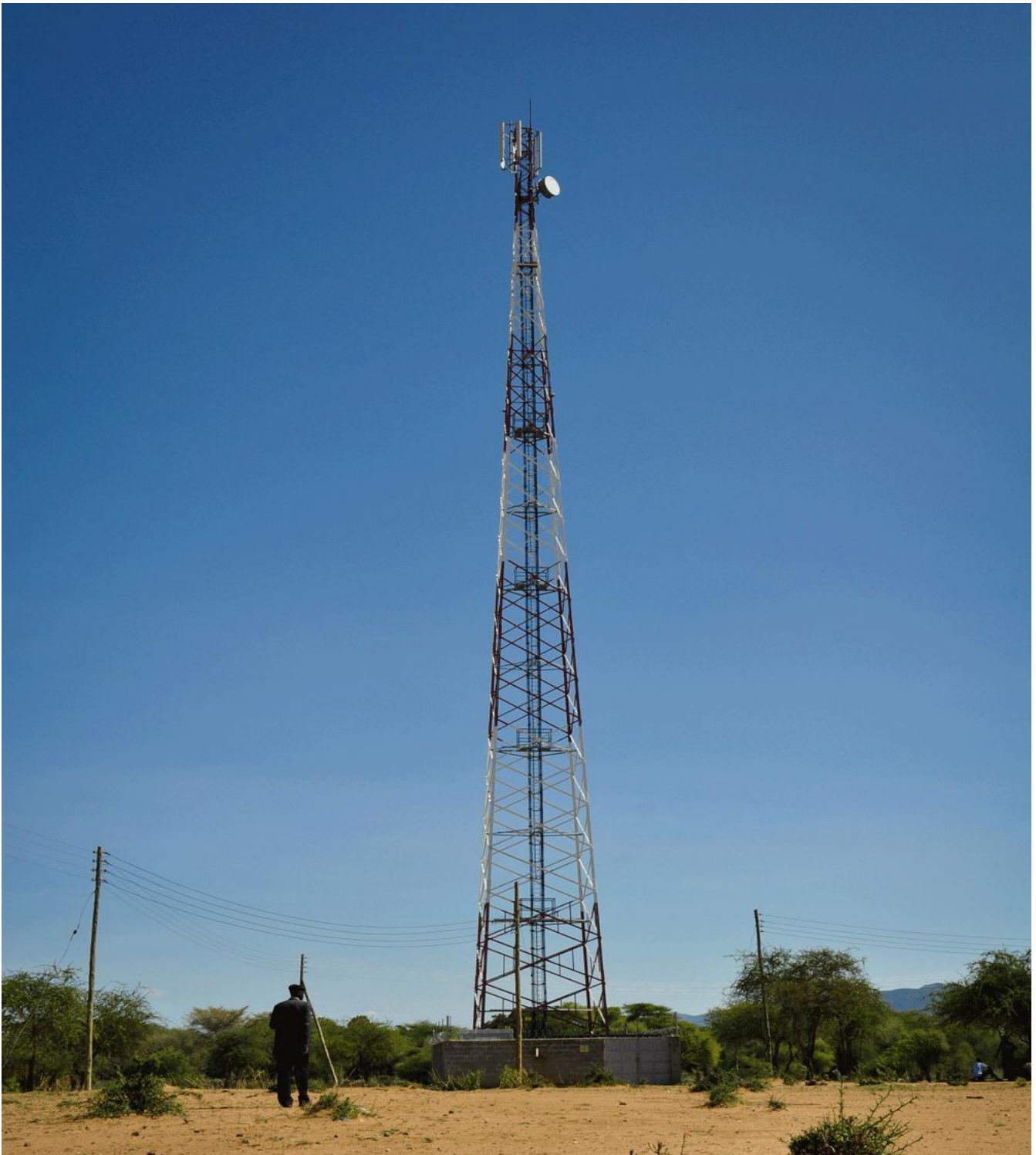


Procurement Model Analysis: CAPEX vs OPEX



Contents

1. Executive summary.....	p3
2. What are the different procurement models:.....	p3
i. Illustration of CAPEX model.....	p4
ii. Illustration of OPEX model.....	p5
3. Comparative analysis of the Models.....	p6
i. Financial analysis.....	p6
ii. Operational analysis.....	p6
iii. Strategic analysis.....	p6
4. Procurement model that operators prefer to follow.....	p7
5. Conclusion.....	p8

