



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

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

WITNESS STATEMENT

STATEMENT OF DR. JOHN KITUI

1. I am a medical doctor graduate of the University of Nairobi with an MPH (with distinction) from the University of Nottingham and an MSc in Health Economics & Policy from the University of Nairobi. My practice has entailed providence of medical care to underserved communities in Kenya and South Sudan, community health planning, health economics and health policy. I am an expert on social, environmental, and economic determinants of health as a practitioner for more than 10 years. I am thus qualified to present a critical review on the impacts on public health in the Environmental and Social Impact Assessment Report submitted for Amu Power Company Ltd, the project proponent, in July 2016 (hereinafter referred to as the EIA Report), for the proposed 1,050MW Coal Fired Power Plant in Lamu County, Kenya, and to give an opinion as to its adequacy for decision making.
2. As regards the methodology to my work, I have applied a content analysis framework to evaluate the EIA Report with focus on the impact on community health of the proposed Coal Fired Power Plant. I examine the positive and negative community health effects

that may respectively derive through employment and economic activity, and from the EIA Report's estimated amounts of hazardous gases emitted during the Coal Fired Power Plant construction and operation. The latter include sulfur oxide (SO₂), Nitrous oxide and nitrous dioxide (NO_x), coarse particulate matter (PM₁₀) and fine particulate matter (PM_{2.5}). I then examined the mitigation measures proposed to reduce adverse community health effects.

3. It is my submission that the EIA Report insufficiently considers the Coal Fired Power Plant's wider negative impacts on public health and minimally recommends generic mitigation measures for adverse effects to merely comply on the face of it with the Environmental Management and Coordination Act, 1999 and its regulations. The Report lacks the rigor and sufficiency of analysis and explicit foci on health endpoints or outcomes, given the extent of what is known on this subject, to allow the award of an Environmental Impact Assessment License and approval of the project to proceed to implementation.

Analysis of the Environmental and Social Impact Assessment Report

4. The public health impact assessment in the EIA Report is part of a broader assessment of the social Impact of the coal fired power plant. While there is nothing wrong with this approach, the rigor and sufficiency of the assessment of the health impact of coal combustion, as captured in (i) the Executive summary, (ii) the *08-Assessment of Potential Environmental and Social Impacts and Mitigation Measures report*, (iii) the *10-Cumulative Impact Assessment Report* and its various Appendices, is insufficient given the widely acknowledged adverse health impacts of hazardous emissions from coal power plants briefly described in section 2.4 of Appendix 02-the Air quality study. (Refer to Annexure 1 on current proposed best practice on what constitutes an environmental health impact assessment) This is especially important due to the adverse health impacts associated with coal plants, which we will further highlight below. (Refer to annexures 2, 3 and 4)
5. Positive impacts on public health are highlighted in section 8.11.10 of the *08 -Assessment of Potential Environmental and Social Impacts and Mitigation Measures report*. These include general health and wellbeing effects arising from increased personal disposable income, training of project workers on sanitation/hygiene and sexually transmitted diseases, worker disease screening, design measures for vector control, improved drainage from constructions, CSR initiatives such as portable water supply by contractors, water and food sanitation, health and safety training, and prevention of environmentally related diseases. However, the last point on chemical exposures and their impacts are casually handled for a Coal Fired Power Plant EIA Report and this will be further discussed in this statement.

6. The project developer proposes to import coal from South Africa and Mozambique, based on proximate location considerations among other factors, and transport them from the port to the project site. While dust suppression is mentioned to be undertaken during unloading operations in Appendix 02-Air quality study section 2.3, this is not explained in detail on what it entails and their effectiveness in preventing coal dust pollution. Equally, coal dust pollution management during transportation of coal on the hoppers from the ship to the power plant along a 15km distance has not been addressed. Further, in future, it is proposed that local coal would be transported by rail or road to the plant. Without proper management of the coal dust pollution during transportation to the coal power plant however, unsuspecting public will unnecessarily be exposed to coal dust inhalation leading to lung inflammation and increased risk for cardiopulmonary disease, chronic obstructive pulmonary disease, hypertension, lung disease, and kidney disease. (Refer to Annexures 5, 6 and 7)
7. Further, section 8.11.10 of the 08 -Assessment of Potential Environmental and Social Impacts and Mitigation Measures of the EIA Report discusses the potential adverse impacts to public health as a result of the proposed project, outlining issues to do with: Temporary housing during construction phase of the project; Transportation air emissions during construction phase of the project; and, Water and sanitation issues.

