



MARCHE PUBLIC DE PRESTATIONS INTELLECTUELLES

Agence Française de Développement

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**OBJET : Pre-feasibility Study for a 300-500MW Pumped Storage
Hydroelectric Project - Kenya**

EGI-2025-0353

TDR

Procédure de passation

Appel d'offres ouvert – En application des articles R. 2124-1, R. 2124-2 1° et R. 2161-2 à R. 2161-5 du Code de la commande publique



1.1 Background

Kenya Electricity Generating Company PLC (KenGen) is a public liability company, registered under the Companies Act of the Laws of Kenya. KenGen was incorporated in 1954 with its core business being the development, management, and operation of power generation plants. The Company is the leading electric power producer in Kenya accounting for close to 60% of the total installed electric power to the National Grid and is listed on the Nairobi Stock Exchange. It is owned 70% by the Government of Kenya and 30 % by the public as private shareholders. KenGen generates power from four main sources: Geothermal, Hydro, Wind, and Fossil Fuel and contributes to about 80% of all electricity consumed in Kenya. Currently, the Company has a total installed capacity of 1,904MW comprising Hydropower 826MW, Geothermal 799MW, Thermal 254MW, and Wind 25.5 MW. The installed capacity in Kenya by December 2022 stood at 3100MW.

A pre-feasibility study was carried out by KenGen which identified potential sites across the country for developing a pumped storage hydropower project. This study was completed in 2018.

1.2 Objectives of the assignment

The objectives of this study are;

1. To carry out a detailed review of the pre-feasibility study completed in 2018 by EDF and shortlist the top four best potential sites in Kenya for pumped storage hydropower projects development based on the current development status.
2. To carry out a detailed analysis of the best two (2) sites out of the four shortlisted options to determine their technical, economic, financial and environmental viability.
3. To prepare conceptual designs for the development of a pumped storage hydropower project.

1.3 Scope of the assignment

Task 1 – Overall legal/regulatory and contractual framework and rationale for developing a pumped storage hydropower project in Kenya:

The Consultant shall review the existing legal/regulatory and contractual framework as well as the economics of the Kenyan power sector and identify the potential drivers and barriers for the development of pumped storage hydropower in Kenya.

To do so, the consultant shall review in particular:

- i. The existing regulatory framework;
- ii. The revenue models of Kenya Power and KenGen;
- iii. The existing contractual framework in the sector (between MoEP/EPRA and Kenya Power, MoEP/EPRA and KenGen, Kenya Power and KenGen);
- iv. The perspective in terms of generation/demand balancing as shown in the Medium Term and Long Term Least Cost Power Development Plans.
- v. Analysis of possible institutional arrangements (IPP, PPP or public with EPC) and associated regulation gap analysis

In particular, the consultant is expected to answer the following questions:

1. What are the existing legal/regulatory and financial/economic incentives (if any) towards the implementation of a pumped storage hydropower project;
2. Whether in the current context, any specific legislation/regulation or contractual arrangement prevents pumped storage hydropower projects from being implemented;
3. What legal/regulatory changes would have to be put in place for pumped storage hydropower projects to be implemented.

The Consultant shall provide a summary of contractual arrangements to be put in place by KenGen and the Government of Kenya for potential pumped storage hydropower projects.

Task 2 – Analyses of the shortlisted four (4) most promising pumped storage hydropower project sites in Kenya:

The Consultant shall analyze the shortlisted most promising sites:

- i. by carrying out a detailed review of the pre-feasibility study report submitted by EDF in 2018 and shortlist the top four best potential sites (including site visits) and recommend the best two sites for development.
- ii. By preparing on this basis a multi-criteria analysis to justify the best site selected.

To the extent possible, the Consultant shall come up with a diversified set of pumped storage hydropower project concepts, in particular:

- iii. The Consultant shall conceptualize an optimized size of pumped storage hydropower project that could be duplicated or up-scaled by adding other turbines;
- iv. The Consultant shall prepare a conceptual design for a pumped storage hydropower project to be developed.

Task 3 - Detailed analysis of the two most potential pumped storage hydropower projects concepts:

The Consultant shall carry out a detailed analysis of the two most potential project concepts as defined in the previous task.

