In partnership with the Netherlands

Best Practice Procurement Guide – East Africa

Green Power for Mobile

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Glossary:

Ah: Ampere Hour
CAPEX: Capital Expenditure
DG: Diesel Generator
ESCO: Energy Service Company
TowerCo: Tower Company
IRR: Internal Return Rate
kVA: Kilo Volt Ampere
kW: Kilo Watt
kWh: Kilo Watt Hour
MNO: Mobile Network Operators
NOC: Network Operations Center
NPV: Net Present Value
O&M: Operation and Maintenance
OPEX: Operational Expenditure
PV: Photovoltaic
RFP: Request for Proposal
ROI: Return of Investment
IRR: Internal Rate of Return
SLA: Service Level Agreement
Wp: Watt Peak

1. Introduction

The mobile telecommunications market in East Africa has grown significantly and has seen stiff competition in the sector. The operators in the region are presented with many challenges in expanding their network to cover the entire population in their respective countries. The limited reach of grid power infrastructure and dwindling power generation capacities has put a tremendous pressure on the operations and impacted the costs of running the network. Three countries in the East African region, Kenya, Tanzania and Uganda have recorded a subscriber base of 71 million reaching a mobile penetration level of 58% overall. However, 20% of the population across these countries is still far from access to mobile telecommunications due to lack of mobile network coverage. Over 96% of the uncovered population is rural and lack access to other modern infrastructure such as electricity and roads.

Kenya, Tanzania and Uganda combined have a total network size of 13,225 tower sites covering a population of approximately 80% across these countries. Due to the limited reach of grid power infrastructure, close to 25% of the entire network is located in off-grid areas, i.e. without access to electricity supply, and has led the MNOs and Tower Companies to rely on diesel generators to power up those off-grid network of tower sites. Even though the remaining 75% of the network is connected to grid electricity supply, more than 25% of this on-grid network of tower sites lacks the reliability and quality of grid power supply. This implies that more than 50% of the entire network in these countries is depends primarily on diesel generators to power up.

The reliance on diesel power has significantly increased the cost of running the network for MNOs and Tower Companies in the region. The poor outlook for improved grid infrastructure and electricity supply has led the MNOs and Tower Companies to consider alternative power solutions, including the green power alternatives, to reduce or minimize the dependence on diesel power in order to reduce the energy OPEX as well as cost of operations and to create a positive environmental impact by reducing the carbon footprint of the network.

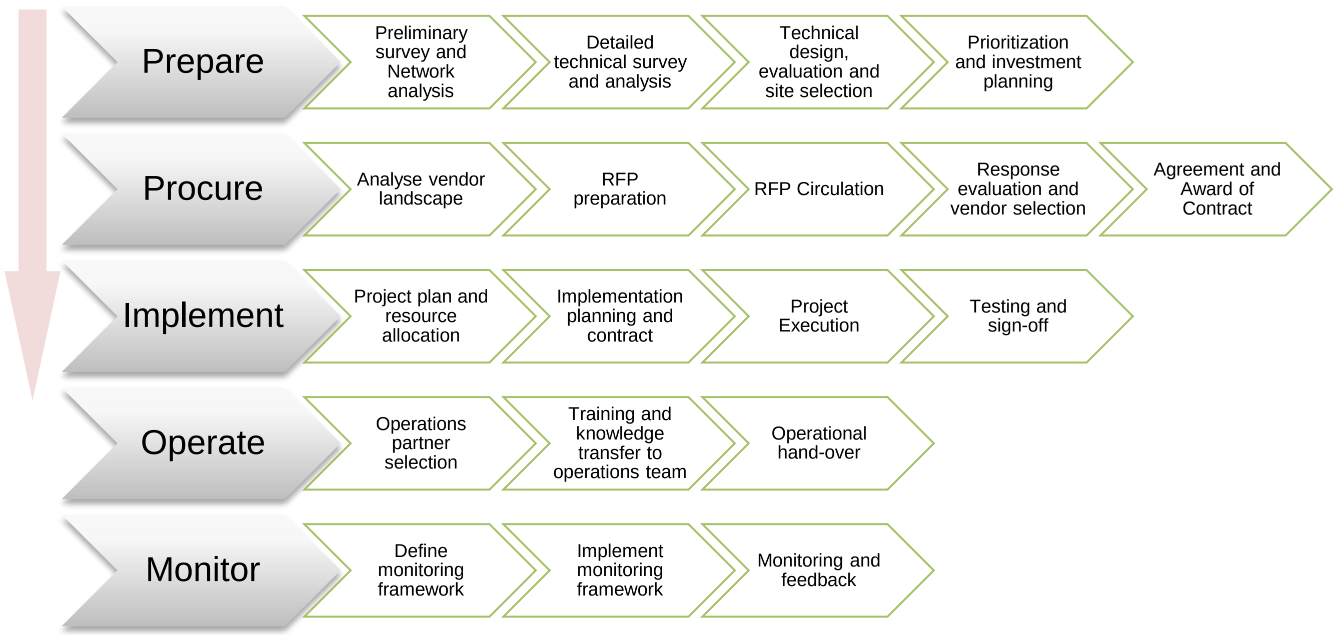
However, the adoption of green power has not reached its potential scale due to various factors including technical know-how, lack of scalable deployment practices, and capital. Despite the existent opportunity of deploying green power at more than 4,000 tower sites, only less than 4% of these potential sites are currently deployed with green power solutions.