The report then concludes on this, that “The impacts of the project on public health are expected to be local in nature and limited to the study area and its environs”. There is no clear indication of what is meant by local and environs. Further, such an assertion is false given the widely acknowledged public health impacts of hazardous emissions from coal fired power plants such as SO₂, NO₂, PM₁₀ and PM_{2.5}, and mercury among other heavy metals, which I discuss later, are not discussed as part of the premises to the assertion. It is noted that Section 8.2.1 and 8.2.2 on atmospheric emissions during the construction and operational phases respectively, acknowledges that ‘the proposed coal power plant may have potential negative impacts on the ambient air quality of the local area’. The Report however then states that pollutant levels would be below national ambient air quality standards. However, recent studies as will be further discussed below show that health impacts do arise from below air quality standards. This would demand that a public health impact assessment section examines and quantifies the impact of such ambient air quality on the health of communities based on pollutant increases and use this to arrive at any conclusion on the impact of the whole project on public health. This has not been done.

8. Further, the EIA report considers the health impact assessment of *the study area and its environs*, however, there is evidence provided where health impacts are carried over a distance of around 15Km which thus necessitates a health impact assessment that not only assesses on site but within that mile radius. (See Annexure 8)

9. The executive summary, under section (j) on Impact on Public Health and Safety, mentions '*hazardous air emissions*' and '*fish poisoning by hazardous discharges from the power plant*' but the impact on health of these emissions and discharges is not explored at all in the sections of the EIA Report referring to the impact on public health of the project. Projected rates of emissions per unit of power despatched and project emission limits are presented in Appendix 02-Air Quality Report but the extent of anticipated impacts on public health and measures to be taken to protect the health of the public are equally not explored in the social impact assessments.
10. Key hazardous emission sources during the operational phase of the project, SO₂, NO_x, PM₁₀, PM_{2.5}, and mercury are mentioned in Section 8.2.2 of *08-Assessment of Potential Environmental and Social Impacts and Mitigation Measures study report* and the intentions to limit these emissions are articulated. But the residual impact on health of communities on the emitted hazardous emissions is not explored in the Social Impact Assessment Study of the EIA Report. It cannot therefore be concluded, as claimed by the report, that "*the impacts on human health are expected to be low at all locations*". Evidence from USA and from Europe (Refer to annexure 9) shows that "*large coal power plants emit several thousand tons of hazardous air pollutants every year and have an average lifetime of at least 40 years. Building new coal power plants mean that hazardous emissions and their effects on health would continue for many years*" and these health impacts ought to have been quantified and presented in the EIA Report.
11. In Section 10.3.11., the information on the Community Health and Safety section of the Cumulative Impact Assessment of the EIA Report is grossly insufficient. Obvious community health and safety risks from gases emitted by coal combustion, which I will come to later, are conspicuously omitted from the list presented in this report, despite the Appendix 09 Social Impact Assessment Report of the EIA Report acknowledging that respiratory diseases are among the top three prevalent diseases and therefore potentially worsened by any air quality changes.
12. Following on from this omission, it is of public concern and public interest that the Cumulative Impact Assessment report, in Section 10.3.1 on Air quality, and Section 10.3.5. on Waste fails to list toxic gaseous by-products and wastes from the operationalization of the coal fired power plant. While the air quality issues are documented in the respective appendices, key sections in the main report merely focus on the dust during the construction phase of the project and not on hazardous emissions each detailed with its comprehensive adverse health impacts. This thus affects judgement on the part of decision makers and regulators on the health risks posed to the community by this project.
13. Further, coal contains uranium and thorium, both radioactive elements, and when burnt they are concentrated up to 10 times their original emission levels. However, impacts of

these substance emissions into the atmosphere and from the coal dump are not considered. (See Annexure 10 which contends that coal ash is more radioactive than nuclear waste)

