

COASTAL AND OFFSHORE OIL AND GAS AND RENEWABLE ENERGY

Presented at the virtual write shop on assessment of the contribution of maritime sectors to Kenya's Blue Economy: values, potentials and governance frameworks: 2nd-4th August 2021

Dr. Jacob Ochiwo, Dr. Paul Ogendi and Mr. Nicholas Rakweri

Background and context

- Oil & gas exploration is a developing activity in WIO incl. KE
- Exploration for oil & gas in KE dates back to 1950s, & 4 potential sedimentary basins have already been established namely Lamu basin (252,297.65 sq. km), Mandera basin (51,441.98 sq. km), Anza basin (76,107.63 sq. km) & Tertiary Rift basin (116,619.13 sq. km).
- The recent oil and gas discoveries in Kenya have increased interest from both public and private sector players on offshore exploration.

Background and context

- Development of new technologies for exploration gives more hope for more offshore oil and gas discoveries in Kenya.
- Offshore oil and gas discoveries would make a significant impact on the Kenyan economy and would trigger new developments.
- The qty of petroleum products imported increased by 5.3% to 6.4 mill. tonnes in 2019, thus putting strain on BoP.
- Offshore oil & gas discoveries would maintain national supplies to meet part of rising dd & have surplus for export.
- The offshore blocks that have been identified for oil and gas exploration are largely in the Lamu basin.

Background and context

- It is estimated that offshore oil and gas potential can yield several billion barrels of oil and trillions cubic feet of gas prospective resources.
- Offshore potential has attracted considerable investment from companies looking to survey and explore the Lamu basin for oil and gas.
- Lamu basin has been sub-divided in to smaller exploration blocks with each block having its unique characteristics based on a study initiated by NOCK in 1991-1995.

Background and context

- All offshore exploration blocks have been defined by their longitudes & latitudes, their sizes & block maps.
- This was followed by enhanced exploration efforts that generated fresh interests in offshore Lamu basin and resulted in the signing of 7 production sharing agreements between 2000 and 2002.
- The pressures and opportunities created by oil and gas exploration activities imply that efforts should be put in advancing understanding about the resources, the associated environment & the social aspects of their exploitation.

Background and context

- A recent exploration well which was drilled offshore, close to the EEZ border with Tanzania met an oil column; the first ever oil discovered off the EA coast, with high prospects for finding commercial quantities.
- If the identified oil and gas reserves continue to yield even a small portion of the expected outcome, Kenya will gain from income earnings and savings on fuel imports that will significantly change the national economy and contribute to poverty alleviation.

Renewable Energy development in Kenya

National Overview

- Total electricity demand in the country increased by 3.9% from 11,182 GWh in 2018 to 11,620.7 GWh in 2019.
- Electricity generation from wind power in Kenya increased from 375 GWh in 2018 to 1562.7 GWh in 2019
- The government of Kenya commissioned Olkaria V geothermal power plant with an installed capacity of 165 MW in November 2019.
- The government through KENGEN has planned to deliver an additional 1729 MW by 2025. This is expected to be obtained from renewable energy sources mainly from geothermal, hydro and wind resources.

Renewable Energy development in Kenya

National Overview cont'd

- The tidal energy and wave energy potential have however not been tapped yet.
- The Govt established an energy technologies devt. programme through MTP III to facilitate diversification of non-renewable & renewable energy mix to meet the energy dd for industrialization & development. This programme has provided for two main projects:
 - ▣ establishment of Renewable Energies Research Laboratory to conduct research and development in the areas of solar energy, wind energy and biofuels, and
 - ▣ establishment of Centre for Petroleum and Gas Exploration Research and Technology Development in oil and gas exploitation. This centre will focus on the value chain in the exploitation of fossil fuel reserves including socioeconomic considerations.

Renewable Energy development in Kenya

Overview of the Coast of Kenya

- In the coast of Kenya, the main sources of renewable energy are solar, wind, tidal and wave. This energy has so far not been tapped.
- Wave energy has also not been tapped but there is potential for it in Kenya.
- Solar power is increasingly becoming important along the coast of Kenya & has been taken up by a number of households as well as commercial and industrial establishments. The total potential for photovoltaic installations is estimated at 23,046 TWh/year.

Renewable Energy development in Kenya

Overview of the Coast of Kenya

- Solar power is a viable option for rural electrification and decentralized applications.
- The Government has for sometime subsidized the photovoltaic stand-alone systems for households and public institutions.
- As part of the medium to long term plan to tap on the solar power potential, the Government aims to install 500 MW and 300,000 domestic solar systems by the year 2030.
- Kenya also has promising wind power potential. The Kenyan coast has lower but promising wind speeds of about 5-7m/s at 50 metres.
 - A few installations have been put in place in the Tana Delta and Lamu

Impact of Coastal and Offshore Oil, Gas and Renewable Energy on marine environment

- Oil and gas exploitation can have severe impacts on surrounding habitats through modification of the environment and pollution.
- The oil and gas production structures that have some direct or indirect environmental impacts include seismic survey and drill ships, floating liquefied natural gas plants, offshore oil and gas production platforms and seabed feed pipelines.
- The initial seismic surveys often affect sea life in close proximity and can affect marine mammals such as whales.
- Disposal of waste drilling mud in the deep sea or open water may have widespread impacts, affecting marine mammals, sea turtles, sea birds and fish.
- Transportation of petroleum once economically viable oil and gas reserves are identified and production commences, is vulnerable to poor maintenance, weak infrastructure and accidents, resulting in potential threats to coastal and marine environment.

