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REPORT OF THE DEPARTMENTAL COMMITTEE ON ENERGY
ON

A STUDY VISIT TO THE KARABIGA COAL PLANT IN TURKEY
FROM AUGUST 13 – 20, 2018

	
THE NATIONAL ASSEMBLY PAPERS LAID	
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TABLED BY:	Hon. (Dr) Robert Pokose, MP Vice-Chair - DC on Energy
BY THE TABLE:	Rachel Kaino - Principal Clerk ASSISTANT

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LIST OF ABBREVIATIONS

AIDS	-	Acquired Immuno deficiency Syndrome
BA	-	Bachelor of Arts
CCS	-	Carbon Capture and storage
CMP	-	Construction Management Plan
COD	-	commercial operation date
CSR	-	Corporate Social Responsibility
ESP	-	Electrostatic Dust Precipitators
FGD	-	Flue Gas Desulphurization
FIMC	-	Fenxi Industry Mining Company
GHG	-	Greenhouse Gases
HELE	-	high efficiency, low emission
HIV	-	Human Immuno deficiency Virus
HR	-	Human Resources
ICT	-	Information Communication and Technology
ID	-	Identification
KETRACO	-	Kenya Electricity Transmission Company
KPIs	-	Key Performance Indicators
LCOE	-	levelized cost of electricity
MOE	-	Ministry of Energy
MP	-	Member of Parliament
NEMA	-	National Environmental Authority
PIU	-	Project Implementation Unit
RAP	-	Resettlement Action Plan
RSC	-	Resident Supervising Consultant
SO	-	Standing Order
TMP	-	Traffic Management Plan
UNESCO	-	United Nations Educational Scientific and Cultural Organization
USA	-	United Sates of America
USC	-	Ultra-supercritical steam

FOREWARD

The National Assembly Standing Orders No. 216 establishes the Departmental Committee on Energy which is mandated to investigate and inquire into all matters relating to the assigned ministries and departments as they may deem necessary and as may be referred to them by the House. The Committee is also mandated to make reports and recommendations to the House as often as possible, including recommendation of proposed legislation. The Committee is therefore responsible for the oversight on all matters to do with Energy as an enabler of the government the big four agenda.

In its bid to enhance its capacity by understanding how best to discharge its mandate, the Committee undertook a study visit to the Karabiga Coal plant in Turkey from 13th to 20th August, 2018. The delegation comprised of five Members and two Staff from Parliament. The main objective of the of the study visit was to enable the Members of Parliament in the delegation understand the operations of a ultra-super critical coal fired power plants construction and operations.

Arising from the study visit to the Karabiga Coal plant in Turkey, the delegation made the very pertinent observations and recommendations as contained in this report. The Committee is also indebted to the Ministry of Energy, the Gulf Energy Limited General Electric and Power China International for making the study visit seamless and fruitful.

I take this opportunity to thank all the Members of the Committee for their input and valuable contributions and time during the deliberations and report writing exercise. The Committee also takes this opportunity to thank the Offices of the Speaker and of the Clerk of the National Assembly for the logistical support accorded to it during the exercise.

On behalf of the Committee and Pursuant to the Standing Orders of the National Assembly, it is therefore my pleasant duty and privilege, to lay this report on visit to Karabiga Coal Plant in Turkey held between 13th – 20th August, 2018 on the Table of House for consideration and approval by the House

Hon. (Dr.) Robert Pukose, M.P

PREFACE

Establishment and Mandate of the Committee

The Departmental Committee on Energy is established pursuant to provisions of Standing Order 216 (5). Under the provisions of Standing Order 216 (5) the Committee is mandated to inter alia:

- (i) To investigate, inquire into, and report on all matters relating to the mandate, management, activities, administration, operations and estimates of the assigned ministries and departments;
- (ii) To study the programme and policy objectives of ministries and departments and the effectiveness of the implementation.
- (iii) To study and review all legislation referred to it;
- (iv) To study, assess and analyze the relative success of the ministries and departments as measured by the results obtained as compared with their stated objectives;
- (v) To investigate and inquire into all matters relating to the assigned ministries and departments as they may deem necessary and as may be referred to them by the House;
- (vi) To vet and report on all appointments where the Constitution or any law requires the National Assembly to approve, except those under Standing Order 204 (Committee on Appointments); and
- (vii) Make reports and recommendations to the House as often as possible, including recommendation of proposed legislation.