14. With regard to fly ash, even though there is risk of radioactive substances and other trace elements such as arsenic, selenium, cadmium, chromium and mercury, the Environmental Impact Assessment License issued to the project proponent on 7th of December 2016 (hereinafter referred to as the EIA license) only deals with transportation of fly ash and does not refer to management and disposal of fly ash yet there are substantial health effects arising from failure to manage the disposal of fly ash as will be further discussed below. Indeed, the Process description section of Appendix 02 Air Quality Study of the EIA Report describes transportation of fly ash from flue gas to the fly ash yard for storage but doesn't address how the fly ash will be handled thereafter. From a health impact perspective, this is a residual risk that needs to be sufficiently assessed and be part of the considerations in the decision on the coal fired power plant.

A technical commentary on the impacts of coal operations on public health

15. The World Health Organisation (WHO), in the context of the Rio+20 UN conference on sustainable development developed health indicators for sustainable energy (Refer to Annexure 11). Amongst them is monitoring of reductions in air pollution-related diseases as a bottom-line measure and monitoring progress in transition to low-emission energy technologies, including greater use of renewable energy. WHO estimates that 3.3 million deaths/year may be due to outdoor air pollution with exposures highest in developing cities. An instrumental indicator of progress and success is thus proportion of electricity generated with technologies that produce low levels of pollutants that harm health and climate across the energy lifecycle, which assertion does not support the implementation of this plant.
16. This is because coal-based energy infrastructure impacts public health in various ways. Coal pollutants affect all major body organ systems and contribute to four of the five leading causes of mortality worldwide, namely heart disease, cancer, stroke, and chronic lower respiratory diseases. Coal-based energy infrastructure equally causes occupational health and safety, mental health, lower IQ, traffic injuries, noise and vibration, air quality, opportunities for physical activity, and the creation or exacerbation of existing spatial or geographic inequalities.
17. The equity question on access to health and exposure to determinants of disease is a critical factor to be considered too. WHO reports that *“there is significant inequality in exposure to air pollution and related health risks: air pollution combines with other aspects of the social and physical environment to create a disproportionate disease burden in less affluent parts of society”*. The location of the coal fired power plant in poor rural villages in Lamu amounts to deliberate discriminatory allocation of health risk

to hitherto marginalised and excluded communities whose health and wellbeing needs to be protected. Equally, health equity can be a useful consideration for the EIA Report based on distribution of population characteristics (e.g. the elderly and children with chronic respiratory diseases such as asthma or chronic obstructive pulmonary disease (COPD) that can be exacerbated by air quality changes in addition to the physical position of the project in relation to ‘sensitive receiver’ buildings or services. Further, mental health arising for instance from changes to the local environment and compulsory property acquisition should be satisfactorily considered in EIA Report.

18. Further, there is no evidence of a safe level of exposure or a threshold below which no adverse health effects occur. Scientists have discovered that even at lower concentrations of particulate matter, ozone, and NO₂ as required by European guidelines, negative health impacts were still felt. A review of evidence on health aspects of air pollution coordinated by the WHO European Centre for Environment and Health, Bonn, WHO Regional Office for Europe in 2013 reports that:

“The review concludes that a considerable amount of new scientific information on the adverse effects on health of particulate matter, ozone and nitrogen dioxide, observed at levels commonly present in Europe, has been published in recent years. This new evidence supports the scientific conclusions of the WHO air quality guidelines, last updated in 2005, and indicates that the effects in some cases occur at air pollution concentrations lower than those serving to establish these guidelines. It also provides scientific arguments for taking decisive actions to improve air quality and reduce the burden of disease associated with air pollution in Europe” (Refer to annexure 12)

The burden of air pollution from hazardous emissions from the coal fired power plant on health will be significant to the residents both close to and far from the power plant and health assessment with the above new data may be considered.

