IFC International Finance Corporation World Bank Group

GSMA Green Power for Mobile

In partnership with Netherlands

GPM Market Analysis - Nigeria+Ghana: Opportunities & prospects

Green Power for Mobile Working Group - Nigeria and Ghana specific

Lagos, 29-30 Jan 2014

Outline

- Background and overview
- GPM Market Analysis – Nigeria and Ghana
- Green Power Adoption – Challenges and Opportunities
- Market Trends – Outsourcing

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Background

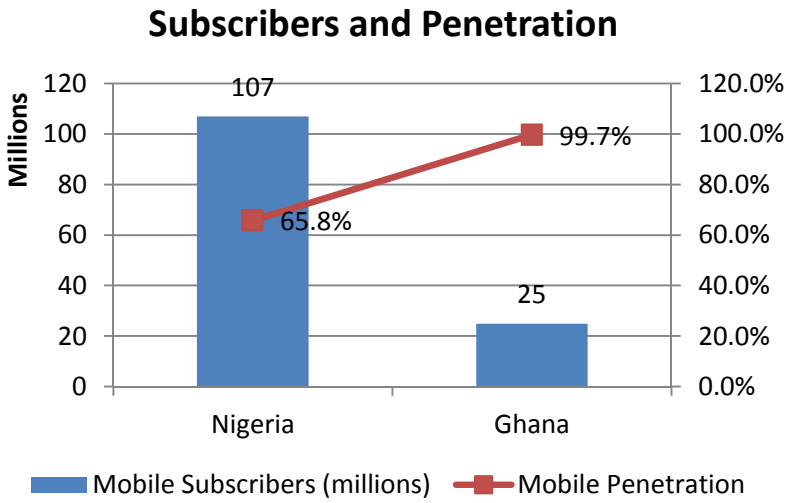
Objective

- ✓ Providing market insights and highlight opportunities, in Nigeria and Ghana.
  - To analyse the state of the telecom market and how networks are currently being powered
  - To provide an understanding of the potential of alternative energy solutions, in particular green power.
  - Take context of various elements, including the industry structure, the regulatory environment and the current state of power within the telecom infrastructure
- ✓ Output
  - Current size of the market and state of power for telecoms
  - Green power resources and potential
  - Future trends and opportunities for green power adoption
  - Market opportunity for 3rd party outsourced energy model.

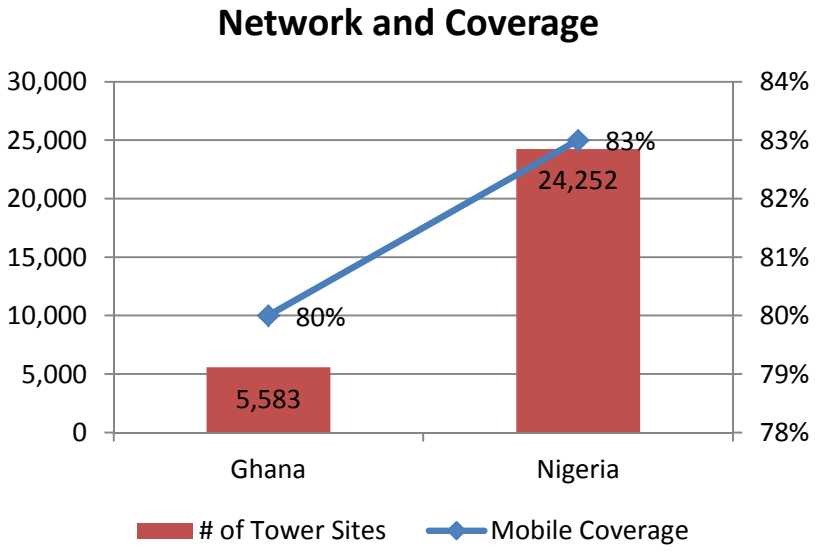


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Telecoms Context: Subscribers and Network



- Subscription base of 24.9 and 107 million respectively for Ghana and Nigeria ; subscriber growth of 17% and 14.8% respectively from 2011 to 2012.
- The penetration level has increased from 57.3% to 65.8% in Nigeria and 85.2% to 99.7% in Ghana.
- Low penetration levels present good opportunity for subscriber growth in Nigeria



