LEGAL ANALYSIS OF FEED IN TARIFFS AND ENERGY EFFICIENCY IN UGANDA

A Thesis Proposal

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In Partial Fulfillment of the Requirements of

Master of laws

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DECLARATION A

I Bukirwa Rowena declare that the work submitted in this report is original and as far I am aware it has never been submitted to any other university or similar institution of higher learning for the award of a degree or any other academic award.

Name of Student: ..Bukirwa Rowena.....

Signature: .....

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"I confirm that the work reported in this thesis was carried out by the candidate under my supervision".

ISAAC KABUYE

Name and Signature of the Supervisor

30/10/2012

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This thesis entitled "**Legal Analysis of Feed in Tariffs and Energy Efficiency in Uganda,**" prepared and submitted by **Bukirwa Rowena** in partial fulfillment of the requirements for the degree of Master of Laws (Natural Resources) has been examined and approved by the panel on oral examination with a grade of _____.

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DEDICATION

This book is dedicated to my dearest parents Mr and Mrs Moses Banalya Yawe for the support and love.

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This project would not have been possible without the help of God. I wish to express my thanks to all those who have helped me in the compilation of this research. I give thanks to the almighty God who has made all this possible. My special thanks and gratitude to the Almighty God to all those who supported me including my husband Patrick Collins Emopus. I would like thank Mr. Kabuye Isaac and Mr. Tajudeen Thani for all the advise , support, patience and coperation. To my family thank you for walking this journey with me. Without their effort the completion of the project would not have been possible.

ABSTRACT

Uganda faces a major problem in its energy sector that is inefficient power supply system. This arises from stunted generation capacity growth, a poor transmission and distribution infrastructure and poor utility commercial practices, has been prevalent. The sub-sector badly needs large investments and prudent utility practices. The sector however lags behind due to the technology advancements such as feed in tariffs beings ignored. However the energy sector lags behind due to operation and implementation of feed in tariffs with in the state. This study analyses the use of renewable technologies in different areas of Uganda. The study further investigates whether the laws (concerning renewable energy technologies) that have been put in place have addressed the inefficient power supply and usage in the state.

TABLE OF TREATIES

The Energy Charter Treaty 1994

The Energy Charter Protocol 1994.

World Summit on Sustainable Development 2002

Protocol on Environment and Natural Resources Management 1999.

The Treaty Establishing the East African Community 2000.

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The Constitution of The Republic of Uganda 1995

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Electricity (Installation Permits)Regulations, 2003.Regulation 5.

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CHAPTER ONE

THE PROBLEM AND ITS SCOPE

Introduction

Energy efficiency plays a fundamental role in shaping the human condition. People's need for energy is essential for survival, so it is not surprising that energy production and consumption are some of the most important activities of human life. Efficient energy use, sometimes simply called energy efficiency, is the goal of efforts to reduce the amount of energy required to provide products and services[1].

Starting from ancient civilization a chronology of selected energy-related events show that human species will always look out for ways to create energy efficiency. Before the modern era, people relied on their own muscles, on the muscles of domesticated animals, such as horses and oxen, and on water and wind[2].

As a result, they built the towns, cities, and transportation networks of ancient civilizations. The technologies that relied on these energy resources are familiar to us all: axes, picks, plows, harnesses, wagons and carriages, waterwheels, windmills, and

[1] Jenny Palm, Energy Efficiency. Publisher: Sciyo. 200

[2] Paul Gipe, Electricity Feed Laws, Feed-in Laws, Feed-in Tariffs, Advanced Renewable Tariffs, and Renewable Energy Payments. http://www.wind-works.org/articles/feed_laws.html. Accessed on 12 March 2012. Every state has it own energy policies. The most effective and efficient way to achieve this goal is to introduce a minimum feed-in tariff that is differentiated by technology. The level should be set close to the technology -dependant hurdle rate (as above). An inflation adjustment is not required. The rate of degression should follow an announced timetable and according to a key rather than left to ad hoc decisions.

sailing ships[3]. With the availability of hydropower potential, the harnessing of energy from moving water came into play.

The vertical waterwheel invented perhaps two centuries before the time of Christ, spread across Europe within a few hundred years. By the end of the Roman era, waterwheels led to the powering of mills to crush grain, full cloth, tan leather, smelt and shape iron, saw wood, and carry out a variety of other early industrial processes.

The invention of Larger and larger water-powered industrial complexes led to the culminating in large water-powered cotton mills operated during the 1770s by William Strutt and Richard Arkwright in England. The introduction of steam power to English coalmines by Thomas Savery and Thomas Newcomen led to the creation of a new source of energy from steam.

Their steam engines and those of James Watt supplanted less geographically flexible water-powered mine pumps. The led to the importation of steam power by the American businesspersons from England and competing successfully with water-powered manufactures[4].

The advent of steam and water as sources of energy led to the emergency of hydropower. The production of electricity with primary batteries and eventually with electromagnetic induction, the transmission of electricity through copper wires, and the development of electric motors ultimately revolutionized the transmission of power. Due

[3] B. Greg, *UK can learn from Germany's feed-in tariff lessons.* The Guardian. 2012 Guardian News and Media Limited. 2012 Guardian News and Media Limited.

[4] B. George, "Energy and Civilization," in *Science, Technology and the Human Prospect*, Chauncey Starr, ed. (New York: Pergamon Press, 1980), 39-52.).

to inefficient supply of energy, the production of power from nuclear energy source and coal also came into play.

The use of coal in the mid-1700s and the development of steam engines set off fast growth of cities, population, and further inventions, including internal-combustion engines and the discovery and use of oil, natural gas, and electricity. This accelerated growth period matured by the end of the 19th century with significant use of fossil fuels and electrification which resulted in to almost-exponential growth of population and energy use[5].

In the early 1980s, financial incentives in the form of capital grant and loans were a common way of encouraging investments in the energy sector. In the mid-1990s, various European countries and promotional programs in charge of the regulation of tariffs for the purchase of electricity from specified renewable sources became more common.

The most important models in this context were (fixed) feed-in tariffs. These tariffs are gaining a lot of usage as goes by and various countries have put them in use[6]. The first country to use these tariffs was the United States of America (USA). The use of tariffs by the USA in 1978 by President Jimmy Carter(National Energy Act (NEA) and the Public Utilities Regulatory Policy Act (PURPA) led to many countries adopting it.

[5] Ibid
[6] Op cit. Note 3

In the 1980s, charcoal and fuel wood met more than 95% of Uganda's total energy needs. These further provided 75% of commercial energy needs, while 21% was provided by petroleum products. Only 3% of commercial energy was provided by electricity on a grid.

Background

Uganda's first land mark of energy was the Owen falls Dam. This dam was built in built between 1950 and 1953. Even though the plant is 58 years old, the economy still heavily relies on it. The dam was managed and run by the Uganda Electricity Board (UEB)[7] .

Until May 2005, Uganda's main source of power was from the Nalubaale and Kiira 380MW hydropower dam complex at the mouth of Lake Victoria. The effective generation capacity of the complex was about 230 MW. However, this favourable situation changed drastically as Lake Victoria water levels dropped to lowest levels since 1951.

The poor hydrological conditions have led to a substantial decrease in hydropower output from about 230MW in 2005 to a low of 138 MW in 2010.

In spite of the decline in generation, demand for electricity continued to grow widening the gap between supply and demand. In 2006, peak demand reached 380 MW resulting into persistent rolling blackouts at peak of 80-120MW. The shortfall in electricity supply

[7] K. Ibrahim. Owen Falls Dam: Powering Uganda for Decades. February 7, 2012. The NewVision. Accessed on 12 July 2012. Accessed from http://www.newvision.co.ug/news/628782-owen-falls-dam--powering-uganda-for-five-decades.html.

has been met through a combination of measures involving procurement of emergency diesel and heavy fuel generators, promotion of energy efficiency and renewable energy. The enactment of the Renewable Energy Policy in 2007 marked a major milestone in the drive to promote renewable energy. The policy envisages an increasing share of renewable energy from 4% to 62% by 2017. In addition to generation from mini-hydros, sugar companies have demonstrated potential to step up generation from bagasse and sell surplus power to the grid. It is now expected that by 2013, sugar companies will be selling up to 50 MW to the grid equivalent to 20% of total electricity supply from the grid.

The Electricity Regulatory Authority in 2007 announced feed-in tariffs (FiT) for hydro power plants of less than 20 MW and the Bagasse based cogeneration. The feed-in tariffs were for a 3-year period (2007-2009). A well designed feed-in tariff policy and clear feed-in tariff guidelines have proved an effective instrument in promoting cogeneration particularly in the sugar sector.

Statement of the Problem

Uganda faces a major problem in its energy sector that is inefficient power supply system. This arises from stunted generation capacity growth, a poor transmission and distribution infrastructure and poor utility commercial practices, had been prevalent. The sub-sector badly needs large investments and prudent utility practices[8]. The sector however lags behind due to the technology advancements such as feed in tariffs beings ignored.

[8] The Energy Policy of Uganda.The Republic of Uganda. Ministry of Energy and Mineral Development. September 2002. Pg 4.

However the energy sector lags behind due to operation and implementation of feed in tariffs with in the state[9].

