



Terms of Reference for the Power Market Study in Kenya

August, 2019

1.0 Introduction

1. The Government of Kenya (GoK) has received a loan from the International Development Assistance (IDA), towards financing the Kenya Electricity Modernization Project (KEMP) whose main development objectives are: (a) increase access to electricity; (b) to improve reliability of electricity services; and (c) to strengthen Kenya Power and Lighting Company (KPLC) financial situation. The GoK intends to apply a portion of the proceeds of this loan to hire a consultant to undertake a comprehensive study on the Power Market for the Electricity Sub Sector in Kenya. The study is intended to examine issues related to development of the power market in Kenya and prepare the sector for both local and regional market participation.
2. The installed generation capacity in the country has increased over time to meet the growing demand. The power sector has grown from a vertically integrated utility to the unbundling of generation from transmission and distribution. Subsequently, a purely electricity transmission company, the Kenya Electricity Transmission Company (KETRACO) Limited was established. Kenya now has a new constitution that was promulgated in the year 2010 and the country is in the process of harmonizing the energy law with the new constitutional dispensation. The Energy Act, 2019 which provides for the introduction of open access in the power sector commenced in March, 2019.

The Ministry of Energy (MOE) commissioned a study in 2012 on “Options for the Development of a Power Market in Kenya” by CPCS Consultants. The general conclusion of the report was that the conditions necessary for genuine competition in the sub-sector did not yet exist at the time. It noted that there was insufficient generation, with over-reliance on hydro resources; inflexible long-term Power Purchase Agreements with private sector generators leading to insufficient un-contracted generation; the presence of a dominant generator; and the ownership of transmission assets dominated by one player (KPLC) with 90% of the ownership. The report recommended that a move to a competitive market in Kenya could be achieved in the medium to the

long-term through a phased transition approach. Since then, much has changed and considerable progress has been made within the electricity sub-sector following devolvement of functions through development of County Governments taking root, more diversification of sources of generation with more geothermal, solar and wind plants coming on stream. Expansion of the transmission system by KETRACO has increased its proportion of ownership of assets to become a key player in the sector. Increased programs aimed towards universal access of electricity were initiated and the Energy Act, 2019 is now in force.

2.0 Background

3. The energy sector remains a key driver for sustainable development. In Kenya, the Vision 2030 has identified energy as one of the enablers in powering the Vision. The sector has been given a central role in transforming the economy into an industrial middle-income country by 2030. Accordingly, the Government has continued to invest heavily in power generation expansion, as well as putting in place adequate system support infrastructure including a comprehensive transmission and distribution network to ensure power adequacy, reliability and accessibility. Reduction in costs of renewable energy technologies such as Solar PV and Wind has created a new growth impetus and demand for own power generation. Considerable number of manufacturing and service industries have installed own power generation plants in order to create efficiency in their operations and cut down on costs of energy in their production and service provision.
4. Power demand in the country is rising significantly over time especially due to the accelerated programmes in productive investment as well as domestic consumer connections. Currently there exist critical programmes for connecting domestic consumers such as the Last Mile connection and the slum electrification project under the World Bank Global Partnership Output Based Aid. The objective of these programmes was to achieve 70% connectivity in the country by 2017 and universal connectivity by 2022. In addition, Kenya Power launched the 'Boresha Umeme Programme' to improve the quality of power supply to its large

power and domestic customers within Industrial Area, Nairobi. The programme has been extended to other counties. In December, 2018 the GoK launched Kenya National Electrification Strategy (KNES) in partnership with World Bank, which will back Kenya in boosting growth, through environmentally sustainable energy solutions. Alongside the KNES launch, the government also launched The Electricity Sector Investment Prospectus which presents the investment opportunities in the energy sector over the next 5 years valued at about \$14.8 billion. The Prospectus will help investors and financiers to identify suitable project opportunities. The Prospectus covers opportunities in power generation, transmission, distribution, off grid electrification, mini-grids and solar systems for homes and institutions.