The Departmental Committee on Energy oversees the performance of the following State departments:-

- (i) Energy, and
- (ii) Petroleum.

The Departmental Committee on Energy was constituted by the House on Thursday, December 14, 2017. The Committee comprises of the following Members:

Composition of the Committee

The Committee comprises the following Members-

1. The Hon. David Gikaria, M.P. - **Chairperson**
2. The Hon. (Dr.) Robert Pukose, M.P. - **Vice Chairperson**
3. The Hon. Cecily Mbarire, M.P.
4. The Hon. Ekomwa Lomenen James, M.P.
5. The Hon. Joseph Wathigo Manje, M.P.
6. The Hon. Lemanken Aramat, M.P.
7. The Hon. Oscar Sudi, Kipchumba, M.P.
8. The Hon. (Eng.) Vincent Musyoka Musau, M.P.
9. The Hon. Amina Gedow Hassan, M.P
10. The Hon. Abdikhaim Osman Mohamed, M.P
11. The Hon. Clement Muturi Kigano, M.P.
12. The Hon. Elisha Odhiambo, MP
13. The Hon. Elsie Muhanda, MP
14. The Hon. Gitau Faith Wairimu, M.P.
15. The Hon. Julius Musili Mawathe, MP
16. The Hon. Ken Chonga, MP
17. The Hon. Tindi Nicholas Mwale, MP
18. The Hon. Walter Owino, MP
19. The Hon. Mohammed Ali Lokiro, MP

Committee Secretariat

The Committee is resourced with the following technical staff, representing the Office of the Clerk;

1. Mr. Benjamin Magut - First Clerk Assistant–Lead Clerk
2. Mr. Douglas Katho - Third Clerk Assistant
3. Ms. Brigita Mati - Legal Counsel
4. Mr. David Ngeno - Research Officer
5. Mr. Abdi Gorod - Fiscal Analyst
6. Mr. Joseph Okong’o - Media Relations Officer
7. Mr. John Ng’ang’a - Audio Recording Officer
8. Ms. Sheila Chebotibin - Sergeant at Arms

Delegation Membership

The delegation comprised of the following Members and staffers of the National Assembly:

- 1) Hon. Mohamed Lokiru, MP – Member of the Departmental Committee on Energy /
Leader of the Delegation
- 2) Hon. Elsie Muhanda, MP – Member of the Departmental Committee on Energy
- 3) Hon. (Capt.) Mohamed Ruweida, MP
- 4) Hon. Stanley Muthama, MP
- 5) Hon. Sharif Athman, MP
- 6) Senator Oletiptip Anwar, MP
- 7) Mr. Douglas Katho, Clerk Assistant III/Delegation Secretary
- 8) Mr. Jeremy Chabari, Legal Counsel II

Objective of the Study Visit

The delegation was guided by the main objective to enable the Members of Parliament understand the Operations of Ultra- Super critical coal fired power plants construction and operation.

Acknowledgment

Hon. Speaker,

The Committee wishes to sincerely thank the Offices of the Speaker and the Clerk of the National Assembly for the support and services extended to the Members to enable the Committee complete this report.

I am grateful for the Members of the Committee whose support enabled the Committee to accomplish this task. Special thanks to the Secretariat for their technical support during the compilation of the report.

On behalf of the Committee, and pursuant to the Standing Orders of the National Assembly, It my honor and privilege to present the Committee Report on the Study visit to the Karabiga Coal Plant in Turkey (13th -20th August, 2018) to the House for consideration and adoption.

