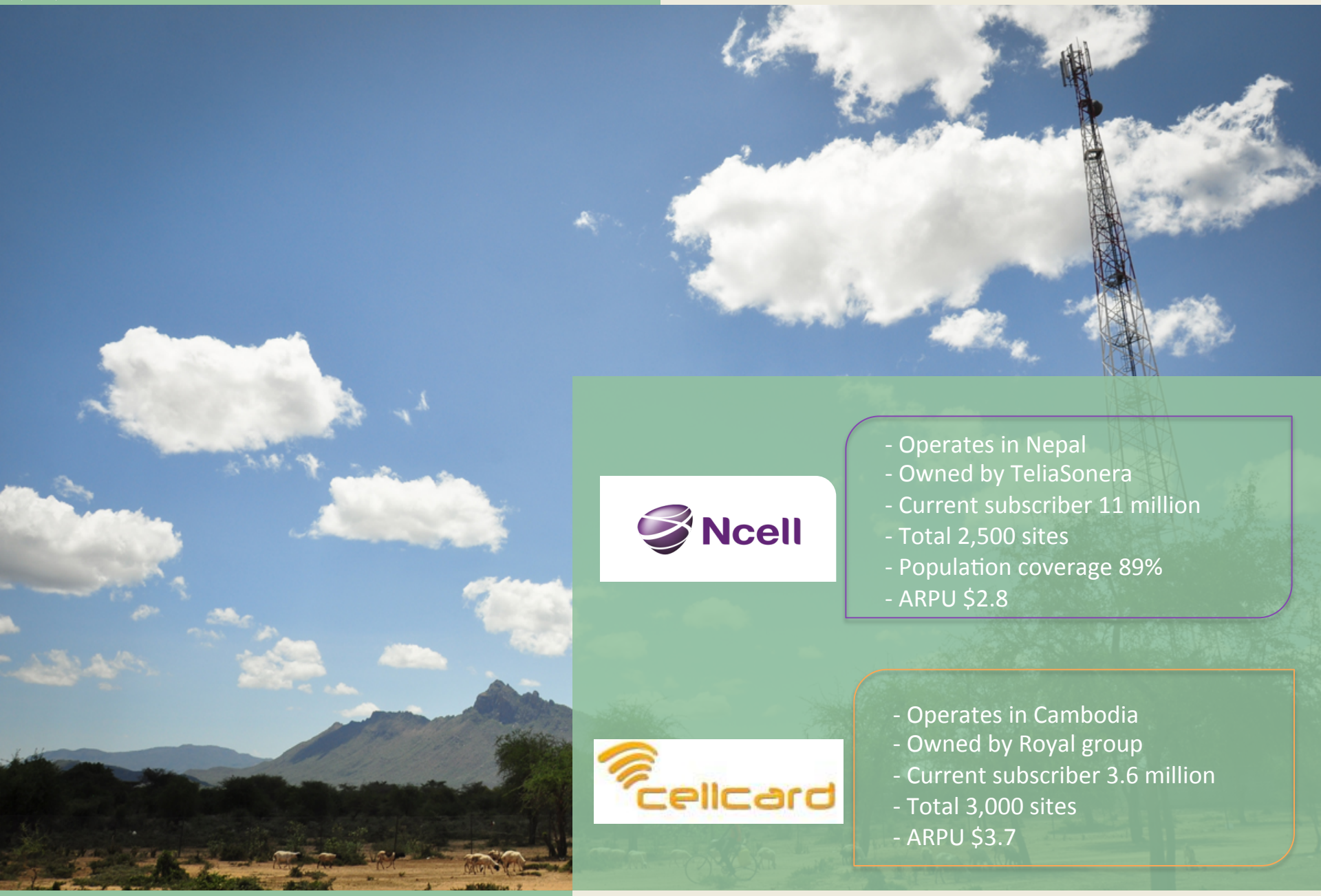
Source: GSMA research

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"The significant price reduction and increased efficiency helped us to consider green power to a great extend. However, total solution cost and operation still is a challenge"