19. The environment is an important determinant of health. For a Coal Fired Power Plant, the impact on health of hazardous by product pollutants through inhalation or ingestion through water needs to be satisfactorily assessed as the health impact of coal combustion and dumping of coal ashes is well known (Refer to annexure 13). Where environmental monitoring exists on coal ash dump sites (such as in the U.S.), it has been noted that toxic residues have migrated into water supplies and threatened human health at dozens of these sites.

“The toxins have made people sick, sometimes fatally. Illnesses include carbon monoxide poisoning, arsenosis, fluorosis, bronchitis, stroke, lung

cancer, pulmonary heart disease, and chronic obstructive pulmonary disease (Refer to annexure 14)

20. In EIA Study Reports for coal fired power projects elsewhere, quantitative risk assessment is most often done in terms of air quality for example exposure to PM₁₀ and its outcomes on mortality and morbidity, or qualitative impact measures of other exposures and risks to human health. Tools such as cost-benefit analysis that explicitly indicate how local communities' health is traded off for wider economic benefits of the coal fired power plants, both in the short term and in the long term, and stakeholder analysis reports on such trade-offs, and field surveys can improve the quality of EIA Reports in evaluating health impacts, informing recommendations and decisions. (Refer to annexure 15 for an example of such an economic benefit analysis report relating to methylmercury exposure). The reviewed EIA Report lacks this level of detail for the impacts on public health.
21. Further, the EIA Report does not recognize mercury emissions as a global priority in the power generation sector and does not provide priority actions to address mercury emissions from this proposed power station, which need to be addressed. In report 08 on Assessment of Potential Environmental and Social Impacts and Mitigation Measures of the EIA Report, section 8.10.2.4 simply provides that stack emissions such as mercury emissions may affect plant growth and cause acidification of aquatic ecosystems. It however then provides in section 8.10.3.1 that the coal plant will use a smoke stack which will eliminate 95% of exhaust gases and particulates including mercury. Further, in Appendix 02 being the Air Quality Study of the EIA Report provides that the mercury present in coal is in relatively low concentrations (app 0.1 ppm) and emitted into the environment at combustion temperatures of above 150 Degrees Celsius.
22. However, at “those temperatures of combustion many of the toxic metals such as lead, cadmium, arsenic, mercury and chromium are liberated from otherwise fairly stable matrices like plastics. Furthermore, they are liberated in the form of tiny particles or gases, which, if they escape from the stack, vastly increase the potential surface area of contact between themselves and the environment. They also penetrate deep into human lungs, where they are rapidly exchanged with the bloodstream. The traditional method of removing metals from emissions is via particulate control devices such as electrostatic precipitators or baghouses (fabric filters). While being generally acceptable, these are less efficient at removing the tiniest particles of concern.” (Refer to annexure 16- which was evidence that was submitted by two well regarded public health experts in the field, these being Mr. Rico Euripidou as well as Prof. Peter Orris on a proposed 115 MW waste combustion plant in Mauritius. Based on their expert evidence, the plans for the plant were cancelled by the Government. This statement refers to some of their articles on the subject matter as well as evidence submitted in Mauritius.)

