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Regulatory Framework for Geothermal in Kenya

Florah M. Mwawughanga

Kenya Electricity Generating Company Ltd., P.O. Box 47936 - 00100, Nairobi, KENYA

E-mail address, fmaghuwa@kengen.co.ke

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ABSTRACT

Geothermal energy is considered one of the benign energy sources. However, it has its own effects that require prevention, minimisation and mitigation. This can be done through regulations besides other means. Currently only about 10 % of electric energy in Kenya is derived from geothermal despite the vast potential in existence in the Kenyan Rift valley, the greatest proportion coming from hydro. This may change in the future to contribute a greater proportion due to negative worldwide lobbying by environmentalists against hydropower dam development on what is perceived as negative environmental impacts.

Based on experience from other natural resources, when access is unregulated the environment suffers hence the importance of regulations in geothermal development.

The objective of this paper is to discuss a number of items of Kenyan legislation and their implications for geothermal development.

Besides legislation, there are policies that are also part of the regulatory mechanism on matters concerning geothermal. Some of the legislation is old and does not suit the current policies and undertakings in geothermal development, so it needs to be reviewed. Some Acts also address issues that are addressed in other legislation that also affects geothermal development thus causing duplication. Thus there is need to establish a central body to co-ordinate and harmonise regulatory issues in connection with investment in geothermal.

The importance of regulations cannot be overemphasised as they ensure sustainable utilisation of resources and a healthy environment. There is need for all those interested in investing in geothermal development to ensure they are aware of all the legislation that will affect their activities before embarking on any development.

1. INTRODUCTION

Geothermal energy is often considered as a benign alternative to fossil fuel or nuclear. However, it has its own impacts on the environment, which normally require preventive, management or mitigation measures. Although the effects of geothermal development can be avoided or minimised through various means, it is generally recognised that geothermal development needs to be controlled and monitored by independent regulatory authorities through enforceable regulations (Hunt, 2001). Experience in other natural resources suggests, regrettably, that if a developer is allowed unregulated access to the resource, the environment often suffers.

In Kenya a greater proportion of electric energy is derived from hydro, considered as one of the "cleanest" sources due to the absence of toxic emissions like those emitted by fossil fuel power plants. However, lately there has been criticism by environmentalists and social lobby groups on hydropower dam construction world-wide due to what is perceived as negative social and environmental impacts. Thus there is need to focus more on benign energy sources such as geothermal energy which is vast in potential in most parts of the Kenyan rift valley. Currently geothermal resources are exploited mainly for electric power production, with other uses on agriculture being experimental. Currently about 10 % of the total electric energy is derived from geothermal. This is bound to change in future due to the change in origin of energy sources in view of the environmental effects of the current popular sources among other factors.

In Kenya there are several Acts of Parliament that work together to regulate and guide geothermal and environmental use in a sustainable manner. Two pieces of legislation so far refer specifically to geothermal, the Geothermal Resources Act of 1982 and supplementary legislation of 1990 and the Environmental Management and Co-ordination Act of 1999 which refers to geothermal in the second schedule. Other regulations do not directly refer to geothermal but, due to their implications, affect geothermal development at various stages and in various ways. There is therefore a need to have them included in the list of regulations that do or may affect development of these resources. These include among others: Electric Power Act, Forest Act, Water Act, Factories Act, Wildlife Conservation and Management Act. The listed legislation may not be exhaustive, but covers some of the important legislation affecting geothermal development in Kenya. Besides the legislation there are Kenyan and international policies and regulations that govern the development of geothermal resources, more especially those tied to conditions on funding geothermal projects which normally require heavy capital investment.

This paper discusses a number of pieces of legislation and their implications with reference to geothermal development in Kenya. The various legislation is enforced by government authorities through the various sectors (Ministries). Most of these authorities issue licences, permits and consents, with penalties or fines to ensure compliance. A brief discussion on some of the policies affecting geothermal development will be given. Other regulations outside these categories may be of international nature and are, in most cases, tied to conditions attached to financing of the projects.

2. LEGISLATION

Legislation is one important tool for ensuring sustainable development of geothermal resources. In Kenya various pieces of legislation play a vital role in meeting this goal.