This document aims at addressing the one key aspect of deployment – the best procurement practice, to assist the MNOs and other stakeholders in adopting the best approach to green power deployment and scaling the adoption of green power. The document also looks at different business models to address the challenge of capital required for investing in green solutions for the MNOs and Tower Companies.

2. Sustainable Procurement Process

For a successful deployment, MNOs and Tower Companies should follow systematic procurement methodology to analyse, plan and invest in green power for telecom tower sites. The below figure illustrates the critical steps involved in procuring green power for telecom tower sites.

Figure 1: Sustainable Procurement Steps



2.1. Process: Prepare

Preparation and planning are the key first step in the sustainable procurement of green power for telecom tower sites. The process involves a detailed analysis of the network, existing operations, and current powering approach in order to design and evaluate alternative power solutions including green power. The final outcome of this process is a list of feasible sites along with dimensioning of respective power solutions, and a phase-wise investment plan with implementation priorities. The detailed process and activities are presented below.

Process	Activity	Details of activity	Outcome
Prepare	Preliminary survey and Network analysis	Survey of the network and analysis to identify problematic sites with energy OPEX	Target regions/sites identified
	Detailed technical survey and analysis	Detailed technical survey to gather technical site parameters and power system - Understand the site loads - Understand the site location, layout, accessibility, operational challenges - Understand the current power system and costs associated	Design inputs - technical, operational and financial
	Technical design, evaluation and site selection	- Carry out the renewable resource analysis - Define solution design criteria - Renewable solution design based on resources, loads, design inputs - Business case analysis and Comparative evaluation of available alternative solutions with base case (existing) scenario - Select feasible sites based on business case and comparative analysis	Feasible sites, technical designs, business cases
	Prioritization and Investment planning	- Define prioritization criteria for alternative solution deployment - Prioritize sites for deployment and plan phase-wise investment required	Implementation Phases and Investment plan

2.2. Process: Procure

After a thorough preparation to understand the network and the feasibility of alternative power solutions, the next step is to prepare, initiate and complete the procurement process. The key activities of the process and their outcome are presented below.

Process	Activity	Details of activity	Outcome
Procure	Analyse the Vendor landscape	- Understand the vendor landscape for the proposed deployments	A list of suitable vendors
	RFP Preparation	- Define RFP scope - Define general requirements - Define technical and performance requirements - Define scope of work, deliverables and timelines - Define response schedule and guidelines - Define evaluation criteria for responses including technical and financial	Detailed RFP document
	RFP Circulation	Circulate the RFP amongst the vendors seeking their response as per the guidelines in the RFP document	-
	Response Evaluation and Vendor Selection	- Evaluate responses based on the criteria - Initiate vendor discussions - Select vendors based on evaluation and discussions	Selected vendor(s)
	Agreement and Award of Contract	- Define scope of the contract - Define conditions of the contract - Define service level agreements - Award of contract	Contract Signed with Vendor(s)

2.3. Process: Implement

The next step, after signing the procurement contract, is to implement. The implementation process is the most crucial process and involves various activities including resource allocation, implementation planning, execution and monitoring of the project. The MNO or Tower Company might also have to go through an additional step of implementation partner selection, depending on whether the implementation phase is included in the scope of the procurement contract signed with the supply vendors. The various activities and their details are presented below.

Process	Activity	Details of activity	Outcome
Implement	Project planning	A detailed project plan with resource requirements need to be prepared	- Project plan - Resource allocation
	Implementation planning and contract	- Select an implementation partner (if not in the scope of procurement contract with vendors) - Sign implementation contract - Prepare a detailed implementation plan with timelines	- Implementation plan with timelines
	Project Execution	- Site access and handover - Design, construct and deploy power system	Power system deployed
	Project monitoring	- Monitor the execution of the project by regular status check and review of progress	-
	Test and Sign-off	- Test and sign-off project execution as per the agreement and contract	Power system live

2.4. Operations and Monitoring

Throughout the procurement process, the MNO or Tower Company needs to plan and implement operational and monitoring the framework in order to successfully operate and monitor the deployed power solution. The key aspects of the operations and monitoring activities that need to be taken care of during the procurement process are presented below.

	Activity	Details of activity	Process involved	Outcome
Operations and Monitoring	Operations partner selection	Selection of an operations partner to operate and maintain the power system	Procure	Reliable Operations Partner
	Capacity building	Training and Knowledge transfer to the operations team	Procure, Implement	Trained Operations Team
	Define Monitoring framework	Define the key elements to monitor Define the performance metrics Define feedback and corrections plan	Procure, Implement	Monitoring Framework
	Implement Monitoring framework	Implement the monitoring framework as per the defined terms	Implement	-
	Operational hand-over and Monitoring	Hand over the power system for operations, maintenance and monitoring activities	Implement	-

3. Procurement Models

The procurement approach and process flow depends on the business model adopted by the MNO/Tower Company for green power deployment. There are two different procurement models prevalent in the telecom industry for deploying green power solutions:

1. In-house or CAPEX Model

2. Outsourcing or OPEX Model

The suitability and adoption of each model for green power deployment depends on the operating environment and availability of resources for an MNO/Tower Company.

