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 review and develop guidelines for system operations and dispatch in the case of the Kenya Power system.

1. 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 Renewable Energy Corporation (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, 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. The generation mix as at the end of February 2019 stood at approximately 29% hydro, 32% Geothermal, 11% Thermal, 16% Wind, 0.8% Solar and 2% imports.

2. Recently, the system has experienced an increased up take of wind and solar. These intermittent resources have come with their challenges. Going forward, more intermittent generation is foreseen. This calls for review, update and improvement of the existing guidelines on system operation and dispatch in order to guarantee effectiveness and efficiency of the system including security and supply affordability in Kenya. Currently KPLC is the System Operator. The system is operated from the National Control Center located in Nairobi.

   NB: The development of the system operation and dispatch guidelines should be in tandem with provisions of the Kenya National Transmission Grid Code of May, 2016.

1. The Energy Act, 2019

3. The **Energy Act, No. 1 of 2019** provides for establishment of:

i. 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.

ii. 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.

iii. Nuclear Power and Energy Agency (NEPA) that will implement nuclear energy programmes and promote the development of nuclear electricity generation in Kenya.

iv. Independent System Operator (ISO) 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:

a) Manage and operate the National Control Centre and other infrastructure established by the National Government for the purpose of carrying out system operations;

b) 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;

c) Optimal scheduling and dispatch of electrical energy and ancillary services throughout the country;

d) Keep records of the quantity and quality of electrical energy supply on the national grid; and

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

4. The *Sessional Paper No.4 of 2004* on energy published on October 2004, on other hand 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. Realization of this policy required unbundling of KPLC into state owned Transmission Company and a private majority owned Distribution Company. While this was achieved through development of Kenya Electricity Transmission Company (KETRACO) in 2008, the need for introducing a wholesale electricity market in Kenya calls for an Independent System Operator. The ISO will be responsible for dispatch, maintaining power system security and carrying out updates and future system studies.

2. Objectives of the Study

5. The objective of the study is to review the existing practice and guidelines for system operation and dispatch, identify the existing gaps and make recommendations for improvement of the same in line with international best practice, taking into consideration the existing and expected generation sources.

6. The specific objectives of study are to:

i. Review existing system operation and dispatch procedures and guidelines;
ii. Identify gaps in the existing system operation procedures and guidelines;
iii. Identify gaps in the existing dispatch procedures and guidelines;
iv. Assess and recommend efficient methods of capture, storage and retrieval of operational data;

v. Assess adequacy of existing tools, skills and manpower for system operation and dispatch;
vi. Assess and recommend the relevant staff skills for effective system operation and dispatch including the staff structure;
vii. Assess the existing periodic staff training and recommend improvement in line with best practice;
viii. Facilitate adequate exchange for technical staff in charge of system operations and dispatch for skills transfer;
ix. Study and recommend best practices in operations with intermittent generation;
x. Determine system spinning reserve requirements and recommend improvements in the light of increased uptake of intermittent generation;
xi. Assess and advise on the adequacy of the existing system operation facilities including but not limited to the existing control building;
xii. Assess and advise on security measures of the control center including cyber security and external physical threats;
xiii. Assess the operational data and system status information dissemination and sharing with/to stakeholders/sector players and advise on adequacy and/or requirements;
xiv. Review the activities above and propose any others that may be included for value addition to the overall objective of this requested consultancy service;
xv. Review existing control center tasks and mandate; and
xvi. Review existing backup center arrangements.

3. Scope of Services, Tasks (Components) and Expected Deliverables.

7. 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:

8. The specific issues to be addressed are:

9.1 – **Task 1**: Review existing system operations and dispatch procedures and guidelines;

- Identify gaps in the existing system operation procedures and guidelines;
- Identify gaps in the existing dispatch procedures and guidelines;
- Provide recommendations on how to certify system operators; and how to gauge their performance.

9.2 – **Task 2:** - Assess and advise on the adequacy of the existing system operation facilities including but not limited to the existing control building;

- Review existing control center tasks and mandate including and adequacy and operationalization of existing backup center arrangements.