2.1 Geothermal Resources Act no. 12 of 1982

This is the principal Act that affects geothermal development in Kenya. The Act regulates access to and exploitation of geothermal resources for power generation. It vests all geothermal resources in the government and empowers the Minister responsible for Energy to authorise geothermal exploration and grant geothermal licences subject to payment of royalties and such other terms and conditions as he may deem fit.

According to the Act, all unextracted geothermal resources are vested in the government subject to any rights which, by or under any written law, have been or are granted or recognised as being vested in any other person. No one is allowed to drill or carry out exploration in a gazetted geothermal area without the written authority or licence from the Minister and may be subject to certain conditions. Failure to meet the set conditions may result in cancellation of the authority or licence.

For purposes of carrying out surveys, investigations, tests and measurements in search of geothermal resources, the Minister gives those involved a written one year authority subject to certain terms and conditions. The authority is not transferable but is, however, renewable. In case the resource is located in privately owned land, then reasonable notice of intention to enter that land shall be given to the owner or occupier by those given the authority.

A Geothermal resources licence may be granted for a period not exceeding 30 years, subject to certain set terms and conditions, and can be for the whole or part of a geothermal resource area. It may be renewed for a period not exceeding 5 years. The licence confers upon the licensee the right to explore, drill, extract and use and do all those things that are reasonably necessary for conducting all those operations. In case of discovery of minerals (by-product) that the licensee needs to recover, the licence may be modified for inclusion of mining lease to enable recovery of the by-product subject to the Mining Act. The licence may not be transferred without the written consent of the Minister. The Minister may also declare a licence forfeited by a licensee by notice due to the following reasons:

1) If the licensee wholly ceases work on or under the land for a continuous period of six months.

2) If the licensee commits a breach or is in default of any provision of the Act or regulations made thereunder or of any terms and conditions of the licence.

The Act requires the licensee to pay annual rent in advance and if payment is not made within 3 months of becoming due a penalty of 10 percent accrues and is paid as if it were part of the rent.

A licensee whose licence has expired, been surrendered or forfeited, may apply to the Minister within 90 days of the surrender, forfeiture or expiry to enter the land which was vered by the licence to remove the plant, machinery, engines or tools erected on the land. If removal is not done within a reasonable time the items may be sold by auction at the risk of the licensee.

As far as safety is concerned the licensee is liable for any loss, damage or injury to any person or property resulting from his or her works or operations. Further, the Minister may by notice to the licensee order to the closure of a bore if the bore is a danger to persons or property in the vicinity, affects detrimentally other bores or a specified tourist attraction, is a nuisance or needs closure in the public interest, is no longer necessary in accordance with the plans approved by the Minister, or for environmental protection, including protection of ground water against contamination, and in the interest of conservation of geothermal resources.

In case of any disturbance of rights of the owner or occupier of any land, or nuisance or damage to land, crops, trees, buildings, stock or works in the course of exploration or development of geothermal resources, reasonable compensation has to be made by the licensee. Where the owner is not satisfied by the compensation, he or she can refer the matter to the High Court within a period of one month to assess and determine the compensation to be paid. So far, geothermal developments have not taken place in land belonging to private individuals, but in future this may happen thus the need to ensure all the requirements are met in good time.

The Minister levies the prescribed fees, rentals and royalties for extraction of geothermal resources for whatever purpose. Any one in contravention of the Act is guilty of an offence and is required to pay fines as defined by the Minister.

In addition to the Act there exists the geothermal resources regulations of 1990 (supplementary to the Act). These were made by the Minister to enable the effecting of the provisions of the Act, and the Act confers powers to Minister to make such regulations which prescribe various actions and items necessary for the proper implementation of the Act.