In the in-house CAPEX model, the ownership and responsibility of procurement lies with the MNO/Tower Company whereas in the OPEX or outsourcing model, the ownership and responsibility of procurement and power supply lies with a 3rd party energy service provider/company (ESCO).

The difference between the two models can be understood from the below illustration.

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
Pay-out to 3rd Party	NA	Operator

3.1. In-house CAPEX model

The CAPEX model is the most preferred and traditional green power deployment model for telecoms in the East African region. By adopting the CAPEX model, the MNO/Tower Company has flexibility and control over design and deployment of green power solution thereby maximizing the OPEX savings and return on investment. However, the overall risk of investment including deployment, operations and security risks fall on the MNO/Tower Company. Also, the scalability of this model depends on the available funding resources within the MNO/Tower Company.

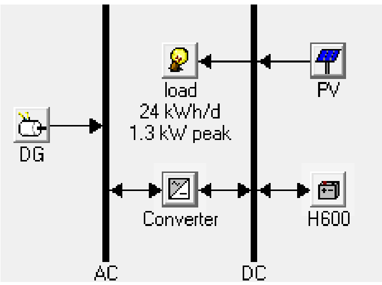
3.1.1. Sample CAPEX Model

A sample Solar-DG hybrid solution is considered to demonstrate the green power design and business case for CAPEX model.

Consider an existing off-grid site with a DC load of 1 kW and running on 10 KVA DG for 16 hours a day. Other key commercial parameters for the design are assumed as below.

- Diesel price (delivered): 1.5 US$/Ltr
- DG fuel consumption: 2 L/hr
- PV Solar cost: 400 US$ for 250W panel

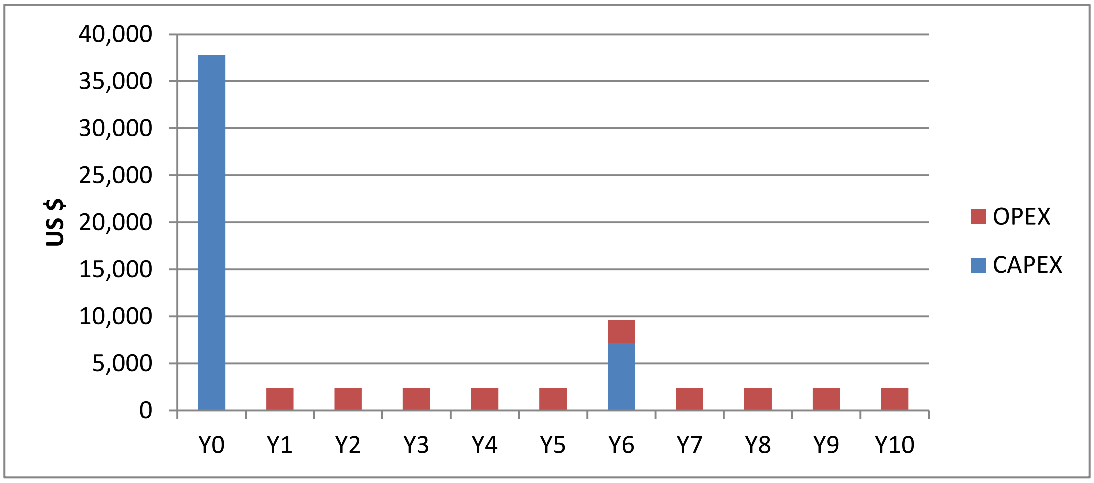
Figure 2: Homer Design Model



	PV (kW)	DG (kW)	H600	Conv. (kW)	Initial Capital	Operating Cost ($/yr)	Total NPC	COE ($/kWh)	Ren. Frac.	Diesel (L)	DG (hrs)
	5.50	10	24	6	$ 38,200	523	$ 40,823	0.932	0.79	523	392

The Homer design model suggests a solar solution of 5.5 kW with 600 Ah battery, 6 kW converter and existing diesel generator. The CAPEX investment schedule and OPEX schedule for the above solution is presented below.

Figure 3: Sample Investment schedule for CAPEX Model



The year-on-year net cash flow for the sample design is presented below along with the OPEX savings achieved in comparison to the base case of diesel based power solution.