Figures

- Figure 1:** Financial analysis between 1kW & 2kW model
Figure 2: Year by year comparison of different model for 2kW load
Figure 3: ESCO model evolution
Figure 4: Telecom tower grid access segmentation

Glossary

- CAPEX:** Capital Expenditure
OPEX: Operational Expenditure
MNO: Mobile network Operators
IP: Infrastructure provider (or Tower Company)
DG: Diesel Generator
kW: Kilo Watt
kWh: Kilo Watt Hour
ESCO: Energy Service Company
IRR: Internal Return Rate,
NPV: Net Present Value
GHG: Green House Gas
SLA: Service Level Agreement
PNG: Pressurised Natural Gas
CNG: Compressed Natural Gas

Executive summary:

This document presents a comparative analysis of an in house CAPEX based and outsourced OPEX based renewable energy model. The Green Power for Mobile procurement model analysis is based on current intelligence of the Indian telecom market.

The GSMA Development Fund launched the Green Power for Mobile (GPM) Programme in September 2008 to 'extend mobile beyond the grid' through the promotion of renewable energy technologies. The programme is supported by the International Finance Corporation (IFC).

Telecom has become one of the largest service industries in India with a promise of keeping people connected. However, in many occasions, this essential service becomes very difficult to deliver for mobile operators due to energy unavailability. Despite these hurdles, the industry finds a way to deliver its service often embracing environment unfriendly, very expensive diesel based solutions, or invests expensive CAPEX for alternative power sources.

The telecom industry has great concerns over the environment and therefore has been looking to identify alternative power sources that fit the requirements of the industry. Thus far, the two ways alternative power sources can be delivered are through a self-invested CAPEX model or through an outsourced 3rd party invested OPEX model.

This document aims to analyse both the CAPEX and OPEX models to help the reader identify the most appropriate procurement model for their situation.



Different procurement models

Green power sourcing for telecoms was earlier limited to CAPEX procurement models only. In the CAPEX model, operators (both MNOs and IPs will be referred to as operators) invest the full CAPEX for green power deployments and bear all risk & operational activities. At one time, it was the only model the industry followed.

More than 10,000 telecom tower sites have been installed with green power sources across the world following the CAPEX procurement model. In India, green power sourcing started getting traction from 2008. Initially, all green power sourcing was on a pilot basis and followed the CAPEX procurement model.

Later OPEX based procurement models were introduced to offload some of the initial CAPEX investment. About 2000 stand-alone green power telecom sites have been implemented with the OPEX model in India.

Investing large CAPEX in green power sourcing is usually less attractive for the Operator as they have other developmental priorities. Therefore, the conventional Diesel Generator based solution comes in very handy for them.

However, since there's a tremendous environmental impact of running DGs and the OPEX of DG operation is extremely high, the industry strives to come-up with a

model where Operator gets green energy without investing the initial CAPEX.

This is what we hereby refer to as the OPEX model; an individual energy service provider, who is expert in green power, invests CAPEX to deploy green power sources at the telecom site. The operator is then charged on a monthly basis, either on a kWh usage basis or flat fee basis.

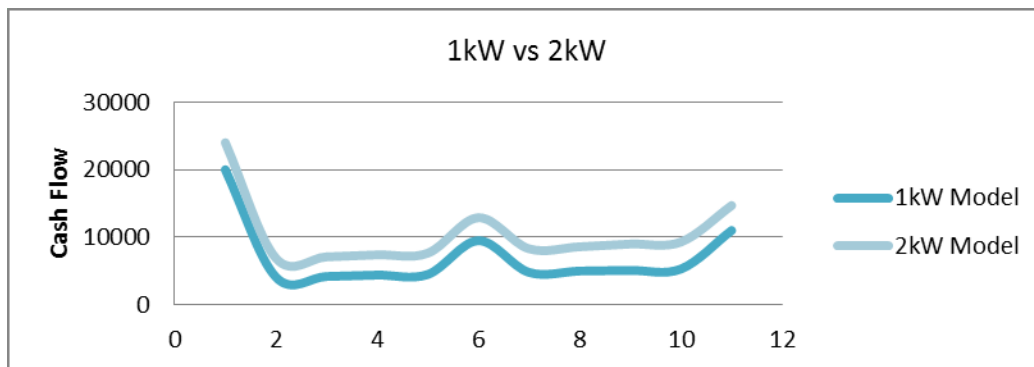
For further information on CAPEX & OPEX procurement models, please read our Best Practise Procurement guide for India.