2.2 Electric Power Act no. 11 of 1997

This is the principal law of the power sector in Kenya. The Act establishes the framework for the regulation of the power sector in the country. It establishes the Electricity Regulatory Board (ERB) which has powers to process and recommend issuing of licences to applicants to generate, transmit and supply electric energy, set, review and adjust transmission and distribution tariffs, enforce environmental and safety regulations, investigate complaints, ensure conditions are conducive to competition and approve power purchase contracts and transmission and distribution contracts. The Act helped in the restructuring of the power sub-sector by creating an enabling environment for private sector participation. This has resulted in independent power producers getting into geothermal development, which was done initially by the government-owned KenGen, formerly the Kenya Power Company (KPC).

In applying for a licence, the Act requires the applicant to give a notice (30-90 days) by public advertisement of his/her intention to apply before making the application. The prescribed fees must accompany the application when being submitted to the ERB for consideration and recommendation to the Minister. Applications for generation, distribution and transmission licences are processed within 180 days after the ERB confirms to the Minister that the application is materially complete in all respects. In recommending the granting of the licence, the board considers among other things the need to protect the environment and conserve natural resources, the energy needs of the community and the proposed area of supply, the technical and financial capacity of applicant to render the service for which the licence is requested and the ability of the applicant to operate in a way that is safe and healthy

for the service users and other members of the public who may be affected by the operations.

The Minister, before granting the licence, gives notice in the Kenya Gazette stating his/her intention to grant the licence, the reasons and time period (not less than 30 days after notice publication) within which objections may be made. After considering objections and representations, the Minister issues the licence subject to terms and conditions set in the Act. Licences for electric power producers are issued for a term of not less than 15 years while that for electricity suppliers is for a term of not less than 30 years.

The licence issued under the Act may not be altered, revised or modified without the written consent of the licensee. Any changes to the licence in terms of time extension must be notified by public advertisement before the alteration application is made. Where the licensee contravenes conditions or requirements of the licence, the board notifies the Minister who in turn orders the licensee to comply with the conditions. The Minister may impose on a licensee a civil fine of not less than KES.10,000 per violation per day.

A licence may be revoked where the Minister, upon the recommendation of the board, is satisfied that the licensee is not operating in accordance with the terms and conditions not-withstanding any order issued or fine imposed as provided by the Act. The Minister gives a 60 days notice to the licensee to show cause why his licence should not be revoked. The Minister gives a notice by public advertisement within one month of the revocation. The licensee, if aggrieved by the Minister's decision or action, shall have the right to appeal to the high court.

Application for renewal of the licence shall be done three years before the fixed date of termination after having given a notice in a public advertisement. The renewal is subject to the licensee having acted in accordance with the terms and conditions of the licence. Transfer of any rights, powers or obligations conferred upon the licence shall be done only with the consent of the Minister.

All contracts for sale of power or transmission services between and among electric power producers, public electricity suppliers and large retail consumers shall be submitted to the board (ERB) for approval and any provisions of any contract done by the board shall be legally binding on all parties. The criteria used by the board in contract approval are that the rates or tariffs are just and reasonable; the metering equipment is installed, owned and maintained by the public electricity supplier; and the costs of any interconnection facilities provided by the electric power producer are to be reimbursed by public electricity supplier.

2.3 Environmental Management and Co-ordination Act no. 8 of 1999

The Act provides for the establishment of an appropriate legal and constitutional framework for sustainable management of the environment and natural resources in Kenya. It outlines environmental impact assessment procedures, environmental audits, monitoring procedures, transmission and environmental quality standards. The government enacted the Act to address the ever-growing concerns about the negative impact of human activity on the environment, conversion and use of energy being one of the those factors contributing to atmospheric pollution, land degradation and global warming, among others.

The Act is administered by the National Environmental Council (NEC) under the chairmanship of the Minister and implemented by the National Environmental Management Authority (NEMA). Under the Act, the Electricity Regulatory Board (ERB), referred to as the board, is recognised as the lead agency for the enforcement of environmental and safety regulations in the electric power sub-sector, the functions of which are conferred by the Electric Power Act of 1997.

