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# Energy for the Telecom Towers

## India Market Sizing and Forecasting



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## Objectives

This document presents the market opportunity for Energy Service Companies and investors in India considering the outsourcing of the energy component of telecom towers. The data presented in this document are based on the feedbacks from major Telecom Tower Operators and Energy Service Companies operating in India.

## Definition

**Telecom Tower Operator:** A company that manages a part or the entire assets of a telecom tower.

**ESCOs:** An energy service company that provides turnkey or end-to-end GPM solutions to an operator for off-grid telecom BTS.

**CAPEX Model:** Mobile Operator or Tower Company invests CAPEX of their own to rollout the renewable solution.

**OPEX Model:** A Renewable ESCO invests CAPEX to generator power at site level and sells power to Mobile Operator or Tower Company.

**Tenancy Ratio:** Tenancy ratios are expressed as a fraction of total number of operators sharing towers/total number of sites present.

**IRR:** Internal Rate of Return is the Rate of Return of an Investment.

## Executive Summary

The Indian Telecom Market is currently facing a sustained growth, adding 10 Million customers per month to the global mobile subscriber pool.

Whereas the penetration is saturating in urban environments, rural areas are still far from being completely covered by a GSM signal. In terms of GSM coverage, 73%<sup>1</sup> of the population was covered at the end of 2009, equivalent to 56% of the land. In 2010, there were an estimated 313.7 Million connections<sup>2</sup> in urban environment (88% of penetration) and 211.6 Million connections in rural environment (~25% of penetration).

This divide between urban and rural coverage and connections is partially explained by the lack of electricity or reliable electricity grid in the country. In 2010, India had an electrification rate of 64.5%<sup>3</sup>, with 93.1% of the urban population and 52.5% of the rural population having access to the electricity grid.

In 2011, there was over 390,000 telecom towers in India, with an average tenancy ratio of 1.6.

Based on the feedback of telecom tower operators, in 2011, 82.2% of the mobile telecom infrastructure is connected to the grid (with a reliable or unreliable access to the electricity grid), with a remaining 17.8% of off grid telecom towers.

In terms of market sizing, telecom tower companies are willing to consider outsourcing the energy component of their infrastructure for a Power Purchase Agreement rate lower than US\$0.70 / kWh (for a diesel litre of US\$1 and above). Based on feedbacks, potential yearly market in 2011 would be valued at US\$379.6 Million when Diesel price reaches US\$1 per litre. This value would increase to US\$523.7 per year when diesel price increases to US\$1.1.

In terms of investments, for the OPEX model, the payback period ESCO should look in the case of the outsourcing model would be 3-4 years with a 20-25% Internal Rate of Return (IRR).

By 2015, GSMA estimates that the total number of tower will increase to 460,000, a 19% increase. In terms of yearly market opportunity, this would represent up to US\$563.5 Million for a PPA rate of US\$0.70 / kWh and a diesel price of US\$1.1.

1 GSMA 2010 based on GIS methodology

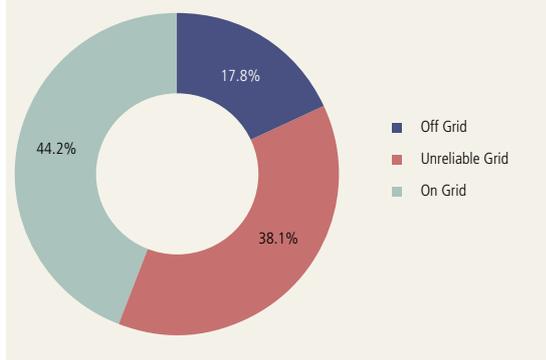
2 GSMA 2010

3 IEA Energy Outlook 2009

## Telecom Tower Market Sizing

At Mid-2011, over 390,000 telecom towers were installed in India. Based on the feedback of telecom tower operators, 82.2% of the mobile telecom infrastructure is connected to the grid (with a reliable and unreliable access to the electricity grid), with a remaining 17.8% of off grid telecom towers.

Figure 1: Telecom Towers Grid Access Segmentation



Source GSMA based on Tower Companies feedback

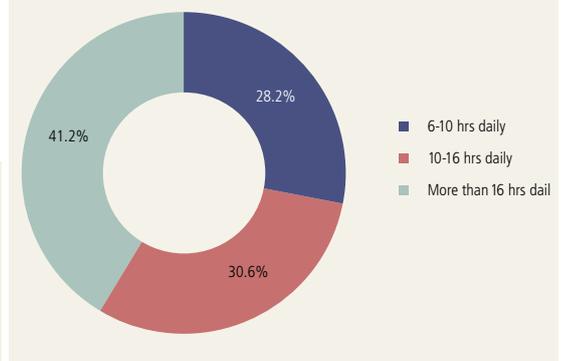
### Towers Connected to the Electricity Grid

For the telecom towers connected to electricity, 53.7% of these towers have a reliable access to the grid (the grid is reliable enough to minimize the use of back-up diesel generators). 46.3% of the towers connected to the grid have unreliable access to electricity with frequent power outages. Whereas the grid is supposed to be reliable in urban environment, most rural sites, at an estimate 95% of total sites<sup>5</sup>, are supposed to have regular power outages necessitating the use of back-up generators. These outages last for at least 4 to 6 hours per day.