Illustration on CAPEX Model:

With the CAPEX model, the entire investment comes from the Operator, so it is more attractive for sites with less power requirements. The higher the power requirement, the higher the CAPEX required and as a result, the business case is less attractive. For example, if we do a comparison of financial figures between 1kW and 2kW Solar-DG hybrid sites, the results are as follows (based on Indian context):

Figure 1: Financial Analysis between 1kW & 2kW model

	1kW	2kW
PayBack	1.6 yr	2.8 yr
ROI	61.1%	35.3%
IRR	64.9%	38.3%



With the CAPEX model, responsibility components come as follows:

Activity	Responsibility
Equipment purchase	Operator
Additional land acquisition (If required)	Operator
Rollout of equipment & project management	Operator
Risk related to rollout	Operator
Site maintenance & operation	Operator
Re-fuelling of DG and risk related to fuel price hike	Operator
Assurance of site up-time	Operator
Site monitoring and Security	Operator
Remote alarm and performance data collection	Operator
Risk of theft and vandalism	Operator
Payout to 3rd Party	Operator

Since green power sourcing equipment belongs to the Operator in this model, it maximises the benefit of utilising or un-utilising the equipment. Additionally, by having green assets in the Operator's balance sheet the value of their portfolio is increased. The CAPEX model is also financially more attractive than in existing diesel solution.

Moreover in the CAPEX model, the Operator bears all risks related to site operation and maintenance which in some cases are not only cost extensive but also difficult to perform well.

Illustration on OPEX Model:

In the OPEX model, a 3rd party energy service company (ESCO) invests the CAPEX and the Operator pays for the energy usage. Since the ESCOs have to make money from this model, for a 10 year business case, usually the Operator ends up paying a little higher than the renewable CAPEX model the OPEX model is still more cost effective than existing diesel based solutions. To make this model more sustainable, ESCOs should engage in a strategic partnership with Operators where they can re-use some of the operators existing infrastructure. Additionally, ESCOs can consider incorporating community based services to enhance the security of this model.

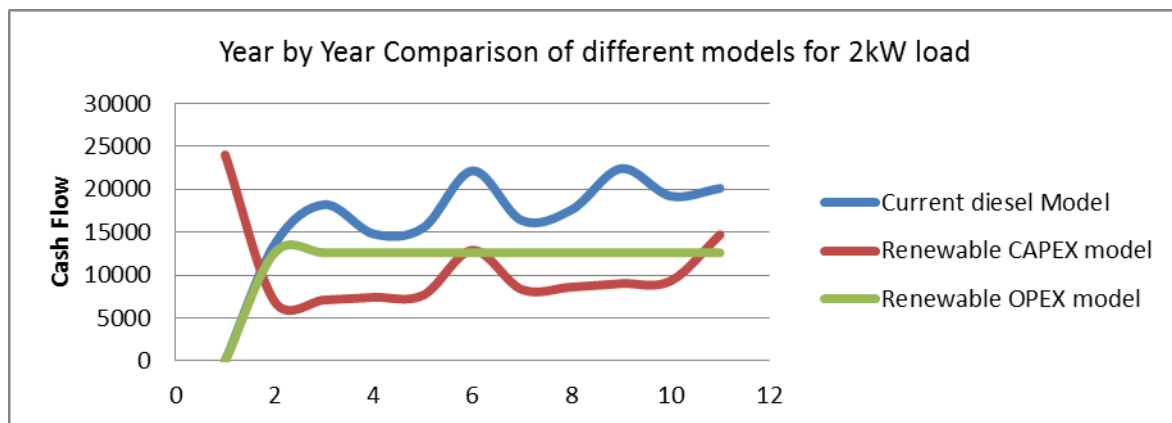
If we compare the OPEX model with the CAPEX model, the responsibility components are as follows:

Activity	CAPEX model	OPEX model
Equipment purchase	Operator	ESCO
Additional land acquisition (If required)	Operator	ESCO
Rollout of equipment & project management	Operator	ESCO
Risk related to rollout	Operator	ESCO
Site maintenance & operation	Operator	ESCO
Re-fuelling of DG and risk related to fuel price hike	Operator	ESCO
Assurance of site up-time	Operator	ESCO
Site monitoring and Security	Operator	ESCO
Remote alarm and performance data collection	Operator	ESCO
Risk of theft and vandalism	Operator	ESCO
Payout to 3rd Party	NA	Operator

Operator only makes one payment to a 3rd Party ESCO for overall site energy management and operation. The ESCO takes the lead for all other activities within the OPEX model.