- The network coverage is still far from reaching the 20% of the population living in remote rural communities
- Size of the network 5,583 and 24,252 sites respectively for Ghana and Nigeria; growing at 27% and 15% respectively as of 2012.
- The mobile network continues to grow in both Nigeria and Ghana

Limited penetration and network coverage present opportunity for future network expansion

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Power Sector Context

Nigeria

- One of the lowest per capita electricity consumption in the world at 121 kWh
- Electrification rate of 55.2%. Poor management of electricity grid.
- Extremely low power generation capacity despite good potential. Hence, leading to supply shortages.
- Average power availability across Nigeria's electrified regions is less than 5 hours per day
- Insufficient regulatory frameworks
- Lack of diversification in energy generation mix

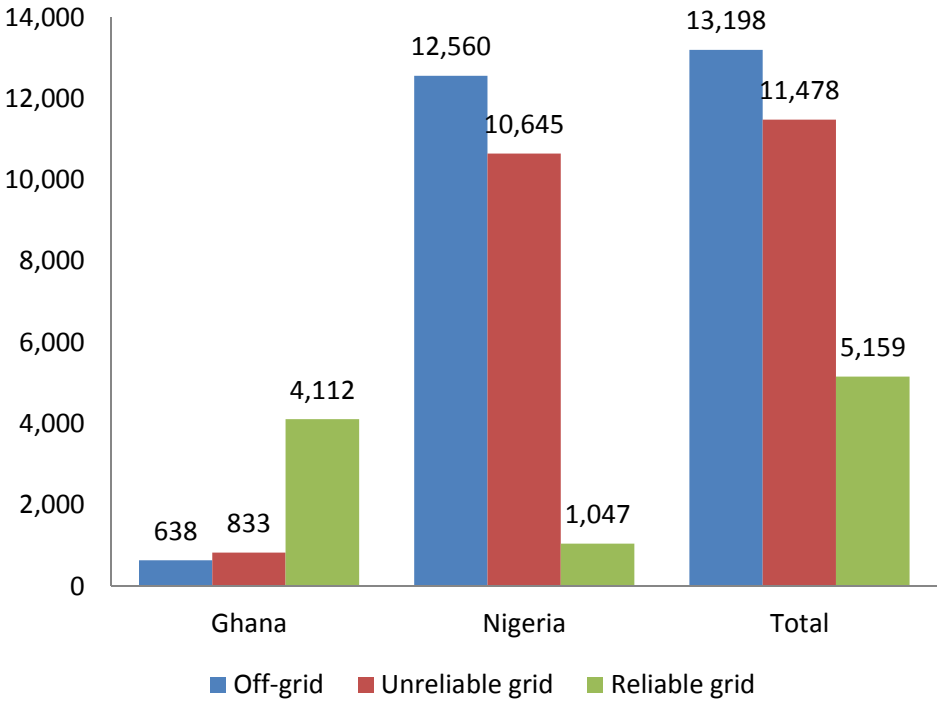
Ghana

- Electrification rate of 77.2% of the population
- Limited capacity expansion in power generation; hence leading supply shortages due to increasing demands
- Deteriorating quality and availability of power supply from the Grid



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Power Supply context for Telecom Networks