Purpose of the Study

1. Energy efficiency is one way which a state can save energy
2. Energy efficiency is important because it is one way to reduce green house emissions.
3. Energy efficiency assist in the lowering of energy demand to reduce air, water, or thermal pollution. In case energy efficiency is not, there is likelihood of the depletion of energy sources, pollution and environmental degradation.
4. feed in tariffs play a major role in conservation of energy,
5. Feed in tariffs increase energy supply and
6. Feed in tariffs conserve the environment. Where states especially Uganda do not us adopt the use of feed in tariffs, energy supply is likely to be low, industrialization will be low and low investments are likely to characterize a state[10].

Research Objectives

1. To analyze laws concerning energy efficiency and sustainability
2. To devise means and ways of creating energy efficiency

[9] Op cit. Note 4

[10] Benon. M. Mutambi . *The Role of Feed-in the Funding and Fast Tariffs in Tracking of Renewable Energies* Electricity Regulatory Authority. A presentation made at the EAPIC Conference, Nairobi, 31stAug-3rdSeptember 2010. Accessed on 12th March 2012

3. To determine how feed in tariffs are made
4. To test whether feed in tariffs have a positive impact on energy efficiency.

Research Questions

1. What legal framework has been put in place to ensure energy efficiency and sustainability?
2. What legal strategies can be used to implement energy efficiency?
3. What is the legal impact of feed in tariffs in the energy sector?
4. Whether feed in tariffs have a positive impact on energy efficiency?

Hypothesis

Feed in tariffs play a major role in the efficient use of energy. Energy efficiency can only be a success where countries increase their dependence on renewable sources of energy rather than non-renewable sources of energy. In order for this to occur effective use of feed in tariffs by using renewable sources of energy can increase energy efficiency. This is because if countries such as Uganda rely more on renewable sources of energy such as solar, wind and hydropower, the country will be able to achieve energy efficiency, security and sustainability [11].

Scope

The scope of the research will be divided into three sections, that is the geographical scope, content scope and time scope.

[11] ibid

The Geographical Scope

The geographical scope defines the location or site of the study. The study will be carried out in Uganda. This will cover seven districts in Uganda; these include Masindi, Buikwe, Jinja and Wakiso.

Content Scope

The theoretical scope defines the issues to be covered such as how energy efficiency, energy sustainability and security came into existence. The theoretical scope will only be based on renewable sources of energy according to the energy policy of Uganda 2002.The theoretical scope will discuss the impact of feed in tariffs in the provision of energy security, sustainability and efficiency. This will include definitions, illustrations and developments in the energy sector.

The Time Scope

The time scope for this research will include all data from 2000 to 2012 in the energy sector. This will include collecting data, analyzing data and presenting it.

Significance of the Study

With the recent energy crisis that the country has been experiencing, the study of concenrining the role of feed in tariffs on the energy sector specifically energy efficiency. It spells out clearly who the probable beneficiaries are that is the people of Uganda. This study will show how energy inefficiency has affected foreign and direct investment as well as households. This study is likely to benefit not only the indigenous people of the country but also foreigners.

This is because energy is the major pillar of industrialization in a country. Without it, a country cannot develop. However, where energy is used efficiently, research findings are likely to benefit communities by increasing the supply of energy and reducing its cost[12]. This is because it involves the introduction of technology and using it to benefit not only the state but also households[13].

Operational Definitions of Key Terms

Energy is always equivalent to the ability to exert pulls or pushes against the basic forces of nature, along a path of a certain length. Energy can take various forms such as kinetic and potential energy. Energy is the capacity of a system to do work. One form of energy can be converted to another form. This transfer is based on the law of conservation of energy one of the laws of thermodynamics. In order to conserve energy, it must be used efficiently. There are two types of energy that is renewable energy and non-renewable energy[14].

A non-renewable resource is a natural resource which cannot be produced, grown, generated, or used on a scale which can sustain its consumption rate, once depleted there is no more available for future needs for example coal, petroleum and nuclear power. Renewable sources of energy are those sources that are replenished continuously by natural processes. This includes solar energy, hydropower,

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[12] The Renewable Energy Policy for Uganda, Page 24. The Energy Policy for Uganda which was approved by Cabinet and published inSeptember 2002 laid down Government's commitment to the development and utilization of renewable energy resources and technologies. This Renewable Energy Policy document, which was approved by Cabinet on the 29th March 2007, therefore reinforces that commitment.whose major purpose e is to increase the use of modern renewable energy, from the current 4% to 61% ofthe total energy consumption by the year 2011.

[13] Ibid.

[14] O. Angelo. Uganda's. From Oil and Energy. Sick Energy Sector _JANUARY 6, 2008. *Accessed on 17 July 2012*

biomass, wind and geothermal among others. In this Policy, as done in many other national energy policies, peat and wastes are also considered as renewable sources of energy. Renewable sources of energy o the other hand are intermittent and reoccurring renewables, and recyclable materials, which are utilized during a cycle across a certain amount of time, and can be harnessed from any number of cycles[15].

Experts show that if the world continues to consume energy at the current rate, the non renewable sources will be exhausted in the near future[16]. In a bid to reduce the use of non-renewable sources of energy, the only way to do this to increase reliance on renewable sources of energy such as wind, solar and hydropower. In order to this state need to adopt feed in tariffs which are defined as A feed-in tariff is a policy mechanism designed to accelerate investment in renewable energy technologies[17].

[15] The Renewable Energy Policy. The Ministry of Energy and Mineral Development. March 2007. Pg 14
[16] Ibid Pg 14
[17] Ibid

CHAPTER TWO

LITERATURE REVIEW

Introduction

For this research, the literature review will include primary such as scholary opinions of authors and authors and secondary sources of research research regarding energy efficiency and feed in tariffs as well as their impact on the social, economic and political aspects of the state.[18].

Energy efficiency plays a fundamental role in shaping the human condition. People's need for energy is essential for survival, so it is not surprising that energy production and consumption are some of the most important activities of human life. Indeed, it has been argued that energy is the key "to the advance of civilization," that the evolution of human societies is dependent on the conversion of energy for human use.

The Increasing rate of industrialization and developments in the world have led to an increase in the exploitation of energy sources especially the non-renewable sources of energy. The answer to this can only be found by assessing the recent developments in the energy sector especially the role of the state in ensuring that energy is used efficiently.

[18] M.K Milivoje . Energy engineering and technology, 07 Feb 2008, taylor and francis group.

Concepts, Opinions, Ideas From Authors/ Experts

Sources of literature review can be categorized into two that is secondary sources and primary sources of data. Secondary sources will include the publications such as books, periodicals, abstracts , reviews , journals, newspaper articles and web pages. A feed-in Tariff (FiT) is a price paid by electricity utilities to renewable energy generators for each unit produced and sold[19].

Conceptual Framework

Energy

Energy is the ability to do work. It can be divided into different categories such as potential (stored energy and kinetic energy (Moving energy). Energy can come in many forms such as electrical energy (energy produced as a result of charging atom), thermal energy (energy produced as a result of heat), solar energy (energy produced from the sun) , biomass energy (energy from garbage) and nuclear energy(energy produced as a results of nuclear fusion and fission)[20].

Energy can further be divided into renewable energy and non-renewable energy.

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[19] Greg Barker, UK can learn from Germany's feed-in tariff lessons. The Guardian. 2012 Guardian News and Media Limited. 2012 Guardian News and Media Limited.

[20] K. Haresh. Renewable and Non-Renewable Sources of Energy. Updated on 1/12/2011. Accessed from http://www.brighthub.com/environment/renewable-energy/articles/5029.aspx. As per first law of thermodynamics energy can neither be created nor it can be destroyed, it can only be converted from one form to the other, so where the energy does comes from? Energy is stored in the nature in various sources and in various forms.

[20]N. L., Kaushik.et al (2011, April). Role of renewable energy sources in environmental protection: A review. Renewable & Sustainable Energy Reviews, 15(3), 1513-1524. Retrieved April 7, 2012, from ScienceDirect

Renewable Sources of Energy

Renewable energy is energy which is generated from natural sources i.e. sun, wind, rain, tides and can be generated again and again as and when required[21]. They are available in plenty and by far most the cleanest sources of energy available on this planet. For example energy that we receive from the sun can be used to generate electricity. Similarly, energy from wind, geothermal, biomass from plants, tides can be used this form of energy to another form.

Non-Renewable sources of Energy

Non renewable resources are energy sources that have a finite quantity are not able to be replenished. This definition includes petroleum and shale oils, uranium, coal, and natural gas, the main sources of energy for human technology. Some limited resources, such as metals and timber, are not considered non renewable, because trees can be re-harvested with proper management and metals can be recycled for further use. It is possible to run out of these things, they do not remain permanently unavailable, and require responsible resource management[22].

Non renewable energy resources currently power our world, but this dependence upon finite resources is a potential recipe for disaster. Not only do many of them cause environmental damage, but what will happen when the wells run dry in the future? Reducing, re-using and recycling must become an integral part of our culture, as must

[22] S. Janet. "Charting a New Energy Future." State of the World 2003. By Lester R. Brown. Boston: W. W. Norton & Company, Incorporated, 2003.

the development and widespread usage of renewable and clean power sources. However, the research will concentrate more on renewable sources of energy[23].