This detailed analysis should cover the following aspects:

- i. Technology assessment, conceptual design and project performance modeling;
- ii. Site survey, topographical and geotechnical analyses;
- iii. Environmental and social study (including potential impacts in terms of resettlement);
- iv. Cost estimates (including mitigation of environmental and social impacts);

- v. Contractual arrangements;
- vi. Economic and financial analysis;
- vii. Key challenges identified;
- viii. Key advantages of this pumped storage hydropower concept;
- ix. Analysis of the potential for up-scaling/duplication in Kenya.
- x. KenGen will make available to the Consultant all relevant studies and reports.

Task 4 – Power Transmission and Interconnection Study:

The Consultant shall assess inter-connection requirements for the pumped storage hydropower project and develop a conceptual design for grid inter-connection based on both the site assessment and Kenya's Grid Code.

Task 5 – Capacity building study visit:

The Consultant shall in consultation with KenGen arrange a one-week study visit for selected relevant KenGen staff (six technical staff) to build up their knowledge and competence on pumped storage hydropower plants. The training will include, among others, practical aspects such as site visits to selected existing pumped storage hydropower projects and advanced hydropower laboratories where model tests on the pumped storage hydropower concept are done.

The consultant's offer shall include all transportation (flights from/to Kenya in economy class + local transportation), accommodation in three-star hotels and food arrangements for the six persons.

Task 6 – Environmental and Social Impacts Assessment (ESIA) Scoping

In compliance with national environmental legislation and international standards (In particular World Bank Environmental and Social standards), an Environmental and Social Impact Assessment (ESIA) is required. The first stage is Environmental Scoping on the two (2) best sites if considered bankable, which will define the scope and Terms of Reference for the full ESIA.

The main objectives of the Environmental Scoping Study will be to:

- a) Identify key environmental and social issues associated with the proposed PSH project.
- b) Define the spatial and thematic boundaries of the ESIA.
- c) Engage key stakeholders to obtain preliminary input and concerns.
- d) Propose the methodology and detailed ToR for the full ESIA study.
- e) Identify key baseline data gaps and critical assessment areas including a GIS map of the project with main issues.

The environmental and social scoping shall cover the following aspects:.

- i. Identify potential key issues related to:
 - a) Hydrology and water resources
 - b) Land use and land take
 - c) Biodiversity and ecosystem services, including preliminary assessment of critical habitat as per IFC NP6
 - d) Landscape and visual impacts
 - e) Climate change resilience and emissions
 - f) Physical and economic displacement
 - g) Community health, safety, and security
 - h) Cultural heritage and Indigenous rights
- ii. Screen for cumulative and transboundary impacts, if applicable.
- iii. Identify key stakeholders including local communities, county governments, regulators, CSOs, and project-affected persons.
- iv. Conduct initial consultations to gather community and institutional input.
- v. Document stakeholder concerns and expectations.
- vi. Propose the spatial and thematic scope of the full ESIA.

- vii. Identify data gaps and studies required (e.g., baseline ecological surveys, water quality, RAP, etc.).
- viii. Recommend impact assessment methodologies.
- ix. Define monitoring and reporting frameworks for the ESIA phase.

Task 7 – Final cost estimation for the project

The consultant shall build a fully flexible financial model to evaluate financing options for the selected projects and conduct all cost and profitability analysis. The financial model shall include estimations of cash flows, balance sheet, and P&L. Specific constraints and demands concerning the presentation of the model results will be discussed with KenGen and the results will be presented with a clear matrix and graphs.

The economic and financial model should be performed through several steps including but not limited to:

1. Definition of model architecture
2. Definition of hypotheses
3. Building of a simplified financial model to define expenses & revenues for this project including injection of outputs in the existing global KenGen's financial model to assess the sustainability
4. Sensitivity and results

The general architecture of the model should be divided into several modules including but not limited to:

1. Assumption worksheets
2. Calculation worksheets
3. Results worksheets
4. Reporting worksheets

The financial model at the project level will provide results for;

- a. Net Present Value (NPV) and Economic Rate of Return (ERR) of the project,
- b. Financial viability of the project based on available cash flows and potential financing options (considering maturity, interest rates and covenants, especially regarding minimum Debt Service Coverage Ratio)
- c. Key parameters such as Levelized Cost of Energy, Economic Internal Rate of Return (EIRR), Financial Internal Rate of Return (FIRR) and additional revenues from Certified Emission Reduction if applicable (CERs)

The model should offer an easy update of assumptions to perform sensitivity analysis on critical parameters (CAPEX, interest rates, OPEX, tariff, among others) that will have been defined throughout the assignment and with KenGen. At the end, the model dashboard and output sheets will be designed to fit the specific client's requirements and provide decision-making analysis.