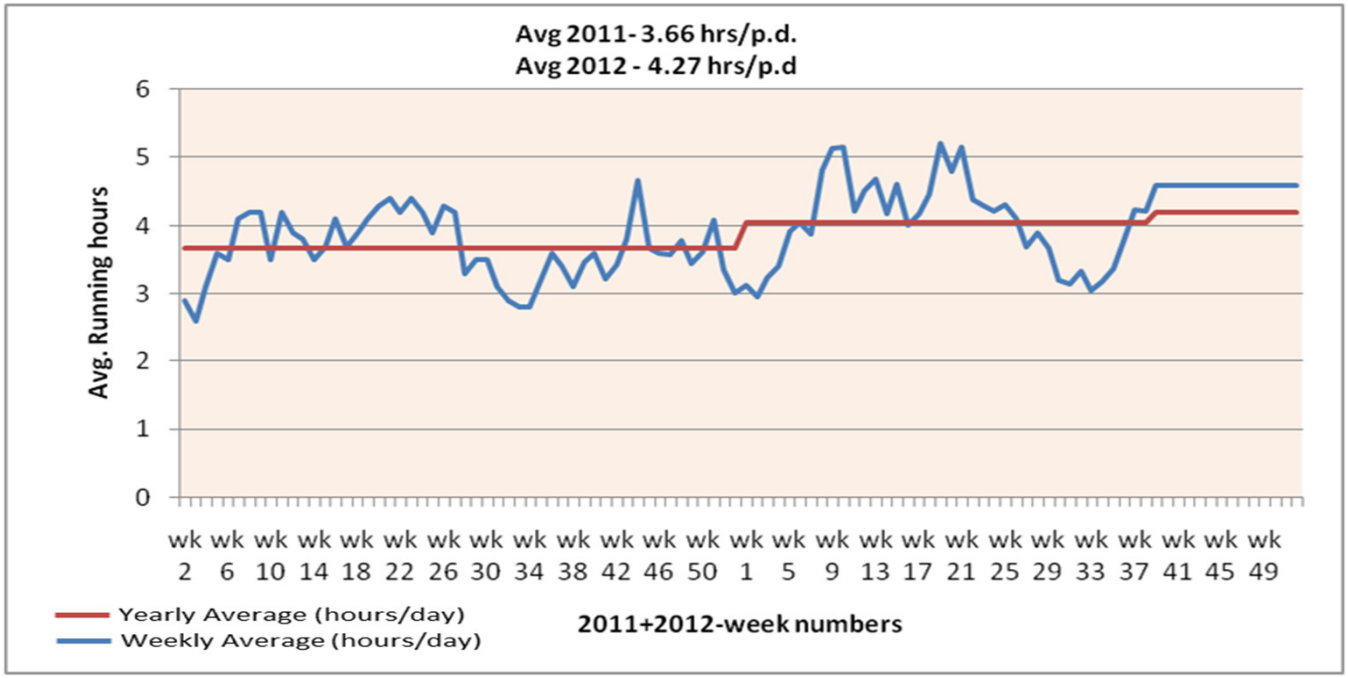
- MNO/TowerCos face challenges to power their existing network
  - Majority of the telecom sites fall in off-grid areas
  - Grid extension to off-grid sites is expensive
  - Most of the grid-connected sites have unreliable power supply
  - More reliance on diesel power due to poor quality and low availability of grid power supply to telecom sites

- MNOs face infrastructure challenges to expand coverage to the uncovered remote/rural population
  - The reach of grid power infrastructure considered as the biggest hurdle to network expansion
  - Power infrastructure is crucial for Mobile Network operations and coverage growth
  - The majority of the uncovered population are living in rural and remote off-grid areas

- Of the total 29,835 sites in Nigeria and Ghana, 16,637 are connected to grid and remaining 13,198 are off-grid
- 52% of the sites in Nigeria are off-grid and over 81% of its on-grid sites suffer power outages for up to 6 hours a day

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Operations Context for Telecom Networks



Ghana

- The availability of grid power supply to the telecom tower sites in Ghana is about 70% of the time
- However, recent decline in the quality and reliability of grid power supply in due to supply shortages

Nigeria

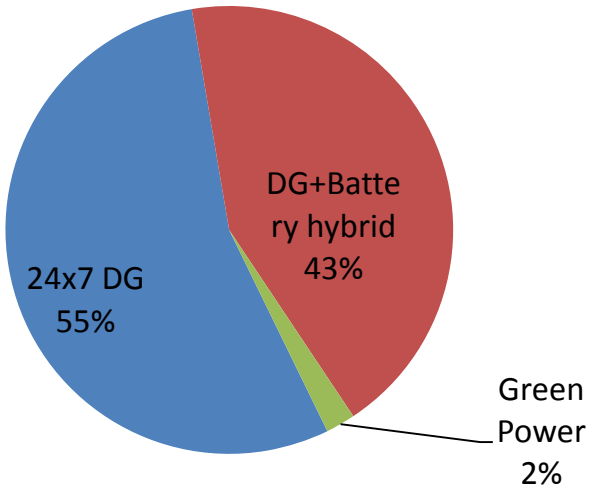
- More than half of the sites are off-grid and usually powered by diesel generators with huge OPEX
- Grid-connected sites suffer due to the poor quality of power supply and frequent outages lasting long hours
- Site security is a major issue as there have been several cases of damage to tower assets across the country
- An on-grid site consumes an average of 1,500 liters per month in Nigeria and 450 liters per month in Ghana.