Figure 4: Cash flow Comparison and OPEX savings

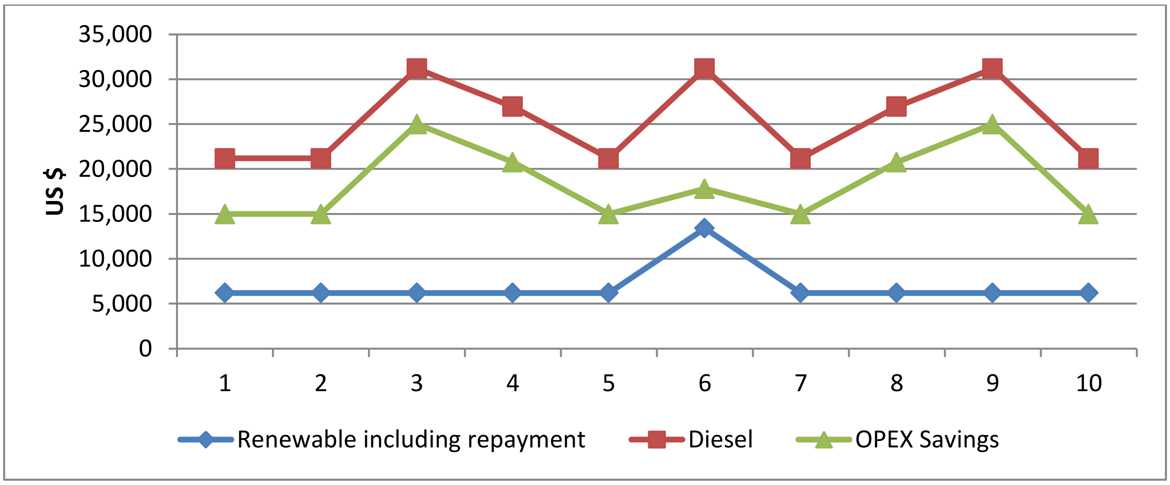


Figure 5: Financial Summary of the sample design

Payback period (years)	1.70
ROI	59%
IRR	57%
NPV	$51,215
Discount Rate	18.0%

3.1.2. Procurement Process Flow: CAPEX Model

The procurement process flow for the CAPEX model's key activities is illustrated below.

Figure 6: Process Flow: CAPEX Model

Process	MNO/TowerCo	Vendor	Remarks
Prepare	Technical Survey and Analysis Design, Evaluation and Site selection Prioritization and Investment planning		The technical survey could be carried out in coordination with the vendors or operational partners. A technical green power feasibility study by a 3rd party consultant would be advised to come up with the output.
Procure	Analyse Vendor landscape, Prepare and Circulate RFP Response Evaluation & Vendor selection Agreement and Award of Contract	Analyse RFP and Respond to RFP	The MNO/TowerCo needs to analyse the vendor landscape and identify relevant vendors to participate in the RFP process. The Vendor need to understand and clarify the terms in the RFP and provide a response as per the guidelines. The MNO/TowerCo will evaluate the responses and carry out vendor discussions to identify and select suitable vendor partners. Both parties agree to the terms and scope of the project and sign the contract.
Implement	Project Planning and Implementation planning Test and Sign-off	Project Execution	The MNO need to allocate project resources and both Vendors and MNOs need to agree on an implementation plan with time lines. Project Execution by Vendor as per the agreement. Test the deployed system including the monitoring framework and sign off.
Operations	Operational Partner Selection	Training and Capacity Building	The MNO needs to select an O&M partner and the Vendor needs to train the O&M team.
Monitor & Feedback	Define a monitoring framework Monitor & Control operations	Implement the monitoring framework along with the power system Operational Handover	MNO defines a monitoring framework and includes in the project scope in RFP phase. Vendor implements the monitoring framework as part of the power system. Monitor and Control by MNO

For a successful deployment of green power based on the CAPEX model, the MNO/TowerCo needs to carefully plan each step and make sure not to miss any important technical and contractual aspects of the procurement. The critical elements of each step are explained in the following sections.

I. Prepare

In the preparation phase, the MNO/TowerCo needs to comprehensively analyse the network and understand the associated OPEX of running each site in the network in order to validate the alternative options for powering the network. The MNO/TowerCo needs to undertake the following broad activities to assist in setting realistic goals for the green strategy.

- Analyse network power requirements and the cost of powering to provide inputs for design and business case analysis
- Analyse and validate the availability of renewable resources to assist in solution design
- Look into energy efficiency to optimize site energy requirement
- Design and optimize the renewable power solution
- Analyse the sites for Grid Extension possibilities and the costs associated
- Analyse and Compare the renewable solutions' cash flow with existing power solution and other possible choices such as the Grid Extension scenario

It is essential to carry out the above activities in order to get clear understanding of the possible alternatives and associated business cases. This will provide clear strategic inputs for drafting a green investment plan and allocating resources. The result of this phase will provide clear directions for the next phase of procurement.

II. Procure

In the procurement phase, the operator needs to clearly draft the requirements based on the output in the preparation phase and provide a precise scope for procurement and implementation. The key elements to cover in the procurement phase are as below.

<u>RFP preparation</u>

- The RFP should define the scope of the project and expected deliverables:
    - Supply scope
    - Implementation scope
    - Services scope
- The RFP should clearly mention the project timelines
- The RFP should provide detailed technical requirements and should cover all the technical and performance related expectations
- The RFP should outline the compliance guidelines including technical compliance of equipment and materials in the supply scope, and general compliance related to financial strength and experience
- The RFP should outline the evaluation approach and key aspects of the evaluation metrics
- The RFP should provide guidelines on preparing and submitting the response to the RFP
- The RFP should provide the responsibility matrix and escalation matrix in line with the project's scope

Sample of Responsibility Matrix

No	Activity	Purchaser	Supplier
1	RFP Distribution	R	
2	Technical Survey/Clarifications	S	R
3	RFP Response Submission		R
4	Supplier Selection	R	
5	Contract Finalization	R	S
6	Release Purchase Order	R	S
7	Installation	S	R
8	Test and Commissioning	S	R
9	Acceptance Test	A	R
10	Final Acceptance Certificate	A	R

Note: R: Responsible, S: Support and A: Approval

Vendor landscaping and RFP Circulation

- The MNO needs to understand the vendor landscape in order to invite in the RFP process
- The MNO needs to circulate the RFP with all the suitable vendors in seek response and clarifications for the RFP

Response Submission by Vendors

The vendors need to analyse and understand the scope and requirements of the RFP and prepare their response accordingly. The vendors may seek clarifications for better understanding of the technical and general requirements.