Based on our questionnaire, the segmentation of unreliable sites is as below:

- 28.2% of unreliable sites have a lack of electricity for 6 to 10 hours per day.
- 30.6% of unreliable sites have a lack of electricity between 10 to 16 hours per day.
- 41.2% of unreliable sites have a lack of electricity for more than 16 hours per day.

Figure 2: Telecom Tower Unreliable Grid Connected Sites Segmentation (based on the number of hours when site is actually connected to the grid)



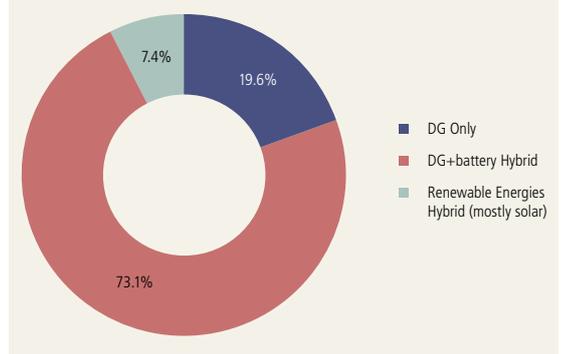
Source GSMA based on Tower Companies feedback

### Towers not Connected to the Electricity Grid

With an electrification rate close to 65% in 2010, almost 18% of the total telecom towers are not connected to the electricity grid. This represents 70,000 telecom towers across India. In terms of segmentation:

- 19.6% of the off grid sites operate on Diesel generators only.
- 73.1% of off grid sites operates on a combination of diesel generators and batteries (considering DG is not running more than 16 hours per day).
- 7.4% of off grid sites operate on renewable hybrid systems, almost exclusively on solar hybrid set ups (CAPEX and OPEX models).

Figure 3: Off Grid Telecom Tower Segmentation Based on Power Source in 2010



Source GSMA based on Tower Companies feedback

<sup>5</sup> Based on Tower companies feedback

### Tenancy Ratio

The tenancy ratio (TR) of telecom towers is highly dependent on the location of the towers. Feedbacks indicate current tenancy ratios range from 1.5 to 2.6. Average TR was estimated to 1.6 at the end of 2010. With a clear move from mobile operators to reduce operating costs and mutualize assets, tenancy ratio is bound to increase in the next years, from around 1.6 to 2.1 by 2015.

### Telecom Tower Market Value

We estimated the potential market value for energy outsourcing, and therefore the potential market for ESCOs, based on the evolution of diesel price and the Power Purchase Agreement (PPA) Rate that would offer ESCOs to tower companies to manage the energy supply. This PPA rate would be fixed by ESCO based on the number of sites a tower company is willing to outsource and the risky situation of a site. Indeed the ESCO is offering a turnkey service, from the supply of the energy to the BTS but also all services including maintenance and security of the power source; some sites might require an increased security, also increasing the PPA rate the ESCO would offer. ESCO feedback suggests this could represent a 20% increase in the PPA rate per kWh.

Based on feedbacks, telecom tower companies would be willing to consider outsourcing the energy component of their infrastructure for a Power Purchase Agreement rate lower than US\$0.70/kWh (for a diesel litre of US\$1 and above). Ideally this rate would be close to US\$0.5/kWh.

In 2011, if diesel market price is US\$1 per litre and for a PPA rate of US\$ of 0.70/kWh, tower companies would be willing to outsource:

- 52.9% of their total tower number in off grid environments.
- 22% of towers with unreliable connection to the grid.
- No On Grid sites would be outsourced.

If diesel market price is US\$1.1 per litre and for a PPA rate of US\$ of 0.70/kWh, tower companies would be willing to outsource:

- 69.4% of its total tower number in off grid environments.
- 34.5% of towers with unreliable connection to the grid.
- No On Grid sites would be outsourced.

In terms of market value, inflection price is located around and below US\$0.7/kWh for diesel price of US\$1 and above per litre. Based on feedbacks:

- For a diesel price of US\$1, market potential is estimated to US\$379.6 Million.
- For a diesel price of US\$1.1, market potential is estimated to US\$523.7 Million.

Figure 4: Energy Outsourcing Market Value in 2011 (in US\$)



Source GSMA based on Tower Companies feedback

The methodology used for this calculation is based on the feedback from tower operators on the percentage of their sites they would be willing to outsource, based on the segmentation of their sites (off grid, unreliable and on grid), considering the PPA rate per kWh an ESCO would offer and the current price of a litre of diesel. The PPA rate per kWh range was established based on feedbacks by tower companies and ESCOs. The diesel price range is based on current price variations. The percentage of sites is then extrapolated to the total number of sites in India.