To further understand the financial benefit, if the ESCO considers a 20% IRR on the same CAPEX investment for a 2kW site as described in the CAPEX model, the cost of a unit of energy will be US\$0.7/kWh. If we plot the financial figures in a graph, the cash flow comparison among current diesel based solutions, a renewable CAPEX model and a renewable OPEX model would be as follows:

Figure 2: Year by year comparison of different model for 2kW load



The graphs shows that the OPEX model cash flow is lower (cumulative 35%) than the current diesel based model and a little higher (cumulative 10%) than the CAPEX model.

The biggest benefit of the OPEX model is that operators get rid of the heavy CAPEX investment for green power deployments but still get credit for GHG emission reduction. Additionally, the last mile operational efficiency of the Operator increases as the ESCO takes the total responsibility of energy management & delivery.

Comparative Analysis of Models

Both the CAPEX and OPEX models have their pros and cons. In order to identify the right model for an operator, three areas need to be analysed across both models: Financials, Operations and Strategy.

	CAPEX Model	OPEX Model
Financial analysis	<ul style="list-style-type: none"> - 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 more attractive - For mass deployment, CAPEX investment is a barrier since it may require hundreds of millions of dollars. 	<ul style="list-style-type: none"> - 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.
Operational analysis	<ul style="list-style-type: none"> - Regular day-to-day site operation is the responsibility of the operator - All cost related to site operation is incurred by the operator - Site uptime and SLA maintenance is typically on the operator. If it fails the Operator bears all financial loss/penalty - OPEX for technical operation is low - OPEX for site operation is high. 	<ul style="list-style-type: none"> - Site operation is a responsibility for the ESCO; therefore Operator does not need to deploy resource for site operation - Operator pays only based on energy usage, a pre-agreed rate, therefore operational cost is forecast-able and comparatively lower than DG based energy cost - SLA and Uptime is the responsibility of the ESCO. If it fails, the ESCO bears the penalty.
Strategic analysis	<ul style="list-style-type: none"> - All asset of green power belongs to the operator, therefore increases portfolio & branding value of the organisation - Maximise utilisation of existing assets - Easy to cope with variable changes - Multi 3rd parties' engagement makes the model complex for operator to handle at last mile - Increase debt for organisation 	<ul style="list-style-type: none"> - Easy to control last mile performance since the ESCO is the only last mile partner - Full benefit of GHG emission reduction - Increases complexity of state management - Not so easy to cope with increased power requirement on a regular basis - Reduces the risk of unforeseen energy OPEX due to market change and consumer inflation.

Procurement model operators prefer to follow:

Both procurement models have their positives and negatives for the operator. Usually it's the operator's strategy that decides which procurement model would suit them best. The CAPEX based procurement model for green power was originally the ultimate choice however over the last few years; the OPEX based procurement model has started getting some traction. All major operators in the Indian telecom market are now in search of the right service provider who is able to provide them with an OPEX model for green power deployments.

Being a major energy consumer, the fast growing telecom market of India has always struggled with power availability. To ensure uninterrupted telecom services, operators have had to look for solutions which can ensure their demand. Diesel generators came as an ultimate choice due to its availability, ease of deployment and reduced CAPEX.