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Powering Scenario: Off-grid

	Nigeria	Ghana
24x7 DG	7,066	133
DG+Battery hybrid	5,221	496
Green Power	273	9
Total Off-grid	**12,560**	**638**
% of Green power	*2.2%*	*1.5%*
% of 24x7 DG	*56%*	*21%*

Overall Off-grid (Nigeria+Ghana)



- The majority of off-grid sites (approx. 55%) are powered by 24x7 DG power solution
- More than 43% are deployed with DG-battery hybrid power systems.
- The share of green power deployments stands ONLY 2% of the total off-grid sites.

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Powering Scenario: On-grid

	Nigeria	Ghana
Grid+DG Only	10,355	4,087
Grid+DG+Battery hybrid	1,313	858
Green Power	24	0
Total On-grid	**11,692**	**4,945**
% of Green power	*0.2%*	*0%*
% Grid+DG Only sites	*82%*	*88%*
% of Un-reliable Grid Sites	*91%*	*17%*

- The majority of on-grid sites are powered by DG power solution, due unreliable grid power supply
- The share of Grid+battery hybrid power systems is less than 20%
- The share of green power deployments is almost NILL, despite 91% unreliable grid sites in Nigeria and 17% unreliable grid sites in Ghana.

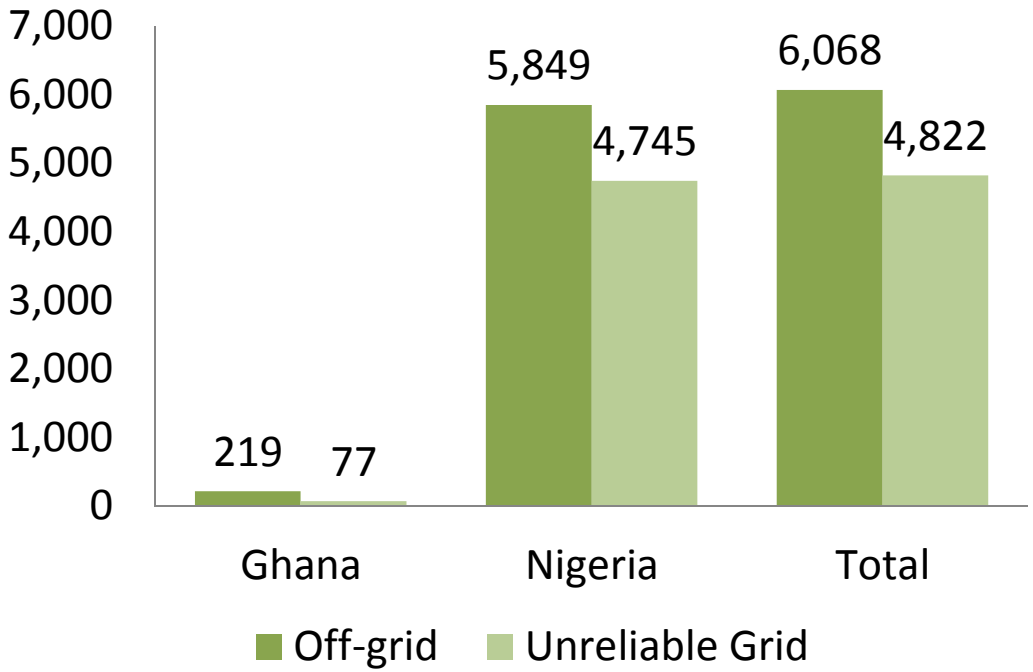
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The Green Opportunity: Resources