Section 121(1) (c) of the Act mandates ERB to "…enforce environmental, (health) and safety regulations in the power sub-sector." The Act sets out terms and conditions that are to be fulfilled to achieve the above. The Board enforces the environmental health and safety regulations according to the laid down terms and conditions involving licences, standards, fines, and penalties among others. The Act requires ERB to take into account the need to protect the environment, conserve natural resources, and protect the health and safety of service users and the public at large, among other things when appraising applications for licences. Licenses are important instruments in enforcing the law. In enforcing the law, the Board regularly monitors the performance of licensees against the performance standards stipulated in their respective licences. Currently ERB is in the process of drafting regulations, rules, procedures and operational guidelines which will set the framework for local standards to be established. Once drafted, these will be forwarded to NEMA for consideration. The law is still young, hence the lack of standards. In the absence of local standards, internationally accepted standards and best practices are applied.

Section 13 (c) of the Act requires a licensee to comply with all possible health, safety and environmental laws. Sections 40 and 99 require the licensee not to use or employ any mode, material or apparatus other than that which complies with specifications prescribed by the Kenya Bureau of Standards (KEBS). Where no such standards exist, the Act specifies that any International Standards approved by KEBS or any other prescribed by the Board may be used. In addition to the Act, there are supplementary regulations of 2003 to help meet the requirements of the Act specifically on the environmental impact assessment process, environmental auditing and monitoring.

The Act lists electrical infrastructure (including electricity generation stations, transmission lines and sub-stations) under the second schedule as projects that have to undergo environmental impact assessment before implementation. Drilling for the purposes of utilising ground water resources, including geothermal energy, is also listed in the schedule thus making it mandatory for all those involved in geothermal development to carry out the process. This involves various processes, which culminate in the issuance of an environmental impact assessment licence once the developer has completed the process. The licence, which is subject to certain terms and conditions, is transferable as long as both the licensee and the party to whom it is being transferred meet the required conditions and only undertake activities the licence is issued against.

This Act is relevant to the geothermal industry in that even before undertaking any development, an environmental impact assessment has to be made detailing all that is to be done, the expected impacts and the preventive and mitigation measures that need to be undertaken. The process will require all the necessary licences, while auditing and monitoring will also have to be done in the course of project implementation and thereafter. To ensure

that different types of wastes are handled well, the power plants will require effluent discharge licences for discharge of effluent into the environment, emission licences for those emitting substances or energy likely to cause air pollution and waste disposal licences where one intends to transport wastes, operate a waste disposal site or plant or generate harzadous wastes. Noise levels that will exceed the set standards will need to apply for exemption permit that does not exceed three months. Where, after completion of the project, rehabilitation is not done as required, the developer will be issued with restoration orders that have to be complied with. All the involved activities need to be done while taking into consideration the health and safety issues and the environment as a whole. The conditions set out in the Act ensure all this is taken care of if developers comply.

2.4 The Factories Act (CAP 514)

Section 5(1) (c) (vii) defines, in part, power stations as factories, This automatically includes geothermal installations. It states, in part, …. (vii) "Any premises in which persons are regularly employed in connection with generating, transformation or transmission of electrical energy or motive power of any kind for supply by way of trade, or for supply for the purposes of any industrial or commercial undertaking or any public building or public institution or for supply to streets or other public purposes". As a result geothermal power stations are fully obliged to comply with most of the provisions of the Act except where the specific machinery stated may not be found in those power stations.

Provisions of the Act include among others the health, safety, and welfare of those in factory premises. The Labour Commissioner is responsible for the administration of the Act through gazetted and certified inspectors and officers.

In connection with health, the Act requires that every factory should be kept clean always, have proper drainage, and have sufficient sanitary conveniences for the employees, unless otherwise stated by the Minister.

To ensure safety, the Act requires that all machines and corrosive and poisonous fluids that may cause danger or risk to anyone within the factory be properly fenced off and fences maintained. Machines including lifts and hoists should also be properly maintained, enclosed where necessary and be in proper working conditions always. Any maintenance shall be done by persons as per the specifications given in the Act. Prohibited areas should strictly remain so and instructions clearly given and administered. The Act also requires that all machines that may cause injury are to be operated by well-trained operators who are well informed of likely dangers and properly supervised. All working gear (fixed or movable) should be of good construction material, adequate strength, free from patent defects (should be tested before use when new), shall be properly maintained and inspected regularly by a person approved by the chief inspector by a certificate in writing. Where a factory chief inspector feels any specified conditions are not necessary, exemption from compliance may be given by a certificate in writing. On issues concerning fire, the Act requires conditions that may cause fires be prevented by storing highly inflammable substances in fire resisting stores, that the factory has easily accessible, adequate and well maintained means of extinguishing fires and adequate suitably located means of escape. It also requires that all the necessary conditions laid down be met. Any contravention of the Act is an offence liable to penalties or fines stated in the Act.