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Ncell

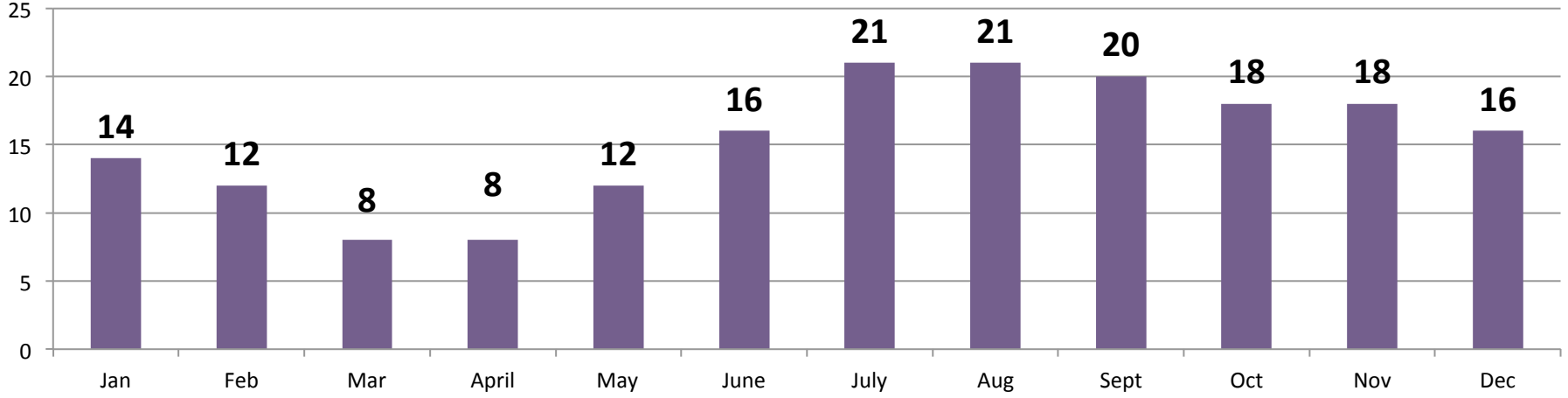
- Operates in Nepal
- Owned by TeliaSonera
- Current subscriber 11 million
- Total 2,500 sites
- Population coverage 89%
- ARPU $2.8

cellcard

- Operates in Cambodia
- Owned by Royal group
- Current subscriber 3.6 million
- Total 3,000 sites
- ARPU $3.7

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Power situation at Nepal



		wet	dry
2008/09	Demand	704 MW	777 MW
	Supply	668 MW	385 MW
	Load shedding	2 hrs	10 hrs
2009/10	Demand	774 MW	845 MW
	Supply	668 MW	385 MW
	Load shedding	3 hrs	13 hrs
2010/11	Demand	843 MW	919 MW
	Supply	668 MW	385 MW
	Load shedding	4 hrs	15 hrs
2011/12	Demand	919 MW	1000 MW
	Supply	668 MW	385 MW
	Load shedding	5 hrs	17 hrs

GSMA conducted a green power feasibility study on May-2011

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Analysed 1227 sites

1,116 problematic sites with green power possibilities

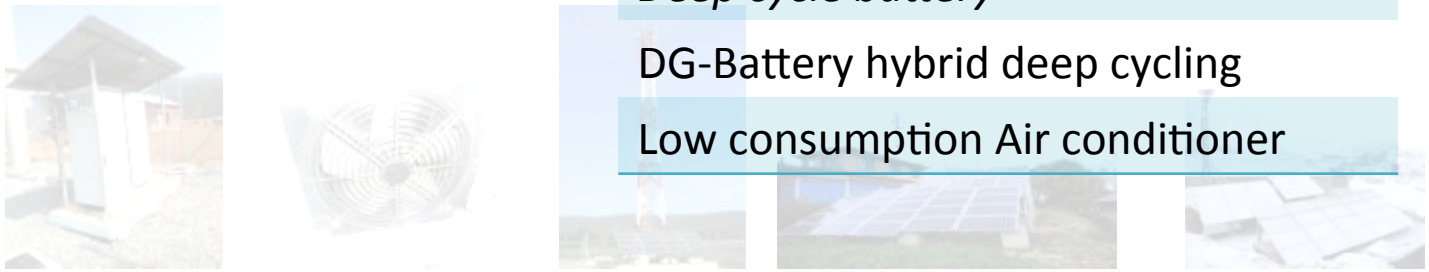
111 problematic sites feasible for deep battery cycling