Thank you

Signed.....

Hon. (Dr.) Robert Pukose, M.P

V/CHAIRMAN DEPARTMENTAL COMMITTEE ON ENERGY

DATE..... 4/12/2018

- 14) develop an efficient Environmental Management Plan; a legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project;
- 15) develop a Traffic Management Plan (TMP) for construction and operational phases. The TMP shall include procedures for transportation of abnormal loads, dust suppression measures, regular inspection of access roads conditions and signage at construction areas;
- 16) develop and implement a documented HR management system and plan with the specific procedures: conditions and terms of employment (contracts and agreements, employment and labor conditions, hiring and layoff), workplace non- discrimination, child/ forced labor policies, guidelines for drug and alcohol use, HIV/AIDS and other health risk-related activities;
- 17) National Environmental Authority (NEMA) to develop clear legal provisions for monitoring and evaluation of the project; and NEMA and County Government should conduct regular supervision mission to ensure compliance to various Environmental and Social Impact Assessment reports recommendations.
- 18) clear reporting mechanisms to NEMA and County Government on the adherence to Environmental Impact Assessment recommendations throughout the life cycle of the Coal Plant.

LIST OF RECOMMENDATIONS

The Committee made the following recommendations on the establishment of the Coal Plant in Kenya;

- 1) Good management of potential impacts on land acquisition and involuntary resettlement;
- 2) Ensure full disclosure, consultation and meaningful engagement of the persons affected by the project (PAPs) throughout the resettlement process (including the host communities);
- 3) Develop and implement a compensation plan for displaced and relocated people;
- 4) Implement the Resettlement Action Plan (RAP) in line with the Constitution, Land laws, National land policy (2009) and international best practice;
- 5) Ensure women are consulted especially during disbursement of compensation to bridge any existing gender inequalities and vulnerabilities arising from payments made to PAPs;
- 6) Provide financial management training to the PAPs to be able to manage compensation funds sustainably;
- 7) prioritize employment opportunities from members of the local community
- 8) the Coal plant should have CSR programmes that include efforts to support improvement of the tourism industry such as conservation of the forests, creation of recreation parks, preservation of heritage sites, etc;
- 9) to mitigate impacts on fishing industry, the EPC Contractor and O&M Company will not discharge raw effluent into the Manda bay which could adversely impact fisheries;
- 10) develop and implement a transparent recruitment process prioritizing the local community and communicate the same through the local administration/ Chiefs' office;
- 11) identify and facilitate training opportunities with vocational training institutions such as the Lamu Polytechnic for the local workforce to participate in other job sectors;
- 12) consult with local and national Government and nongovernmental agencies on the current and future infrastructural development plans for the County with a view of supplementing their implementation;
- 13) develop a Construction Management Plan (CMP) and sub-plans outlining procedures for management of Air quality, Dust emission, waste disposal and Sanitation, Camp management, HIV/AIDS policy, Malaria management and other communicable diseases;

1.1. Background on Coal

Over the years, coal has been used as an energy resource primarily burned for the production of electricity and heat. It is also used for industrial purposes such as refining metals. Coal is the largest source of energy for the generation of electricity worldwide as well as one of the largest worldwide anthropogenic sources of carbon dioxide releases. It produces about 42%¹ of the total electricity production around the world.

It is worth noting that world's proved coal reserves are currently sufficient to meet 134 years of global production, much higher than the R/P ratio for oil and gas². There are an estimated 1.1 trillion tonnes of proven coal reserves worldwide. R/P ratio is the length of time that those remaining reserves would last if production were to continue at the previous year's rate. They are calculated by dividing remaining reserves at the end of the year by the production in that year. The R/P ratios are calculated excluding other solid fuels in reserves and production.