Task 8 – Risk analysis and mitigation

The Consultant shall analyze the PSP risks and prepare a risk matrix using a reliable method. The risks analysis will include among other risks such as the risks associated with planning, construction, operations, and the hydrological risks associated with the project. Potential mitigation options with estimated costs to manage the risks will also be described.

Task 9 – Preparation of Terms of Reference for Full Feasibility Study (Optional):

The consultant shall prepare standard Terms of Reference (TORs) for a full Feasibility Study of Pumped storage Hydropower in Kenya if the projects are bankable. The TORs should be utilizable for any of the two proposed project concepts. This shall include

1. ToR for a full FS with detailed economical and financial analysis and network study up to detailed design,

2. Based on the analysis in Task 6, prepare a detailed ToR for conducting the full Environmental and Social Impact Assessment.

Task 10 – Project Implementation Plan

The consultant shall prepare a project implementation plan with timelines for the implementation of the two projects. The timelines will include a list of required steps for project implementation including a Detailed Feasibility Study, PPA negotiations, project financing, design, procurement, construction, commissioning, start-up, and performance acceptance testing, indicating the estimated time required for each step, as well as milestones, including commercial operation dates.

1.4 Reporting Requirements

- i) The Consultant shall prepare **minutes of the Kick-off meeting**.
- ii) The Consultant shall be required to prepare and submit the following reports to KenGen:

a) Inception Report

The Consultant will be expected to prepare an inception report within 14 days (2 weeks) after the contract signature in which he will indicate the work schedules and a detailed methodology on how he intends to proceed with the study.

b) Draft Report

The Consultant shall present a soft copy and five (5) hard copies of a draft report which shall include the results indicating the major findings of the study, significant recommendations, and other requirements, **within five (5) months after the contract signature**. The Consultant will present the same to a stakeholder's review workshops which will be organized to take place in the **second week after the submission of the draft report**.

c) Review Workshops

The consultant shall present their findings in a one (1) day review workshop after preparing the draft reports. The workshops shall have the participation

of KenGen staff and other invited key stakeholders. The consultant shall subsequently address any concerns raised in the workshop in their Draft final report.

d) Draft Final Report

Before submission of the Final report, the Consultant shall forward the Draft Final Report in soft copy within three (3) weeks after receiving the final comments incorporating the comments received during the review Workshops for KenGen review and concurrence.

e) Final pre-feasibility study Report

A soft copy and ten (10) hard copies of the final report will be submitted one week after the receipt of KenGen's concurrence on the Draft Final Report. The software used for data analysis as well as the Final Report shall be handed over in soft copy and/or CD-Rom.

- iii) The Consultant will also prepare an **Executive Summary** of its findings and recommendations, outlining the Project's rationale, providing a generic description of essential features of the project and embracing a summary of his/her findings and recommendations. This summary shall provide comments and guidance on the way forward. It should be designed as a stand-alone document as it is intended to be used as a basis for high-level decision-making.
- iv) The Consultant shall prepare a **Summary Sheet for the most promising project concepts**. It shall cover the following:
 1. Locations of the two (2) proposed pumped storage hydropower projects;
 2. Summary configurations / required works;
 3. Key environmental and social challenges;
 4. Expected budgets;
 5. Conclusions of economic and financial analysis;

6. Timelines for the project's next steps.

1.5 Organization

a) Coordination by the Client:

The focal point for the assignment at KenGen will be the Capital and Energy Planning Manager.

b) Consultations and site visits:

The Consultant shall plan, as a minimum:

1. An inception meeting with the KenGen team;
2. A half-day briefing session with KenGen team on the general concept of pump storage;
3. Bilateral meetings with MoEP, EPRA, KenGen, Kenya Power, KETRACO;
4. Site visits to the four (4) shortlisted potential sites;
5. A workshop for the presentation of the draft final report to the team comprising MoEP, EPRA, KenGen, Kenya Power, KETRACO;
6. A workshop for the final presentation of the findings to the KenGen team;

c) Planning, Organization and Supervision of The Study:

KenGen will be in charge of coordinating the study.