$11.8 million will be saved every year by implementing GSMA recommendation

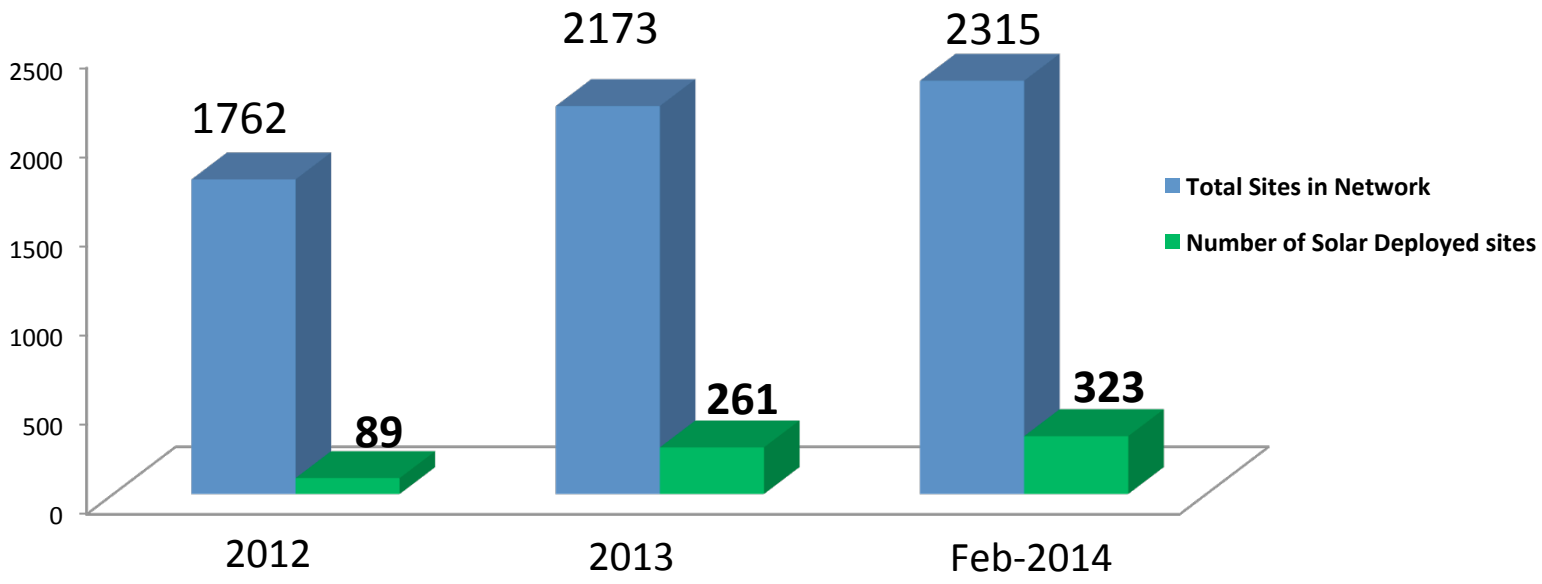
Average payback of green solution: 3.36 yrs

Activities undertook:

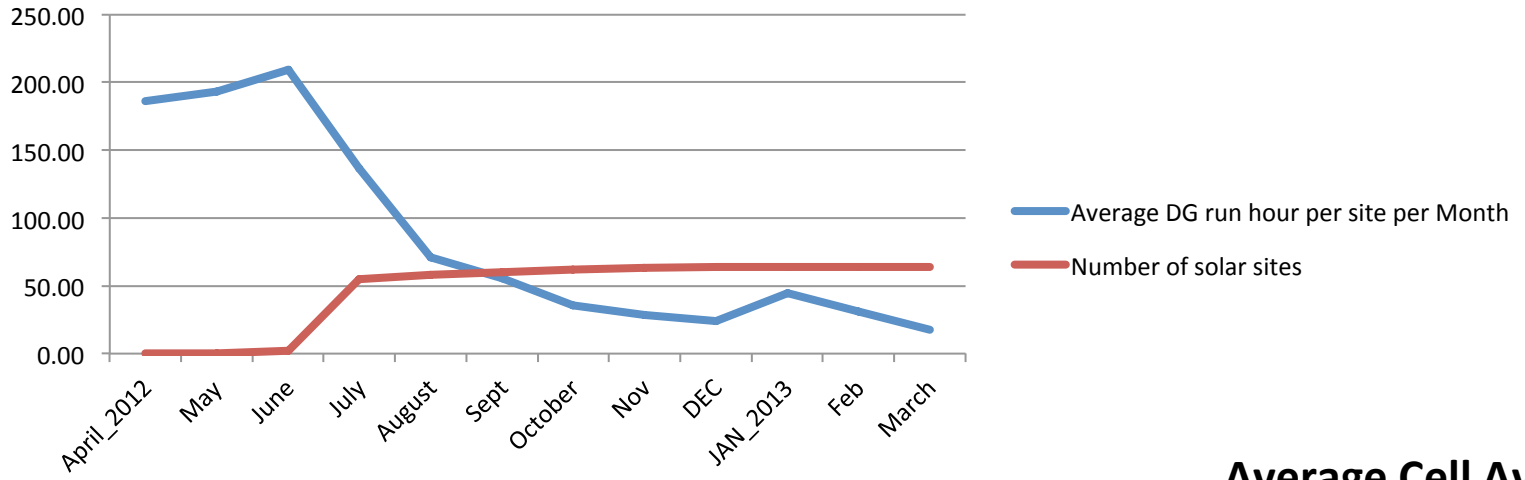
- Green power source deployment
- Low consumption BTS deployment
- All Outdoor site since 2010
- Free cooling
- DC DG
- *Deep cycle battery*
- DG-Battery hybrid deep cycling
- Low consumption Air conditioner

