



Environment and Social Impact Assessment (ESIA) Study for the Proposed 1,050MW Coal Fired Power Plant Project, Kenya

Report Prepared for

Amu Power Company Limited

Report No. KT/4085/ESIA/V1/R1

July 16



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Prepared for:

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1 Project details

Title of Project	: 1,050MW Coal Fired Power Plant, Lamu County, Kenya	
NEMA Reference Number	: NEMA/PR/5/2/14779	
Owner's Engineer (Up to Financial Close)	: Sargent and Lundy, Chicago, USA	
NEMA licensed Firm of Experts	: Kurrent Technologies Ltd. (Kenya)	
NEMA License Number	: 0191	
Specialists	Study name	Specialist
	Marine Thermal Discharge Study	: Ward Karlson Consulting
	Air Quality Study	: Ward Karlson Consulting
	Nosie Quality Study	: Ward Karlson Consulting
	Ecological Impact Assessment Study	: Geoffrey Mwangi, Dr. George G. Ndiritu, Dr. Peter Njoroge, Mr. Vincent Muchai, Mr. Laban Njoroge, Mr. Kennedy Wambua
	Geology and Soils Study	: Mr. Bernard Muhangu – Reg. Geologist
	Hydrology study	: Mr. Bernard Muhangu – Reg. Geologist
	Hydrogeology study	: Mr. Bernard Muhangu – Reg. Geologist
	Social Impact Assessment study	: Ms. Belinda Muya and Mr. Gideon Owaga
	Cultural Heritage Assessment study	: Dr. Freda Nkirote and Ms. Angela Kabiru
	Visual Impact Assessment Study	: Aurecon South Africa

Disclaimer

Please see disclaimer below regarding this ESIA Study.

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Where field investigations have been carried out these have been restricted to a level of detail required for achieving the stated objectives of the work.

This work has been undertaken in accordance with the Quality Management System of Kurrent Technologies Ltd.

2 Acronyms and abbreviations

Acronym	Definition
AfDB	African Development Bank
ALARP	As Low As Reasonably Practical
APCL	Amu Power Company Limited
API	American Petroleum Institute
asl	Above Sea Level
BAT	Best Available Technologies
BMP	Best Management Practices
BSI	British Standards Institute
CDL	Chart Datum Level
CLO	Community Liaison Officer
DB	Distribution Board
DOSHS	Directorate of Occupational Safety and Health Services
DWT	Dead weight tons
EDL	Effluent Discharge License
EMCA	Environment Management and Coordination Act, 1999
EPR	Environment Project Report
ERC	Energy Regulatory Commission
ESIA	Environment And Social Impact Assessment
ESMP	Environment And Social Management Plan
ESP	Electro-Static Precipitator
ETP	Effluent treatment plant
FGD	Flue Gas Desulfurization
FY	Fiscal Year
H&S	Health and Safety

Acronym	Definition
Ha	Hectare
HIA	Heritage Impact Assessment
HSD	High Speed Diesel
I&APs	Interested and Affected Parties
IFC	International Finance Corporation
IPP	Independent Power Producer
JSA	Job Safety Analysis
KenGen	Kenya Electricity Generating Company Ltd.
KETRACO	Kenya Electricity Transmission Company
Km²	Square Kilometers
KP	Kenya Power
KPA	Kenya Ports Authority
KTL	Kurrent Technologies Ltd.
kV	Kilovolt
kWH	Kilowatt Hour
L.N.	Legal Notice
LAPSSSET	Lamu Port South Sudan Ethiopia Transport Corridor Project
m²	Square meters
m³/day	Cubic meters per day
m³/hour	Cubic meters per hour
masl	Meters Above Sea Level
MCA	Member of the County Assembly
MCE	Member of the County Executive
mg/l	Milligrams per liter
MJ/kg	Mega joules per kilogram
MoEP	Ministry of Energy and Petroleum

