Environmental Impact Assessment in Kenya: Challenges of Emerging Technologies on Development Projects

S. Obudho Omondi and V. Ochanda

Abstract—Energy extraction and use based on current technologies is a precursor to many developmental agenda especially in developing countries. Most developed countries have made substantial strides in their economies due to vast amounts of fossil fuels and nuclear energy available in their land or ocean floors. The consequences of these technologies has seen rise in industrial accidents due to nuclear leakages and oil spills, but also the current trend of climate related changes brought about mainly by the fossil fuels air pollution. These countries are currently re thinking their development agenda as well as sustainability, coupled with diverse stringent standards that need to be met in order for these energy technologies to be environmentally friendly. Developing countries on the other hand are just beginning to adopt these emerging technologies. Kenya, Uganda and Tanzania have recently identified and are in the process of harnessing these energy options, but face the challenge of environmental disasters related to fossil fuel use. In Kenya for example the UNEP office in Nairobi has on several occasions called on the country to embrace cleaner energy options that are available within its boundaries, the question has of course been on the development agenda of the country which sees this as an opportunity to improve services for its citizen, of course trading off the environmental consequences related to its use. Besides the challenge of importing skilled manpower to deal with the emerging energy technology use, Kenya is practically wanting with the environmental impact assessment procedures related to the use of fossil fuels and nuclear energy. The National Environment Action Plan, and the National Policy is very clear on its emphasis for Environmental Impact Assessment (EIA) on such development projects. This legislative challenge needs to be addressed for Kenya to realize the benefits as well as prevent the obvious environmental challenges related to it.

Keywords—Emerging technologies, nuclear, oil, environmental impacts, policy legislation and standards.

I. INTRODUCTION

To bring developing countries' energy use up to industrialized country levels by the year 2025 would require increasing present global energy use by a factor of five. The planetary ecosystem cannot stand this, especially if the increases are based on non-renewable fossil fuels. Threats of global warming and acidification of the environment negates this especially in developed countries where doubling of energy use based on present mixes of primary sources is proving a challenge [1]; [2], however this is not the case with Norway and Finland who are still striking new zones of fossil fuels. Any new era of economic growth must therefore be less energy intensive than growth realized in the past. Energy efficiency policies must be the cutting edge of national energy strategies for sustainable development, and there is much scope for improvement in this direction, the generation of nuclear power is only justifiable if there are solid solutions to the unsolved problems to which it gives rise to. The highest priority should therefore be accorded to research and development on environmentally sound and ecologically viable alternatives, as well as on means of increasing the safety of nuclear energy.

II. ENVIRONMENTAL THREATS OF NON-RENEWABLE ENERGY USE

The development of environmentally appropriate technologies is closely related to questions of risk management. Such systems as nuclear reactors, electric and other utility distribution networks, communication systems, and mass transportation are vulnerable if stressed beyond a certain point. Applying sophisticated analyses of vulnerabilities and past failures to technology design, manufacturing standards, and contingency plans in operations can make the consequences of a failure or cause much less catastrophic accidents. A major purpose of large system design should be to make the consequences of failure or sabotage less serious [3]

There is thus a need for new techniques and technologies - as well as legal and institutional mechanisms - for safety design and control, accident prevention, contingency planning, damage mitigation, and provision of relief. Environmental risks arising from technological and developmental decisions
impinge on individuals and areas that have little or no influence on these decisions. Their interests must be taken into account. National and international institutional mechanisms are needed to assess potential impacts of new technologies before they are widely used, in order to ensure that their production, use, and disposal do not over-stress environmental resources. In addition, liability for damages from unintended consequences must be strengthened and enforced. Generally a sustainable system is a technological system that can search continuously for new solutions, as well as an administrative system that is flexible and has the capacity for self-correction and choices must be made, but in the certain knowledge that choosing an energy strategy inevitably means choosing an environmental tragedy [4].

Environmental threats of nuclear and fossil fuels energy sources have serious probability of climate change generated by the 'greenhouse effect' of gases emitted to the atmosphere, the most important of which is carbon dioxide (CO2), produced from the combustion of fossil fuels. urban-industrial air pollution caused by atmospheric pollutants from the combustion of fossil fuels, acidification of the environment from the same causes; and the risks of nuclear reactor accidents, the problems of waste disposal and dismantling of reactors after their service life is over, and the dangers of proliferation associated with the use of nuclear energy. No technology currently exists to remove CO2 emissions from fossil fuel combustion. States should conduct Prior Environmental Assessments of proposed activities which significantly hinder and reduce proportionately the adverse effects on the environment or use of the natural resource.