The biggest reserves are in the USA, Russia, China and India. China is the largest coal consumer, accounting for 49% of the world's total coal. The next largest, is the United States, consumed 11% of the world's total. China's coal consumption increased by more than 2.3 billion tonnes over the past 10 years, accounting for 83% of the global increase in coal consumption. Australia is the world's largest coal exporter, exporting about 70% of its coal production.

The extraction of natural resources has however led to negative development performances³ which include among others; corruption, poor governance, violent conflicts, poorer economic performance, environmental pollution (28%⁴ of the carbon dioxide and Sulphur dioxide⁵ emissions come from coal extraction) and social grievances. The carbon dioxide gas is a major contributor to Green House Effect associated to global climate

¹ OECD/IEA 2010

² BP's Statistical Review of World Energy, 2017

³ Martin Neumann (2015); Extractive Industries and the Poor in Africa – A Case Study of Coal Mining in the Mui Basin, Kenya; *Masters Thesis*, Radboud University Nijmegen, Berlin

⁴ *Ibid.*,

⁵ Mutemi M and Samoei, D (2012) Status of Water Quality in The Coal Rich Mui Basin on Kitui County, Kenya *ARPAN Journal of Earth Sciences*

change. Sulphur dioxide and nitrogen dioxide in the atmosphere are associated with acid rain and lung cancer⁶.

1.2. Coal in Mui Basin, Kitui County

The Mui Coal Basin is located 180 km northeast of Nairobi, Kenya and covers an area of 500km². Exploration for coal has been conducted by Kenya's Ministry of Energy (MOE) since 1999 and has focused on four blocks, Blocks A, B, C and D, included surface geological mapping, geophysical surveys, exploration drilling, detailed coal quality analyses and resource evaluation.

A Chinese firm, Fenxi Industry Mining Company (FIMC), was contracted to mine coal way back in 2014.

Coal mining in Mui basin impacts directly on human settlement with attendant losses that include loss of housing and ancillary structures, loss of farmland and grazing land, loss of key infrastructure including schools, churches, cultural sites and commercial buildings, as well as potential loss of access issues. The directly affected population in Kitui County contained within the Mui Basin include⁷:

- a) Block A which covers the area between Zombe and Kabati spanning 121.5 km²
- b) Block B covering the area between Itiko and Mutito spanning an area of 117 km²
- c) Block C covering the area between Yoonye and Kateiko spanning an area of 131.5 km² and
- d) Block D which includes the area between Isekele and Karunga which is approximately 120 km².

1.3. Coal in Lamu

In 2013, the Government of Kenya proposed the construction of a 1,050-megawatt coal plant in Lamu County. It would be the first coal-fired generation plant in Kenya, and the first in East Africa. The proposed Lamu Coal Power Station is a 1,050 MW coal-fired

⁶ Baig and Yousuf (2017). Coal Fired Power Plants: Emission Problems and Controlling Techniques, *Journal of Earth Sci. and Climate Change*

⁷ Final Report of the Rapid Assessment of The Extractive Industry Sector in Kitui County: The Case of Coal Exploration and Mining in The Mui Basin by Diakonia

thermal power station which would be located on Kenya's Indian Ocean coast, 20km from Lamu's islands and historic Old Town, a UNESCO World Heritage site.

The project sponsor is the Amu Power Company, which has a power purchase agreement with electricity distributor Kenya Power. The project is expected to cost USD two billion and to be operational in 2020. Amu will have the mandate to operate and own the development for 25 years. The government is hoping to get power from the plant to support heavy industries and the plant will be relying on coal imported from South Africa until Kenya starts sourcing coal from Kitui's Mui Basin.

Kenya is also determined to practice a balance between non-renewable and renewable energy with the aim of promoting clean energy by 2030 and industrialization. The state is also set to join the proposed Clean-Coal Alliance whose objective is to share technology on burning coal while producing very little smoke.