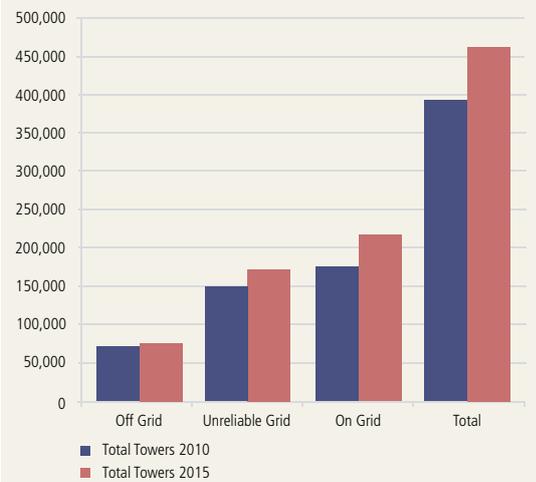
### Payback Period and IRR

In terms of financial viability, for the OPEX model, the payback period ESCO should look at would be 3-4 years with a 20-25% Internal Rate of Return (IRR) on their investments. Overall, the feedbacks collected from the telecom tower companies indicate they would be more interested in the perspectives of the OPEX model (fixed rate), where the power part at the tower sites is outsourced to the ESCO.

### Forecast Telecom Tower Market in 2015

By 2015, GSMA estimates that the total number of tower will increase over 460,000, a 19% increase from 2011. The growth of telecom towers is conservative as, based on feedbacks, the number of off grid sites would grow less than 5% compared to 2011. Main growth will come from on grid and unreliably grid connected sites (>20%) built up by the need to increase 3G coverage and extension of urban and semi urban GSM coverage.

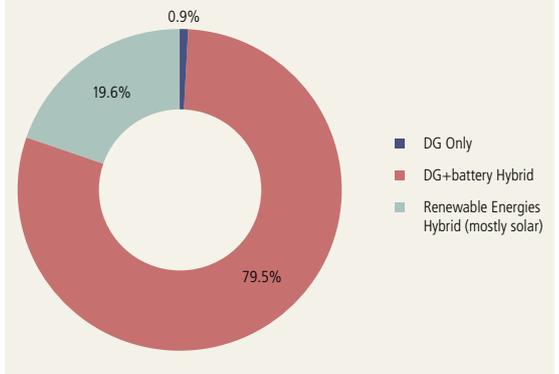
Figure 5: Telecom Tower Growth 2011-2015



The number of off grid sites would grow by 2% to reach around 71,500 sites across India. In terms of segmentation:

- 0.9% of all sites would operate on Diesel generator only – The number of pure diesel generator source is rapidly decreasing due to the conversion to diesel battery hybrid source.
- 79.5% on diesel generator and batteries as back-up.
- 19.6% on renewable energies hybrid – mostly solar hybrid and OPEX model.

Figure 6: Off Grid Telecom Tower Segmentation Based on Power Source in 2015

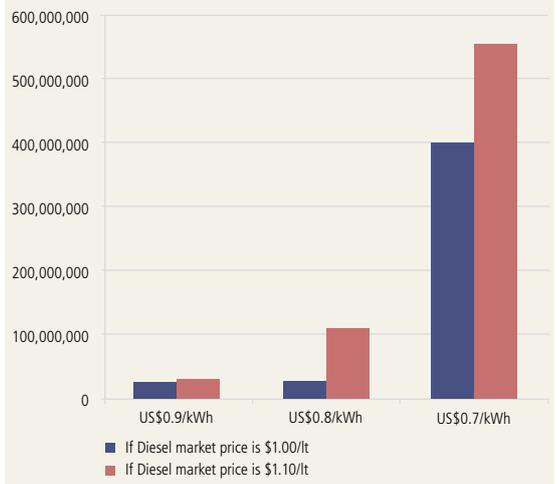


Source GSMA based on Tower Companies feedback

In terms of yearly market value, based on feedbacks for a PPA rate of US\$0.70/kWh:

- For a diesel price of US\$1, market potential is estimated to US\$407 Million.
- For a diesel price of US\$1.1, market potential is estimated to US\$563.5 Million.

Figure 7: Energy Outsourcing Market Value in 2015 (in US\$)



Source GSMA based on Tower Companies feedback

## Conclusion

The Energy Outsourcing Market for the Indian Telecom Towers represents an interesting opportunity for Energy Service Companies. Valued at more than US\$500 Million in 2011 (with high diesel price and Power Purchase Agreement rate equal or below US\$0.70/kWh), the financial equation makes sense for tower companies willing to outsource the energy component at their sites. These tower companies mentioned their interest in the OPEX model, where the ESCO invests in the power generator (for new sites) and sells back the power under a PPA to the tower company. For investors, the payback and IRR financial indicators (communicated by tower companies) would have to be further investigated, but show for the time being these investments would be profitable in a few years. The biggest challenge for this market will be to reach a critical number of sites tower companies would be willing to outsource, so that ESCOs could offer a low enough PPA rate.



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