Acronym	Definition
MP	Member of Parliament
MPA	Mega Pascal
MSD	Medium Speed Diesel
Mt	Million tons
MW	Megawatt
NEMA	National Environment Management Authority
NFPA	National Fire Protection Association
NLC	National Land Commission
NMK	National Museums of Kenya
NO_x	Oxides of nitrogen
OEM	Original Equipment Manufacturer
OGV	Ocean going vessel
OSHA	Occupational Safety and Health Act, 2007
OUV	Outstanding universal value
OWS	Oil Water Separator
PM₁₀	Particulates with a diameter of 10µm or more
PM_{2.5}	Particulates with a diameter of 2.5µm or more
PPE	Personal Protective Equipment
ppm	Parts per million
ppm	Parts Per Million
PPP	Public Private Partnership
ppt	Parts per thousand
S&L	Sargent & Lundy
SCR	Selective Catalytic Reduction
SEDC	Sichuan Electric Power Design & Consulting Co. Ltd.
SIA	Social Impact Assessment

Acronym	Definition
SO₂	Sulfur dioxide
SO_x	Oxides of sulfur
STI	Sexually Transmitted Infection
ToR	Terms of Reference
UKC	Under Keel Clearance
UNFCCC	United Nations Framework Convention on Climate Change
VIA	Visual Impact Assessment
WHC	World Heritage Council
WHO	World Health Organization
WHS	World heritage site
WWTP	Waste Water Treatment Plant

3 Terminology and Definitions

Terminology	Definition
Alien species	Animals and plants invading and becoming established in areas where they do not normally occur
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the “do-nothing” alternative.
Ambient	Refers to the surrounding environment and/or conditions
Ambient sound level or ambient noise	The totally encompassing sound in a given situation at a given time and usually composed of sound from many sources, both near and far. Note that ambient noise includes the noise from the noise source under investigation. The use of the word ambient should however always be clearly defined (compare with residual noise).
Aquifer	A bounded underground accumulation of water in certain types of geological formations
Biodiversity	The number and variety of living organisms on earth, the millions of plants, animals, and micro-organisms, the genes they contain, the evolutionary history and potential they encompass, and the ecosystems, ecological processes, and landscapes of which they are integral parts.
Compaction	Compression of the soil such that it is difficult to plough, and water cannot drain through it effectively or an increase in the density of something.
Cultural resources	A broad term covering any physical, natural and spiritual properties and features that are adapted, used and created by humans, in the past and the present. Cultural resources include traditional systems of cultural practice, belief or social interaction.
Cumulative impacts	Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients or heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
Direct impacts	Impacts that are caused directly by an activity and generally occur at the same time and at the place of the activity. These impacts are generally associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
Domestic Waste	Solid waste, composed of garbage and rubbish, which normally originates from residential, private households, or apartment buildings. Domestic waste may contain a significant amount of toxic or hazardous waste from improperly discarded pesticides, paints, batteries, and cleaners.

Terminology	Definition
Do-nothing alternative	The “do-nothing” alternative is the option of not undertaking the proposed activity or any of its alternatives. The “do-nothing” alternative also provides the baseline against which the impacts of other alternatives should be compared.
Economic growth	Percentage change in GDP, generally measured in terms of a calendar year.
Ecosystem	Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space.
Effluent	That water which flows out of a man-made system into a river, usually wastewater.
Emissions	Referring to pollutants released into the atmosphere.
Employment	Number of people employed in jobs in the formal sector of the economy.
Endangered species	Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.
Endemic	An “endemic” species is a species that grows in a particular area (is endemic to that area) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.
Environment	The surroundings within which humans exist and that are made up of: <ul style="list-style-type: none"> i). The land, water and atmosphere of the earth; ii). Micro-organisms, plant and animal life; iii). Any part or combination of (i) and (ii) and the inter-relationships among and between them; and iv). The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environment Impact Assessment	Environment Impact Assessment (EIA) means the process of collecting, organizing, analyzing, interpreting and communicating information that is relevant to the consideration of the application.
Environmental impact	The degree of change in an environment resulting from the effect of an activity on the environment, whether desirable or undesirable. Impacts include both the direct or indirect consequences of an activity.
Environmental Impact Assessment Report	In-depth assessment of impacts associated with a proposed development. The second Phase of an Environmental Impact Assessment.
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.
Erosion	Wearing away or rock and soil by physical or chemical action, especially by wind or water, leading to removal of particles.
Fauna	The animal life of a region.