- Assess and advise on security measures of the control center including on cyber security and external physical threats;
- Assess and advise on the operational data and system status information dissemination and sharing with/to stakeholders/sector players and advise on adequacy and/or requirements

9.3 – **Task 3**: Assess the current status and recommend efficient methods of capture, storage and retrieval of operational data;

9.4 – **Task 4:** Assess the extent to which intermittent generation affects operations and dispatch of the Kenyan system**.**

- Study and recommend best practices in operations with intermittent generation and how best to dispatch intermittent sources in the existing Kenyan system;

- Determine system spinning reserve requirements and recommend improvements in the light of increased uptake of intermittent generation;

9.5 - **Task 5:** Assess the adequacy of existing tools, skills and manpower requirements for effective system operations and dispatch;

- Provide recommendations on how to bridge tools, skills and manpower requirement gaps for effective system operations and dispatch. These should include recommendations on periodic staff training program in line with best practices.

- Facilitate an appropriate exchange program for technical staff in charge of system operations and dispatch for skills transfer;

9. The key materials to be reviewed include:

- National Energy Policy, 2018
- Energy Act, No.1 of 2019
- 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 RmbH, SNC Lavalin (2013) and AF Marcados (2018)
- the existing policies, procedures 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
- Kenya National Transmission Grid Code (KNTGC), 2016
- Kenya National Distribution Code (KNDC), 2016
- 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.

4. Team Composition & Qualification Requirements for the Key Experts

10. The consultant is expected to assemble a team, 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):

- Project team leader with experience in electricity dispatch and management of Independent System Operations, implementation of electricity grid codes, power market and electricity whole sale analysis, open access and energy auctions in a developing country;
- Financial Analyst (a graduate in a business-related field, Economics or Commerce), competition expert;
- Power System Planning Expert (electrical engineering or power economics); and
- Electrical Engineering Expert.

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.

5. Training

11. The consultant will be expected to undertake and meet the cost of training in power market analysis, open access and retail 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.

6. Reporting Requirements and Time Schedule for Deliverables

12. The work is expected to commence by November 2019 and for a period of 6 months. The consultant will work closely with the Economic Regulation Department of EPRA formerly Energy Regulatory Commission (ERC) as well as the Ministry of Energy, KPLC and KETRACO to ensure that the expected results are realized during the study.

13. The consultant will deliver the following outputs:

- An inception report, within 1 (one) month after the signing of the contract 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.

- A first draft report within 4 (four) months after presentation of the inception report detailing all aspects of the study and covering the entire scope and objectives of the study.

- Convene a 1 day stakeholder's consultative forum 2 weeks after presentation of the draft report. The consultant will organize and pay for the venue within Nairobi for about 50 participants.

- 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 tariff setting and management 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.

7. Facilities to be provided by the Client

14. The client will undertake provide the following:

- The Consultant will provide his own office accommodation and facilities for his use during the period of the assignment
- The client will nominate a project manager and counterpart staff from EPRA, the Ministry of Energy, KPLC and KETRACO 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

8. Qualifications of the consultancy firm

15. Interested consultancy firms must have at least 15 years of experience in the area of electricity dispatch and system operations 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 as follows:

- Team Leader/Coordinator who must be a graduate in Electrical Engineering and not less than 10 years senior management. 3 of those years must be in a similar position

- Mechanical Engineer and not less than 10 years senior management. 3 of those years must be in a similar position. Knowledge in system operations and dispatch in power markets with considerable generation from Wind and Solar PV.

- Financial analyst who must be a graduate in a business related field, Economics or Commerce and registered with a financial or accounting professional body. At least 10 years' experience in financial analysis of public sector utilities financial analysis will be essential
- Tariff expert Who must have post graduate qualifications in an energy sector related field with a minimum of 10 years in the field of tariff setting in the electric power sector
- Power system planning expert who must be a graduate in electrical engineering or Power Economics with at least 5 years in a relevant area
- Engineering expert who must be a graduate in electrical engineering with at least 5 years' experience in the field of electrical engineering

9. **Selection Method:**

16. The attention of Consultants is drawn to section III, para 3.14, 3.16 & 3.17 of the World Bank's *Procurement Regulations for IPF Borrowers: Procurement in Investment Projects Financing Goods, Works, Non-Consulting and Consulting Services, "Procurement Regulations for IPF Borrowers" July 2016, revised November 2017 and August 2018* ("Procurement Regulations"), setting forth the World Bank's policy on conflict of interest.

Consultants may associate with other firms in the form of a joint venture or a sub consultancy to enhance their qualifications. 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.

A Consultant will be selected in accordance with the Quality Cost Based Selection (QCBS) method, following shortlisting, as set out in the above procurement Regulations.

17. 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.