Efficiency

Efficiency in general describes the extent to which time or effort is well used for the intended task or purpose. It is often used with the specific purpose of relaying the capability of a specific application of effort to produce a specific outcome effectively with a minimum amount or quantity of waste, expense, or unnecessary effort. "Efficiency" has widely varying meanings in different disciplines. Types of efficiency include energy efficiency, operating efficiency, cost efficiency and pollution efficiency. Energy efficiency is the ratio of useful work made from a process, by the raw power taken to achieve that process. This might seem to be common sense, but a definition helps to explain the concept[24].

Operating efficiency can be defined as the measures can be very specific to a particular machine or system, but they can reflect broader issues also. The efficiency of all individual parts that comprise the whole is operating efficiency. Cost efficiency is the measure of the cost of achieving a task divided by the amount of work it took to achieve it. Pollution efficiency is the amount of work performed by a process divided by how much pollution is generated by that process[25].

[23] Ibid

[24] Ibid, Page 204

[25] Ibid , Page 50

Energy Efficiency

Energy efficiency is the goal of efforts to reduce the amount of energy required to provide products and services. Energy efficiency and renewable energy are said to be the *twin pillars* of sustainable energy policy[26]. Primary Sources of data on the other hand is direct description of an occurrence of an individual who actually observed or witnessed its occurrence. Therefore, under primary sources of data, the research will be carried out using a questionnaire that respondents will fill in. After this , the research will undergo four major processes that is data collecting , data processing, data analysis and reporting [27].

Tariffs

A tariff is either a tax on imports or exports (trade tariff) in and out of a country, or) a list or schedule of prices for such things as rail service, bus routes, and electrical usage (electrical tariff, etc.). An energy tariff is a type of tax that is assessed on an energy product. For example, an energy tariff may be imposed on the sale or purchase of oil, electricity, coal, and gas.

Local, state, provincial, or federal governments can levy energy taxes. In order to promote sustainable energy policies, some countries offer individuals and entities energy tariff credits for using renewable energy resources. For example, private citizens

[26]B. Greg. *UK can learn from Germany's Feed in Tariff lesson. The Guardian 2012 Guardian News and Media Limited .*

[27]Ibid

who use solar, wind, or biofuels as energy sources may receive income tax credits in some countries[28].

Feed in tariffs can be based either on the levelised cost of generation including a reasonable.These are usually bilateral contracts between the producer and the grid / system operator[29]. Feed in tariffs are typically in use to incentivize the production of electricity based on renewable energy. According to Barker (2012), renewable sources of energy are those sources of energy, which can be renewed or recycled to produce energy[30].

A feed-in tariff is a policy mechanism designed to accelerate investment in renewable energy technologies. It achieves this by offering long-term contracts to renewable energy producers, typically based on the cost of generation of each technology. Feed in Tariffs have their roots in the eighteenth century[31].

A feed-in tariff (FIT) is a standard offer contract advanced renewable tariff or renewable energy payments is a policy mechanism designed to accelerate investment in renewable energy technologies. It achieves this by offering long-term contracts to

[28] L. Peter. Feed IN Tariffs the way Forward for Renewable Energy.Accessed on from http://www.japanfocus.org/-Peter-Lynch/3654. Accessed on 28/7/2012.

[29] G. Paul. A Snapshot of Feed-in Tariffs around the World in 2011. http://www.renewableenergyworld.com/rea/news/print/article/2011/10/snapshot-of-feed-in-tariffs-around-the-world-in-2011October 6th 2011.Accessed on 23 April 2012.

[30] A. Klein, et al(October 2008). Evaluation of Different Feed-in Tariff Design Options: Best Practice Paper for the International Feed-in Cooperation, 2nd Edition. Berlin, Germany: BMU. Accessed 1/July/2012 Accessed from : http://www.feed-in-cooperation.org/wDefault_7/wDefault_7/download-files/research/best_practice_paper_2nd_edition_final.pdf

[31] Ibid.

renewable energy producers, typically based on the cost of generation of each technology[32] .

Feed in tariffs include the generation tariff which involves a fixed income for every kilowatt hour of electricity you generate whether you use yourself in your property or export it to the grid. A feed in tariff can also include an export tariff, which is an additional fixed income for every kilowatt-hour of electricity you sell back to the grid[33].

Designing a Feed in Tariff

A feed in tariff is developed in order to support renewable sources of energy such as hydro power and solar power. Feed in Tariffs in Uganda are based on bagasse cogeneration and hydropower. For instance if an individual or investor is able to produce power from a mini hydropower, he can be allowed by government to sell/feed power to the national grid and thereby gain a financial reward[34].

There should be a tariff calculation plan should be transparent and based on real generation costs and return. FiT design can be based either on the levelised cost of generation including a reasonable return or the value of generation to the utility/society (Avoided costs).It should take into account, investment costs, grid related and administrative costs, operation and maintenance works, fuel costs and financing costs.

The ability to allow individuals to generate energy from renewable sources of energy and feed it into the national grid should be for a specified period of time that is

[32] Op cit. Note 28
[33] Ibid

[34] M.N. Benon.The Role of Feed in Tariffs in the Funding and Fast Tracking of Renewable Energies. The Electricity Regulatory Authority. A presentation made at the EAPIC Conference, Nairobi, 31stAug-3rdSeptember 2010

15-20 years[35]. The project of generating power from renewable sources of energy involves administrative procedures such as licensing and subsidies. The grid operator should be obliged to purchase all the power generated.

It is important to define the methodology for grid connection and cost sharing. Three methods are commony used that is deep, shallow and super shallow[36].

Power Purchase Agreements

The PPA is considered contractually binding on the date that is signed(effective date) . Once the project has been built , the effective date ensures that the purchaser will buy electricity that will be generated and that the supplier will buy the electricity that will be generated and that the supplier will not sell its output to any one except the purchaser.

Power purchase agreements (PPA) are contracts between two parties that is one who generates electricity for the purpose of sale (the seller) and one who is looking to purchase electricity (the buyer). There are different types of power purchase agreements depending on the type source of energy harnessed (solar, wind, water).Under the PPA, the seller is often the developer and owner of the technology that generates electricity.

However under the PPA, the buyer is often a utility company that purchases the electricity generated from the seller. Power purchase agreements have been signed between the government and private investors, Recently, Kakira Sugar Works (1985) Ltd entered into a Power Purchase Agreement (PPA) with government to supply

[35] Ibid
[36] Ibid

electricity to the national grid. This is in line with government's policy of liberalising the power sector and to encourage participation of the Independent Power Producers.

There are three sugar factories in the country namely Kakira Sugar Works, Lugazi Sugar Works and Kinyara Sugar Works.

According to NEMA (1998), Kakira Sugar Works has an installed capacity of 4.5 MW, the sugar company now generates 2 MW which is used in the factory and excess sold to UEB (which was privatized). Although the company had an installed capacity of 4.5 MW by 1998 and could use only 2 MW, six years down the road, it has not succeeded to sell its excess electricity to government or any other buyer. The company can produce more energy than what is currently installed but can only do so if the market for the energy is available

According to Gumus, a feed-in tariff (FIT) is a standard offer contract advanced renewable tariff or renewable energy payments is a policy mechanism designed to accelerate investment in renewable energy technologies. It achieves this by offering long-term contracts to renewable energy producers, typically based on the cost of generation of each technology[37].

Theoretical Perspectives

[37] G. Seda,Turkey,Incentives for renewable energy. http:www.mondaq.com x/130778/Renewables/Incentives+For+Renewable+Energy 28 April 2011.

Authors like Benjamin are of the view that energy efficiency has its basis on the theory of sustainability and the polluter pays principle. Such authors believe that energy should be used efficiently to avoid depletion of sources of energy especially non-renewable sources of energy such petroleum and coal.

Other authors such as Richards (2010) believe that energy should be put to effective use and where it is not then penalties are the appropriate solutions. These theories came in place during the nineteenth century with the exploration and production of petroleum by states such as United States of America, Russia and Indonesia.

Legal Framework

Publications that will be of great use during the research include international treaties. These treaties have been ratified and passed as laws. Therefore, this will also include treaties to which Uganda is signatory.

The Energy Charter 1994

The Energy Charter Treaty provides a multilateral framework for energy cooperation that is unique under international law. It is designed to promote energy security, energy efficiency and sustainability through the operation of more open and competitive energy markets, while respecting the principles of sustainable development and sovereignty over energy resources.

The Treaty's provisions focus on four broad areas, the protection of foreign investments, based on the extension of national treatment, or most favored nation

treatment (whichever is more favorable) and protection against key non-commercial risks, non-discriminatory conditions for trade in energy materials, products and energy-related equipment based on WTO rules, and provisions to ensure reliable cross-border energy transit flows through pipelines, grids and other means of transportation, the resolution of disputes between participating states, and - in the case of investments - between investors and host states, the promotion of energy efficiency, and attempts to minimize the environmental impact of energy production and use[38].

The Energy Charter Treaty and the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects was adopted on 17 December 1994, at Lisbon, Portugal, as Annex 3 to the Final Act of the European Energy Charter Conference. As of 20 March 1998, 28 Countries and one Regional Economic Integration Organization had deposited instruments of ratification with the Depositary (Government of Portugal).

Energy Charter Protocol

This Protocol defines policy principles for the promotion of energy efficiency as a considerable source of energy and for consequently reducing adverse environmental impacts of energy systems. It furthermore provides guidance on the development of energy efficiency programmes indicates areas of cooperation and provides a framework for the development of cooperative and coordinated action.

