



IN THE NATIONAL ENVIRONMENT TRIBUNAL AT NAIROBI

SAVE LAMU.....1ST APPELLANT
SOMO M. SOMO.....2ND APPELLANT
RAYA FAMAU AHMED..... 3RD APPELLANT
MOHAMMED MBWANA.....4TH APPELLANT
JAMAL AHMED ALI.....5TH APPELLANT
ABUBAKAR MOHAMMED TWALIB.....6TH APPELLANT

-VERSUS-

NATIONAL ENVIRONMENTAL MANAGEMENT AUTHORITY.....1ST RESPONDENT
AMU POWER COMPANY LIMITED.....2ND RESPONDENT

WITNESS STATEMENT
STATEMENT OF DAVID OBURA

1. I am a Founding Director of Coastal Oceans Research and Development in the Indian Ocean (CORDIO) East Africa, a Kenyan research organization, and an Environmental Impact Assessment Expert registered by NEMA (#208) in 2007. I have served in reviews of several environmental cases before the National Environmental Tribunal (NET), including one on Blazer Investments (Watamu, 2008) and the East Africa Whale Shark Project (Tiwi, 2013).
2. I have a PhD in Marine Biology (1995) from the University of Miami, USA, and a BSc Honors degree in Zoology (1989) from Harvard University, USA. My professional affiliations include: Fellow of the Western Indian Ocean Marine Science Association (Zanzibar); Chair of the Coral Specialist Group of the International Union for the Conservation of Nature Species Survival Commission and further serve on its Marine Conservation Sub-Committee; Member of the Global Ocean Observing System's Biodiversity and Ecosystems Panel; Member of the Group on Earth Observations Biodiversity Observation Network's (GEOBON) Marine Biodiversity Observation Network (MBON); Technical Lead of the Global Coral Reef Monitoring Network (GCRMN) of the International Coral Reef Initiative (ICRI) starting in 2017; Member of the Marine Protected Areas Action Group; Member of the Steering Committee of the bioDISCOVERY project of Future Earth; Member of the Scientific Steering Committee for the 50reefs initiative of the Global Climate Change Institute (University of Queensland, Australia) and the Ocean Agency.
3. With regard to the project area in question, I started working on the marine environment in Lamu County in 1994 with a site visit on behalf of Kenya Wildlife Service (KWS) to assess the prospects for a community protected area at Kiweni, Pate reef (opposite Manda Toto Island). I then led a joint coral reef monitoring programme with KWS, WWF and CORDIO

from 1999 to 2007 after which the programme was continued by other partners. The work covered the reefs from Ras Tenewi in the south, the Manda and Pate reefs, and reefs in the Kiunga Marine Reserve as far as Kiunga town. Further, in 2015, I conducted additional surveys on the Pate Reef System and Kiunga Marine Reserve in partnership with The Nature Conservancy and Northern Rangelands Trust-Coast (NRT-Coast) to set a baseline for community conservancies around Pate Island. I am thus well versed in all matters marine and environmental in Lamu County and fit to make this statement.

4. It is my testimony that the Environmental and Social Impact Assessment Study hereinafter referred to as “the EIA”, conducted for the proposed 1,050 Megawatt (MW) Lamu Coal Plant project has gross omissions with respect to critical environmental impacts. These center around toxic compounds in coal dust and ash, their mobilization into the air and sea, and impacts particularly on marine biota. Aspects of physical dispersion are presented, but the EIA totally lacks any discussion or references to biological and physiological interactions and impacts. As a result, the license conditions are inadequate to safeguard the surrounding environment and people from negative impacts of the coal plant. Solely on this basis, the license should be rescinded until these and other omissions are dealt with.
5. Further, the cumulative impacts section under the EIA is also grossly inadequate as it does not consider the entire LAPPSET Master Plan of which the coal plant is one part. On the basis of this, an EIA for the coal plant cannot be complete until Strategic Environmental Assessment(s) is/are conducted that address the multiple issues engendered by the project(s) described in the Master Plan, and identify objectively the scope each individual EIA should cover.
6. With regard to climate change, this being the largest (planetary) scale of environmental impact from human activities, not only is the principal impact of the plant, which is minimizing carbon dioxide emissions from the actual burning of coal, not mitigated, further, the project is in opposition to Kenya’s national and international commitments under the UNFCCC regime, and in particular, the Paris Agreement, to minimize and reduce greenhouse gas emissions. The project also nullifies any national benefits accrued from other energy sector projects from zero- or low-emission sources such as wind, geothermal and solar energy.