The interaction between KenGen and the consulting firm (or consortium of consulting firms) will take the following form:

The personnel appointed by KenGen shall take part in the work with the consultants and be actively involved in performing the study and supervising it at all decision-making levels. The consulting firm must submit all key matters requiring approval to KenGen.

KenGen will provide the consulting firm with all key available information and will work in conjunction with the consultants in collecting any item or items of additional information that may be required.

The consultants shall explain the methodology they propose to use, especially the number of days the Consultant will be on site to collect and verify data (e.g. as a proportion of the total project duration) and the time spent locally in Kenya working with the KenGen team. The consult shall also indicate the proposed location for the study visit.

Planning of activities should take into account logistic aspects such as facilities for bringing the services of experts and equipment to the country, topographical and climatic conditions for the work area, possibilities of processing information, etc.

The area to be covered and desk activities will be defined. At the end of the work a report describing the work implemented, the information obtained, analytical and interpretation procedures used, and the results achieved shall be produced.

In planning the work, sequential inter-relation and implementation of activities will be sought so that the information supplied by one or more disciplines will permit the most advisable implementation of the remaining activities. For this purpose, it will be indispensable to prepare a detailed timetable of activities. Where possible it is recommended that activities proceed in parallel to save the time of implementation of the study.

For the correct implementation of the study, the project's organization will have to be defined taking into consideration that the entity in charge of supervising the work is KenGen with the support of a consulting firm or consortium of consulting firms, plus the needed expert or experts to complement KenGen capabilities.

Bearing in mind the activities to be implemented, and the human, technical, and physical resources available in KenGen for the project implementation, the activities that this entity will have to carry out will be determined in addition to the activities that will have to be performed by consulting firms, specialized institutions, or individual consultants.

d) Logistic Aspects:

It will be necessary to consider those logistic aspects that permit carrying out the work with greater efficiency; some can be summarized as follows:

- *Foreign Experts.* For technical experts that have to be brought in from abroad, the local staff involved will have to handle the appropriate procedures sufficiently ahead of time to obtain the required immigration documents, visas, customs, and special operations.
- *Transportation.* To support field operations, suitable motor vehicles will be needed.

During the planning of activities, the various work groups will have to mutually support each other, since this will ensure substantial savings in terms of time and resources. For example, it would be advisable that the Power Evacuation study group to use PSS/E software to ensure easy of compatibility with KPLC/KETRACO software.

The program of activities should be displayed in a bar chart and critical path chart, prepared so that the preliminary and final results of one or various disciplines can be used on a timely basis by the others.

e) Counter-Part KenGen Team:

To facilitate faster information gathering (from within KenGen and other relevant local agencies) and synthesizing, KenGen shall second staff to work with the consultant on a full-time basis during the Project Inception and Implementation. This will also serve as part of the knowledge transfer, which is critical for capacity building.

The consultant shall involve the KenGen team in all aspects of the undertaking. The staff to be seconded by KenGen shall include;

1. Hydrologist
2. Mechanical Engineer
3. Electrical Engineer
4. Civil Engineer
5. Surveyor
6. Geologist
7. Financial Analyst/Economist
8. Environmentalist
9. Social expert

f) Facilities/Services To Be Provided By KenGen

KenGen will provide the following facilities:

- i. A site office with basic furniture (if required by the Consultant)
- ii. Access to relevant information to the extent of its availability
- iii. Counterpart personnel
- iv. Free access to KPLC and KenGen installations

KenGen will in addition and in liaison with the Ministry of Energy and Petroleum, provide all necessary assistance to the Consultant including liaison with other government ministries and agencies and in obtaining the necessary data and documentation.

g) Improvement of Terms of Reference

The Consultant may offer suggestions and improvements to the Terms of Reference, which it considers would result in better implementation of the study.

1.6 Study Duration

- Estimated Study duration: 6 months.

1.7 Deliverables

Number of deliverables	Deliverables	Delivery date, from contract effectiveness
/	Avance	/
1	Inception report	Week 2
2	Technical preliminary Report	Week 16
3	Draft Report	Week 19
4	ESIA Scoping Report and ToRs	Week 19
5	Review Workshop	Week 21
6	Draft Final Report	Week 24
7	Final Report	Week 25