Such action may include the prospecting for, exploration, production, conversion, storage, transport, distribution, and consumption of energy, and may relate to any

[38] The Energy Charter Treaty, 1994, Article 2.

economic sector[39]. The objectives of the protocol include, the promotion of energy efficiency policies consistent with sustainable development, the creation of framework conditions which induce producers and consumers to use energy as economically, efficiently and environmentally soundly as possible, particularly through the organization of efficient energy markets and a fuller reflection of environmental costs and benefits; and the fostering of cooperation in the field of energy efficiency[40].

According to this protocol contracting parties are required to cooperate and assist each other in ensuring the implementation of energy efficiency policies and mechanisms. In addition to the above state parties are obliged to create and adopt policies which are legal , financial and regulatory in structure. The Protocol further provides that state parties shall promote the use of any such technologies, services and management practices in order to ensure energy efficiency.

In order for this to occur state parties are required to put in place admintrative and legal structures in order to ensure the energy cycle is conserved[41].

The World Summit on Sustainable Development

The World Summit on Sustainable Development tool place in South Africa, Johannesburg from 26th to 4th September 2002[42]. It was convened to discuss

[39] The Energy Charter Protocol. Article 1 (1)
[40] The Energy Charter Protocol. Article 2 (a), (b) and (c)
[41] Ibid Article 7 and Article 10.
[42] Opinion of the European Economic and Social Committee, 2012 World Summit for Sustainable Development. 15th September 2010. Accessed fromhttp://www.earthcharterinaction.org/content/attachments/4/EU%20Commission%20and%20EC%20 2010.pdf. Accessed on 27-06-2012.

sustainable development and promote effective engagement of states in the area of energy. When delegates met in Johannesburg, they were after concrete measures that would balance our current and future needs.

The one way to do this is through effective use of energy. Effective use of energy was clearly one of the underlying principles that were expressed under the Kyoto Protocol. It should be noted that Uganda is party to these agreements therefore it is the obligation of the state to ensure effective use of energy and to control waste. The International Energy Agency (IEA) declares that we have 5 years to start cutting emissions, or risk being driven into an uncontrollable acceleration of climate change.

The IEA and other agencies' most recent studies also suggest that unconventional natural gas is very risky, carbon capture and storage dead in the water, and highly polluting coal an increasing source of power. The "wedges" for getting our emissions down keep getting fewer and thinner even as our understanding of the pace and scale of the climate challenge suggests ever more daunting challenges. The only to reduce on these gases is by investing in renewable sources of energy.[43]

Regional Agreements

With the promotion of the East African Community, treaties have been put in place to ensure effective use of energy. According to the treaty, the members include The members of the Community, in this Treaty referred to as "the Partner States", shall

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[43] The Statute of the International Atomic Energy Agency.

be the Republic of Kenya, the Republic of Uganda and the United Republic of Tanzania and any other country granted membership to the Community under this Article[44].The Treaty further provides

> "...The partner states agree to take concerted measures to foster co-operation in the joint and efficient management and sustainable utilization of natural resources within the Community..."

The Protocol also shows that East African states shall promote the establishment of wood lots, efficient production and use of wood and other available energy resources[45].

Ugandan Legislation

The constitution of Uganda provides that the State shall promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations[46].

The literature review will also include Ugandan legislation. The Constitution further provides that the State shall promote and implement energy policies that will ensure that people's basic needs and those of environmental preservation are met[47]. The Constitution of the Republic of Uganda provides that the State shall endeavor to fulfill the fundamental rights of all Ugandans to social justice and economic development and shall, in particular, ensure that—

[44] The Treaty Establishing the East African Community. Article 3 (1)
[45] Protocol on Environment and Natural Resources Management, Artcle 19 (d)
[46] The Constitution of the Republic of Uganda 1995, Article 1, clause xxxii (ii)
[47] Ibid, article 1 , clause xxii (iii)

(a) all developmental efforts are directed at ensuring the maximum social and cultural well-being of the people; and

(b) all Ugandans enjoy rights and opportunities and access to education, health services, clean and safe water, work, decent shelter, adequate clothing, food security and pension and retirement benefits[48]. The State shall promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations.

In order to ensure efficient supply of energy, Uganda through the Ministry of energy and Mineral Development passed a Renewable Energy Policy. This policy defines *Modern Renewable Energy* means renewable energy resources that are transformed into modern energy services like electricity, which can be generated from water power, wind power, solar energy, geothermal energy and biomass cogeneration.

It also refers to clean fuels derived from renewable energy resources like biogas, ethanol, methanol, hydrogen or solar water heating as well as biomass utilized in efficient biomass technologies, like improved charcoal stoves and improved firewood stoves[49].

[48] The Constitution of the Republic of Uganda, article 1 clause XIV
[49] The Renewable Energy Policy. The Ministry of Energy and Mineral Development. 2007. Pg 14

The Electricity Act of Uganda 1999

The Electricity Act in Uganda explicitly promotes the use of renewable energy for electricity supply, especially in rural areas. The Electricity Act stipulates that the Minister of Energy and Minerals should incorporate renewables in the "Rural Electrification Strategy and Plan" which is approved by the Cabinet. This requirement is further strengthened by the obligation for the Minister to annually report on the progress to the Parliament. Section 64 (2) of the Ugandan Electricity Act states that (Republic of Uganda, 1999)

In addition, the formerly government owned utility, Uganda Electricity Board (UEB), was unbundled into separate business functions of generation, transmission and distribution[50]. In 2001, the assets, liabilities and operations of the UEB were transferred to separate limited liability companies for generation, transmission, and distribution. The successor companies were registered in accordance with the Companies Act under the following names:

- Uganda Electricity Distribution Company (UEDCL)
- Uganda Electricity Transmission Company (UETCL)
- Uganda Electricity Generation Company (UEGCL)

[50] M. Benon. Successfully Regulating Electricity From The Sugar Industry: The Case of Uganda. Accessed from http://www.era.or.ug/Pdf/Uganda_Cogeneration%20World_SA_14%20Sept%202010.pdf. Accessed on 21/August 2012.

The Electricity (Primary Grid code) Regulations,2003

Any one licensed to generate, transmit or operate a renewable plant must comply with this code. Generators, distributors of big consumers shall provide such reasonable cooperation and assistance to the Systems Operator as the System Operator may request in pursuance of all of the above general requirements including compliance with instructions issued by the Systems Operator[51]. The Act establishes a Grid Committee which is responsible for amending the grid code. These codes moderate the relationship between the operator, supplier and generator of power.

Value Added Tax Act (Cap 349)

According to this Act, "goods" includes all kinds of movable and immovable property, thermal and electrical energy, heating, gas, refrigeration, air conditioning and water, but does not include money[52]. There for energy can be referred to as a good under this act. Energy therefore is subject to Value Added Tax. Section 4 A tax, to be known as valued added tax, shall be charged in accordance with this Act on:

(a) every taxable supply in Uganda made by a taxable person;

(b) every import of goods other than an exempt import; and

(c) the supply of any imported services by any person[53].

According to the Act, supply of goods denotes A supply of electrical or thermal energy, heating, gas, refrigeration, air conditioning or water is a supply of goods[54]. A

[51] The Electricity (Primary Grid Code)Regulations 1.3.3
[52] Value Added Tax Act, Cap 349 Section 1 (h)
[53] Ibid, Section 4

supply of thermal or electrical energy, heating, gas, refrigeration, air conditioning, or water, takes place where the supply is received[55]. Except as otherwise provided under this Act, the taxable value of a taxable supply is the total consideration paid in money or in kind by all persons for that supply.

(2) The taxable value of –

(a) a taxable supply of goods by way of an application to own use;

(b) a taxable supply for reduced consideration; or

(c) a taxable supply described in section 9(9)[56].

Renewable Energy Policy 2007

The enactment of the Renewable Energy Policy in 2007 marked a major milestone in the drive to promote renewable energy. The policy envisages an increasing share of renewable energy from 4% to 62% by 2017. In addition to generation from mini-hydros, sugar companies have demonstrated potential to step up generation from bagasse and sell surplus power to the grid. It is now expected that by 2013, sugar companies will be selling up to 50 MW to the grid equivalent to 20% of total electricity supply from the grid[57].

[54] Ibid, section 10 (2)
[55] Ibid, section 15 (2)
[56] Ibid, section 21 (1) and (2)
[57] The Renewable Energy Policy of 2007

The Energy Policy 1997

In 1997, the Government of Uganda formulated a comprehensive and detailed Strategic Plan and an Energy Policy for transforming the Uganda power sector into a financially viable electricity industry[58]. The objectives of these reforms include;

- making the power sector financially viable and able to perform without subsidies from the Government budget by moving towards cost reflective tariffs;
- increasing the sector's efficiency;
- improving the sector's commercial performance;
- meeting the growing demand for electricity and increasing area coverage;
- improving the reliability and quality of electricity supply; and
- attracting private investment[59].

Related Studies

Related studies in the area of feed in tariffs were carried out by Benon Mumbi on behalf of the Electricity Regulatory Authority which clearly out the cost of setting up projects. These studies show which areas have been pit in place to ensure the use of feed in tariffs. These studies show how tariffs can be calculated.