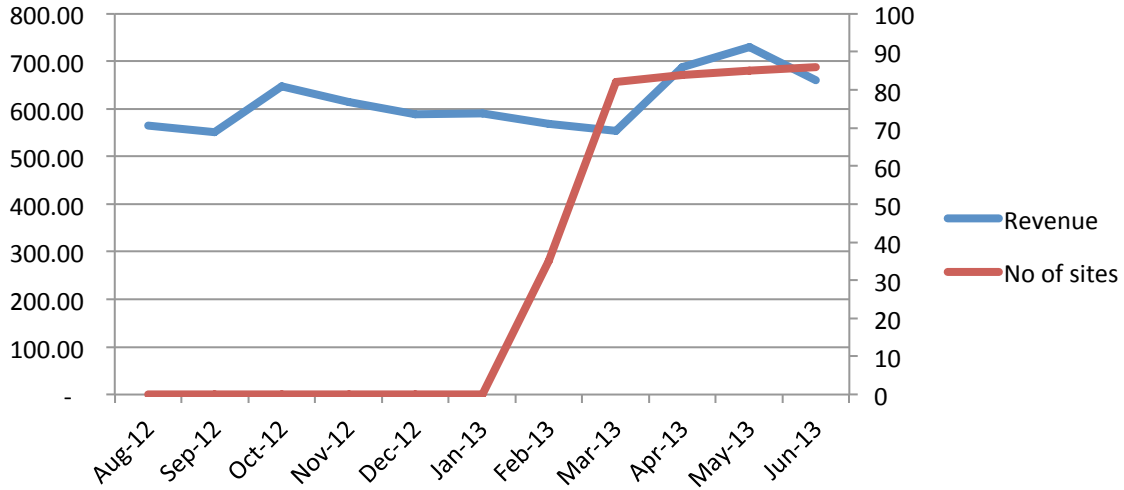


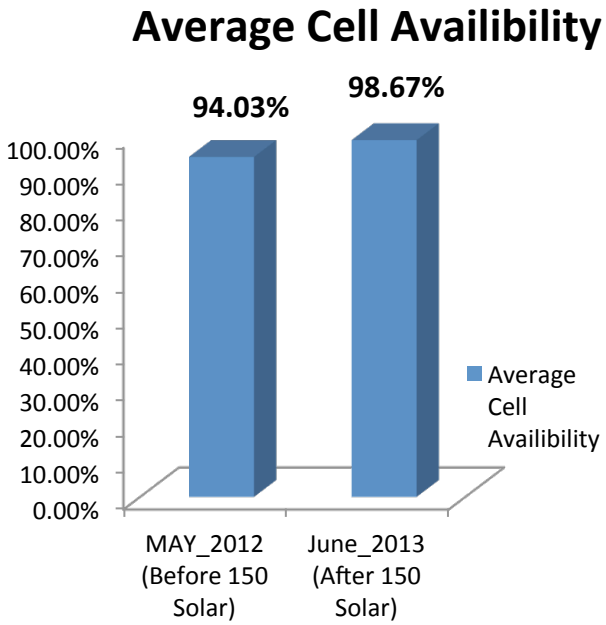
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Some deployed sites

Ncell









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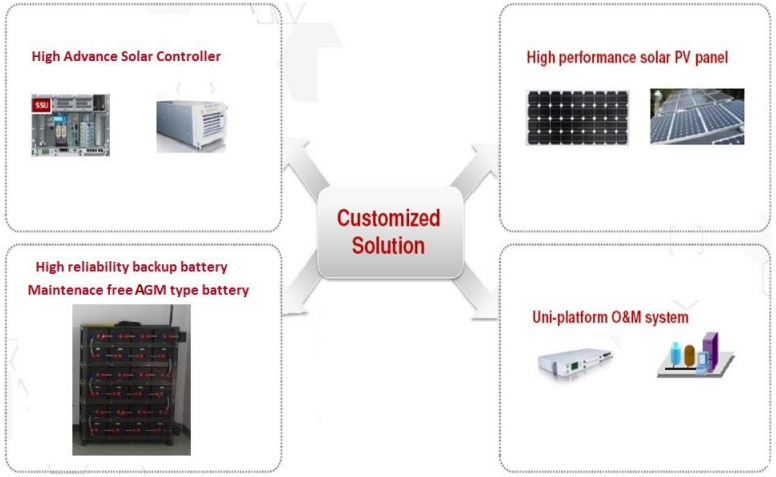