The US delegation at the COP23 climate talks in December, 2017 promoted the use of new technologies that improve efficiency and reduce emissions from coal and other fossil fuels as part of the solution to climate change. The Donald Trump administration is pushing for an international "clean coal alliance" that would share carbon capture and storage (CCS) and high efficiency, low emission (HELE) technologies with developing countries. The alliance would likely be made up of some of the biggest coal consumers in the world, such as the US, along with coal consuming countries, including Japan, Australia, Vietnam and some African countries.⁸

The plant will run on steam provided by three super-critical boilers, three steam driven turbines (350 MW each) that will power three generators of similar size to produce the electricity. With an expected annual dispatch factor of 85%, the plant will feed 7,308,249 MWh into the national grid annually.

The project technology is based on super-critical heating of pulverized coal which ensures the highest efficiency in burning coal to reduce Greenhouse Gases (GHG) emissions. In

⁸ The energy advocate website

addition, the project will include a wet Limestone Flue Gas Desulphurization (FGD) System to minimize Sulphur dioxide emissions, Low Nitrous Oxide Burners to be used in combustion technology to reduce Nitrous Oxide emissions and High Efficiency Electrostatic Dust Precipitators (ESP) for particulate

1.3.1. Project Components.

The key project components as at now will include—

- (a) three high-pressure supercritical units each of 350MW, with condensing steam turbines operating as base load capacity;
- (b) coal receiving berth at Kililana with coal off-loading and handling equipment;
- (c) construction of a terrestrial based coal conveyor system (~15km long) complete with transfer towers between the coal receiving berth at Kililana and the coal stock yard within the project site;
- (d) a coal stock yard with 38 days' storage capacity, including 20 days of Security Stock;
- (e) a 1270mX900m Ash yard, 25.8 m high and designed for a storage capacity of 15 years;
- (f) construction of a Limestone receiving system and gypsum handling system;
- (g) construction of a once-through sea water cooling system;
- (h) construction of a Flue gas air quality conditioning equipment including a 210m tall chimney. This includes a flue gas desulphurization system and electrostatic precipitators;
- (i) development of Sea water desalination facilities to meet the demand for the power plant's process water, service/fire water as well as water for domestic use;
- (j) a Sub-station and switching facilities up to the 400 kV overhead line gantries for power evacuation into the KETRACO 400 kV system;
- (k) distributed control system (DCS) for monitoring and control of plant operation;
- (l) buildings, roads, and other structures for the Project;
- (m) auxiliary boiler and black-start diesel generator (DG); and
- (n) a permanent workforce for the operational phase of the project having a capacity to accommodate 250 – 300 persons.

1.3.2. Waste water discharge

The Coal Plant plans to discharge cooled water into the ocean using submerged pipes with a diffuser at the end installed for cooling water discharge.

1.3.3. Energy supply alternatives

Based on an analysis of the various energy supply alternatives, it has been established that the coal fired power plant has the following benefits over all other sources of energy—

- (a) coal power has the lowest levelised cost of electricity (LCOE) of US¢7.52/kW hour;
- (b) coal fired power plant has a relative quick development timeline to commercial operation date (COD) and is second to a natural gas fired power plant;
- (c) coal fired power plants technology is proven over many years and continuous improvements are being made in order to make them more efficient and environmentally sustainable; and
- (d) it is easy to get professionals globally for coal fired power plants.

1.4. Amu Power Company Ltd.

Amu Power Company Limited is a consortium of Gulf Energy, Centum Investment Group, China Huadian, Sichuan No 3 Power Construction Company and Sichuan Electric Power Design and Consulting Company. The special purpose vehicle will develop, own and operate the station for 25 years as part of the Lamu Port and Lamu-Southern Sudan-Ethiopia Transport Corridor, which will include the proposed Lamu Port at Manda Bay, connecting railroads, oil pipelines, and a refinery⁹.

In 2013, the Government of Kenya initiated plans for developing the Lamu Coal Power Plant. The proposed plant was scheduled to generate 1,050 megawatts of coal-fired thermal power on 865 acres of land at Kwasasi, Lamu County.