	Solar	Wind	Biomass	Fuel Cell	Pico-Hydro
Ghana	High	Medium to Low	Low	Medium to Low	Low
Nigeria	High	Medium	Low	Medium to Low	Low
Stage of Adoption	Commercial	Pre-pilot to Pilot	Pre-pilot	Pre-pilot	Pre-pilot
Barriers to Adoption	▪ Higher pricing of solar power systems leading to huge CAPEX requirement ▪ High load in multi-tenant scenario for tower companies ▪ Availability of local support for spare parts and Support from O&M partners for maintenance ▪ Lack of regulatory support and clear guidelines for green power adoption	▪ Reliability of power generation ▪ Low scalability and high investment ▪ No satisfactory pilot results	▪ Unavailability of vendors and technology adoption ▪ Operational complexity and Supply challenges ▪ Pre-pilot stage and unproven operational feasibility	▪ Inhibition from using hydrogen fuel tanks in the premises due to perceived safety issues ▪ High initial CAPEX and Fuel supply challenges ▪ OPEX Savings not yet established	▪ Low market awareness ▪ Availability of water body close to tower locations ▪ Cost of technology ▪ Regulatory clearance
Risks of Adoption	▪ Operational risk in terms of local challenges in theft and breaking of solar panels ▪ Local support and availability of spares	▪ Low energy resource ▪ Unreliable wind speeds and change of wind direction by season	▪ Biomass supply and sustainability ▪ Reliability issues due to breakage in supply links	▪ High replacement cost of fuel cells ▪ Reliability of fuel supply	▪ Operational risks associated with limited knowledge and readiness

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The Green Opportunity: Numbers



Potential sites	10,890
Investment required (million US $)	560+
Potential OPEX Savings (million US $/year)	190+
Reduction in diesel consumption (%)	76%

- Nigeria and Ghana combined present an opportunity of 10,890 sites for green power alternatives
- This constitutes 42% of the total unreliable-grid sites and 46% of the total off-grid sites in both countries.

- Potential OPEX savings of over 190 million US$ per year
- Diesel consumption reduced by 76% from current levels

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The Green Opportunity: Challenges

Technology

- Availability and cost of technology
- Limited skills on technology selection and right solution dimensioning
- Technical support post deployment

Operational

- Reliability of technology and vendors
- Theft, vandalism of equipment
- Lack of committed support from partners at ground level

Financial

- Funding choices in addition to internal budgets
- Limited knowledge and support from commercial banks to finance green deployments
- Proven business models for off-loading the funding requirement

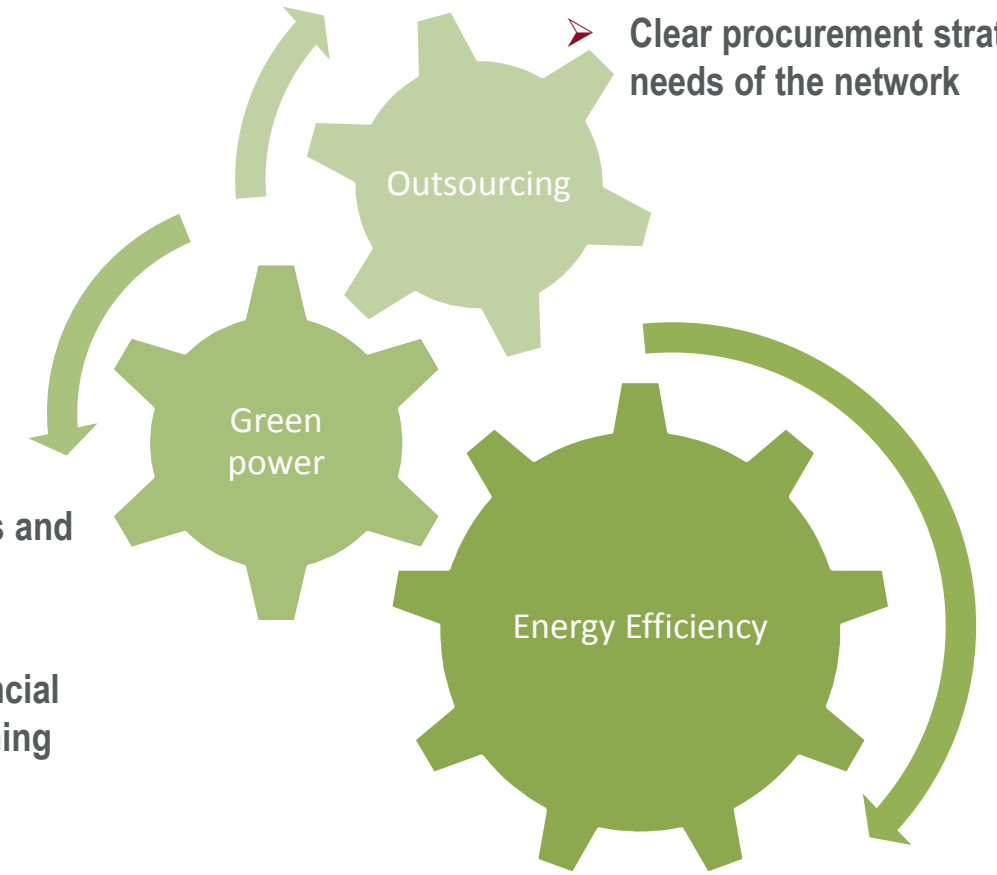
Eco-system

- Availability reliable operational partners and technology vendors
- Local knowledge and technical support
- Regulatory support and policy guidelines to drive the green adoption

