



**REPUBLIC OF KENYA
MINISTRY OF ENERGY AND PETROLEUM**

**KENYA PETROLEUM TECHNICAL ASSISTANCE PROJECT (KEPTAP)
PROJECT MANAGEMENT UNIT (PMU)**

**COMPONENT C – SUSTAINABLE IMPACT OF OIL AND GAS INDUSTRY
REFORMS AND CAPACITY BUILDING**

**SUB- COMPONENT C.1.2 -STIMULATE THE DEVELOPMENT OF
DOWNSTREAM OIL AND GAS INDUSTRY**

IMPLEMENTING AGENCY – MINISTRY OF ENERGY AND PETROLEUM

**TERMS OF REFERENCE
FOR
CONSULTANCY SERVICES TO PERFORM A FEASIBILITY STUDY FOR THE
DEVELOPMENT OF A DOMESTIC GAS MARKET THROUGH THE
ACQUISITION OF FLOATING STORAGE AND RE-GASIFICATION UNIT**

August 2017

1.0. Introduction

The Government of Kenya (GoK) aims to create a domestic gas market by utilizing gas as a power source and an industrial fuel, currently the GoK is looking at importing the Liquefied Natural Gas (LNG) as it seeks to develop its domestic supply. In Kenya, LNG Gas-to-Power value chain does not exist. Gas development in upstream, midstream, or power sector is yet to commence.

Despite Kenya's long exploration history, it was only in 2012, 2014 respectively that natural gas was discovered offshore and onshore Kenya with a total base case resource estimate of 10.8 Tcf. So far the volume is considered uncommercial due to lack of existing infrastructure to meet the development needs.

The 2016 National Power Generation and Transmission Plan (PGTMP) did not include natural gas as a source of energy. For the next two decades, the national electricity demand is forecasted to grow at about 7.3% per annum. In 2008 the Ministry of Energy assessed the feasibility of a permanent regasification LNG facility with a breakeven price of \$ 4-6/MMBTU. In 2010 KenGen performed a design study for a LNG gas fed power plant in Mombasa indicating viable consumer costs of \$ 0.08-0.10/kWh. In 2014 the GoK explored the option for LNG supply from the Government of Qatar. The gas price exceeded the project breakeven price (\$10/MMBTU). The negotiated gas price (\$18/MMBTU) was at par with the high international market price at the time. As a result, the tender for the construction of the associated power plant was put on hold.

Early 2015 the global gas price significant fell down to levels of \$ 3-6 /MMBTU at the spot market. The price has recently stabilized and its outlook is favorable. Therefore, the GoK has expressed interest to review the viability of a FLNG fed power plant and to assess the gas supply options.

2.0 Background

The 2015 National Energy & Petroleum Policy (to be enacted) carries the mission of facilitating the provision of clean, sustainable, affordable, competitive, reliable and secure energy service at least cost while protecting the environment. There is neither a specific energy source that has been excluded, nor has one been prioritized other than aiming for diversification of the energy mix. In addition, Kenya has signed the 2015 Paris Global Climate Change Agreement supporting worldwide carbon emission reduction efforts.

Last May the first PGTMP was issued. This covers the strategy for the coming 20 years, i.e. 2015-2035 supplying 5-10,000 MW. The current installed power generation capacity is around 2,300 MW. The renewables (geothermal, hydro-electric) are dominant given its indigenous availability, and its lowest cost of consumption. The cost of electricity for geothermal is about \$ 0.06-0.07/kWh and for hydro-electric about \$ 0.09-0.12/kWh. The PGTMP costing study for gas as an energy source is viewed as incomplete given the limited supply options being covered and outdated gas prices being assumed. The forecasted LNG market price did not reflect the drop occurring in the year 2015. If in future gas would be demonstrated as viable least cost energy source, formal inclusion in the PGTMP would be likely. Yearly updates of the Plan are expected.

In the Lamu Basin the offshore gas volumes discovered in 2012, 2014 respectively are around 8+ Tcf in block L8 and 1.2+ Tcf in block L10A. In the onshore block 9,

a gas column of 1.6+ Tcf penetrated the Anza Basin in 2012. Over the last couple of years, the level of exploration significantly decreased and if any, it is mainly focusing on oil prospects. Minor associated gas is expected from the Early Production System and the Full Field Development Plan of the South Lokichar assets.

Kenya is strategically well placed for LNG supply from a variety of countries. The range of supply scenarios captures the benefits of potential cooperation with neighboring countries, like Qatar, USA, Mozambique and Egypt on bilateral, or regional gas trade to jointly benefit from the potential developments of recent large gas discoveries via LNG gas infrastructure. The long term supply options should include swapping LNG with domestic gas as future gas discoveries may happen as exploration continues.

In view of the attractive gas price outlook and the rising domestic electricity demand and fuel requirements for large scale industrialization MoEP would like to perform a feasibility study to develop a domestic gas market through importation of LNG via a FSRU.

3.0 Objective of this assignment

The Objective of this assignment is to assess;

- a. The commerciality of a converting existing thermal power plants to natural gas.
- b. The resulting implication on the cost of electricity
- c. The feasibility for a Floating Storage and Regasification Unit (FSRU) and equity financing options for the required capital investment.