5. The interconnected system in Kenya had a total installed capacity of 2,686.1 MW as at 31st January 2019. This includes the new capacity of renewable energy that has been commissioned at Lake Turkana Wind Power Project (300MW) and Garissa by Rural Electrification and Renewable Energy Agency (REREC) Solar Plant (50MW). This interconnected system is made up of 826.23 MW of hydro, 742.48MW of thermal, 662.0 MW of geothermal, 325.5 MW of wind, and 26.05MW from cogeneration, 50.3 MW from Solar and 2MW from Biogas. There was also 32.7MW from isolated off grid system bringing the total installed capacity in the system to 2,718.81M. The total effective capacity was 2,646.6 MW. The highest peak demand of 1,882MW was recorded on, 14th February 2019. This is an indication that demand for electricity has been increasing over time despite two general elections that were held in the same year in 2017. Table 1 below provides details of installed capacity by January 2019.

Table 1: Installed Electricity Capacity, January 2019

Generation Type	Mar 2013			January, 2019		
	Installed MW	Effective MW	% contribution (Effective)	Installed MW	Effective MW	% Contribution (Effective)
Hydro	816.2	766.9	46.42%	826.23	805.02	30.52%
Geothermal	251.4	244.9	14.82%	663.00	655.00	24.83%
Thermal (MSD)	466	447.5	27.09%	716.32	691.82	26.22%
Temporary Thermal - grid	120.0	120.0	7.26%	-		
Thermal (GT)	60.0	27.0	1.63%	60.00	55.00	2.08%
Wind	5.1	5.1	0.31%	336.05	335.51	12.72%
Biomass	26	22	1.33%	28.00	23.50	0.89%
Solar	-	-	0	50.250	50.250	1.90%
Interconnected System	1,745	1,633	98.85%	2,680	2,616	99.17%
Off grid thermal	22.1	18.7	1.13%	30.57	21.33	0.81%
Off grid wind	0.55	0.20	0.00%	0.55	0.01	0.00%
Off grid solar	0.22	0.50	0.03%	0.69	0.62	0.02%
Imports	0.00	0.00	0.00%	0.00	0	0.00%
Total Capacity MW	1,768	1,652	100.00%	2,712 ¹	2,638 ²	100.00%

Table 2: Projected Demand for Electricity in the Medium Term, 2018-2023

Year	GWh	Growth	MW	Growth	Load Factor
2018	10,965	5.33%	1,888	7.67%	66.29%
2019	11,718	6.87%	1,960	3.81%	68.24%
2020	12,334	5.25%	2,065	5.36%	68.17%
2021	12,939	4.91%	2,170	5.06%	68.07%
2022	13,863	7.14%	2,342	7.94%	67.57%
2023	14,543	4.91%	2,461	5.06%	67.47%

Source: Draft MTP, 2018-2023

6. Demand for electricity in the medium Term 2018-2023 is projected to increase from the peak demand of 1,882MW that was recorded in February 2019 to 2,461MW in 2023. The total installed capacity in the next five years is projected to reach about 5,325MW of which close to about 2,000MW will be from renewable sources.
7. KETRACO has also made significant expansion of its transmission network in the last 7 years while KPLC has also increased its bulk distribution substations.

3.0 The Energy Act, 2019 and Open Access in Kenya

8. The *Sessional Paper No.4 of 2004* on energy published on October 2004, set out the national policies and strategies for Kenya's energy sector in the short to the long term. Among other activities of the electricity sub-sector set out in this policy was transforming the power transmission system into an open access system that would allow large electric power consumers to contract with generators of their choice. It also included creating a domestic pool with a provision for wholesale and retail markets to create competition and thus reduce the cost of electricity. This is a subject of this study.
9. Realization of this policy required unbundling of electricity transmission and distribution to create a state owned Transmission Company and KPLC to mainly deal with distribution of electricity in the country. While this was achieved through establishment of Kenya Electricity Transmission Company (KETRACO) in 2008, the need for introducing a wholesale electricity market in Kenya calls for an Independent System Operator (ISO). The ISO will be responsible for dispatch, maintaining power system security and carrying out updates and future system studies.
10. The **Energy Act, 2019**, provides for establishment of:

- Energy and Petroleum Regulatory Authority (EPRA) whose sole mandate will be regulating electrical energy, petroleum, renewable energy and other forms of energy. Additionally, the Authority is responsible for monitoring compliance and ensure fair competition, accredit energy auditors, collect and maintain energy data, prepare indicative national energy plans, set, review and adjust electric power tariffs, approve power purchase and network service contracts among others.
- Rural Electrification and Renewable Energy Corporation (REREC) responsible for overseeing the implementation of the Rural Electrification Programmes, managing REP funds, developing and updating rural electrification and renewable energy masterplan, collecting and maintaining data on renewable energy sources among others.
- Nuclear Power and Energy Agency that will implement nuclear energy programmes and promote the development of nuclear electricity generation in Kenya.
- Independent System Operator who will be responsible for matching consumer's requirements or demand with electrical energy availability or supply, maintaining electric power system security and arranging for the dispatch process. This operator will have the duty to:
 - i. Manage and operate the National Control Centre and other infrastructure established by the National Government for the purpose of carrying out system operations;
 - ii. Give directions, exercising supervision and control as may be required for ensuring stability of network operations and for achieving the maximum economy and efficiency in the operation of the electric power system;
 - iii. Optimal scheduling and dispatch of electrical energy and ancillary services throughout the country;
 - iv. Keep records of the quantity and quality of electrical energy supply on the national grid; and

- v. Coordinate with system operators of the countries whose electric power systems are interconnected with the Kenyan system to ensure efficient operations.

4.0 Electricity Open Access in Kenya

Since the last study, the system has moved from a situation of deficit capacity to one of surplus much of which comes from renewable energy. Power from renewable energy sources is benefiting from improved technologies that are significantly reducing costs and having the ability to be integrated into the system. We therefore have the possibility developing cheaper energy to meet increasing demand. It therefore means that surplus capacity will continue to increase. This could be offered to eligible customers at competitive prices if a power market exists. It is therefore important to begin to develop a power market that will create the right environment for power exchanges between various generators and consumers.

11. According to the Energy Act, 2019, "open access," means the non-discriminatory provision for the use of an electric transmission or distribution system or common user petroleum logistics facility by any licensee or consumer. Under section 164 (1) of the Act, It shall be the duty of a transmission licensee to:

- Provide non-discriminatory open access to its transmission system for use by any licensee or eligible consumer on payment of fair and reasonable transmission or wheeling charges as shall be prescribed in regulations made under this Act; and
- Provide such information as may be prescribed in regulations made under this Act to enable the Commission approve the fees, charges and requirements under subsection.
- Unless otherwise provided in its license, the licensee shall ensure, as far as technically and economically practicable, that the transmission system is operated with enough capacity (and, if necessary, augmented or extended to provide enough capacity) to

provide network services to persons authorized to connect to the grid or take electrical energy from the grid.

12. Further under section 168(1) (d) of the Act, with regard to open access, affirms that it shall be the duty of a distribution licensee conditions of distribution to provide non-discriminatory open access to its distribution system for use by any licensee, retailer or eligible consumer upon-
 - Payment of use of system charges as shall be prescribed in regulations made under this Act and such other fees; and
 - Compliance with such minimum requirements of the distribution licensee.
13. In addition, Section 4 (3) on energy policy and planning, states that each county government shall develop and submit a county plan to the Cabinet Secretary in respect of its energy requirements. Section 7(1) states...."where the National or County Government determines that a supply of energy in any area is necessary and upon assessment it is established to be commercially inexpedient to provide for the necessary reticulation by any licensee, the Cabinet Secretary or County Executive Committee member as the case may be, may undertake the provision of any such works or provide the funds necessary for the development of such works". The Act in Section 8(1) also requires the Cabinet secretary to provide a conducive environment for energy investment in consultation with the County Agencies. The fourth schedule of the constitution 2010 -8(e) provides for electricity and gas reticulation and energy regulation. The study should examine implications of the role of county Governments and its implications on open access the power market in the country.
14. From the foregoing, it has now become necessary to undertake a power market study in anticipation of the coming on board of the open access regime and establishment and operationalization of electricity trading within the East African Power Pool (EAPP).