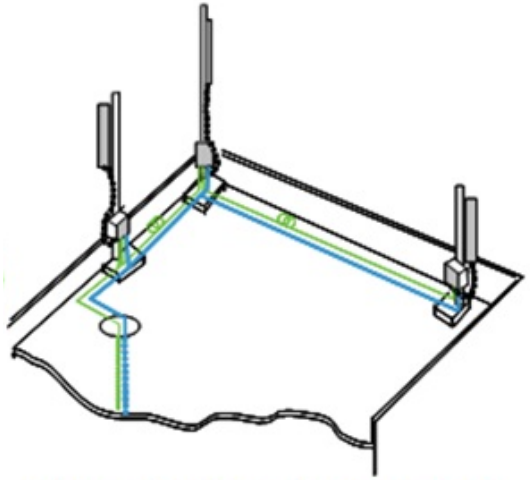
Only 20% population has access to grid electricity

Only 95% sites has challenge with grid energy access



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After - Distributed BTS System



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All upcoming sites are GF with Solar hybrid

1400 solar hybrid deployed so far

Reduced Diesel usage by about 90% across the network

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About 38,000 deployed green powered telecom site

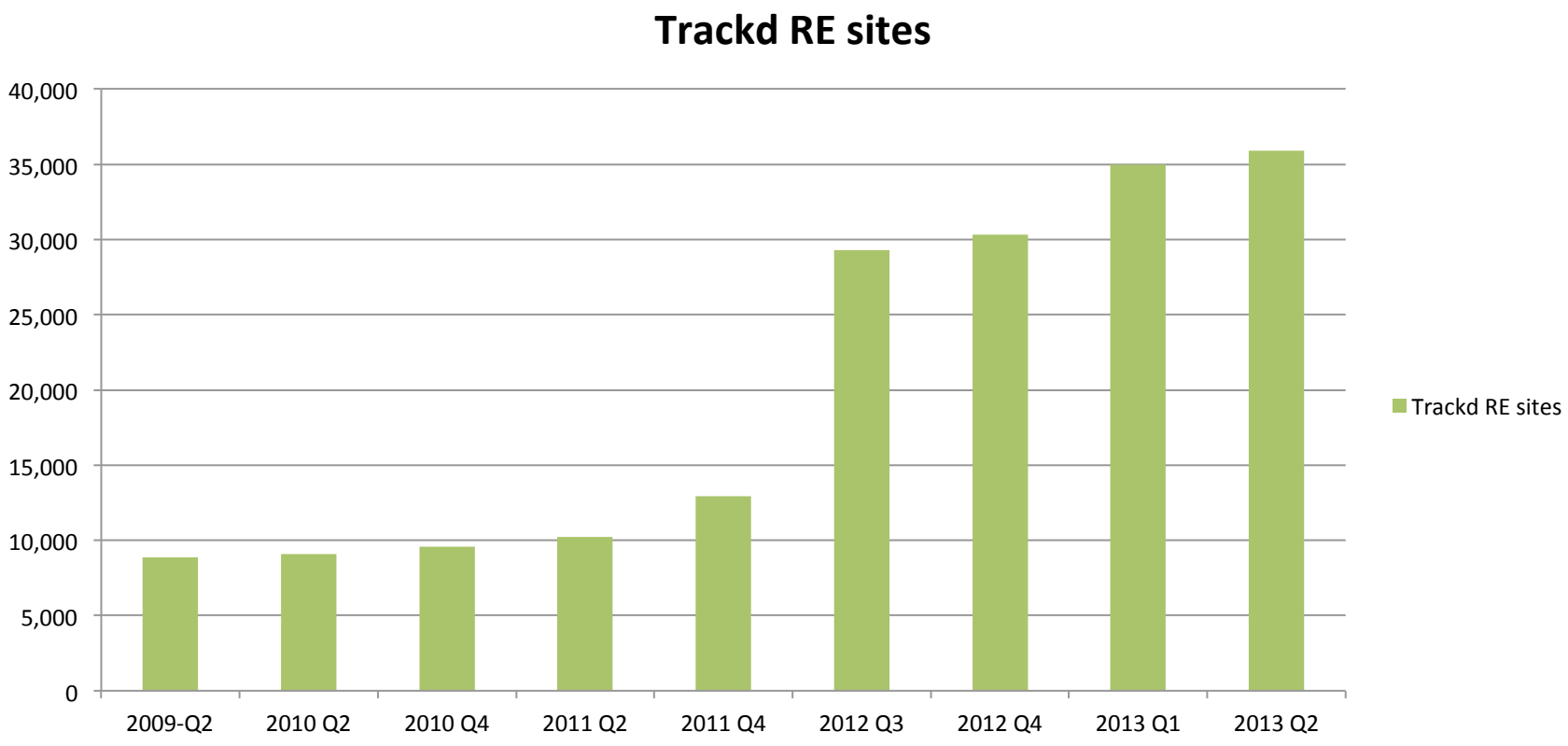
&

Another **7,000** site deployed are on the pipeline



Numbers are increasing every year…..