The Act also requires that a general register of particulars set out in one of the schedules in the Act be kept. It also provides for the posting (in a prominent position) of an abstract of the Act, notice of addresses of the chief inspector and nearest labour officer, printed rules under part VII of the Act and any other notice and document required by the Act. These should be in English and vernacular languages as may be directed by the inspector. These should be preserved and available for inspection for at least two years or any other period prescribed.

To provide protection for those working where fumes are likely to be present, the Act requires that removal of the fumes be done, using suitable ventilation and other necessary apparatus. Where workers are involved in processes exposing them to wet, injurious or offensive substances, they should be provided with well maintained protective clothing and appliances including, where necessary, suitable gloves, footwear, goggles and head coverings. The Act also sets rules regarding the health, safety and welfare of manual workers (working hour limits, meal preparation, ambulance and first aid, rest rooms, supervision, unacceptable wage deductions). It also provides for any person not to wilfully interfere or misuse any means, appliance, convenience or anything provided under the Act for securing health, safety or welfare of factory employees. No employee should wilfully do anything that will endanger his life or that of other employees.

As concerns, the employees' welfare, the Act provides for supply of drinking water, washing facilities, accommodation for clothing facilities (clothes not in use during working hours), suitable sitting facilities for female employees whose work is done standing, and provision of a well-maintained first aid box of the standard prescribed in the Act, which varies according to the number of employees.

In case of contravention of the provisions of the Act, there are provisions for prescribed actions for the various contraventions. Where the factory occupier or owner feels he is not responsible for the offence charged upon him, then there is provision for him/her to notify the court within a specified time period, concerning the right person to be charged instead. This is subject to it being proven that factory occupier or owner is not responsible.

The Act is applicable to geothermal development in light of the machinery involved in the power stations, all the activities and the persons involved in the operations, the emissions in as far as the health, safety and environmental issues are concerned and due to the fact that power plants are categorised as factories. Compliance with the requirement ensures that the different parties are taken care of thus minimising the risks and cost that may arise out of non-compliance.

2.5 The Water Act (CAP 372)

The Act vests water resources in the Government and establishes rules and procedures for the use of water. No construction of any waterworks shall be undertaken without a permit from the Water Apportionment Board whether from ground water or surface water body. Where a well is to be constructed by a contractor, the contractor is required to apply for the permit. Anyone abstracting ground water is required to ensure, by adhering to laid down conditions, that no pollution or contamination of the water occurs.

The water apportionment board decides on how much water a licensee can abstract depending on the water amount available, the licensee's water requirements and the requirements of other users, among other factors. When the land or undertaking to which the permit is issued is transferred to another land holder or owner, the permit shall be returned to the Water Apportionment Board for endorsement of the name of the new landowner or holder.

Where the Minister, in consultation with the Water Resources Authority, feels that special measures are necessary for public interest for protection purposes, he may declare, the area a conservation area until another order is made. Anybody diverting or abstracting water from such an area will need the necessary permit before starting any required works. The permit provides for abstraction using only mechanical means.

The Act affects geothermal development operations such as drilling, well testing, cooling, water use in offices and for domestic purpose in cases where employees are housed on site because all require plenty of water. Therefore all the required licences and conditions will have to be met for all those water needs. The existing installations in Olkaria have been making use of water from Lake Naivasha. In future, resources located where surface water bodies are unavailable will rely on ground water and so there will be a requirement for ground water permits.