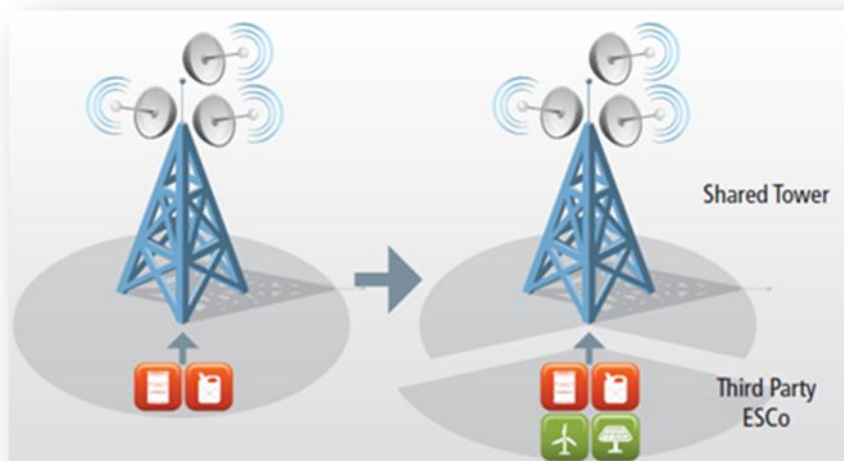
However, due to heavy OPEX and growing environmental issues, operators always looked for alternative green power solutions which can not only reduce environment risks but also could even reduce energy OPEX. Large numbers of trials have been deployed across India on various alternative power sources, such as, solar, wind, bio fuel, hydrogen fuel cell, bio mass, PNG/CNG based generator etc. It was found that last mile maintenance and optimised usage of solutions was not up-to mark.

One of the reasons for this was that operators were not energy experts. It ends with some basic questions:

1. Whether the operator should deploy thousands of sites without being experts in any of the alternative solutions
2. Which the solution is most feasible for each location
3. Whether operators will be able to put up the CAPEX from their own balance sheet

This turns into a basic need of a specialised company that can invest, generate, maintain and deliver energy, an ESCO. Since the ESCO brings all the expertise and the CAPEX investment; strategic partnership with the ESCO makes a lot of the above problems easy to solve.

Figure 3: ESCO model evolution



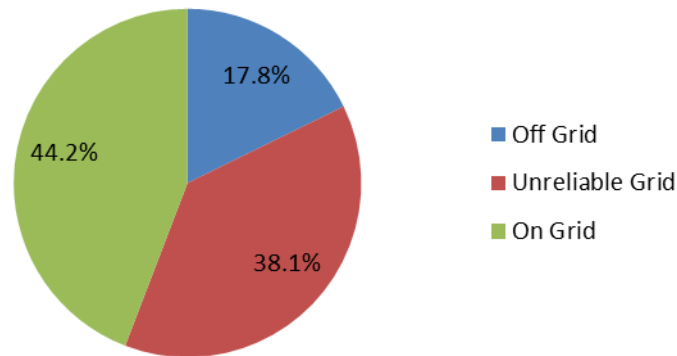
This model can bring enormous opportunity for both the ESCO and the Operator. Further details on this can be found in the Renewable Energy Market Sizing document. Having said this, OPEX based ESCO models are not as simple as described.

There are plenty of areas where both ESCO and Operators have to make some compromises in order to make this model work. The GSMA's Green Power for Mobile Best Practise Procurement Guide of India described a lot of these situations.

Conclusion:

Being the second largest telecom industry in the world, Indian telecom operators are severely lacking dependable grid power source. From a recent GSMA publication (Energy for Telecom towers: India Market Sizing and Forecasting), it was found that 17.8% of towers are off-grid, 38.1% towers are unreliable grid and 44.2% tower are on-grid connected.

Figure 4: Telecom tower grid access segmentation



No doubt, the industry is moving to alternative power sources to off-load heavy diesel OPEX for off-grid and unreliable grid sites. However, due to the massive number of sites, it does not come as an easy choice for operators to deploy green power sources with the CAPEX model.

This opens up the opportunity for the OPEX based ESCO model. The ESCO not only gets huge opportunity to grow its business, but also becomes a strategic partner for operators by managing their power requirements; a win-win for both parties. It's very much predictable that ESCOs will be the ultimate choice for operators to off-load power related activities at site and concentrate on their core telecoms business. It not only will save operators OPEX but will also significantly reduce the heavy GHG emissions on the environment.

About the GSMA Association

The GSMA represents the interests of mobile operators worldwide. Spanning 220 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organisations. The GSMA also produces industry-leading events such as the Mobile World Congress and Mobile Asia Congress.

About the Development Fund Serving the underserved through mobile

The GSMA Development Fund brings together our mobile operator members, the wider mobile industry and the development community to drive commercial mobile services for underserved people in emerging markets. We identify opportunities for social, economic impact and stimulate the development of scalable, life-enhancing mobile services.

For more information on the GSMA's Green Power for Mobile, please email greenpower@gsm.org