5.0 Rationale and Objectives of the Study

15. The Government of Kenya's big four agenda is a real deal in unlocking the country's economic prosperity. Kenya is among the African countries with a well-diversified economy and as such has the potential of becoming an industrial powerhouse in Africa. Cheap and quality energy remains a paramount element in promoting manufacturing, fostering quality healthcare, attaining food security and ensuring affordable housing. A study by Steve Cicala, a professor of public policy at the University of Chicago and a research fellow finds that wholesale power markets have the tendency to reduce the cost of generating power by about 40% annually compared to the cost of generating power under traditional command-and-control style regulation. Additionally, competitive power markets are more efficient because they shift generation from higher to lower cost units more effectively than the traditional dispatch methods.
16. The main objective of the study will be to analyze the possibility of establishing a power market in Kenya and its implication to the in-country and regional market.

The specific objectives of study are to:

- Undertake an analysis of the current electricity market in Kenya and its implication to a development of a power market;
- Design an appropriate market that addresses the Energy Act 2019 on open access;
- Design an appropriate market that clarifies the role played by the county governments and their participation on power generation and distribution in Kenya;
- Review the existing conditions in electricity sector investment commitments in generation and across the supply value chain;
- Review the power market study by CPCS and the recommendations made by the study and assesses what is needed to transition to the power market and if these conditions exist and if they do not, recommend a road map for transitioning;
- Evaluate the implementation of the generation and transmission investment plan and provide guidelines for the entry of additional generation capacity to the network;

- Identify and evaluate approaches for large eligible customers to gradually be allowed to choose their electricity provider while ensuring financial sustainability of the sector, including setting out the trajectory for entry of eligible customers to enter the market and to evaluate the financial impact of the trajectory on KPLC;
- Prepare recommendations on what capacity building activities, as well as the other institutional adjustments, should be taken so that Kenya can establish an Independent System Operator (ISO);
- Prepare regulations for supply contracts between eligible consumers and authorized generators;
- Prepare regulations for use of the network by eligible customers;
- Assess options for sustainable reticulation and provision of electricity services by the counties as per the new 2010 Constitution;
- Assess the level of competition in the electricity market and provide clear guidelines on the role of transmission and distribution operators;
- explain and illustrate basic auction concepts and terminology relevant for restructured wholesale power markets;
- To clarify the types of complicating factors that specifically arise for double-auction implementations of day-ahead markets within restructured wholesale power markets; and
- What tools exist to analyze performance of electricity markets and especially with regard to double auctions implementation of day-ahead markets within a restructured wholesale market?

6.0 Scope of Activities

17. The consultant will be required to carry out all the consultancy services necessary to arrive at recommendations to meet the stated objectives. These shall include not less that the following activities:
18. Specific issues to be addressed are:
 - 18.1– **Task 1:** To review previous relevant studies, reports, plans and documents in so far as they relate to this study.

Review various reforms that have been implemented in the power sector in Kenya and highlight the key achievements, challenges and lessons learned. Based on information gathered, review the power sub-sector structures including the extent of the work on unbundling and determine what further needs to be done to make the opening of access and wholesale market work.

18.2 –**Task 2:** Review the adequacy of the sector policy, regulatory and legal environment in place. In particular, provide an analysis of the following current policy and legislation and its implications on a power market and open access in Kenya:

- a) The Energy Policy, 2015 ;
- b) The Energy Act, 2019 with respect to new developments in the power market structure in Kenya and implications for development in line with the Least Cost Power Development Plan (LCPDP);
- c) The Public Private Partnership Act, 2013;
- d) Competition Act

18.3 -**Task 3:** Determine potential barriers, if any, to advancing the electricity wholesale market opening and suggest how to mitigate them. Identify risks and opportunities posed by market opening in electricity supply to non-household customers.