Studies carried out by Kakerenzi have shown that energy efficiency was a concept, which had not gained acceptance[60]. However, with time, new sources of

[58] Ibid
[59] The Energy Policy, 1997
[60] S. Karekezi, et al 2004. 'An Overview of Power Sector Reform in Africa'. In: Marandu, E. and Kayo, D. (Eds), The Regulation of the Power Sector in Africa: Attracting Investment and Protecting the Poor. African Energy Policy Research Network, Nairobi and ZED Books, London, UK.. Page 102

energy both renewable and non-renewables sources were discovered such as biomass and geo thermal. Because of conserving, non-renewable sources of energy expert's advice states to increase their usage on renewable sources of energy as such feed in tariffs arose.

In a bid to increase efficient use of energy, scientists came up with the concept of energy efficiency or a scheme of saving energy by using it appropriately. As a, result of this many developed and developing states are increasing the efficient use of energy through the concepts of sustainability and security. Feed in tariffs and other incentives are one of reducing on green house gases.

Missing Gap

A review of amended Electricity Acts in several sub-Saharan African countries reveals that most of them do not explicitly mention or promote the use of renewable energy in electricity generation. Countries with vigorous renewable energy programmes have amended their Electricity Acts to explicitly promote renewable energy, including Ghana, Kenya, Namibia and Uganda. In these countries, the amended Electricity Acts have played an essential role in the promotion of renewable energy

CHAPTER THREE

RESEARCH DESIGN

This chapter discusses the design procedures and methodology that will be put in use when conducting research in the scope of the area chosen in Uganda. It further shows the sources of data that the research pattern follows. The research design includes an outline of what the research is about. This design will show the means of obtaining information, methods of data collection and analysis of data which is of great significance while conducting the research.

The research will be a descriptive and cross-sectional. A descriptive research is one which involves describing in detail the characteristics of the community or region where the population resides. This will also involve explaining and describing the key characteristics of the situation in the past and present times. This is done as to achieve systematic description that is factual and accurate.

The study will also be cross-sections as it will cut across different regions or districts in Uganda. This will involve describing the key elements from each population in a different regions. The study will also be qualitative in nature. A qualitative research is one whose data is basically descriptive in nature. That is the data is obtained and ordinarily expressed in non-numerical terms.

During the research will reflect strategies such as narratives, phenomenologies, theories studies and case studies. The research will explain the different concepts such as feed in tariffs, net metering and other incentives in the energy sector.

Descriptive and cross-sectional research design is the suitable method for the research because the study involves describing the past and present state of the use of renewable energy policies in Uganda. Furthermore, the research will involve a comparison between the past and the present use of energy in Uganda. This comparison will require providing characteristics of the population in different districts.

The study will be qualitative nature meaning it will involve describing and analyzing effects of energy efficiency and how various communities have embraced the use of renewable energy technologies such as feed in tariffs . The study will further describe the applicability of feed in tariffs in different communities as well the responses of the participants. This research will also include a historical or narrative inquiry describing the past occurances for the purpose of describing the causes, effects or trends of the events that have occurred in the energy sector of Uganda(Amin,2005).

Research Population

The research population can be defined as the complete collection of all the elements that are of interest in the particular investigation. Basing on the research the population will include the a aggregate or totality of objects or individuals having one or more characteristics in common that are of interest in this research area of energy. This research will be carried on the Ugandan people as well as investors that have taken interest to invest in the renewable energy sector

Research Instrument

Data collection for this study will be carried out using the qualitative method of research which involves using documentary evidence or publications about stakeholders involved in the production and distribution of renewable energy. (Amin,2005).

Data will be gathered or obtained from the department of Geological Surveys and Mines in the Ministry of Energy and Mineral Development (MEMD), the Uganda Bureau of Statistics (UBOS) and publications earlier made on RETs. The Internet will be an important source of information especially on Uganda and the projects that the government has undertaken to ensure efficient supply of energy.

Validity and Reliability of the Instrument

The validity measurement is essential to successful scientific activity. Before choosing a research instrument, it important to ascertain its validity. This involves producing accurate results and measuring what needs to be measured. Validity refers to the appropriateness of the instruments while reliability refers to its consistency in measuring whatever it is intended to measure. Data quality control refers to validity and reliability of the instruments. There are various ways of checking the validity of an instrument such as empirical validation and the theoretical validation. For this research, the most appropriate method is the content validity test.

Data Gathering Procedures

The data gathering procedure will involve the use of books, articles, statutes, trade policies and internet sources. These will provide for details concerning the usage of renewable energy technologies by investors, the government and on a domestic scale. These process will involve collecting, processing and analyzing data using the frequency and distribution tables (Amin,2005).

Limitations

Limitations to the study can be considered to be potential sources of bias/ threats to the validity of the findings in the proposed study. Since the research is based on feed in tariffs and energy efficiency with in the Ugandan region, the likely limitations include language barrier. Some SMEs do not have a culture of record keeping; very little is recorded - the information is very scanty, it does not cover long periods of time and in some instances unreliable. Most SMEs do not advertise themselves, making it difficult to locate them. There was also problem in accessing information from some government departments due to the bureaucracies involved in these departments, which required long periods before data could be secured. In some instances, the required data was not available in the format suitable for the study. Although everything was done to avoid suspicions, a few respondents were unwilling to disclose their business information, and it required a lot of time and explanation before they could release any information. In addition, there was a time constraint.

CHAPTER FOUR

FINDINGS, PRESENTATON AND ANALYSIS

Introduction

Uganda has abundant energy resources that is renewable resources and non renewable sources, yet there is widespread energy poverty all over the country. There is an urgent need to develop the resources and improve energy supply. As the world moves forward, Uganda has also taken the obligation to conserve and effectively use energy by ratifying treaties through legislation[61]. The Constitution provides that the State shall promote and implement energy policies that will ensure that people's basic needs and those of environmental preservation are met"[62].

The Ministry of Energy and Mineral Development (MEMD) is responsible for the sector, dealing specifically with energy policy formulation, implementation and monitoring. This chapter therefore will show the different findings , presentations and analysis in the area of energy efficiency and feed in tariffs.

Findings

The findings will include the information gathered concerning the use of renewable energy technologies in Uganda. The Renewable Energy Technologies (RETs) considered in this studies are mainly Geothermal and cogeneration, but also the status of other renewables including, Solar, Bio-fuels and Small hydro are outlined. The RETs

[61] The Renewable Energy Policy of Uganda
[62] The Constitution of the Republic of Uganda.

study found out that there is political will and moral support extended to firms and organizations that produce, promote, or manufacture RETs in Uganda. The Ugandan government has also taken initiative to promote some of the RETs although, little has been achieved, so far.

Overall Status of Energy

95% of Uganda's 25.4 million people do not have access to electricity. This coupled with annual population growth rate of ~ 3% in a framework where electricity demand growth is 7-8% per annum, spells trouble for the energy sector. This sector is characterised by biomass, fossil fuels, and hydro electricity power generated from two large dams.

The annual energy consumption is estimated to be 20 million tonnes of wood, 430,000 tonnes of oil products, hydropower installed capacity of 300 MW from two large dams, another 13.05 MW from small hydro projects; located in the west and one in the West Nile region in northern Uganda and 10 MW from cogeneration. The country also generates 3 MW from thermal to cater for the electricity needs of urban towns in the Northern region where the national grid has so far not been extended.

Biomass Energy

According to the research conducted, biomass energy still remains the most affordable and used source of energy. Biomass (firewood, charcoal and crop residues) plays a very significant role in Uganda's energy supply. It constitutes over 90% of total energy consumption in the country. Biogas has so far been spread to five districts

across Uganda. Most of the traditional energy technologies (wood and charcoal stoves and charcoal production kilns) currently used in Uganda are inefficient[63].

Fuelwood requirements have contributed to the degradation of forests as wood reserves are depleted at a rapid rate in many regions Fuel wood and charcoal still remain the most affordable source of energy to most rural and urban households for over 95% of Uganda's population. The decrease in biomass energy resources and the increase in energy demand are a big challenge to the population and to the country as a whole.

The Energy Assessment Mission Estimates noted that, although there was an apparent high rate of growth of demand for energy, of between 6% and 8%, Fuel wood is also highly utilized in small-scale industries (for example, brick and tile production, agro-processing and fish processing).

Wind Energy

The use of wind as a source of energy has not been embraced by many people including investors. The use of renewable technologies such as wind mills is used to a small extent despite the wind speeds that have been recorded in specific areas suc as karamoja. Though wind speeds have been recorded at low metrological heights and not the standard 10 meters, implying that the wind regime may be much higher than indicated.

According to Karekezi ,the Roman Catholic Mission, the Church of Uganda and the Karamoja Development Authority (KDA) have installed wind pumps in Karamoja in

[63] The Energy Policy of Uganda.The Republic of Uganda. Ministry of Energy and Mineral Development. September 2002. Pg 18

the Eastern parts of the country. The average wind speed about 3 m/s, but in flatter areas like around Lake Victoria and the Karamoja regions as well tops of hilly areas, the speed may varying reaching up to 6 m/s – which is quite sufficient to run small wind generators of around 50 kWp.

However, though areas have been found to possess sufficient wind for harvest, very few investments have been carried out. In addition to this, very few people renewable technologies that can be used to harvest wind as a source of energy are used to a small extent for instance to light street lights in Kampala.