Terminology	Definition
Flora	The plant life of a region.
Groundwater	Subsurface water in the saturated zone below the water table.
Habitat	The normal abode or locality of a living organism defined by the set of physical, chemical and biological features. the natural home of species of plants or animals.
Hazardous	Processes or substances which have the potential to cause significant danger or harm to human health or the environment (e.g. hazardous waste).
Heritage	That which is inherited and forms part of the National Estate.
Hydrology	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Indigenous	Born, growing, or produced naturally (native) in an area, region, or country.
Indirect impacts	Indirect or induced changes that may occur as a result of the proposed activity (e.g. the reduction of water in a stream that supplies water to a reservoir that supplies water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
Industrial	Resource use patterns linked to or influenced by commercial / industrial benefits.
Land	Terrestrial bio-productive system that comprises soil, vegetation and other biota, as well as the ecological and hydrological processes that operate within the system.
Legal requirements	Identification and listing of the specific legislation and permit requirements which could potentially be infringed upon by the proposed project, if mitigation is necessary should the proposed development impact on a heritage resource.
Migration	The number of people entering and leaving the country. Internal migration refers to the relocation of people within the country.
Monitoring	In an environmental context, the repetitive and continued observation, measurement and evaluation of environmental data to follow changes over a period of time to assess the efficiency of control measures.
Negative impact	A resultant change due to an activity that reduces the quality of the environment (e.g. by reducing indigenous species diversity and the reproductive capacity of the ecosystem; by damaging health; property or by causing nuisance).
Noise	Any acoustic phenomenon producing any aural sensation perceived as disagreeable or disturbing by an individual or group. Noise may therefore be defined as any unwanted sound or sound that is loud, unpleasant or unexpected.
Perennial	Flow throughout the year.
Pollutant	A substance that contaminates.

Terminology	Definition
Pollution	Defilement or unfavorable alteration of the surroundings, normally as a result of human actions. In the water environment, any foreign substance that impairs the usefulness of water.
Pollution prevention	Complete prevention of releasing hazardous substances having polluting properties to any public stream or water body.
Positive impact	A resultant change due to an activity that improves the quality of the environment (e.g. restoring natural species diversity and ecosystem functioning, by removing nuisances or improving amenities).
Rare and endangered species	Species, which have naturally small populations, and species which have been reduced to small (often unstable) populations by man's activities.
Red data species	Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of threatened species.
Rehabilitation	The restoration of a disturbed area which has been degraded as a result of activities such as mining, road construction or waste disposal, to a land use in conformity with the original land use before the activity started.
Significant impact	An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.
Soil	A mixture of organic and inorganic substances, the composition and structure of the latter is derived from the parent rock material. Soil also contains bacteria, fungi, viruses and micro-arthropods, nematodes and worms.
Solid Waste	Any solid, semi-solid, liquid, or contained gaseous materials discarded from industrial, commercial, mining, or agricultural operations, and from community activities. Solid waste includes garbage, construction debris, commercial refuse, sludge from water supply or waste treatment plants, or air pollution control facilities, and other discarded materials.
Stakeholder	Individuals or groups concerned with or affected by an activity and its consequences. These include authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.
Surface Water	All water naturally open to the atmosphere (rivers, lakes, reservoirs, ponds, streams, seas, estuaries) and all springs, wells, or other collectors directly influenced by surface water.
Topography	Referring to natural features on the surface of the earth.
Topsoil	The top few centimeters of soil that contains most of the soil organic matter and nutrients.