23. Mercury exposure is especially impactful in the nervous systems of children, infants, and above all the developing foetus. High dose exposures have been demonstrated to result in low birth weight, severe mental retardation, small head circumference, cerebral palsy, deafness, blindness, and seizures. Low dose exposures can result in lowered IQ, decreased performance on tests of attention, fine motor function, and language, and developmental delays, such as delayed walking. Such effects can take place even at exposure levels where the mother remains healthy or suffers only minor symptoms due to mercury exposure. (Refer to annexure 16)
24. Further, mercury contamination in the environment presents a serious health risk to those who eat contaminated fish, marine mammal, and wildfowl species.
25. This is especially relevant in our case as section 8.10.3.3 of *08 -Assessment of Potential Environmental and Social Impacts and Mitigation Measures report* of the EIA Report acknowledges that residue ash will contain mercury and the planned ash dumpsite will pose a threat of seepage and ash spill contaminating the environment. Further, it notes that the ash dumpsite will be located in a tidal zone. Mitigation measures are however not provided in the entire EIA report including 11-the Environmental and Social Management and Monitoring Plan (hereinafter referred to as the Environmental Plan) and neither is it addressed by the EIA license issued to the project developer.
26. As a guideline, UNEP has finalised a global negotiations process to address mercury emissions globally. The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury which was agreed on the fifth session of the Intergovernmental Negotiating Committee in Geneva, Switzerland 19 January 2013. One of the major highlights of this Convention includes control measures on air emissions (from the coal thermal power sector). Mercury emissions from coal thermal power stations can be predicted from the concentrations of mercury found in the coal deposits. These vary globally. In our case, no such chemistry and analytical work has been undertaken. The only tests as regards mercury are the ambient mercury concentrations in the Air Quality Study which are insufficient.
27. For new sources of coal fired power stations under the convention, it recommends that Parties must use best available techniques (BAT) and best environmental practices (BEP) to control and reduce mercury emissions, as soon as practicable but no later than five years after that country ratifies the Convention. Neither BAT nor BEP are mentioned within this EIA Report. A “new” source is a source where construction (or substantial modification) begins one year after the Convention enters into force for the Party. The Convention is expected to come into force by September 2017.
28. We further note that EIA license condition 2.12 requires the project proponent to dispose off debris and all excavated material as per the Environmental Management and Coordination (Waste Management) Regulations of 2006. It further, in license 3.13

requires that all solid waste is handled according to these waste regulations. While the Environmental Plan states that under no circumstances will solid waste be burnt on site, it later on provides that all hazardous materials will be disposed offsite in accordance with the above 2006 waste management regulations. Indeed, 02 Policy, Legal and Institutional framework of the EIA Report acknowledges that the treatment options provided for hazardous waste in Rule 19 includes *inter alia* incineration.

29. However, we submit that the latest evidence on this indicates that waste incinerators and their incineration emissions are extremely toxic with associated public health outcomes. This is because incineration does not get rid of the waste but merely converts it into other substances which are known human carcinogens and endocrine disruptors., among other adverse health effects. (Refer to annexure 16)
30. Further, according to section 8.6 of the *08-Assessment of Potential Environmental and Social Impacts and Mitigation Measures report of the EIA Report*, fly ash is to be stored in ash yards. As per section 8.6.3 on operational phase waste management, the report acknowledges the importance of a properly designed ash yard and provides that it should have four layers of protection to prevent subsurface and groundwater contamination. However, the Environmental Plan simply states that this will be an impermeable layer and the license conditions do not speak further to this and simply states that the project proponent should adhere to the Environmental Plan provided.
31. However, from experience I have yet to see a “managed” ash pond. (See Annexures 17 and 18, the latter consists of pictures of ash ponds and its effects on local ecology and environment). The United States Environmental Protection Agency has found that living next to a coal ash disposal site can increase your risk of cancer or other diseases, especially if you live near an improperly lined wet ash pond that contains coal ash comingled with other coal wastes and you get your drinking water from a well. According to the EPA’s peer-reviewed “Human and Ecological Risk Assessment for Coal Combustion Wastes,” people in those circumstances have as much as a 1 in 50 chance of getting cancer from drinking water contaminated by arsenic, one of the most common and dangerous pollutants in coal ash. This risk is 2,000 times greater than the EPA’s goal for reducing cancer risk to 1 in 100,000.
32. That same risk assessment provides that living near ash ponds increases the risk of health problems from exposure to toxic metals like cadmium, lead, and other pollutants. Typically, coal ash contains arsenic, lead, mercury, cadmium, chromium and selenium, as well as aluminum, antimony, barium, beryllium, boron, chlorine, cobalt, manganese, molybdenum, nickel, thallium, vanadium, and zinc. All can be toxic. Especially where there is prolonged exposure, these toxic metals can cause several types of cancer, heart damage, lung disease, respiratory distress, kidney disease, reproductive problems, gastrointestinal illness, birth defects, impaired bone growth in children, nervous system