Hydroelectric Power

The hydroelectric power potential of Uganda is high and estimated at over 2,000 MW, mainly along the River Nile. Current exploitation is about 317 MW, of which 300 MW is on the River Nile and generated by the Uganda Electricity Generation Company Limited. UETCL has export contract obligations to neighbouring countries as follows: Kenya (30 MW), Tanzania (9 MW) and Rwanda (5 MW)[64].

Uganda is widely dependant on hydro electricity especially for its industrial plants. According to the findings, various donors have financed renewable technologies such as two major independent power producers, AES Nile Power and Norpak Power Company are in various stages of setting up large power plants[65]. Uganda's

[64] The Energy Policy of Uganda.The Republic of Uganda. Ministry of Energy and Mineral Development. September 2002. Pg 18.
[65] The Energy Policy of Uganda.The Republic of Uganda. Ministry of Energy and Mineral Development. September 2002. Pg 16

electrification rate is very low, with grid access of only 5% for the whole country and less than 2% in rural areas[66].

Solar Energy

Karekezi *et al.* (1997) found out that, solar energy sources were hardly used in Uganda and that there were at least 538 PV installations in the country, which by 1992, had amounted to a total capacity of about 152.5 KW, being used by the Ministry of Health and other government corporations. By the same time (1992) there were 238 PV vaccine refrigerators, amounting to about 60 kW of installed capacity.

By 1998, there were approximately 1,500 solar installations in the country, which had been financed by external donor agencies and they included 300 community-based systems. In 1998, NEMA (1998) also found out that, PVs were mainly found in large institutions and international Non-Governmental Organizations.

Today however, the number of solar units in the country can be estimated to be more than 10,919 PV installations and is slowly being disseminated in the rural areas. According to the findings, the biggest setback to solar energy in the country has mainly been the initial costs of the solar equipment. The current cost of a solar home system - solar unit that can be used for lighting and probably a radio set is about US $ 550.

Many Ugandans cannot afford the upfront costs of solar panels. There is also a problem of accessibility of solar technologies in rural towns of the country (almost all solar businesses are based in the capital city), profiteering by some private firms, and

[66] Ibid.

failing to give advice about the capacity of PV; very few programmes are in place to disseminate solar energy countrywide.

Geo thermal/ bagasse cogeneration

Cogeneration is the simultaneous production of energy, heat and power from a single energy system and source. It is also known as combined heat and power (CHP) technology. The three sugar companies in Uganda namely, Kakira Sugar Works Ltd (KSWL), Kinyara Sugar Ltd, and Sugar Corporation of Uganda Ltd (SCOUL) have for a long time produced power for their own use using bagasse. Following the reforms in the electricity sector, KSWL and Kinyara Sugar Ltd have started producing surplus power which is exported to the national grid.

In 2001, KSWL entered into a tripartite power purchase agreement with UEDCL and UETCL with an energy purchase price of US$0.049/kWh. Kinyara Sugar Works on the other hand submitted a notice of intended application for generation of 7.5 MW for own use and sale to the grid in 2006. The company was awarded a generation and sale license in 2007. SCOUL first applied for a license to generate 6.6 MW and sell the surplus power (3 MW) to the grid in 2005 at a tariff of US$0.076/kWh.

However, from the study findings the other two factories do not have an immediate plan of expanding their cogeneration plants beyond producing the power needed for their industrial consumption. Kinyara Sugar Works is in the pipeline of being privatised, according to the factory management, increased cogeneration by the factory will depend upon the plans of the new owners[67].

[67] M. Benon. Successfully Regulating Electricity From the Sugar Industry. The Case Study of Uganda. Accessed from http://www.era.or.ug/Pdf/Uganda_Cogeneration%20World_SA_14%20Sept%202010.pdf

These three sugar factories have incurred a lot of costs while financing renewable energy technologies for instance In 1998, KSWL submitted a proposal to the Ministry of Energy and Mineral Development (MEMD) for expansion of its cogeneration plant. In this proposal, KSWL wanted to install a 30 MW Turbo-Alternator and a high pressure 160 TPH boiler, in order to be able to sell 18 MW to the grid.

This proposal, however, was not taken up partly due to the fact that the Government owned utility Uganda Electricity Board (UEB) had started negotiations with AES to build the 250 MW hydropower dam at Bujagali falls. Laws such as the Electricity Act and regulation favour the use of renewable technologies such as feed in tariffs to a small scale In addition to the above, the sugar factories have received very few grants to enable them to operate.

Presentations

Energy Efficiency Strategy

The programme seeks to implement the Energy Efficiency Strategy. The Government will promote efficient utilization of renewable energy resources, through the activities described in the *Energy Efficiency Strategy for Uganda.*

Table 1: Energy Efficiency Strategy for Uganda[68]

PROGRAMMES BASELINE	**BASELINE**	**CUMULATIVE TARGET**	
1)Power Generation	**2007**	**2012**	**2017**
Hydropower plants (large) (mw installed	380	830	1200
Hydropower plants (mini and micro)(MW installed)	17	50	85
Cogeneration (MW installed)	15	35	60
Geothermal (MW installed)	0	25	45
Municpal Waste (MW installed)	0	15	30
2)Rural Electrification and Urban Access	**2007**	**2012**	**2017**
Electrified households through PREPS/LIREPS and CIREPS	250,000	375,000	625,000
3)Modern Energy Services for Households	**2007**	**2012**	**2017**
Improved woodstoves (no)	170,000	500,000	4,000,000
Improved charcoalstoves (no)	30,000	100,000	250,000
Institutional Stoves (no)	450	1,500	5,000

[68] The Renewable Energy Policy for Uganda. The Ministry of Energy and Mineral Development. 29th March 2007.Pg 25. Accessed on 21 August 2012. Page 5.

Baking Ovens (No)	60	250	1,000
Klins (lime,charcoal,brick...) (no)	10	30	100
Household biogas (No)	500	300,000	100,000
Solar Home Systems (Kwp)	200	400	700
4)Biofuels (Ethanol and biodiesel)(m^3/a)	**0**	**720,000**	**2,160,000**
5) Energy Efficiency	**2007**	**2012**	**2017**
Energy savers (No)	1,000,000	2,000,000	4,000,000
Industrial energy audits implemented (No)	20	70	300
Energy efficient equipement Industries	15	50	250

In terms of the economic dimension of sustainable development, energy efficiency is clearly an important motor of macroeconomic growth. In terms of the environmental dimension, conventional energy sources are major sources of environmental stress at global as well as local levels. In terms of the social dimension, energy efficiency is a prerequisite for the fulfillment of many basic human needs and services, and inequities in energy provision and quality often manifest themselves as issues of social justice[69].

[69]Adil Najam and Cutler Cleveland , Energy and sustainable development at global environmental summits. Accessed from http://www.eoearth.org/article/Energy_and_sustainable_development_at_global_environmental_summits. Accessed on 27-06-2012

Feed in tariffs have been implemented in some parts of the country where by private individuals are allowed to generate energy from renewable sources of energy which they feed in to the national grid. The country has numerous mini- and micro-hydropower sites which can be developed to supply isolated areas or feed into the national grid[70].

Analysis

Uganda's geothermal and Cogeneration Resources and Reserves

Despite the enormous current geothermal resources, the country has not been able to install any geothermal plants. Nevertheless, studies done on three sites of Katwe, Buranga and Kibiro by the Geological Survey and Mineral Development (GSMD) and the United Nations Development Programme (UNDP) between 1993 - 1994 indicate that with commitment, Uganda's potential to meet the 5% target is possible.

Renewable energy technologies projects are capital intensive and the source of capital financing is a critical investment decision. Arranging long-term financing at favourable terms has been one of the major hindrances to promotion of cogeneration projects. Commercial banks prefer to lend short-term and at very high interest rates. On the other hand, international development finance institutions prefer to lend to reasonably large projects (i.e. >25 million US Dollars)[71].

[70] The Energy Policy of Uganda.The Republic of Uganda. Ministry of Energy and Mineral Development. September 2002. Pg 16

[71] Benon M. Mutambi. Successfully Regulating Electricity From the Sugar Industry. The Case Study of Uganda. Accessed from http://www.era.or.ug/Pdf/Uganda_Cogeneration%20World_SA_14%20Sept%202010.pdf. Page 8

Grid connection and charging still remains a problem which has not been addressed by law. Most cogeneration projects are likely to be embedded generators and far from the main grid. This implies that in order to interconnect with the national grid, a transmission line has to be constructed. Experience has shown that the decision on who should finance and construct such is critical to the success of cogeneration. Shallow connection charging where the renewable energy[72].

Inefficient supply of energy has greatly affected sectors of the country such as infrastructure, agriculture, industry and commerce, households and institutions. There is significant potential for energy efficiency (EE) through improved use in households, industry, commercial buildings and the transport sector. Since expenditure on energy constitutes a large proportion of the country's GDP and a particularly large proportion of poor household expenditure, it is necessary to emphasise the effective and efficient use of energy.

There exists only three sugar factories namely Kinyara Sugar works Limited (KSWL), Sugar Corporation of Uganda Limited (SCOUL) and Kakira Sugar Works (1985) Limited (KSW). That are engaged in small-scale cogeneration primarily to meet their industrial energy needs. The low levels of cogeneration in the country can best be explained by the poor fit policies before liberalization of the energy sector.