Environmental concerns arising from coal dust and coal ash

7. Coal dust, a fine powdered form of coal, can be created during mining, transportation, or by mechanically handling coal. It improves the speed and efficiency of burning and makes the coal easier to handle. Coal, and therefore its dust, contains toxicants such as polycyclic aromatic hydrocarbons (PAHs) and trace metals/metalloids.
8. Coal ash is the residue left once coal dust is burnt. Most coal ash contains aluminum oxide (Al_2O_3), calcium oxide (CaO), silicon dioxide (SiO_2), as well as trace metals including arsenic, boron, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, selenium, thallium and uranium.
9. The EIA considers the following components of coal in investigating air pollution effects: SO_x (oxides of sulphur), NO_x (oxides of nitrogen), particulate matter fractions (PM10 and PM2.5) and, it also mentions oxygen and carbon monoxide. However, as earlier asserted, another key toxic component of coal are polycyclic aromatic hydrocarbons (PAHs). The following word searches in the entire EIA documentation reveal the following:

- a. “PAH” is quoted on page 16 in Appendix 14C SGS Baseline Water And Sediment Quality Report, in “all samples were analyzed for metals, nutrients and PAH at SGS laboratory”. However, no such results for PAH are presented.
 - b. The words “polycyclic”, “aromatic” and “hydrocarbons”, either singly or together, are written once, in 4-Description of the Project, in Table 4-3: “Light Diesel Oil specifications”.
 - c. There is thus no assessment of these particular toxic components of coal in the EIA, which is required.
10. It is also my submission that wind conditions considered for the dispersion of dust/smoke are entirely inadequate. The site experiences monsoon seasonality, which means strong winds from the south/southeast for 4-6 months, strong winds from the north/northeast for about 2 months and fluctuating/calm conditions in between. Further, wind conditions vary over a 24-hour period, usually with relatively calm conditions at night and in the morning, with strong peak winds around midday and in the afternoon. The wind rose fig 5-1 in the Air Quality Study of the EIA shows only the frequency of wind direction, but presents no data on wind speed, which is the primary variable affecting dust/smoke/ash plume dispersal, and its variation by season and time of day. Thus, it is totally insufficient for describing what can happen in the different seasons, with key vulnerabilities depending on the three conditions mentioned above.
11. Further, the presentation of results in the Air Quality Study of the EIA hides the significance of air pollution of the plant in two ways:
 - a. The main text does not refer to the maps in Annex C, thus hiding presentation of dispersal of plumes. Further, the maps do not give clear indications of the locations of sensitive receptors.
 - b. Tables 5-10 to 5-14 show average conditions by hour, day and year. Because of the high variability in wind speed and direction with daily and seasonal variability, peak values and the worst case scenarios must be presented (e.g. top 10%), not averages. In addition, the method for averaging over these time periods is not explained.
12. The practice of submitting Air Dispersal results is that it needs to be presented and assessed with respect to the following:
 - a. Under different seasonal wind conditions at daily peak winds during those seasons;
 - b. Illustrated by maps showing the locations of sensitive receptors; and,
 - c. With additional maps extending to the farthest reach of air pollution levels above ambient.
13. As regards coal handling, 4-Description of the Project indicates that coal handling facilities from the ship to the plant had not been described at the time of the EIA, so no impacts are described or assessed (section 4.6.1.2, page 14, 4-Project Description). It is my submission that the license should not have been issued until all aspects of environmental impacts are fully assessed, especially since the transport route shown in fig. 4-2 is approximately 15 km.