4.0 Scope of Work

The following spectrum will need to be executed

- Review LNG related studies and models. These are, however not limited to, the 2008 permanent regasification LNG facility study, the 2010 LNG fed power plant study, the 2014 FLNG supply feasibility models, the 2015 study “Towards an Oil & Gas Master plan” and the 2017 ongoing National Petroleum Master Plan.
- Study the existing Energy policy framework and the 2016 PGTMP.
- Determine the technical configuration of converting existing thermal power plants to natural gas. Assess subsequently its commerciality and conclude the resulting cost of electricity.
- Assess the feasibility of a FRSU acquisition by studying i-vii
 - i. Analyze the current global LNG market and its outlook. In particular, consider the potential supply from new LNG projects in East/North Africa. Provide an overview of recommended counterparties.
 - ii. Investigate contract framework (price, minimum & recommended quantity, spot and/or term, time frame, payment T&C) for LNG supply. The range of scenarios includes replacing LNG imports with domestic gas at the long term.
 - iii. Provide feasibility level analysis for the development of an offshore LNG terminal (FRSU, jetty). This includes cost profiles for possible regasification technologies, design & operations, marine & other environmental factors, land-side issues, and lease options.
 - iv. Determine technical configuration and cost profiles (development & operational) for LNG fed power plant allowing for technological change to natural domestic gas fed.
 - v. Develop total expenditure profiles for LNG supply, offshore LNG terminal, gas fed power plant and any interconnecting infrastructure.

- vi. Screen the different GoK equity financing options for required investment profile for the LNG supply and the offshore LNG terminal.
- vii. Establish the breakeven cost of electricity for the range of investment forecasts and its robustness against regional/international gas price sensitivities.

5.0 Cross – Sector Relationships

Within the MoEP, both departments of Petroleum and Energy will cooperate. Other relevant government agencies will be incorporated in the study.

6.0 Deliverables

The core deliverables for this assignment are the provision of advice and assistance required to execute the Scope of Work and address the Objective. This includes a comprehensive feasibility study of converting existing thermal plants, the acquisition of a FSRU and a report with the analysis of the LNG market, investment scenarios, and its resulting impact on the cost of electricity. The associated equity financing options for the required GoK investments will be captured.

7.0 Reporting Obligations

The following reports will have to be issued and approved by the Client

- 1) Inception report
- 2) Interim Report(s)
- 3) Final Report

All deliverables shall be submitted to the MoEP for review and approval. Deliverables must be submitted in electronic copy and printed copy (5 copies) as required by the MoEP. Deliverables are expected to comply with the deadlines established.

8.0 Duration of Assignment

The duration of the assignment is expected to be about 3 months. The consultant is requested to present a work plan and any assumptions made regarding the level of effort indicated in this TOR prior the start of the assignment.

9.0 Client support

9.1 Implementation arrangements

The MoEP will designate two Focal Points, one from Petroleum and one from its Energy section, each to work with the Consultants. The Consultant shall make its own arrangements for carrying out its services, including, documents reproduction, printing and reproduction of all reports.

The MoEP Focal Points will provide existing documentation regarding the Project, nevertheless, the Consultant will be responsible for obtaining all the necessary public information required to perform the tasks included in these TOR. All reports to be provided under this assignment shall be sent to MoEP.

9.2 Consulting Service Requirements

The key members of the Consultant's team shall not change throughout the duration of the contract with the GoK. Any staff changes will require the GoK approval. The Consultant's recommendations must be consistent with the World Bank's safeguard policies. It is expected that the work would be conducted both in the consultant's office and in MoEP office.

10.0 Expected Consultant Experience

The consulting company shortlisting criteria includes;

- Significant in-depth international expertise and regional knowledge in the FRSU-Power sector and relevant consulting services advising National Governments.
- It has a track record of success in technical and commercial feasibility assessment and implementation of LNG options for countries with no prior LNG infrastructure, preferably in similar country environment like Kenya.
- At least 3 contracts of similar nature and complexity, or more complex and relevant, that the firm has successfully completed in the past 10 years.

The consulting firm may propose the best team combination to achieve the overall goal. To be considered for the assignment, proposed team members should submit their respective CV's.

10.1 Key positions

The key team positions (with indicative qualifications) are:

LNG Expert/Project Director: 10+years' experience in LNG receiving terminal design, costing, and project management. A degree or higher education in Energy related discipline. Demonstrate 3 relevant projects successfully completed.

Marine Expert: 10+years' experience in the marine issues that influence siting possibilities for LNG terminals, encompassing the implementation, operation, safety, reliability, high-level environmental issues, and other aspects; should be fully knowledgeable on factors relating specifically to FSRUs such as potential for single buoy mooring and other technical design issues. Demonstrate 3 relevant projects successfully completed

LNG Commercial Expert: 10+years' experience in LNG trading, procurement. Experience in introducing LNG to new markets is valuable. Demonstrate 3 relevant projects successfully completed Conflict of Interest

Gas Fired Power Plant expert: 10+ years' experience. Demonstrate 3 relevant projects successfully completed converting thermal plants using natural gas and LNG fed power plants.

11.0 Conflict of Interest Statement

The Consultant is required to disclose any potential conflicts of interest arising out of other assignments. Where the Consultant currently represents any private sector party, or any potential (regional) stakeholders that would create a conflict of interests or to the extent any conflict of interest would arise in the future, the Consultant shall provide a copy of its policy and/or procedures with respect to conflicts management (only reference to such procedure will not suffice) upfront in their bids. In addition to the Consultant's conflict of interest and confidentiality policy, the Consultant shall detail any measure that may be required to avoid conflict of interests and ensure the confidentiality of information received in connection with the implementation of this assignment.