2.6 Public Health Act (CAP 242) of 1921, revised in 1986

The Act is administered by the Central Board of Health and chaired by the Director of Medical Services in the Ministry of Health. Section 126 states that the Minister, on advice of the board, may make rules and confer powers and impose duties in connection with the carrying out and enforcement thereof on local authorities, magistrates, owners and others as to:

a) Inspection of land, dwellings, buildings, factories and trade premises and for securing the keeping of the same clean, free from nuisance and so as not to endanger the health of inmates and the public

b) Construction of buildings, provision of proper lighting and ventilation and prevention of overcrowding.

c) Periodical cleansing and whitewashing or other treatment of dwellings and cleaning of land attached thereto and removal of rubbish or refuse.

d) Drainage of land, streets or premises, disposal of offensive liquids, removal and disposal of rubbish, refuse, manure or waste matter.

e) Standards of purity of any liquid which after treatment in any purification works, may be discharged therefrom as effluent.

f) Establishment and carrying on of factories or trade premises which are liable to cause offensive smells, or effluvia or discharge or other material liable to cause such smell or effluvia or to pollute streams or otherwise liable to be a nuisance or injurious or dangerous to health and for prohibiting the establishment or carrying on of such factories or trade premises in unsuitable localities or so as to be a nuisance or injurious or dangerous to health.

g) Inspection of the district of any local authority by that local authority with a view to ascertaining whether the lands and the buildings thereon are in a state to be injurious or dangerous to health and the preparation, keeping and publication of such records as may be required.

Section 126 (A) states that every municipal, urban and area council shall, if so required by the Minister, make by-laws for any or all of the following matters concerning the control and regulation of buildings and sanitation, space, lighting, ventilation and dimensions of rooms intended for human habitations, chimneys, prohibition of temporary or movable buildings for business or dwelling purposes, fire escape, certificate of fitness for occupation or habitation for new or altered buildings, and compel employers to house their employees, sanitary conveniences, clean drinking water and repair or demolish unsafe, dangerous or dilapidated buildings.

However, no by-law shall be inconsistent or repugnant to any written law in force in the same area made under any other provision of this Act. The by-laws may include provision to give notices and deposit plans, sections, specifications and written particulars and to inspect work on testing of drains and sewers and to take samples of materials to be used in construction of buildings or in the execution of works.

Section 130 (1) b states that the Minister, on the advice of the board, may make and impose on local authorities and others the duty of enforcing rules in respect of defined areas, ".…….prohibiting or regulating the erection of dwellings, sanitary conveniences,.…, factories or other works likely to entail risk of harmful pollution of such water supply, or prohibiting or regulating the deposit in the vicinity of, or in any place draining into any filth or noxious or offensive matter or thing. "

The Act is relevant to geothermal operations in matters mainly concerning general health and safety of dwellings for human habitation, welfare of employees, and sanitation among other general public health concerns that may arise in the course of construction and operational phases.

2.7 Wildlife Conservation and Management Act (CAP 376)

The Act establishes the Kenya Wildlife Service (KWS) with the mandate to manage National Parks and national reserves, sustain wildlife to meet conservation and management goals, formulate policies regarding conservation, management and utilisation of all types of fauna (wildlife) and flora and to prepare and implement management plans for National Parks and National Reserves and display of fauna and flora in their natural state for the promotion of tourism.

The Act affects geothermal generation within the National Parks and the transmission lines traversing these parks. So far all the geothermal developments undertaken are within the parks and there is even greater likelihood of more being developed in the near future since more resources have been confirmed to exist within the parks. The existenting geothermal developments necessitated the formulation of some agreement between the developers and KWS to ensure that the developers' activities are in harmony with KWS goals and objectives. This has worked very well so far and hopefully will do in future since in the agreement there is provision for constant consultation and resolution of conflicts in case any arise.

2.8 Forests Act (CAP 385)

The Act, in part, provides for prohibition of construction of any roads or paths in a forest or felling, cutting, taking, burning, injuring or removing any tree, erecting any building, clearing, cultivating or breaking up land for cultivation or any other purpose in a forest area or Central Forest or in unalienated Government land without the authority of or a licence from the Director of Forestry or any other person authorised by him on that behalf. In case of a nature reserve, authority or licence is only issued with the object of conserving the natural flora and amenities of the reserve. The authority or licence issued is subject to certain terms and conditions.