impacts, cognitive deficits, developmental delays and behavioural problems. In short, coal ash toxics have the potential to injure all of the major organ systems, damage physical health and development, and even contribute to mortality. See for example annexures 19 and 20 where fly ash exposure may lead to hair loss due to thallium and arsenic; selenium contamination on fish once it seeps through; and, airborne particles of the fly ash which affect lungs and bronchii leading to silicosis (scarring of lung tissue).

33. Studies conducted in India attest to such breaches of ash ponds which lead to contamination of surface and ground water as well as deluges in neighbouring agricultural fields destroying them. Further, during the summer months in India, a lot of ash blowing out from the ash ponds would lead to ash deposition and contamination of nearby residents' houses, villages and farms. (See Annexure 21). This is important as the Kwasasi area experiences strong monsoon winds which increases the likelihood of such a scenario taking place in Lamu County. Retainer wells suggested in the Environmental Plan would only prevent pollutant run-off to Manda Bay but would not prevent atmospheric pollution that would lead to adverse health impacts.
34. This makes it all the more important for the license to have conditions that describe in detail the impermeability of the barriers of the ash pond.
35. Further, there is need to evaluate and make a distinction between wet ash and dry-ash handling and management practices in the EIA Report, which has not been done. This is because wet ash handling requires vast areas for ash management and these are frequently subject to failure – if waste ash gets into the marine environment off Lamu this will result in gross marine environmental impacts. (See Annexure 22) With regard to the impacts on human health in particular, methyl mercury bioaccumulation in fish has serious health impacts on communities that rely on fish as their primary source of protein.
36. Finally, the EIA Report in section 8.10.3.3 of *08 -Assessment of Potential Environmental and Social Impacts and Mitigation Measures report* acknowledges that the amount of residue of fly ash will depend *inter alia* on the geological origins of coal. However, the quantity of fly and bottom ash to be produced are not clearly estimated in the EIA Report. In practice, these are based among other things on the efficiency of the technology and the quality of the coal. If the project developer intends to import South African coal for example, practice there indicates that coal fired power stations are inefficient producing as much as 40% ash and burning very low quality coal. Thus, if this is not calculated in the EIA Report, it is difficult to calculate and assess the extent of health impacts that would arise from this waste.

Questions over methodology, assumptions and data

37. The methodology applied in the ESIA to assess the impact of the coal fired power plant on health does not meet what constitutes best practice in environmental health impact

assessment. Integrated environmental health impact assessments' *"focus is on providing inclusive descriptions of multiple impacts from multiple stressors in such a way that they can be evaluated against the potential societal benefits of the causes of the stressors (See Annexure 1)*