Before liberalisation, the existing policies restricted the private sector from generating power for sale and limited them to producing power for their industrial consumption. Kakira sugar Works for example has shown interest in expanding its

[72] Ibid. Page 9

cogeneration plant to supply power to the national grid. According to factory management, plans are under way to up grade the cogeneration plant to produce more Plans for expansion were earlier frustrated by the poor policies existing before liberalization of the energy sector.

Efficient use of energy and feed in tariffs is crucial to the industrialization of the state. Efficiency of energy usage is low in most factories in Uganda. A number of factories operate below rated capacity, hence lowering overall efficiency. Lack of appropriate mechanisms to enable modern and efficient energy services to be accessed by the rural population[73].

Inefficient production and use of biomass energy resulting in adverse effects on the environment and the health of biomass energy users, especially in rural households. Analysts have further commented that there has been Low public awareness about the efficacy and potency of renewable energy technologies (RETs) such as feed in tariffs: even if people are aware of RETs, their real potential and technical limits and constraints are generally underestimated.

The Clean Development Mechanism (CDM) created under Kyoto protocol has not been a successful project financing mechanism for small renewable projects. It has been found to be complicated and questionable in terms of carbon dioxide emissions. Kakira Sugar Works has been pursuing the carbon credits for over three years and has not yet succeeded[74].

[73] The Energy Policy of Uganda.The Republic of Uganda. Ministry of Energy and Mineral Development. September 2002. Pg 23

[74] Benon M. Mutambi. Successfully Regulating Electricity From the Sugar Industry. The Case Study of Uganda. Accessed from http://www.era.or.ug/Pdf/Uganda_Cogeneration%20World_SA_14%20Sept%202010.pdf

Many people are unware of the procedures that are involved in generating power on a small scale and selling it to the national grid (feed in tariffs)[75].Underdeveloped markets in RETs equipment and services because of high initial investment costs and lack of financial capacity to cover the initial investment. Many of these renewable sources of energy have not been exhausted due to Inadequate financing mechanisms and other incentives to facilitate investment, communication, promotion and dissemination of RETs such as feed in tariffs[76]. Furthermore technologies concerning feed in tariffs and energy efficiency have not been fully exhausted due to Inadequate data available on the potential of indigenous renewable energy sources (geothermal, solar, wind, mini and micro hydro, etc).

Legal and institutional frameworks

The current situation is that feed in tariffs and power purchase agreements are negotiated, on a case by case basis. This increases transaction time, costs and leads to low investor turn out. Furthermore, the current feed – in - tariffs are low, because project sponsors expected some subsidy. With the removal of subsidies, the tariffs will be higher[77].

Under the Electricity Act, the role of government includes policy making while the role of licensing and tariff setting was transferred to an independent regulator. Under the Electricity Act, the regulator is supposed to carry out its function in an independent and transparent manner. Electricity tariffs should be set at levels that recover all the reasonable costs incurred by licensees including a reasonable rate of return however so

[75] Ibid Pg 30
[76] Ibid, Pg 31
[77] The Renewable Energy Policy for Uganda. The Ministry of Energy and Mineral Development. 29th March 2007

far this has been achieved as funding has been low over the years in the energy sector. The Electricity Act also provides for a single buyer form of market structure[78].

The Electricity Regulatory Authority

This regulatory institution of electricity in Uganda is the Electricity Regulatory Authority. Accordingly many investors have found the procedure of being granted a license by the Electricity Regulatory Authority as tedious and beuracratic this is because the Uganda Regulatory Authority reserves the discretion when granting licenses. In the case of **Electromaxx (u)Ltd V Electricity Regulatory Authority**, an injunction was issued to restrain the respondent Electricity Regulatory Authority from granting an independent power producer a license M/S Jacobsen Electro as for the generation and sale of 50 mega watts of thermal power until the final determination of the commercial appeal No.02 of 2007.

> "One of the functions of the Electricity Regulatory Authority is to issue licenses for the generation, transmission distribution or sale of electricity. In the performance of its functions the Authority must ensure a fair balance of the interests of the consumers, the Government and participants in the power sector... If an injunction was to issue which restrains the Authority from the due performance of its statutory functions, and on appeal the Authority turns out to be the successful party, the Authority would thereby have suffered

[78] The Electricity Act.1997

inconvenience because it would have been disabled in the timely execution of its functions[79]."

The functions of the authority include to issue licenses for the generations, transmission, distribution or sale of electricity, ownership or operation of transmission systems, to establish a tariff structure and to investigate tariff charges, whether or not a specific complaint has been made for a tariff adjustment to approve rates of charges and terms and conditions of electricity services provided by transmission and distribution companies, including others.

The authority has the power to provide licenses concerning the generation, transmission and operation of power plants. Feed in tariffs are provided under section 51 which provides

"(1) No person shall construct, own or operate a generating station with a capacity of or exceeding 0.5 megawatts without a generation licence issued under this Act.

(2) The authority shall, subject to the payment of the prescribed fee, register a generating station constructed, owned and operated for commercial purposes of a capacity not exceeding 0.5 megawatts[80]"

Though the Act allows individuals to produce if they exceed 10 mega watts and the license expires all installations of the plant are transffered back to the

[79]Electro Maxx (U) Ltd V ElectricitY Regulatory Authority.[2007] UG CommCM106. HCT-OO-CC-MA-0200(Arising from HCT-00-CC-CA-0002 OF 2007) High Court of Uganda (Commercial Court Division)
[80] The Electricity Act. 1999. Section 51

government[81]. By publishing the feed in tariffs and having a standardized power purchase agreement, the business environment is made more predictable and thus transaction costs will be reduced and investments should increase.

The state's renewable energy sector especially hydro power plants has been affected by the high rate of corruption. For example though the government has put in place plans to build a hydropower plant at Karuma falls.

This measure will apply to hydro power schemes, cogeneration plants and is already being implemented. This will increase the accessibility of electrical power to middle income households[82].

UMEME

Umeme was formed in 2004 when the Government of Uganda sold Uganda Electricity Distribution Company Limited (UEDCL) to a consortium belonging to Globeleq (56%), a subsidiary of the Commonwealth Development Corporation (CDC) of the United Kingdom and Eskom (44%), the electric generating company of South Africa. This insitution has experienced various challenges in the area of renewabale energy and energy efficiency.

Though the energy sector has been managed by UMEME, there has been disatisfaction not only from members of parliament but also the public concerning electricity. This has been caused due to the high tariffs that have increased this

[81] The Electricity Act. 1999. Section 52
[82] Ibid. Pg 7

financial year. As a result of this UMEME has decided to sell most of its shares to foreigners, insititutions, members of the public and employees of UMEME.

Installations on land

Any person licensed to generate power(feed in tariffs) must consider the issue of land. In order to ensure energy efficiency through the use of renewable energy technologies, it is important to consider the issue installations on land such as electricity poles and lines. However, since the Electricity sector was privatized, there have arosen many disputes concerning installations on land. Some land owners have complained of land grabbing, non- payment or delay in compensation where land is needed for installations. As a result before any renewable energy policies are put in place, the rights of the landowner must not be violated. The Act stipulates that

> "A licensee shall not, in the exercise of the powers conferred under this section, except with the consent of the owner of the land under, over, along, across, in or upon which any electric supply line is placed—
>
> acquire any right other than that of the user of the land under, over, along, across, in or upon which an electric supply line or post is placed and for the reason of that exercise;

exercise those powers in respect of any land vested in or under the control or management of a local government or other public authority, except in accordance with the procedure set out in section 68[83]"

In order to enusure efficient supply of energy, a licensee is required to ensure that the rightsd of land owners are not violated.In the case **Emmanuel Turyamuhika Kikoni V Uganda Electricity Board**, during September and October, the defendant entered the plaitiffs land at Itaaano L.C. 1, Kebisoni, Rukungiri District and turned a strip of that land measuring 700 metres by 30 metres into an electricity way leave. In the process a high voltage line of 33 KV passed over land comprised in Rujumbura Block 20 Plots 115 and 192 and the plaintiff's hedge and eucalyptus trees were cut down.

It is the plaintiffs case that he has lost use under the strip of land already mentioned the extent of which was assessed at 5.18 acres. The defendant neither sought the consent of the plaintiff nor compensated him. Hence this suit. As a result the the plaitiff was awarded damages amounting to 54,058,580 shs as a result of trespass (the defendant passed electricity power lines through the land without the consent of the plaitiff)[84].

[83] The Electricity Act.1999.section 67 (2)
[84] Emmanuel Turyamuhika Kikoni v Uganda Electricity Board. HCT-05-CV-0021-2004.[2005]UGHC 106.

According to the Regulations, before any installations are put in place, a licensee must submit an application in writing to the committee[85]. 'Electrical installation work" means the installation, alteration or repair, wholly or partially, of any conductor or apparatus or system of wiring in or upon premises, connected or intended to be connected to a supply of electricity[86].

Tariffs and Terms of Supply

Tariffs and terms of supply of energy still remain on case by case basis. This is because the Electricity regulations do not show the formula or method that will be used to calculate tariffs. According to the regulations, Where a licensee feeds power into the tariff structure and terms of supply shall be in accordance with principles of tariff calculation and terms of supply prescribed by the authority taking into account the licensee's total revenues from tariffs covering all reasonable costs and a reasonable rate of return[87].