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A significant progress happened through-out the world on green telecom deployment in last 4 years.

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Out of the **38,000** deployment:

Technology	Number of sites
Solar	35,000
Wind	700
Solar-Wind hybrid	1,200
Fuel Cell	1,200
Others	24

Approximately **4,500** green sites are deployed on **OPEX** based ESCO model.

↓

And majority of them are mainly in Asia

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31,000 sites are deployed in ASIA

But majority of them are in China



Asia gets the credit of deploying **84.5%** of total global green telecom deployment

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Future trend

How to Move forward?

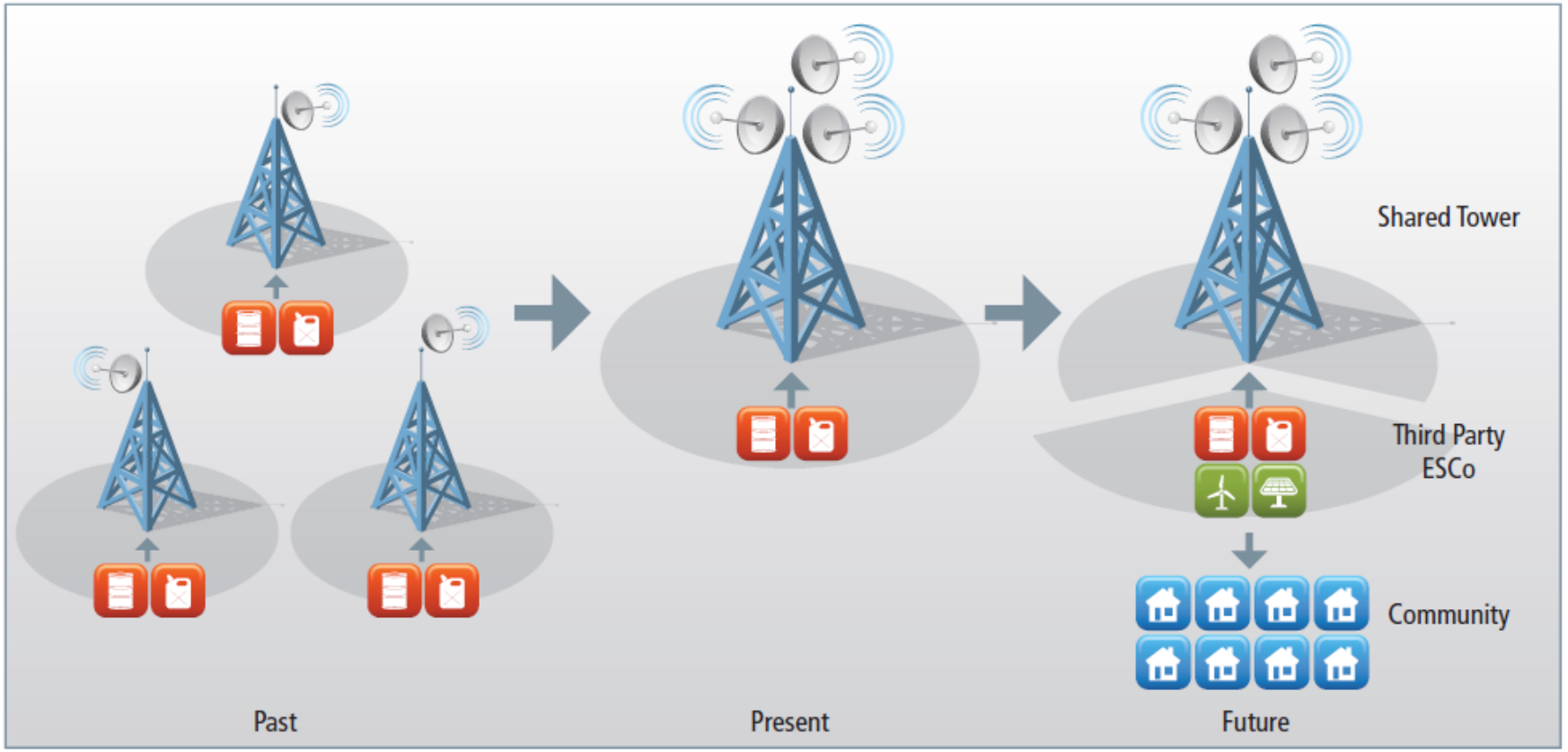
Who will take lead?