38. "Technical elements here require in-depth understanding and demonstration of biological, chemical, and physical processes in the causal chain from source to effect. In best practice, certain metrics, health outcomes and concentration–response functions have been used to assess the health impact of particulate matter, ozone, and NO₂. The calculation of health impacts requires several components: (a) an estimate of current concentrations of the pollutant(s) under review; (b) a determination of the target concentration or standard; (c) the concentration–response functions that typically relate a change in pollution to a per cent change in a health outcome; (d) a baseline level of the health outcome; and (e) a characterization of uncertainty. Some of these are attempted but conspicuously missing in the impact on health are the (c) the concentration–response functions that relate a change in pollution as a result of coal fired power plant to a per cent change in a health outcome of concern; (d); and (e) a characterization of uncertainty around these changes. This casts doubt on the process of arriving at conclusions on the impacts on public health, and on sufficiency of the information presented on health impact assessment sections. The EIA Report is not robust on this front yet the impact on health of the coal fired power plant project, especially of the hazardous emissions is a key 'significant impact'.
39. It is not indicated how relevant departments at the county and national Ministry of Health were involved in either the development of the content of the health impact assessments in the EIA Report requirements, development of the health risk assessment analysis methodology, involvement in the adequacy test of an early draft of the EIA Report, or involvement in public meetings, as opposed to written submissions, during the preparation of the EIA Report.
40. The EIA Report is ideally meant to manage and present trade-offs in public health impacts against other beneficial considerations for locals or wider economy. A national benefit of energy being traded off against negative public health impacts on local communities or smaller populations such as the elderly and children with asthma within those communities needs to be explicit and quantified. The EIA Report processes could have better managed these localised risks for potential 'losers' of the coal fired power plant project. A wider range of impacts are identified in literature than those captured in the EIA Report as regards exposures and impacts on air quality and noise. Duty of care for those affected by the stress and mental health issues associated with compulsory property acquisitions and negative changes to local environment associated with this requires that this is anticipated, documented and mitigation measures put in place. Some aspects are attended to but generally lacking in detail and rigor.

41. There is a preference, from public health experts and communities, for rigorously undertaking human health risk assessments in EIA Reports. There are noted methodological issues associated with assessing incremental health risk from the project over and above existing background exposures related to air quality in particular. The risk assessment methods fail to point to the coal fired power plant as a potential cause of health impacts and worse still, appears to be providing a false 'transparent' overview of the lack of risk to health from the coal fired power plant project.

Overall conclusions and recommendations

42. Given the gross omissions on the public health impact assessment sections of the EIA Report, I thus conclude that it has failed to satisfactorily meet best practice standards on environmental health impact assessments.

43. While EIA Reports are necessary to support major infrastructure project decisions and fully promote and protect human health, in this incidence, the EIA Report study for the 1,050MW coal fired power plant in Lamu county, Kenya insufficiently assesses the environmental impacts on public health and has glaring omissions which should not serve as a basis for approval of the project. Critical external community health costs of the coal fired power plant have not explicitly been quantified nor taken into the cost-benefit account.

44. Coal-fired power stations are particularly polluting and harmful to the environment and consequently to health. They are not the best practicable environmental option: coal-fired power stations do not, as is required by NEMA, provide the most benefit or cause the least damage to the environment and to people's health as a whole, at a cost acceptable to society, in the long term and/or the short term. Environmental legislation requires investigation and evaluation of alternative options as a comparator and a basis for making a societally optimal choice. This has not been properly evaluated in this EIA Report.

45. Protection of public health, and demonstration of sufficient effort to do so, needs to remain a core aspect in the decision making process by all stakeholders in the consideration of the coal fired power plant project. Exposure to hazardous air emissions and pollutants is largely beyond the control or influence of individuals and communities living near and far from a coal fired power plant, and there is therefore a moral case for action by this Tribunal and from other public authorities at all levels to protect community health.

46. Finally, the Precautionary Principle (PP), an established principle of international law, with regard to risk management bestows a social responsibility to protect the public from exposure to harm. One of its definitions states: *“When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context*

the proponent of an activity, rather than the public, should bear the burden of proof. The process of applying the precautionary principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action” While” the principle does not seek to establish zero risk, since all human activity involves some risk it does, however, involve an assessment, of both risk and benefit from a proposed activity, leading to a decision as to whether or not the proposed activity should be permitted. Involved in such decisions are a number of factors, including whether or not valid and realistic alternatives are available.” (Refer to annexure 16) This principle should be upheld in the face of the glaring gaps in this EIA Report as detailed above.

Dated at Nairobi thisday of2017.

Signed by Dr. John Kitui
The Appellants’ Witness

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