Response Evaluation and Vendor Selection

The evaluation of the responses should be done at two levels – one, the technical evaluation and two, the general vendor evaluation.

- Technical Evaluation
  - Proposed solution dimensions and its performance parameters such as DG run hours, OPEX savings, energy generation, life of equipment and warranty
  - Financial evaluation including CAPEX required, return on investment and payback period
- General vendor evaluation
  - Financial strength and technical experience of the vendor
  - Commercial terms including payment terms and delivery schedule
  - Aftersales technical support and availability of spare parts

Agreement and Award of Contract

Once the response evaluation and vendor selection is done, the MNO and Vendor need to comply with the terms and a sign contract agreement to identify the scope of the project. The agreement should clearly mention the terms of supply, implementation, and associated support services. The agreement should also provide penalty clause for deviation from the contract terms.

The MNO may separately sign an operations and maintenance contract with the managed services providers which would include various service level agreements in line with uptime requirements of the sites.

III. Implement

In the implementation phase, MNO and vendor need to agree on a project implementation schedule with clear milestones. MNO needs to allocate resources to monitor and support project execution. The implementation must focus on scope, schedule and cost to achieve a scalable project.

For the smooth execution of the project, the MNO/TowerCo needs to monitor the overall project progress and:

- A specific time line has to be agreed between both parties.
- Regular project meeting need to be conducted to track the progress.
- Site visit on regular basis has to be done to ensure deliverable.
- An acceptance test has to be done based on equipment specification, functionality and expected performance

IV. Operations and Monitoring

After successfully implementing a green deployment, the most crucial part is operations and monitoring of the deployed power solution. For guaranteed savings and expected performance, the MNO/TowerCo needs to put in place robust operational practices and a monitoring framework in order address to the challenges and mitigate the risks of theft, vandalism, and site security. The key aspects of operations and monitoring are outlined below.

- Operations and Maintenance
    - The MNO/TowerCo needs to identify and partner with a credible operations and maintenance partner for reliable operations of the deployed system.
    - An adequate training and knowledge transfer programme has to be coordinated with the equipment vendor partner to ensure capacity building for in-house and outsourced operations teams.
    - The MNO/TowerCo needs to carefully implement the operations and monitoring systems during the implementation phase.
        - An intelligent controller should be used at the site to automate the deployed power system and automatic operational feedback
        - The O&M partner should maintain a strict log-book of all their activities
        - The MNO/TowerCo needs to build robust operational processes to address some of the challenges of site security, equipment vandalism and fuel pilferage.
    - Implement Access control and Security systems
        - The MNO/TowerCo needs to implement multi-level site access protocol and set strict guidelines and processes for site access in order to ensure site security and identify breach of site access protocol
        - Set a minimum number of times the O&M partner should visit the site
        - Site security should be the responsibility of the O&M partner. The site security guard should live within the security fence 24hrs/day
        - A security supervisor should be appointed for every cluster/area whose responsibility will be supervising individual security guards
        - In the event of fuel theft/pilferage, the primary investigation should be done by the security supervisor. The security guard should be

        - replaced immediately
        - The security guard should not be provided with any keys other than the front gate
    - The MNO/TowerCo needs to set clear performance benchmarks and penalty clauses
        - A SLA for individual components (PV, Battery, DG, Controller, rectifier etc.) should be agreed upon. If any of these components are down or malfunctioning, the O&M partner should be responsible for that and penalised
- Monitoring and Control
    - The MNO/TowerCo needs to set strict monitoring and control practices to regularly monitor the performance of the site and to assist in preventive and reactive maintenance of the site operations.
    - Monitor and Control site access
        - Implement a central monitoring and control system for site access providing multilevel access based on operational requirements
    - Monitor fuel refilling
    - Monitor site performance
        - Implement site performance monitoring framework and system
        - Integrate the monitoring system with the central monitoring systems such as NOC
        - Monitor equipment level performance information to identify and address any discrepancies and mitigate operational risks
        - Plan a regular maintenance schedule based on performance and operating conditions of the equipment
        - Monitor the system's level of performance and control OPEX costs

3.2. OPEX Model or Outsourced Energy Model

The OPEX model or the energy outsourcing model in East African telecom industry is at pre-pilot stage. The operators are currently evaluating strategies to incorporate energy outsourcing in the overall network operations. The OPEX model enables the operators to reduce energy OPEX and dependence on diesel generators without having to invest the capital for the renewable energy solution. And also, outsourcing power generation will help the MNO/TowerCo eliminate the challenges associated with power management and increase the focus on core activities.