Powering base stations is a “cost of doing business” for operators and is not intuitively a part of network design.

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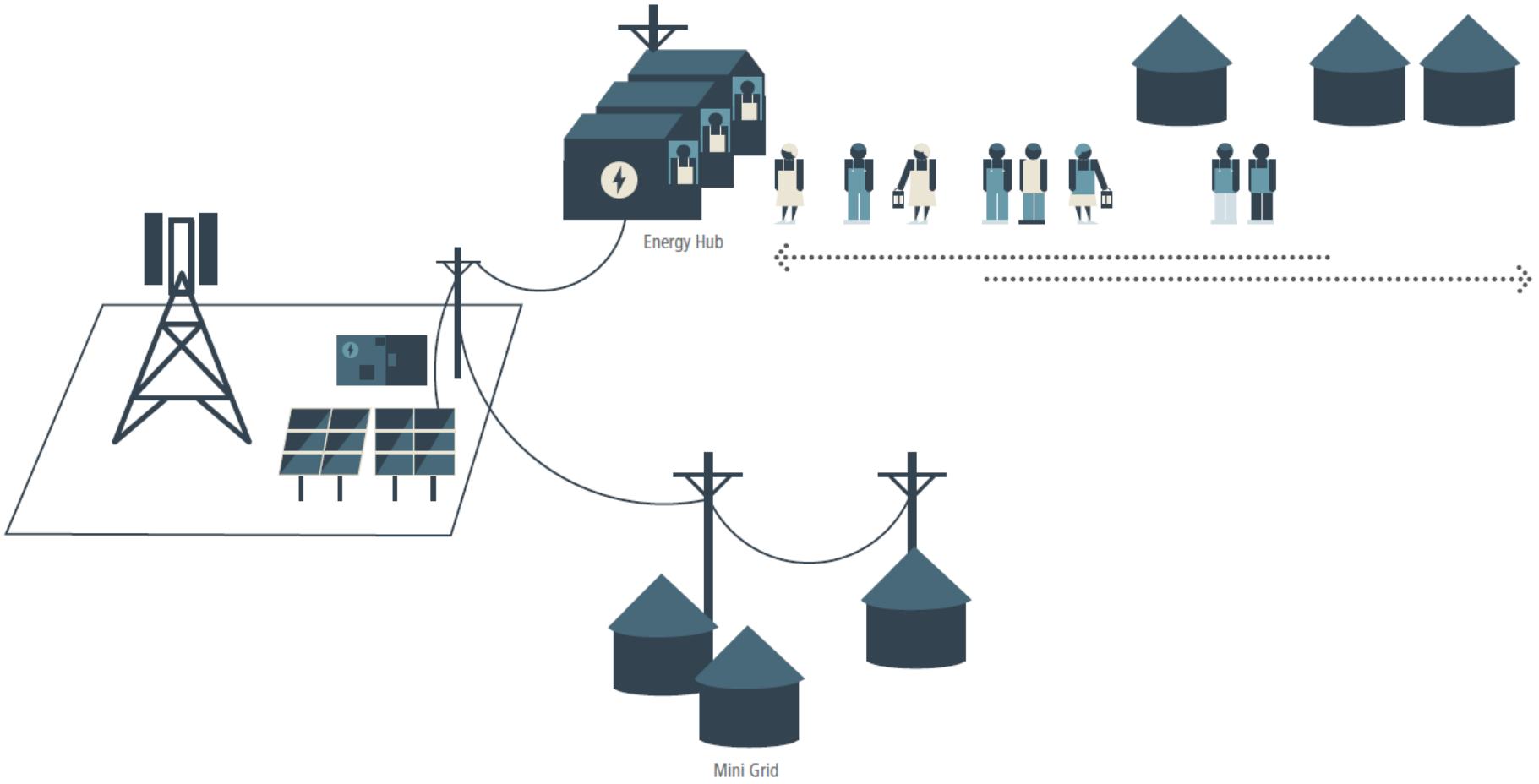
Transformation of Business Models