14. Further, the ash yard is described in 4-Description of the Project, with a number of issues related to it being inadequate or unclear:
 - a. It is planned to have a storage capacity of 15 years of operation. However, the operational life of the plant is projected to be over 30 years (4-Project Description, 4.11- Decommissioning). Provision for ash disposal for the total operating life of the plant must thus be anticipated in the EIA.
 - b. It is designed to Chinese Standard GB 18599-2001. Given the exorbitant levels of pollution known from China in the coal/energy sector and laxity in their environmental and mining laws, I submit that NEMA should look further into this and ensure that it is adequate for Kenya.
 - c. Further, the impact assessment section (8-Assessment of Potential Social and Environmental Impacts and Mitigation Measures, section 8.6.3, table 8-23) does not include any assessment of wind and suppression of dust blowing off the ash yard and into the atmosphere.
15. As regards dust suppression related to the coal stockpile, 4-Description of the Project states “To control dust to the air from the coal storage area, a permanent water sprinkler system shall be provided” (page 18), and this is anticipated to reduce dust by 50% (Air Quality Study, Table 7-1). However, water use for this system is not indicated quantitatively, though it seems from section 4.10.2.4 (4-Project Description) that it will be supplied from desalination. Even so, the volumes and capacity for operations need to be specified clearly. The same section further states “The entire coal handling system, including the coal conveyors, shall be completely encapsulated by dust proof enclosures. At areas where dust formation is expected, e.g. at transfer points, dust shall be collected by suction systems with filters”. But these are not described, and their effectiveness is not assessed in the impact assessment.
16. As regards emissions, 4-Description of the Project states “The emissions control equipment for each pulverized coal-fired boiler would consist of low nitrogen oxide burners, wet flue gas desulfurization and electro-static precipitator” (section 4.6.4) but does not describe these further, or their efficiency. “Wet flue gas desulfurization” is further described in 8-Assessment of Potential Social and Environmental Impacts and Mitigation Measures, section 8.2.2, as scrubbing by seawater, meaning that sulphur is transferred from the air into seawater. No further assessment is made of the impact of this sulphur in seawater, as it has toxic impacts in seawater, as much as it does in the air.
17. As regards the water supply system referred to in section 4.6.2 of 4-Description of the Project, this section does not distinguish freshwater from seawater, and doesn’t clearly indicate the dust-control freshwater needs, nor the source of this freshwater (though section 4.10.2.4 of 4-Project Description suggests it is from desalination).
18. Further, all of the treatment of toxic emissions and coal dust/ash, to the extent they are done in the EIA relate *exclusively* to impacts in the air and terrestrial environments. In no case are any impacts considered in the marine environment in spite of the EIA itself emphasizing the value of marine ecosystems in the project area, and there being adequate evidence that toxic effects are also relevant in the sea. Of particular relevance to the project site are these findings:
 - a. Broad-based evidence of physical impacts of coal dust, and varied but significant evidence physiological impacts, on marine organisms (Refer to annexures 1, 2 and 3)

- b. Mangroves- coal dust significantly reduces carbon dioxide exchange of upper and lower leaf surfaces by 17–39% (Refer to annexure 4)
- c. Demonstrated direct impacts of coal smothering on three key marine taxa (the coral *Acropora tenuis*, the reef fish *Acanthochromis polyacanthus* and the seagrass *Halodule uninervis*) (Refer to annexure 5)

Thermal pollution and cooling water discharge

19. Higher temperatures in seawater from power plants have been shown to result in direct and indirect changes in species health and population structure, and indirect changes that result from these (Refer to annexures 6, 7 and 8). In addition, the oxygen-carrying capacity of seawater is reduced and there is an increased risk of low-oxygen events or Harmful Algal Blooms. The footprint of the thermal plume varies considerably depending on the size of the plant and conditions in the receiving waters, with plumes of up to 5 km reported in these studies. The Marine Thermal Discharge Study identified a zone of around 1.5 km² (see table 4-2 of Marine Thermal Discharge Study) in which seawater will be at greater than 0.2 °C above normal ambient temperatures. It is expected, therefore, that the marine communities within this zone will be impacted, with total mortality in the zone very close to the diffuser outlet, changing to species and health impacts towards the edge of this zone. In the mid-channel location of the effluent diffuser, the benthic habitat is a mix of sandy and seagrass bottoms (low vulnerability to thermal stress), with mangroves on the shoreline (though these may be sacrificed during construction), and patchy corals in the deeper parts of the channels (both with higher vulnerability to thermal stress). It is noted that the Marine Thermal Discharge Study, as was done in the Air Dispersal Study evaluates *only* the physical dispersal and dynamics of the plume, but omits completely any estimation of biological/physiological effects and interactions, and what should be done to mitigate these.
20. It is frequently the case that in reality, the area of a thermal plume is greater than modeled in EIA studies, so it is likely that the impact zone will be larger than the above mentioned 1.5 km² area indicated by the EIA. Studies in Brazil found impacts from thermal pollution at distances of 1-1.5 km from an outfall where the initial temperature anomaly was above 3-5°C (Refer to annexure 7). The Pate channel in which the diffuser is located experiences very strong tidal exchange on a 12-hourly basis, which will effectively mix waters and dissipate the thermal plume more effectively than in low-exchange bays and estuaries (Refer to annexure 6), however this can have the effect of spreading a smaller temperature anomaly over a large area.
21. The interpretation of the thermal effluent effect is unclear, and it is likely that the area of impact will be larger than is shown. It is important to note that this region will nevertheless be in the primary impact zone of the development of the Lamu Port, and may be viewed as a sacrificial zone for cumulative impacts – an issue that is not addressed in the relevant section of the EIA. Nevertheless, by not estimating more accurately the effect of the thermal plume on the biota in the impact zone, and potential effects farther afield, the EIA falls short of what should be required.