The concept of an energy service company (ESCO) has been introduced to the telecoms industry to facilitate the outsourcing model.

3.2.1. Energy Outsourcing Models

There are three different energy outsourcing models applicable in the telecom industry.

- Monthly Flat Fee Model
- Power Purchase Agreement (PPA) model
- Energy Savings Agreement (ESA) model

In the monthly flat fixed fee model, the ESCO would own, install, operate and maintain the renewable energy equipment and provide power to the operator's site for a fixed monthly cost. The MNO/TowerCo will benefit from zero CAPEX and a constant or predictable energy OPEX.

In the PPA Model, the ESCO owns, installs and maintains the renewable energy power system and sells power to the MNO/TowerCo at an agreed per kilowatt-hour (kWh) rate. The main benefits of a PPA to the MNO/TowerCo are that the payments for energy are an operating expense. The operator is only paying for the power they use and the investment of the power equipment is the responsibility of the ESCO. In this type of arrangement the MNO/TowerCo must typically commit to a minimum consumption of power or otherwise assume the risks of energy load levels.

An ESA model is where an ESCO installs the renewable energy system and operators pay based on a portion of verified energy cost "savings". The key component to the ESA model is the payment formula which will determine how much of the savings will be passed through to the operator and how much will go to the ESCO to recover the capital cost of the equipment. This formula to split the saving will sometimes change at an agreed time during the term of the contract.

I. Monthly Flat Fee Model

In the Flat Fee Model, the ESCO bears the financial risk of OPEX increases for any of the power sourcing components. For any given power requirements, the ESCO is required to provide uninterrupted power (99.95% power availability) for the entire duration of the contract. While calculating the monthly fee, the ESCO usually has an implied margin of 10% – 15% on its cost.

In addition, the ESCO has to be careful while considering all possible operating costs as some can be unpredictable (i.e. diesel fuel cost etc.). As this model precisely triggers a specific power requirement of telecom equipment, the ESCO gets the monthly fee regardless of whether or not the telecom equipment consumes the power.

For the sample off-grid site of 1kW and design model considered above in the CAPEX model illustration, the Flat Fee Model cash flow, savings and returns opportunity for both the MNO/TowerCo and the ESCO are illustrated bellow.

Figure 7: Cash flow of an ESCO in Flat Fee Model

ESCO year-on-year cash outflow/investment											
	0	1	2	3	4	5	6	7	8	9	10
ESCO Cash (out)flow	9,630	7,757	7,814	7,874	7,937	15,203	8,072	8,145	8,221	8,301	15,585

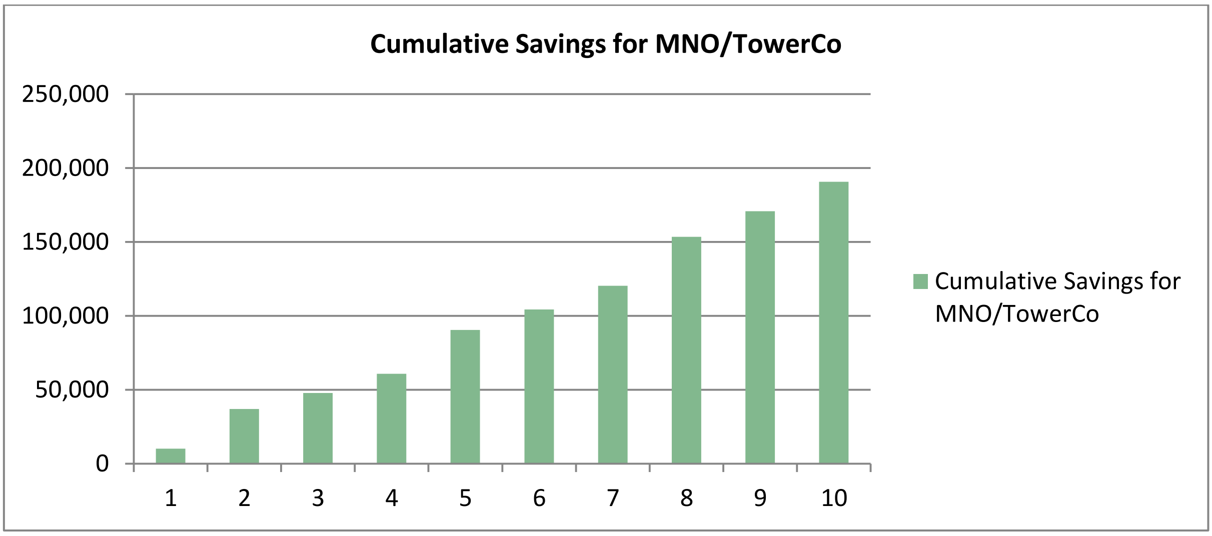
Estimated monthly flat fee payable by MNO to ESCO will be,	
Implied Margin	15%
Annual Fee	12,022
Monthly	1,002

Figure 8: Cash flow of an MNO in Flat Fee Model

MNO year-on-year cash pay-out/OPEX										
	1	2	3	4	5	6	7	8	9	10
MNO Cash (out)flow	12,022	12,022	12,022	12,022	12,022	12,022	12,022	12,022	12,022	12,022

Cumulative savings for the MNO by adopting Flat Fee Model, compared to the diesel based power scenario

Figure 9: Cumulative Savings for an MNO in Flat Fee Model



Note: All the above figure are in US $.