Good opportunity for Multiple stakeholders to be benefited

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Community Power

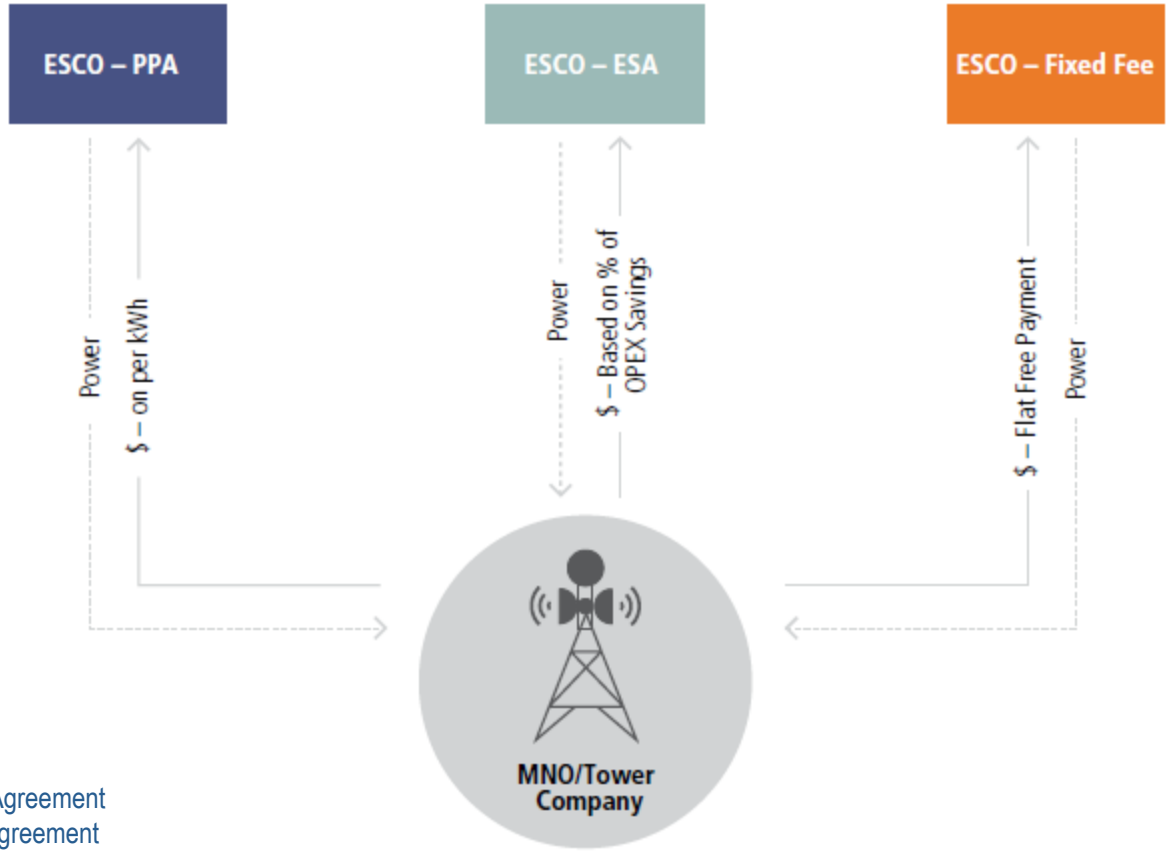


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Procurement model:

CAPEX vs OPEX

3rd Party ESCO Business Models



PPA – Power Purchase Agreement
ESA – Energy Savings Agreement
Fixed Fee – Monthly Fixed payment

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	CAPEX Model	OPEX Model
Financial analysis	- Operator has to invest all CAPEX either from its own source or from capital market; therefore financial risk belongs to Operator - IRR and NPV of Green Power deployment is significantly attractive. - For mass deployment, CAPEX investment comes as a barrier since it may require hundreds of millions of dollars.	- Operator does not have to invest for CAPEX, therefore no financial risk to deploy green power - IRR and NPV increases for telecom site since site OPEX reduces - Since mass deployment increases the business opportunity for ESCO, it comes more viable to invest.

	CAPEX Model	OPEX Model
Operational analysis	- Regular day-to-day site operation is a responsibility of operator - All cost related to site operation is incurred by operator - Site uptime and SLA maintenance is typically on operator. If fails, Operator bears all financial loss/penalty - OPEX for technical operation is low - OPEX for site operation is high.	- Site operation is a responsibility of ESCO; therefore Operator does not need to deploy resource for site operation - Operator pays only based on energy usage in a pre-agreed rate, therefore operational cost is forecast-able and comparatively lower than DG based energy cost - SLA and Uptime is a responsibility of ESCO. If fails, ESCO bears penalty.

	CAPEX Model	OPEX Model
Strategic analysis	- All asset of green power belongs to operator, therefore increases portfolio & branding value of organization - Maximize utilization of existing asset. - Easy to cope-up with variable changes - Multi 3rd parties' engagement makes the model complex for operator to handle at last mile - Increase debt for organization	- Easy to control last mile performance sine ESCO is the only last mile partner - Get full benefit of GHG emission reduction - Increases complexity of state management - Not so easy to cope-up with increasement of power requirement in regular basis - Reduces the risk of unforeseen energy OPEX due to market change and consumer inflation.