All these terms must clearly be laid out in the power purchase agreement providing for the rights and duties of the licensee. The licensee is required to pay any extra fees in form of compensation and taxes where required.

[85] Electricity (Installation Permits)Regulations, 2003.Regulation 5.
[86] Ibid.
[87] Ibid, section 75

CHAPTER FIVE

RECOMMENDATIONS AND CONCLUSIONS

Introduction

The country's reliance on renewable technologies such as feed in tariffs and ensuring energy efficiency has been affected various factors such as climate, over taxation of renewable machinery such as solar panels and batteries, corruption, poor maintenance of renewable energy machinery such as hydro power plants as well as managerial and institutions contingencies.

In an effort to promote the use of renewable energies in Uganda, the European Union has launched the Sustainable Energy Markets Acceleration (SEMA) project, to help sensitize the public on the importance of renewable energies and increase their usage. This project is intended to stimulate private sector investment and popularise the use of such energies [renewable] among Ugandans for a green economy.

According to NEMA (1998), whereas the generation capacity has tripled in the last 10 years the country still suffers from power deficit despite the estimated 2700 MW potential along the River Nile and 22 other mini hydro-sites identified in other parts of the country. The growth in industry and population has meant an increase in power demand. In Uganda the construction of large dams is also coming under criticism because of their negative social, environmental and economic problems. The industrial sector has been growing at about 14% per annum, yet investment in power generation has largely remained stagnant for the last 25 years (1972 – 1997) (NEMA, 1998).

This power situation can be best handled by increased investment in renewable energy resources, which do not require large capital investments. In terms of the economic dimension of sustainable development, energy efficiency is clearly an important motor of macroeconomic growth. In terms of the environmental dimension, conventional energy sources are major sources of environmental stress at global as well as local levels.

In terms of the social dimension, energy efficiency is a prerequisite for the fulfillment of many basic human needs and services, and inequities in energy provision and quality often manifest themselves as issues of social justice. Uganda's energy sector continues to collapse due to embezzlement of funds. Uganda has reported various cases of misappropriation and embezzlement of funds by public figures. With the administrative post of Inspector general having been vacant, prosecuting public

For example due to the growing demand for electricity and the lack of public and private investments in power infrastructure projects, Uganda has experienced prolonged drought coupled with increased discharges from Lake Victoria. Consequently, the Nalubale and Kiira hydropower plants at Jinja are now producing significantly less power than the installed capacity. The following recommendations are made concerning the use of renewable technologies and creation of energy efficiency.

Current challenges faced by the Energy Sector

In the 2007 renewable strategy, the government outlined its vision of making "modern renewable energy a substantial part of the national energy consumption," with the overall goal of boosting the use of renewables, including large hydropower, from the current 4% to 61% of the total energy consumption by 2017. National goals are broken down into numerical targets, either for power production or for number of installations. These objectives grew out of the 2002 Energy Policy for Uganda, which outlined the government's commitment to developing and using renewable energy and technologies[88].

Though the country has put in place policies to attract investors in the renewable energy sector, many investors are scared of the political risk. Political risk is something investors are worried about." As a result, the World Bank played a crucial role in covering political risk if the government reneged on its promises, which enabled Sithe Global to bring its private equity to the deal. The negotiators hammered out a complicated deal over about 18 months.

Uganda's strategy encompasses small scale renewables investments, particularly for tackling rural poverty, through a national policy for offering feed-in tariff (currently negotiated on a case-by-case basis); solar energy technologies; biofuels for both transportation and power generation; and so-called modern biomass use combined with

[88] The Renewable Energy Policy.

legislation to control open biomass burning – the current source of 90% of the nation's energy.

These approaches, in turn, are designed to deal with specific challenges:

- "Unprecedented electricity supply deficit on the national grid due to the fall in Lake Victoria water levels as a result of prolonged drought," the strategy said, causing hydropower output to plummet and forcing installation of more than 100 MW of diesel generation;
- Escalating world oil prices;
- Scarcity of electricity in rural areas; and
- The government's commitment under the Kyoto Protocol to cut CO2 emissions.

Recommendations for the Government

The Government should put in place a regulatory system which is consistent with the existing industry and market structures. In the mean time, emphasis will be put on awareness, quality control and standards[89]. With increasing load shedding and growing fuel supply shortages, the shortfall between energy demand and energy supply in Uganda is reaching a crisis point.

Government should also offer subsidy on RETs and introduce hire purchase or other forms of credit to the consumers[90].

[89] The Energy Policy of Uganda.The Republic of Uganda. Ministry of Energy and Mineral Development. September 2002. Pg 41.
[90] Ibid

In order to boost the use of renewable tehnologies, government has to put in place tax incentives that favour not only the communities but investors. So far government has waived taxes on importation of solar PV equipment and solar thermal. The World Bank has also given grant to at least three companies that are dealing in solar related products of about US $ 16.000. The companies to benefit from this grant include:- Solar Energy for Africa, Solar Energy Uganda Limited and Energy Systems Limited Uganda. This grant is an indication that solar is gaining recognition of the World Bank as being vital in the rural electrification process. In the case of Uganda, there is currently no import tax charged on Solar Systems imported into the country. This is a tax incentive by the Uganda government to stimulate growth in the renewable energy sector.

Geothermal studies and consequently exploration should be expedited so that government can attract investors in geothermal development. Other benefits derived from geothermal should also be boosted. In order to boost the use of renewable technologies, government should invest more in science based research.

The government should also increase subsidies in the energy sector so as to promote investment in this sector. These subsidies should be given to firms dealing in the use of renewable technologies such as Balton.

The government should put in place scholarships to promoter studies in the use of RET'S. It is important for any country to invest in research as a way of promoting the energy sector.

Government should sensitize the public about the use of renewable technologies such as feed in tariffs and energy efficient stoves. Through patnering with non-governmental organizations such as Carbonafrica (an organization in charge of reduction of carbon emissions). Through sensitisation, the public can engage in other renewable energies such as wind and solar.

Recommendations for Stakeholders

Stakeholders include ministries for energy and trade, UNBS, Uganda Revenue Authority (URA), UETCL, UEDCL,UEGCL, Uganda Manufacturers Association (UMA), trade associations, manufacturers, importers and traders, as well as all categories of consumers.

The success of a FiT policy lies in its design. RETS are expensive therefore it is crucial that that the Uganda Regulatory Authority including other stake holders design policies that will favour the economy and the investor. Best practice design of FiT requires that the following be addressed;

- Tariff Calculation Methodology should be transparent and be based on the actual costs of generation;
- Differentiate FiT by technology and plant size
- The duration of payment should be reasonably long (15-20 yrs)
- Decide on the financing mechanisms preferably the costs be distributed across all consumers

- Reduce the lead time for project approval (no. of authorities involved)[91]

Stakeholders such as the ministry of energy and mineral development as well as Uganda National Bureau of Standards (UNBS) should put in place mechanisms that ensure efficient use of energy such as Energy Efficiency, that is using energy wisely and eliminating wasteful energy practices, is now more important than ever. Energy Efficiency describes a wide range of actions and technologies that can be simple and no-cost: such as switching off lights that you are not using, to moderate: such as purchasing an_energy saving stove_to extreme: such as remodeling an industrial plant to produce electricity from its waste heat[92].

Financial institutions such as banks should provide credit schemes which can allow the public to access RETs such as loans. For micro-finance and financial institutions, informal investors and the larger private sector, it is recommended that development of renewable energy investment portfolios be made for geothermal and cogeneration plants amongst other RETs.

Stakeholders such as donor organizations like Carbonafrica should diversify and simplify credit access on RETs purchase and installation. This is where states and organization rewarded a monetory award depending on the reduction of carbon emissions.

[91] M.Benon . Successfully Regulating Electricity From the Sugar Industry. The Case Study of Uganda. Accessed from http://www.era.or.ug/Pdf/Uganda_Cogeneration%20World_SA_14%20Sept%202010.pdf.

[92] Karekezi, S., Kimani, J. and Amenya, S. 2004. 'An Overview of Power Sector Reform in Africa'. In: Marandu, E. and Kayo, D. (Eds), The Regulation of the Power Sector in Africa: Attracting Investment and Protecting the Poor. African Energy Policy Research Network, Nairobi and ZED Books, London, UK .

There is need to educate the communities about RETs and establish demonstration units starting from the grass root levels that be used as models for the communities to learn from[93].

Recommendations for the law makers

Law makers should put in place laws and regulations that will regulate the conduct of independent contractors, local and foreign investors as well as government. Laws in the areas of energy are still lacking and have not been amended.

Overall Electricity Law Amendment should outline what the longer term policy aims are and who is expected to play which role. The details of how the according support instruments would then be implemented are to be further elaborated and described in downstream policy and regulation[94].

Law makers should develop an electricity spot market where people investors can be allowed to sell electricity.

Law makers should emphasize investment in geothermal exploration through the buying and selling of shares. Foreign and local investment in the energy sector can only be encouraged if provided for by law. For Instance Investing in geothermal exploration with guarantee of shares in the event of resources being found is one way to increase power supply.

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[93] Kinuthia, P., 2003. Kenya Country Data and Statistics Compilation. AFREPREN, Nairobi.

[94] S.Karekezi, et al. 2005. Do the Poor Benefit from Power Sector Reform? Evidence from East Africa. AFREPREN Occasional Paper 25. AFREPREN, Nairobi, Kenya.