Financial Summary for an ESCO in the Flat Fee Model	
Payback to ESCO	**2.23 years**
RoI to ESCO	**44.7%**
IRR	**32.8%**
NPV	**$11,874**
Discount Rate	**18%**

II. Power Purchase Agreement (PPA) Model

The PPA is a more complicated model. In this model, the MNO/TowerCo pays for power on a per kWh basis for the exact usage of energy. The rate for per kWh may become more difficult to calculate as the market scenario may change over the 10 years of the business case. The key to implementing this model successfully is aligning the per-kWh price-expectations of MNO with the rate an ESCO is able to provide. It should be remembered that the per-kWh rate may not be as competitive as commercial power as it's a distributed renewable energy model. Also, due to the distributed nature, the O&M and last mile operation becomes quite costly to maintain the required uptime demanded by the telecoms industry.

For illustration of the PPA model, consider the same example above keeping the year-on-year ESCO cash outflow as per the above.

Considering a 10% on top of the site load, the yearly power requirement for an MNO/TowerCo would be as below.

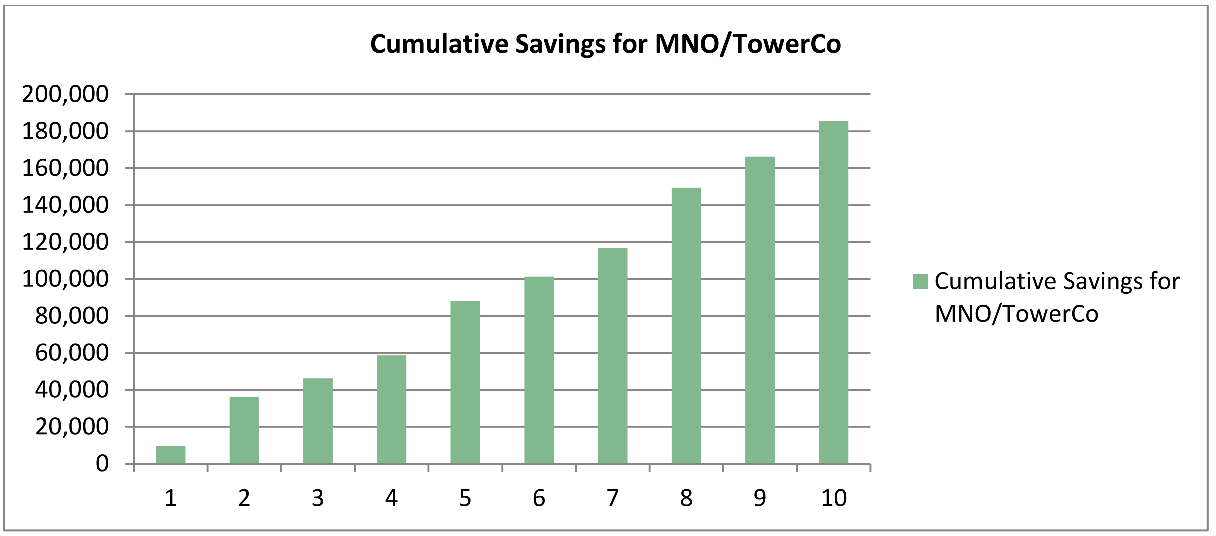
Annual Power requirement of MNO/TowerCo	9,636 kWh

For an expected IRR of 20%, the PPA rate would $1.3 per kWh.

Figure 10: Cash flow of an MNO in PPA Model

MNO year-on-year cash pay-out/OPEX										
	1	2	3	4	5	6	7	8	9	10
MNO Cash (out)flow	12,527	12,527	12,527	12,527	12,527	12,527	12,527	12,527	12,527	12,527

Figure 11: Cumulative Savings for an MNO in PPA Model



Financial Summary for an ESCO in the Flat Fee Model	
Payback to ESCO	**2.16 years**
RoI to ESCO	**46.3%**
IRR	**39.9%**
NPV	**$15,997**
Discount Rate	**18%**

In the PPA model, the kWh rate and associated cash flow may be different depending on the load and power requirement of a site.

III. Energy Savings Agreement (ESA) Model

In this model, a 3rd Party ESCO invests CAPEX for renewable energy solution implementation. After the implementation, the ESCO measures how much energy OPEX has been reduced by introducing renewable energy. The difference between the earlier OPEX and current OPEX is calculated to determine the gross savings. The ESCO will receive a percentage of the OPEX savings value from the IP/MNO.