In January 2014, the Government of Kenya invited bids from private developers to build, own, and operate the power station. In September 2014, the development rights were awarded to a consortium consisting of Gulf Energy, a Kenyan energy generating company, Centum Investments, a private equity firm, headquartered in Nairobi, with investments in Kenya and Uganda and Sichuan Electric Power Design and Consulting Company Limited, a subsidiary of Power Construction Corporation of China.

⁹ https://www.sourcewatch.org/index.php/Lamu_Power_Project#cite_note-Sign-28

2. VISIT TO THE KARABIGA CENAL POWER STATION

2.1. The Karabiga Cenal Power Station

Cenal power station, also known as Karabiga Cenal power station, is a 1,320-megawatt (MW) coal-fired power plant in Çanakkale province, Turkey.

The Karabiga Cenal Power Station is a 50-50 JV of Cengiz Holding A.Ş. and Alarko Holding A.Ş, two of the biggest Turkish construction companies. It was founded in 2011 to develop the very first Turkish power plant equipped with ultra-supercritical boiler technology.

The design had to accommodate a diverse range of coal from various sources around the world

The project was designed to local Turkish and international standards with stringent European Union emission standards.

The project was designed by a Chinese Design Institute and constructed by local Turkish companies.

CENAL Enerji, a leading EPC and plant owner operating in Turkey, hired ThermoGen Power Services Inc. to execute the power plant performance acceptance test for the ultra-super critical coal plant Karabiga, located in Canakkale, Turkey.

The Ultra Super Critical Coal Plant includes two blocks of 660 MW each using ultra super critical coal boiler technology from Alstom.

These ultra super critical coal boilers feed two steam turbines each generating 660 MW at full load. Furthermore, these boilers technology allow the plant to generate low emissions as their boiler efficiency is highly improved. As a result, this plant is one of the most efficient plants in the world.

The testing program includes the following activities:

- (a) revision of the performance, emissions and acoustic guarantees;
- (b) identify the design of the plant and current instrumentation;
- (c) advise on the performance test procedure revisions;
- (d) creation of the emissions and acoustic test procedures;
- (e) approval and applicable revisions of the performance, emissions and acoustic test procedures until they are accepted by all the involved parties;
- (f) supply high-precision temporary testing instrumentation to conduct the overall plant performance tests;
- (g) installation of the precision testing instrumentation;

- (h) technical Direction during the performance test (thermal, emissions and acoustic testing);
- (i) collection of data from all available resources (high-precision instrumentation);
- (j) creation of the preliminary performance test report;
- (k) creation of the final performance test report;
- (l) discussion of testing results with the witnessing party until acceptance.

Finally, TGPS led the test execution; installation; testing equipment installation and test reports in coordination with CENAL, GE and local contractors

2.2. Ultra-supercritical boiler, turbine and generator design

At the heart of coal-fired electricity generation lies the steam cycle. Typically, pulverised coal is fed into a giant industrial furnace surrounded by boiler tubes filled with water. The burning coal heats the water to create steam, which is transferred at high-pressure to turbines linked to a generator.

As the generator spins, electrons are generated that are stepped up in voltage by transformers, while the turbine steam is condensed back into water and returned to the boiler for reheating.

In ultra-supercritical steam (USC) power plants, the extreme boiler temperature and pressure heat the water so that it becomes a 'supercritical' fluid that exhibits properties of liquid and gas phases.

In this state, supercritical steam is much more efficient at driving the giant turbines that spin the plant's generators. The upfront cost of such technology is 20%–30% more expensive than a traditional subcritical unit, but that is offset by improved net thermal efficiency levels and reduced emissions

The second unit of the Karabiga Energy Power Plant consisting of 2 units of a 660 MW capacity each and whose first unit went in operation on November 7, 2017 in accordance with the provisional acceptance of the ETKB (Ministry of Energy and Natural Resources) was completed successfully and went into commercial operation on December 27, 2017 following the ETKB's provisional acceptance. The power plant is continuing its production at full capacity with two units in coordination with load dispatching.