Health Impacts from Dust

22. As regards this, the EIA mainly presents anticipated positive impacts on public health through increased income and screening of workers. There is very little treatment of respiratory risks and impacts. It also focuses on employees and occupational aspects, not the broader landscape potentially affected by pollution, and the growth in human population density that the port and city growth will entail.

Cumulative impacts based on the LAPPSET Master Plan

23. It is my submission that the restricted focus of the cumulative impacts section (10 Cumulative Impact Assessment) – to “cumulative impact assessment covers past, present and future interactions between the Lamu coal power project and the proposed 220kV overhead transmission line” – is so narrow as to be almost meaningless. The report justifies this on the basis of concurrent *construction*, whereas cumulative impacts need to include consideration of concurrent *operation*.
24. Given this, the cumulative impacts section should also include other aspects of the entire LAPPSET project in addition to the coal plant. Referring to the LAPPSET master plan, these include:
- Port development and shipping traffic relevant to marine habitats.
 - New Lamu City – how will growth in population around the coal plant affect health risk/exposure? How will sewage and pollution loads from this development interact with loads from the coal plant?
 - Tourism and resort cities – how will the growth of these be affected by potential impacts from the coal plant, and the linked effects they may have?
25. Further, section 10.3.6 of 10-Cumulative Impact Assessment, does not include a section that clearly focuses on marine/seawater quality and cumulative impacts, though the marine environment has been identified already as of key concern and among critical habitats. Thus, additional sections are needed for this.
26. It is also my testimony that the entire study of 10-Cumulative Impact Assessment has no quantitative basis, being based purely on textual arguments. This renders it almost useless.

Climate change arguments

27. The report quotes “Kenya’s national emissions were estimated to be 73 million tCO₂e in 2010 and the vast majority of these arose from land use, land use change and forestry and agriculture (75%). The energy sector accounted for 11.37% of emissions in 2010. // ... the operational phase carbon footprint for the proposed project, is estimated to be approximately ~8.8 million tons CO₂e per year from 2020 onwards”. Based on this, Kenya’s energy sector currently produces 11% of 73 Mt, which is 8.03 Mt.
28. While it is acknowledged that there will be an expected increase in emissions from the energy sector as Kenya endeavours to be a middle income country by 2030 (as per Kenya’s Intended Nationally Determined Commitments), the CO₂ from this *one* plant which will *double* current GHG emissions from the energy sector is too steep an incline.
29. Indeed, compared to this, the 310MW Lake Turkana wind project will annually offset 16 million tonnes of CO₂ emissions, i.e. *twice* the amount from Amu; and geothermal power which has the abatement potential of 14 MtCO₂e a year by 2030.

30. Further, none of the mitigation options presented deal with the core problem, which is to sequester carbon and not allow it to be emitted, and to consider all relevant options to reduce emissions, such as cooling system technology, coal grades to be used, etc.
31. In addition, extensive details on minor amounts of the plant's emissions from various sources, for example transport, hide the fact that no effort is made to reduce the CO2 emitted from burning coal. This section should be expanded to include all options such as costs, so that decisions on costs are not made by the company alone, but by the environmental regulator and national offices responsible for GHG and climate change.

Dated at Nairobi thisday of2017.

Signed by DAVID OBURA
The Appellants' Witness

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