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The Green Opportunity: Strategy

- Understand available deployment models
- Clear procurement strategy to meet the energy needs of the network

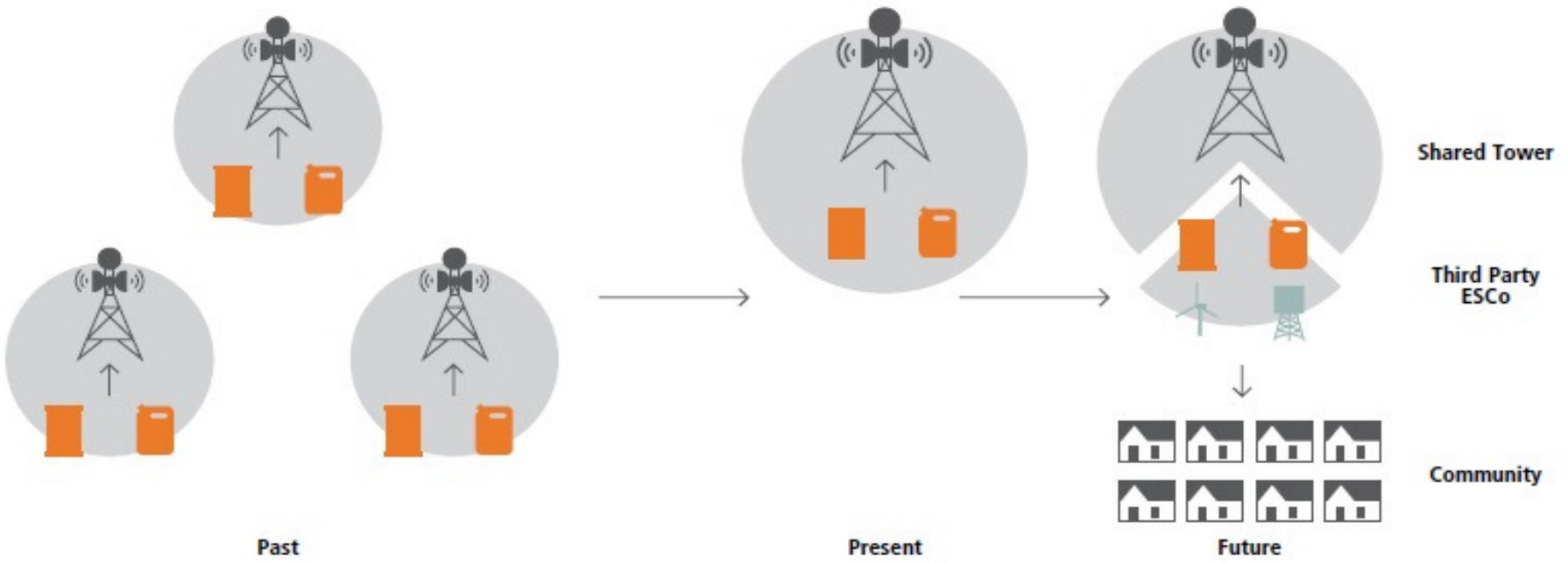


- Analyse potential green choices and vendor landscape to support deployments
- Develop business case for financial feasibility and investment planning

- Long term view on energy efficiency and green power investments
- Network energy efficiency to optimize network and future energy requirement