The Karabiga Energy Power Plant completed according to the “Advanced Technology” and “Environmental Energy” slogans, making use of high quality imported coal, and our

country's first Ultra Super Critical Power Plant, ensures boiler fuel release flu gas much lower than norms attained thanks to "Nitrogen Oxides Purification Systems", "Electrostatic Precipitators" and "Desulphurization from Sea Water Systems".¹⁰

The plant sells the ash by product to cement factories in Europe and USA. The Turkish Environmental Regulator monitors the emissions from the Plant daily. The regulator has fixed a "sensor" to relay the emissions from the plant daily to the government. The plant also has a jetty for ships to offload coal. The coal storage area is covered to prevent environmental degradation. The coal ash is transported through a road that is far away from the residential area. Kabariga Power Plant has been developed using GE Ultra-Super Critical Coal Power Technology,

3. COMMITTEE OBSERVATIONS

The Committee made the following observations on the exploration and future mining of coal resources in Kenya:

- 1) That energy is an enabler of development. Access to affordable and reliable electricity is the foundation of prosperity in the modern world. Even has Kenya adopts the use of coal as an affordable and reliable energy it is important to ensure that it adopts the best technology to minimize the environment impact of coal mining and further ensure a clean environment for its citizens pursuant to article 42 of the Constitution of Kenya, 2010.¹¹
- 2) That there is a general downward trend among the heavy producers and consumers of coal to retire their plants to pave way for the introduction of efficient and climate friendly technologies of power production.
- 3) That Kenya has ratified Kyoto Protocol which is an international agreement linked to the United Nations Framework Convention on Climate Change can adopts the best technology to minimize the environment impact of coal mining and further ensure a clean environment for its citizens pursuant to article 42 of the Constitution of Kenya, 2010.

¹⁰ <https://www.alarko.com.tr/ajax/page/canakkale-karabiga-ithal-komur-santrali-en>

¹¹ Constitution of Kenya, 2010

- 4) That the discovery of oil in Kenya is coming at the time when use of fossil fuels is getting international condemnation with regard to climate change, however Kenya can further venture into solar, geothermal, wind, and tidal waves among others.
- 5) That the National Land Commission should ensure that the people affected by the project are fully compensated before the works begin.
- 6) That the environmental Authorities have come up with relevant regulations on coal fired electric power plants before works on construction of the coal fired electric power plant in Karabiga and taking into consideration;- an integrated approach that requires the permits or licences for power generation plant to consider the whole environmental performance of the plant, covering e.g. emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, and restoration of the site upon closure; emission limit values of mercury, hydrogen chloride and hydrogen fluoride from the combustion of solid fuels; environmental inspections with adequate plans accordingly; and a public participation in the decision-making process, and inform the public of its consequences, by having access to permit applications, permits and the results of the monitoring of releases;
- 7) That since Coal mining involves displacement of human population with attendant losses of housing and ancillary structures, farmland and grazing land, key infrastructure including schools, churches, cultural sites and commercial buildings, as well as potential loss of access issues then:
 - i. civic education on the potential benefits of the project to the residents in the affected areas must be addressed comprehensively. To avoid conflicting messaging and discordance, the partners should work closely with the Liaison Committees and authorities to develop manuals that can then be used to conduct proper civic education.
 - ii. Elaborate compensation mechanisms for the displaced be established and should be transparent and accountable to eliminate incidences of corruption
 - iii. The political economy environment in the country demands a strategic entry point for any intervention. The most prudent entry-point would be through ecumenical structures and respected community leaders/seers. This is premised on the belief that the religious institutions relish the advantage of being in touch with the grassroots populations and are also able to engage at the highest political level.
 - iv. there is need to identify champions who can amplify the voices of communities up to the national level surrounding the coal development

project to include women, youth, faith leaders and other opinion leaders to drive key messages. These stakeholders should be inducted and trained on the salient issues at play and should be able to then build knowledge and understanding amongst their peers.