Some of the difficulties of this model are:

It is challenging to identify actual OPEX savings. In order to do this, an ESCO must observe the current diesel based OPEX, and then observe the OPEX for renewable

Sometimes unavailability of the current energy OPEX can lead to delays in deployment as progression cannot be made until the ESCO has examined the current energy OPEX

If the energy requirement at the site increases, it becomes very difficult for the ESCO to measure the OPEX saving

Figure 12: Cash flow comparison and OPEX Savings in ESA model

	1	2	3	4	5	6	7	8	9	10
Renewable (incl. repayment)	6,192	6,192	6,192	6,192	6,192	13,392	6,192	6,192	6,192	6,192
Diesel Scenario	21,182	21,182	31,182	26,942	21,182	31,182	21,182	26,942	31,182	21,182
OPEX Savings	14,990	14,990	24,990	20,750	14,990	17,790	14,990	20,750	24,990	14,990

In the ESA model, the OPEX savings realized above are proposed to be shared amongst the ESCO and MNO/TowerCo on mutually agreed sharing structure. The year-on-year ESCO revenues in this model for 50% share in OPEX savings is presented below.

Figure 13: Year-on-year ESCO revenue in ESA model

ESCO year-on-year revenue in ESA model										
	1	2	3	4	5	6	7	8	9	10
ESCO revenue	7,495	7,495	12,495	10,375	7,495	8,895	7,495	10,375	12,495	7,495

3.2.2. Energy Outsourcing Models - Summary

The suitability and adoption of a particular energy outsourcing model depends on various factors including the complexity associated with the model, the expected differential change in current operating approaches, and the familiarity of the MNO/TowerCos about each of these models.

The below figure illustrates the overall ranking in terms of preference to each of these models.

Figure 14: Preference-wise ranking of outsourcing models

	Complexity	Expected Differential Change in Operations	Overall preference
Flat Fee Model	Low	Low	High
PPA model	Medium	Medium	Medium
ESA model	High	Medium	Low

3.2.3. Procurement Process Flow: Energy Outsourcing/OPEX model

The procurement process flow and the details of activities in each process step is presented in the figure below.

Figure 15: Process Flow: Energy Outsourcing/OPEX model

Process	MNO/TowerCo	ESCO	Remarks
Prepare	Network analysis to identify sites for ESCO model → Analyse and draft power requirements and expectations		The MNO/TowerCo need to identify sites or regions for energy outsourcing and come up with technical and energy requirements for the network and the expected target price/costs or target savings.
Procure	Select an outsourcing model and Prepare RFP → Analyse ESCO landscape and Circulate RFP → Evaluation & ESCO Partner selection → Agreement and Award of Contract	Analyse RFP and Respond to RFP	The MNO/TowerCo needs to select an energy outsourcing model based on the cost-benefit analysis and define an RFP around the selected model. The MNO/TowerCo then circulates the RFP amongst the available ESCOs. The ESCO needs to understand scope and terms of the RFP and prepare and submit their proposal. The MNO/TowerCo evaluates the proposals and selects an energy outsourcing partner and signs an energy outsourcing contract with the ESCO.
Implement	Project Planning and Phase-wise implementation plan	Technical Survey, validation and power system dimensioning → Project execution → Test and Live	Both parties need to define and agree to a project plan with timelines for phased implementation. The ESCO needs to carry out detailed technical survey to understand the power requirements and dimension the power systems based on current and expected power requirements. TheESCO will execute the project, test and start supplying power to the sites on the agreed business model.

Key elements to consider for the success of energy outsourcing model are:

For an MNO,

- Understanding of the current and future energy needs of the network
- Right business model selection based on cost-benefit analysis, operating context and readiness of eco-system
- Choosing the right ESCO partner for energy outsourcing based on
  - Background and Financial strength
  - Operational experience

    - Technical strengths and technology innovations
    - Operating procedures and approach
    - Human resources and partners
- RFP Definition
    - Define clear scope of the project including the deployment size
    - Define power requirements and technical requirements from an ESCO
    - Define expectations from an ESCO including financial, organizational and operational strengths
    - Define clear responsibilities, commercial terms, SLAs and penalty clauses

For an ESCO,

- Set up robust operational processes to operate and maintain the energy systems.
- Implement site automation for operational control
- Deploy professional security services to protect and secure the assets and control vandalism and fuel theft at the site
- Perform scheduled and preventive maintenance of equipment and power system for strict adherence to the uptime and power supply SLAs
- Deploy robust monitoring system for performance monitoring and operations control

For both parties,

- Agree on a win-win business model
- Agree and sign a win-win contract with
    - Suitable contract tenure
    - Minimum power usage for PPA model
    - SLAs and Penalty clause
    - Penalty relaxation cause and relaxation items
    - Asset ownership clause
- Clearly define commercial and operational terms in the contract
- Clearly define asset ownership, exit clause and asset transfer guidelines
- Set Performance SLAs and Penalty clause for covering any uptime losses
- Minimum operating resources from ESCO to mitigate operational failures which will affect MNO revenues

4. Conclusion

The MNOs and Tower Companies in East Africa are faced with various challenges in adopting green approach for powering telecom infrastructure. The CAPEX required for deploying green power is one of the biggest challenges hindering the adoption in the industry. Despite a huge OPEX savings potential, the green power deployments are yet to reach the possible scale of adoption. Innovations in the energy provision business models, such as the outsourced energy model, are expected to address these challenges while providing the MNOs and Tower Companies with OPEX savings. However, the adoption of these new business models in energy provision to the telecom infrastructure is yet to be established and require collaboration across industry stakeholders in driving its adoption.

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