18.4. -**Task 4.** Review of the Least Cost Power Development Plans (LCPDP) for the last 5 years and make consideration for introduction of a power market in line with the generation, transmission and distribution capacities and costs to the year 2035;

18.5. – **Task 5.** Assess the operational and financial performance of the sector entities, in particular:

- a) Review the Cost of Service Study by AF Marcados of 2018 and provide opinion on how it would relate to development of a power market and open access in Kenya. Specifically review the Long Run Marginal Cost (LRMC) of supply across the power system focusing on generation, transmission and distribution at different times of the day. Costs should be expressed in economic and financial terms including opportunity costs of capital investments using appropriate discount factors;
- b) Review revenue and investment requirements of operating the transmission and distribution networks and how it affects development of a Power Market and open access;
- c) Review the peak power demand against proposed generation plans and assess the adequacy of the plans and sufficiency of energy for a power market. Are we ready to introduce power markets in Kenya;
- d) Review the retail tariff categories and evaluate their appropriateness and adequacy. If necessary, recommend tariffs to facilitate power markets and open access in the Kenya power system;
- e) Recommend the criteria of selection of appropriate eligible consumers that would be considered for purchase of power directly from power producers. A minimum consumption level needs to be established for the purpose of qualification;
- f) Propose wheeling tariffs for transmission and distribution networks;
- g) Assess the impact of the recommended tariffs and tariff structures to facilitate power markets and open access on the demand for electricity;

- h) Assess the impact of the recommended tariffs and tariff structures on the competitiveness of the productive sectors and propose an appropriate phasing in where consumers may be adversely affected;
- i) Prepare financial projections using appropriate financial planning model, of the electric power industry for KPLC and KETRACO with regard to power markets and open access; and
- j) Assess and propose appropriate tariff structure for rural-based community power generation and distribution systems and in particular a framework for application by Mini-hydros.

18.6 - **Task 6.** Develop the market design and action plan for implementation and include detailed steps (with specific milestones). Identify the eligible large non-household customers and conduct stakeholder workshops. Define indicators to measure and monitor progress in opening the electricity market.

18.6 - **Task 7.** Make recommendations on what capacity building activities as well as any other institutional adjustments that should be undertaken so to establish an ISO.

6.1 Key materials to be reviewed:

- National Energy and Petroleum Policy, 2015
- Energy Act, 2019

- The Competition Act
- Study on Options for the Development of a Power Market in Kenya
- Sessional Paper No.4 on Energy
- Energy Act No. 12 of 2006
- Least Cost Power Development Plan 2015-2035, LCPDP MTP 2018-2023
- Vision 2030 and Medium-Term Plan (MTP) 2018-2023
- All previous tariff studies and in particular, the Tariff Study of 2007 by Fichtner GmbH, SNC Lavalin (2013) and AF Marcados (2018)
- the existing policies and practices in power utilities
- Ongoing initiatives in the power sector; such as Kenya Electricity Modernization Programme (KEMP);
- Existing PPAs and previous retail tariff reviews
- Regional interconnectivity and power exchanges and their bearing on supply and tariff setting
- Dated covenants with development partners among power utilities and especially their financial and efficiency targets necessary to attain long term viability and sustainability
- Kenya Electricity Grid Connectivity, 2016
- The Kenya Electric Power System Study 2011
- Other applicable government policies that have a bearing on the energy sector in general and the electric power sub-sector in particular. These will include but not limited to sector utility strategic plans, Energy Masterplans, East African Power Pool Masterplan, national budget policy papers and other relevant policy documents.