- 8) That the Museums Authority in Karabiga were able to play a **role on Potential impacts on immovable archaeological finds by:-**
- i. institute a watch brief to for all excavation activities;
 - ii. develop and implement a chance finds procedure which must be incorporated into contract documents for all Contractors who will undertake construction works;
 - iii. undertake construction works carefully in areas with Mwongo trees for any visible signs of human remains;
 - iv. here human remains appear in the course of any excavations, work should stop and a qualified scientist from the National Museums of Kenya engaged to advise on the way forward.;
 - v. engaging a qualified scientist from National Museums of Kenya during the construction to offer advise during construction phase
- 9) That a monitoring plan which includes both internal and external monitoring comprising of a three tier process that includes internal field monitoring by the Resident Supervising Consultant (RSC) and the Project Implementation Unit (PIU) with monthly audits by the Environmental Control Officer to detect early deviations from expected performance and early institution of remedial measures.

4. RECOMMENDATIONS

The Committee made the following recommendations on the establishment of the Coal Plant in Kenya;

- 1) Good management of potential impacts on land acquisition and involuntary resettlement;
- 2) Ensure full disclosure, consultation and meaningful engagement of the persons affected by the project (PAPs) throughout the resettlement process (including the host communities);
- 3) Develop and implement a compensation plan for displaced and relocated people;
- 4) Implement the Resettlement Action Plan (RAP) in line with the Constitution, Land laws, National land policy (2009) and international best practice;
- 5) Ensure women are consulted especially during disbursement of compensation to bridge any existing gender inequalities and vulnerabilities arising from payments made to PAPs;
- 6) Provide financial management training to the PAPs to be able to manage compensation funds sustainably;
- 7) prioritize employment opportunities from members of the local community
- 8) the Coal plant should have CSR programmes that include efforts to support improvement of the tourism industry such as conservation of the forests, creation of recreation parks, preservation of heritage sites, etc;
- 9) to mitigate impacts on fishing industry, the EPC Contractor and O&M Company will not discharge raw effluent into the Manda bay which could adversely impact fisheries;
- 10) develop and implement a transparent recruitment process prioritizing the local community and communicate the same through the local administration/ Chiefs' office;
- 11) identify and facilitate training opportunities with vocational training institutions such as the Lamu Polytechnic for the local workforce to participate in other job sectors;
- 12) consult with local and national Government and nongovernmental agencies on the current and future infrastructural development plans for the County with a view of supplementing their implementation;
- 13) develop a Construction Management Plan (CMP) and sub-plans outlining procedures for management of Air quality, Dust emission, waste disposal and Sanitation, Camp management, HIV/AIDS policy, Malaria management and other communicable diseases;

- 14) develop an efficient Environmental Management Plan; a legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project;
- 15) develop a Traffic Management Plan (TMP) for construction and operational phases. The TMP shall include procedures for transportation of abnormal loads, dust suppression measures, regular inspection of access roads conditions and signage at construction areas;
- 16) develop and implement a documented HR management system and plan with the specific procedures: conditions and terms of employment (contracts and agreements, employment and labor conditions, hiring and layoff), workplace non- discrimination, child/ forced labor policies, guidelines for drug and alcohol use, HIV/AIDS and other health risk-related activities;
- 17) National Environmental Authority (NEMA) to develop clear legal provisions for monitoring and evaluation of the project; and NEMA and County Government should conduct regular supervision mission to ensure compliance to various Environmental and Social Impact Assessment reports recommendations.
- 18) clear reporting mechanisms to NEMA and County Government on the adherence to Environmental Impact Assessment recommendations throughout the life cycle of the Coal Plant.