III. KENYA DEVELOPMENT AGENDA AND ENERGY

The Kenya Vision 2030 identifies energy as one of the infrastructure enablers of its social economic pillar. Sustainable, competitive, affordable and reliable energy for all citizens is a key factor in realization of the Vision. Fossil fuels encompass petroleum (oil, oil shale and gas) and coal resources. As at 2014 petroleum accounts for about 22% of the total primary energy consumed in Kenya [5]. According to the Draft National Energy policy Kenya has had no known commercial reserves of petroleum until March 2012 when Tullow Oil, discovered oil in Ngamia-1 well at Lokichar in Turkana County. By February 2014, Tullow had drilled seven more exploration wells at Etuko-1, Twiga-1, Ekales-1, Paipai-1, Amosing-1, Agete-1, and Awoi-1 six of which had oil. The API gravity of the oil was estimated at between 300 and 350, indicating high quality oil. [5].

Extensive coal exploration has taken place in the Mui Basin of Kitui County where a total of 76 wells have been drilled with 42 wells intercepting coal seams of various thicknesses at different depths. More wells are being drilled to appraise the coal reserves in the basin of which Block C has been appraised to have 400 million tonnes. More coal exploration is going on in other parts of the country. These resources are expected to provide about 1,900MW of electricity generation by 2016 and 4,500MW by 2030. Coal exploration programme and efficient utilisation of coal resources is challenging while minimising the environmental impacts associated with its use. Kenya recently discovered natural gas at Mbawa in Lamu [5].

The National Environment Action Plan of 2009 provides a framework to the implementation of the Environment Policy and realization of the National Millennium Development Goals and Vision 2030. “Vision 2030, with its ambitious development blueprint, is a key opportunity for the Kenyan Government to address environmental challenges as a key element underpinning the country’s sustainability and development” [2]. The genesis of the National Environment Action Planning can be traced back to 1992 during the Earth Summit held in Rio de Janeiro. The summit came up with various recommendations, among them Agenda 21 and a Global Environmental Action Plan. The summit called on all States to prepare Environmental Action Plans, as a tool for integrating environment into national planning and development process. Kenya actively participated in the two conferences. Kenya has developed two NEAPs The milestones of the 2009-2013 NEAP was the development of the Environmental impact assessment and audit regulations, unfortunately among the issues discussed in NEAP the management and development of standards for impact assessments with regards to nuclear and fossil fuels is largely unexplored.

The draft national Energy Policy states clearly the advantages of indulging in this new energy technology, and as part of the institutional framework, NEMA is the authority with regards to environmental protection in the energy sector, this in essence means that NEMA needs to have the capacity to handle EIA coming out of these investments. The current regulations have gone a long way in enhancing environmental protection, however with several weaknesses that will needs to be addressed before the implementation of guidelines and standards to manage, the energy sector. Uganda has gone a mile by initiating legislation on the proposed laws - Petroleum (Exploration, Development and Production) Bill, 2012 and the Petroleum (Refining, Gas Processing, Conversion, Transportation and Storage) Bill, 2012 that will govern emerging oil and gas industry for the next 50 or so years [6].

A. TECHNOLOGY AND ENVIRONMENTAL MANAGEMENT IN KENYA

First, the capacity for technological innovation needs to be greatly enhanced in developing countries so that they can respond more effectively to the challenges of sustainable development. Second, the orientation of technology development must be changed to pay greater attention to environmental factors. The technologies of industrial countries are not always suited or easily adaptable to the socio-economic and environmental conditions of developing countries. To compound the problem, the bulk of world research and development addresses few of the pressing issues...
facing these countries, such as arid-land agriculture or the control of tropical diseases. Enough is being done to adapt to these recent innovations in materials technology, energy conservation, information technology, and biotechnology in developing countries with no commensurate laws that will protect the environment on these matters. These gaps must be covered by enhancing research, and the technical capabilities of relevant employees in NEMA to handle such cases. In all countries, the processes of generating alternative technologies, upgrading traditional ones, and selecting and adapting imported technologies should be informed by environmental resource concerns. Most technological research by commercial organizations is devoted to product and process innovations that have market value. Technologies are needed that produce 'social goods', such as improved air quality or increased product life, or that resolve problems normally outside the cost calculus of individual enterprises, such as the external costs of pollution or waste disposal.