Impact of Coastal and Offshore Oil, Gas and Renewable Energy on marine environment

- Offshore oil exploration is prone to oil spillage which may result in massive death of marine organisms and disruption of ecosystem functions.
- Mangrove forests are particularly sensitive to oil pollution, and accidental oil spills or blow outs during exploration drilling pose the most significant threats.
- A massive oil spill may impact coral reefs, seagrass beds, lagoons, turtle nesting beaches, MPAs with valuable biodiversity, fishing grounds, & unique marine animals such as dolphins, dugongs, whale sharks and humpback whales.
- Other impacts include physical obstruction and interference with movement of marine mammals, fish, and access for navigation and fishing activities.
- Wave energy apparatus located close to shore are likely to affect sediment transport & distribution & could result in coastal erosion and accretion in other areas, and could be a hazard to shipping.
- Tidal barrages are likely to cause changes to sediment transportation, water circulation and biological communities.

Impact of Coastal and Offshore Oil, Gas and Renewable Energy on marine environment

Some mitigation measures to minimize negative impacts:

- Avoidance of whale migration seasons & knowing whale or dolphin breeding or feeding areas are necessary.
- Seismic surveys include a marine manual observer on board, specifically to address encounters with mammals and to guide mitigation procedure.
 - ▣ Need for guidelines covering soft start procedures, minimum safe distances from marine mammals and constant monitoring and vigilance during operations.
- ESIA should be undertaken before oil and gas exploration.

Governance Framework



- A number of institutional, legal/regulatory and policy frameworks are in place

Institutional Framework

S/No	Institution	Mandate
1	Ministry of Petroleum and Mining	The State Department for Petroleum and Mining has the mandate of spearheading all petroleum operation programmes in the country including policy formulation, review of fiscal, legal and regulatory framework, monitoring and supervision of oil and gas exploration, development and production activities
2	The National Oil Corporation of Kenya (NOCK)	Facilitates and directly participates in oil and gas exploration activities in Kenya in the upstream, midstream petroleum infrastructure development and downstream marketing of petroleum products
3	Ministry of Energy	To undertake the following six functions: National Energy and Policy management; Hydro-power Development; Geothermal Exploration and Development; Rural Electrification Programme; Promotion of Renewable Energy; and Energy Regulation, Security, and Conservation

Institutional Framework

S/No	Institution	Mandate
4	Energy and Petroleum Regulatory Authority	To regulate, monitor and supervise upstream petroleum operations in Kenya in accordance with the law relating to petroleum, the regulations made there under and the relevant petroleum agreement
5	Energy and Petroleum Tribunal	Hearing and determining disputes and appeals in accordance with the Energy Act or any other written law
6	The Rural Electrification and Renewable Energy Corporation	To among other things develop, promote and manage in collaboration with other agencies, the use of renewable energy and technologies, including but not limited to biomass (biodiesel, bio-ethanol, charcoal, fuel-wood, biogas) municipal waste, solar, wind, tidal waves, small hydropower and co-generation but excluding geothermal

Institutional Framework

S/No	Institution	Mandate
7	Nuclear Power and Energy Agency	Identifying appropriate sites in Kenya for the construction of nuclear power plants and their related amenities
8	Renewable Energy Resource Advisory Committee	Advise the Cabinet Secretary & County Governments on among other things management and development of renewable energy resources
9	Geothermal Development Company	Developing steam fields and selling geothermal steam for electricity generation to Kenya Electricity Generating Company PLC (KenGen) and private investors
10	National Land Commission	Managing public land on behalf of the national and county governments, and with the consent of the national and county governments, alienate public land. Since oil and gas exploration is mostly done on public land, the NLC plays an extremely important role in regulating oil and gas sector to this extent

Institutional Framework

S/No	Institution	Mandate
11	National Environmental Management Authority	To exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment. In relation to oil, gas and renewable energy exploration, section 9(2)(b) provides that NEMA should take stock of the natural resources in Kenya and their utilisation and conservation.