This will apply to developments where the resource is located in forest areas or nature reserves. Development of the resource involves activities such as cutting and clearing of vegetation and soil excavation, among others, all of which alter the forest ecosystem. Most of these activities are prohibited by the Act, thus the necessity for requirement to apply for the licence or seek authority in good time accordingly. Where a resource is within a nature reserve exploitation may not be allowed.

3. OTHER REGULATIONS

In addition to the legal framework, there are policies and other factors that affect geothermal development in Kenya. Geothermal exploration, drilling and resource assessment involve high risks and heavy capital investment. The Kenya Government and Government-owned KenGen have usually funded such projects. However, with the liberalisation of the energy sector in 1996 to incorporate independent power producers, things have changed. Full geothermal development activities have been funded by international financiers such as the World Bank and the International Monitory Fund, among others, and the Kenya government. The international financiers have imposed conditions tied to funding such as conforming with the World Bank and European Union guidelines and best accepted international practices especially in the absence of local standards. Thus even before the Environmental Management Act came into being geothermal projects undertaken from the early 90s have had to be subjected to such conditions before implementation.

Development of projects in the energy sector are also affected by the least cost development plan which was instituted in 1986 and updated annually since 1996. Under this plan projects are ranked according to economic merit order. According to this plan, fossil fuel fired power plants are better placed compared to geothermal. However, geothermal may be preferred for being an indigenous source and being more environmental friendly. In addition, the current policy of assigning an environmental tax for every ton of carbon dioxide produced will ensure that geothermal will be better placed than fossil fuel fired power plants.

4. DISCUSSION

Some legislation needs revision to suit the current situation. Some is too old and the fees, penalties or royalties specified are too low. As such, some people can default several times and pay the fines promptly without much difficulty, thus leading to problems as far as sustainability is concerned. However, even after the review, the fees and penalties should not be so excessive as to discourage would-be investors. They should be tailored to suit fairly different categories of interested parties.

In some cases different pieces of legislation address aspects that are addressed in other legislation thus causing duplication. For instance among the different items of legislation considered, the issue of health and safety features in a number of them and defaulters would be penalised separately as per the requirements of the different Acts. Some harmonisation is required to prevent duplication and also to ensure that the licensing process is shorter.

Some legislation may conflict with the fulfilment of policies in other sectors and thus need some harmonisation. For instance there is need to provide cheaper and affordable energy for faster industrialisation and poverty reduction. However, where some of the royalties, fees and fines are set too high by certain sectors through requirements of legislation, then the cost of the product is bound to be high which will ultimately be passed over to the consumer. As such, energy will continue to be expensive.

Consideration for a central body to co-ordinate regulatory issues in connection with investment is urgently needed. This is in reference, partly, to the duplication problem and the minimisation of time taken to deal with different sectors needed to fulfil the regulatory requirements.

5. CONCLUSIONS

Regulations might sometimes present what may seem to be bottlenecks to faster development due to the time taken by various processes that developers have to follow to meet certain requirements. However, these are very necessary since certain detrimental events or effects can be avoided through the guidance of such regulations. Moreover, experience has shown that where access to resources is unregulated, the environment often suffers.

Compliance with provisions of legislation is very vital to avoid future expenses that might arise due to non-compliance thus making the projects ultimately very expensive or leading to one being barred from undertaking any further development. Clear and appropriate energy and environmental policies and legislation are vital for sustainable development of geothermal energy in Kenya. Licences, permits and penalties among other conditions set in legislation ensure implementation and compliance with the law.

Where legislation is new, it is important that developers take them it up and ensure compliance before implementation of their projects for sustainability and harmony with all stakeholders. This calls for stringent measures in handling issues that have legal implications. The legislation may be various; it is thus worthwhile for developers to ensure that they are well aware of all those relevant to their activities and ensure compliance as required.

Regulations ensure harmony between developers, enforcers and the environment. This is because they have provisions to protect all the parties involved in case of a problem.

Regulations should ensure investor and government interests are taken care of. They should continue to be the source of funds for the different sectors but should not be too high to act as impediment to investment.

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