Kenya has high potential with the use of renewable energy sources, for example, it is estimated that Kenya receives 4-6 kW/m²/day of solar energy, on average, which translates into about 1.5 billion tons of oil equivalent, making it a major alternative for energy. Environmental issues arising from provision of clean energy are inadequate clean energy supply, inadequate financial resources and technology, pollution control, sustainable natural resource use, enforcement of legislations and promotion of private production and distribution of energy [7]. The Kenya Environmental Policy of 2012 clearly states that the countries current state is the use of cleaner energy options available and the policy requirements are mainly on the development and promotion of integrated national strategy for sustainable utilization of renewable energy and Promote adaptation of the cleaner production concept in all energy production and consumption activities” these policy statements largely mean that Kenya is not yet prepared to handle the emergence of new energy technologies, especially fossil fuels extraction, refining storage as well as transport.

B. ENVIRONMENTAL PROTECTION

In the United States, the petroleum refinery industry is regulated at both national and local levels. The Environmental Protection Agency sets standards for controlling these pollutants, and closely monitors refineries for compliance. At the local level, states issue permits to refineries based on compliance with a number of factors, including disturbances to vegetation and wildlife, emissions from Floating roof tanks, and the potential for environmental contamination of soils or water[8]; [9]. Other regulatory agencies mandate that petroleum companies follow safety standards protecting the health of workers against long-term exposures to potentially carcinogenic substances. These safety measures also protect against accidents harmful to both employees and the environment. Because of these stand, oil refinery companies must constantly redesign and modernize their existing plants, or build new and more efficient ones. The enormous costs of complying with these regulations, ensuring safer refineries, have pushed many U.S. oil companies to relocate to other parts of the world, namely developing countries. Developing countries eager to attract new business, offer a cheaper workforce and less stringent environmental regulations [10]; [6].

C. INTERNATIONAL ENVIRONMENTAL LAWS KENYA ASCRIBES

Kenya is a signatory to several Multilateral Environmental Agreements (MEAs) that are aimed at environmental protection these include the Convention on Biodiversity (CBD), UN Convention to Combat Desertification (UNCCD) and the UN Framework Convention on Climate Change (UNFCCC). Other important MEAs include Ramsar Convention, the Montreal Protocol on Substances that Deplete the Ozone Layer, Convention on International Trade on Endangered Species (CITES), Rotterdam Convention on Prior Informed Consent (PIC) and the Stockholm Convention on Persistent Organic Pollutants (POPS). The ratification of most of this international policies means that the government in all facets must participate in development that is sustainable, in this sense that the development programmes do not at any time affect nature and the environment. This in essence is the role that the National Environmental Management Authority (NEMA) has been given the mandate by the government to ensure environmental sustainability at all facets. The other great institutional flaw in coping with environment/development challenges there is governments' failure to make the bodies whose policy actions degrade the environment responsible for ensuring that their policies prevent that degradation. But much of their work has of necessity been after-the-fact repair of damage: reforestation, reclaiming desert lands, rebuilding urban environments, restoring natural habitats, and rehabilitating wild lands.

CHALLENGES WITH EIA IMPLEMENTATION IN KENYA

EMA, established under section 7 of the EMCA (1999) is the main administrative body for EIA in Kenya. Its object and purpose is to exercise general supervision and co-ordination over all matters relating to the environment. It is also the principal instrument of Government in the implementation of all policies relating to the environment. EIA challenges in Kenya mainly lie in practice [11]; [12]; in [13]. Generally, some documented challenges facing EIA in Kenya include; • Lack of compliance with regulation during practice. It is noticeable once the license has been issued and permission granted to commission the project. No follow up is done once the project is operational. • Inadequate or lack of consideration of public views given during a public participation fora [11]. The general public are always reluctant to give their views and even when they give they rarely confirm if their views were taken into consideration. • Inadequate use of monitoring information to improve current practice or prevent damage recurrence [11].
Inadequate capacity within lead agencies to effectively participate in performing their functions as outlined in the Act – EMCA (2004 n.d.) Especially the role of monitoring project development
• Limitation by the size and expertise of its field expert staff among other needed resources and poor remuneration which leaves them open to corruption from big companies.
• Inadequate competence of some NEMA registered experts. This compromise the quality of the output reports [12]

IV. CONCLUSION

In conclusion therefore it is necessary to have in place the necessary pieces of legislation that will govern these emerging technologies not only to protect the environment but also to protect the local communities living around the project areas. Disposal of used fuel rods from nuclear power stations and the by products from oil refineries should be legislated upon to avoid environmental disasters that may result from poor handling and excesses of not having legislations that govern these technologies. Kenya having ratified many environmental treaties can borrow from them that are applicable and of importance in protecting the environment.

REFERENCES