Regulatory framework

S/No	Instrument	Provision
1	<i>Petroleum (Exploration and Production) Act Chapter 308</i>	<p>To regulate the negotiation and conclusion by the Government of petroleum agreements relating to the exploration for, development, production and transportation of, petroleum and for connected purposes.</p> <p>It is the main legislation regulating petroleum exploration and production in Kenya.</p>
2	Petroleum (Exploration and Production) Regulations, 1984	<p>Provides that a petroleum agreement shall be negotiated on the basis of the model production sharing contract substantially in the form set out in the Schedule, and that No person other than a company incorporated or registered in Kenya under the Companies Act may enter into a petroleum agreement with the Government.</p>

Regulatory framework

S/No	Instrument	Provision
3	The Petroleum Act No.2 of 2019	To provide a framework for the contracting, exploration, development and production of petroleum; cessation of upstream petroleum operations; to give effect to relevant articles of the Constitution w.r.t upstream petroleum operations, regulation of midstream and downstream petroleum operations; and for connected purposes
4	Energy Act No. 1 of 2019	Provides for national energy policy to be developed by the Cabinet Secretary in consultation with relevant stakeholders. It is the main law in the energy sector including the renewable energy sector
5	Maritime Zones Act (Cap 371)	to consolidate the law relating to the territorial waters and the continental shelf of Kenya; to provide for the establishment and delimitation of the exclusive economic zone of Kenya; to provide for exploration and exploitation and conservation and management of the resources of the maritime zones; and for connected purposes.

Regulatory framework

S/No	Instrument	Provision
6	Kenya Maritime Authority Act (Cap 370)	Established Kenya Maritime Authority to regulate, co-ordinate and oversee maritime affairs. Section 5(f) provides that one of the functions of the Authority is to ‘develop, co-ordinate and manage a national oil spill contingency plan for both coastal and inland waters and shall in the discharge of this responsibility be designated as the “competent oil spill authority”’.

Policy Framework

S/N o	Policy	Provision
1	<i>Kenya Vision 2030</i>	Economic and macro pillar focus on oil and other mineral resources sector
2	<i>Sessional Paper 4 on Energy 2004</i>	Promote equitable access to quality energy services at least cost while protecting the environment. The Sessional Paper deals with both petroleum and renewable energy.
3	<i>Draft National Energy Policy, 2014</i>	To provide affordable Quality Energy for All Kenyans

Capacity gaps and further development on Coastal and Offshore Oil, Gas and Renewable Energy

- The Government does not have adequate financial resources and technical capacity to undertake coastal and offshore oil and gas exploration on its own. The inadequacy in technical capacity is mainly in the areas of marine geology, petro-chemical fields and technological sphere.
- There are limited capabilities in engineering, construction, logistics, and supplies, health and safety.
- Government agencies that are charged with management of environment and ensuring compliance of mitigation measures and monitoring procedures associated with large projects such as offshore exploration are often lacking the technical capacity to ensure sustainability.

Capacity gaps and further development on Coastal and Offshore Oil, Gas and Renewable Energy

- Engaging in capacity building is fundamental for buy-in and participation, which is crucial to confidence building, transparency, and sustainability.
- Development of renewable energy alternatives including marine based alternatives are weighed down by constraints e.g.
 - ▣ inadequate long-term hydrological and meteorological data
 - ▣ inadequate transport infrastructure
 - ▣ inadequate local participation to develop acceptance
 - ▣ lack of locally available spare parts
 - ▣ insufficient electricity grid coverage
 - ▣ high dependence of rural communities on ecosystem services.

Conclusions and recommendations

- Offshore oil and gas exploration has been on-going with mixed results. If economically viable oil reserves can be found, Kenya will gain from foreign exchange earnings and savings on fuel imports, that can significantly change the national economy and contribute to economic empowerment among the local communities.
- Efforts should be put in advancing understanding about oil and gas resources, associated environment and social aspects in order to address the pressures and opportunities created by oil and gas exploration activities.
- It is critical to put in place an effective regulatory framework for oil and gas exploration to avoid occupational hazards that may occur if the exploration of the newly discovered oil and gas reserves is carried out with inadequate regulation.

Conclusions and recommendations

- Offshore oil and gas exploration and renewable energy are governed by robust legal, policy and institutional frameworks that support sound env. management procedures to ensure that exploration for oil and gas, and development of renewable energy is optimally done for sustainable development in the country. These frameworks provide for mitigation of likely pollution from offshore oil exploration or eventual drilling.
- The country should ensure oil pollution preparedness through capacity building to respond to potential accidental oil spills
- There is need to have insurance for compensation of any eventual loss of livelihoods that could be associated with eventual drilling.
- The country needs to sign and ratify all IMO Conventions relevant to oil and gas exploration, adhere to the conditions of the Nairobi Convention, promote regional coordination on planning of transboundary issues such as oil spill contingency measures, piracy and security.

Conclusions and recommendations

- It is also critical to:
 - ▣ enhance awareness raising and capacity building covering environmental regulators and negotiators in the energy sector
 - ▣ promote effective management and governance of the oil and gas resources
 - ▣ promote participation of the civil society organizations, &
 - ▣ develop and promote renewable energy alternatives.
- The Government should ensure that bilateral agreements made with prospecting companies are designed to provide direct & indirect benefits to the local people and the country at as a whole.

THANKS