7.0 Team Composition & Qualification Requirements for the Key Experts

19. The consultant is expected to assemble a team of experts, under the leadership of an experienced team leader, comprising of at least the following international and/ local experts and this will be part of the criteria to be applied in the selection of the consultants(s):
- i) Project team leader with experience in power market and electricity wholesale analysis, open access and energy auctions in a developing country;
 - ii) Financial Analysis Expert (a graduate in a business-related field, Economics or Commerce), competition expert;
 - iii) Power System Planning Expert (electrical engineering or power economics); and,
 - iv) Electrical Engineering Expert.
 - v) Legal expert
20. All members of the team must be academically and professionally qualified with a first degree or higher, and 10 years relevant working experience in their area of expertise in the power sector. All the professional staff must be fluent in the written and spoken English. Consultants may associate to enhance their qualifications.

8.0 Training

21. The consultant will be expected to undertake training in power market analysis, open access and retaliated tariff issues and management in the key sector utilities as part of the deliverables. The capacity building framework will be as follows
- One (1) training workshop for 5 days on tariff setting for key stakeholders in the power industry involving staff from EPRA, KPLC, KETRACO, REREC, GDC) and key Ministry of Energy staff after the presentation of the final draft report. About 20-30 participants will benefit from this training
 - One (1) week benchmarking exercise in countries with Independent System Operations for 6 staff appointed by the above organizations.

9.0 Reporting Requirements and Time Schedule for Deliverables

22. The work is expected to require 12 person-months and will cover a total period of six (6) calendar months commencing September, 2019. The Consultant will provide all the necessary expertise and services to enable the task to be completed within the agreed duration of the contract, which will be signed with the Principal Secretary, MoE.
23. The consultant will work closely with the Economic Regulation Department of EPRA as well as the Ministry of Energy to ensure that the expected results are realized during the study.
24. The consultant will deliver the following outputs:
 - An inception report, within two (2) weeks after the commencement of the services, which among others will give the consultant's interpretation of the terms of reference, present a technical approach to the work and allocate duties to the consultancy team including a time allocation schedule.
 - An Interim Report within 8 (Eight) weeks after the commencement of the services.
 - A Draft Final Report within 16 weeks of the commencement of the services, detailing all aspects of the study and covering the entire scope and objectives of the study.
 - A final report incorporating comments from stakeholders as collected during the stakeholders' forum within 6 (six) months after the commencement of the work.
 - A training report focusing on pertinent aspects of power market and open access as well as articulating key findings of the study as they relate to the 2019/20 tariff review.
 - The Consultant shall prepare and (12) submit soft and (12) hard copies of the reports specified above to the MoE, for onward distribution to the key stakeholders for noting, comments and approval as appropriate.

10.0 Workshops on Study Findings and Recommendations

25. The Consultant is expected to present the interim and draft final reports in one (1) day workshops for stakeholders drawn from the Electricity sub-sector. The workshops shall be held not less than seven days after submission of the relevant reports and inputs of the stakeholders at the workshops shall be taken into account in each of the subsequent reports. The consultant is expected to organize and meet the cost of the workshops in venues within Nairobi for up to 60 participants.

11.0 Facilities to be provided by the Client

26. The client will undertake the following:
- The client will nominate a project manager and counterpart staff from EPRA(2), the Ministry of Energy(2), Kenya Power(2), KETRACO(2), REREC(2) and KenGen(2) to work with the consultants during the assignment.
 - The consultant will be expected to pay for any arrangements agreed upon by him/her and any other third parties. The client will not pay for such costs.
 - The client will provide appropriate administrative support to the Consultants as and when needed.
 - All relevant reports involving past tariff reviews as well as existing policy and legislative document will be availed on request by the consultant

12.0 Qualifications of the consultancy firm

27. Interested consultancy firms must have at least 15 years of experience in the area of power markets and open access and must have undertaken a similar study in a developing country within the last 5 years. Interested consultants must have at least professional staff qualifications and competence for the assignment.
28. A firm declared ineligible by the World Bank group in accordance with the Bank Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants shall be ineligible for short listing. Firms may partner either during the expression of interest or thereafter but the conditions

applicable to the firm whose application is received will be applicable to the partnering firm. Firms are particularly encouraged to partner with local experts.