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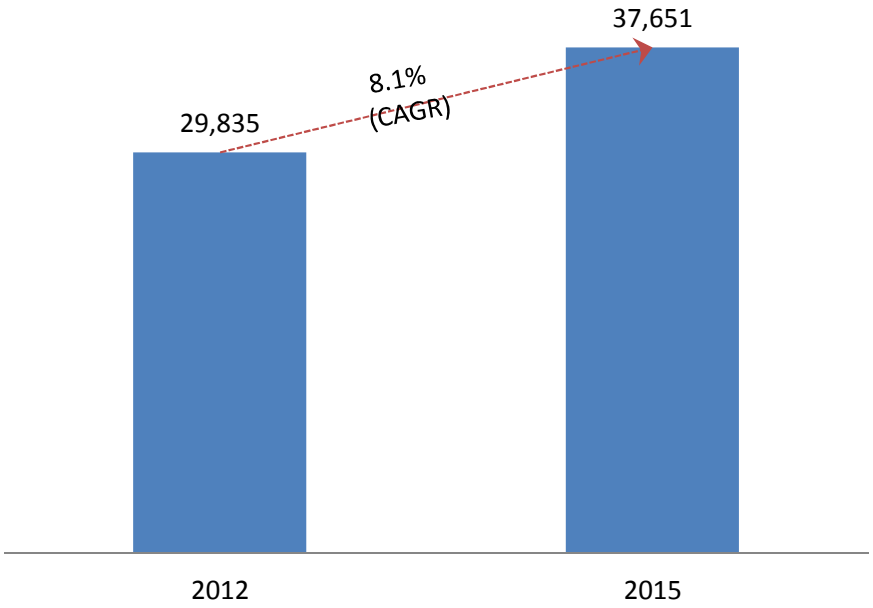
The Green Opportunity: ESCO Business

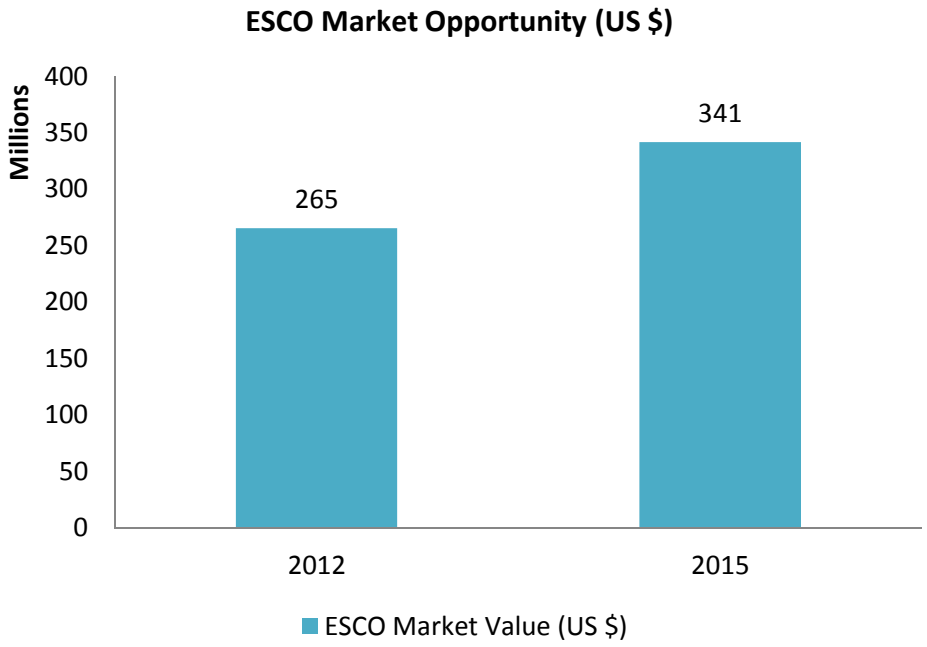


	Potential sites - 2012	Investment required – 2012 (million US $)	Revenue Potential – 2012 (million US $/year)	Additional Potential sites by 2015	Additional Investment required by 2015 (million US $)	Revenue Potential by 2015 (million US $/year)
Nigeria and Ghana	10,042	725	265	3,260	240	340

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Growth Forecast





- GPM estimates that the number of telecom sites will increase from 29,835 in 2012 to more than 37,650 by 2015 at a CAGR of 8.1% across Nigeria and Ghana
- Corresponding ESCO market potential would increase from 265 million US$ to 340 million US$
- Growth in tower outsourcing will impact the rate of expansion of the network and ESCO market potential

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References

1. GSMA-IFC Green Power for Mobile programme
2. Powering Telecoms: GPM Market Analysis – West Africa

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Thank You!

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