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RENEWABLE ENERGY RESOURCES AS A RELIABLE AND SUSTAINABLE SOURCE FOR RURAL ELECTRIFICATION AND DEVELOPMENT IN TANZANIA:

Challenges of Renewable Energy Private Sector's Investments in Tanzania

Master's Thesis

Master of Science in Economics

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John, Felix Elimesia
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DEDICATION

To my Late Grandmother Bibi Nsiande Elishiisha Yetro Lema

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LIST of ACRONYMS and ABBREVIATIONS

CARMATEC	Centre for Agricultural Mechanization and Rural Technology
COSTECH	Tanzania Commission for Science and Technology
CTI	Confederation of Tanzania Industries
EPPs	Emergency Power Producers
EWURA	Energy and Water Utilities Regulatory Authority
HFO	Heavy Fuel Oil
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IPPs	Independent Power Productions/Projects
IPTL	Independent Power Tanzania LTD
JESR	Joint Energy Sector Review
MEM	Ministry of Energy and Mineral in Tanzania
MIT	Ministry of Industry and Trade
NBS	National Bureau of Statistics
NGO	Non-Governmental Organisation
NKRA	National Key Results Area
NSGRP	National Strategy for Growth and Reduction of Poverty
OECD	Organization for Economic Cooperation and Development
OTA	Office of Technology Assessment (USA)
RE	Renewable Energy
RE SMEs	Renewable Energy Small and Medium-Sized Enterprises
REA	Rural Energy Agency
SIDA	Swedish International Development Agency
SIDO	Small Industries Development Organisation
SMEs	Small and Medium-Sized Enterprises
TANESCO	Tanzania Electric Supply Company Limited
TAREA	Tanzania Renewable Energy Association
TaTEDO	Tanzania Traditional Energy Development and Environment Organisation
TDTC	Technology Development and Transfer Centre
TDV25	Tanzania Development Vision 2025
TGDCL	Tanzania Geothermal Development Company Limited
TIRDO	Tanzania Industrial Research and Development Organization
TPDC	Tanzania Petroleum Development Corporation
TPDC	Tanzania Petroleum Development Corporation
UNFPA	United Nations Development Program
VETA	Vocational Education and Training Authority
VTT	Valtion Teknillinen Tutkimuskeskus (Technical Research Centre of Finland)

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ABSTRACT

Energy and the services provides has become most needed aspect for basic human needs, human comforts as well as for enhancing human health, wealth, education and better lifestyle. Reliable, affordable and sustainable energy supply is essential for social and economic development. Tanzania is facing a vast challenge on energy supply because the existing energy supply sources are overwhelmed by the growing rate of energy demand. The energy demand has grown high due to population growth, economic activities, technological changes and Tanzanian's desire of better lifestyle. The growing energy demand and irregularity in power supply, requires the government to find way to enhance energy investment interests especially from private sector to enter in energy generation and supply sector with focus on using renewable energy sources. Renewable Energy Small and Medium-Sized Enterprises (RE SMEs) are seen as vital to individual and social economic development. However, RE SMEs in Tanzania are unable to effectively start up and/or substantially grow quantitatively as well as qualitatively due to various reasons. The purpose of this study is to deepen the understanding of the factors that hinder investments in renewable energy resources in rural area in Tanzania, to uncover the causes and give suggestions on what the government should do for existing Renewable Energy SMEs to perform successfully and attract more investors.

The study was carried out using a questionnaire survey as tool for data collection. Questionnaires were sent to selected individuals, and some government authorities and RE SME owner-managers whose sample was selected from Tanzania Renewable Energy Association (TAREA) database and from Ministry of Energy and Mineral in Tanzania (MEM). Both qualitative and quantitative data analysis approach were used to analyze the data from questionnaires to identify potential barriers to investment in energy sector in a Tanzania context. The empirical result shows that high cost (capital) of investment and innovation that rated to 78.3%, lack of appropriate source of finance or loans that ranked to 79.1%, infrastructures scantiness in rural area that counts 68.5% and lack of purchasing power due to low income in rural societies and graded at 67.4% were revealed (table 4 below) as important dynamic aspects of the problem. The study findings suggested that the government should provide investors with easy access to loans, business stimulus, incentives and carefully and wisely planned tax exemptions or reduction. Also reduction of unnecessary procedure (bureaucracy), improved transparency, improved infrastructures and with strengthened and assured country's political stability the more investors will get attracted. It also suggested need of appropriate policies and strategies that support RE SMEs to perform successfully and be more efficient in their servicing proving efforts.

Keywords: RE SMEs Investments Challenges/Barriers, Small and Medium-Sized Enterprises, SMEs Importance, Energy Essentiality, Renewable Energy Resources.

1. INTRODUCTION

This study focused on identifying the factors hindering utilization of renewable energy resources as a reliable, affordable and sustainable source for rural electrification and development in Tanzania. The efficient use of renewable energy sources is essential for economic and social development in rural areas in Tanzania. The study investigated the challenges of renewable energy private sector investments (especially Renewable Energy Small and Medium-sized Enterprises - RE SMEs) to invest in rural areas in Tanzania.

Electrification of rural areas in Tanzania is very important to national economic and, social developments as well as in supporting the national strategy of "Big Results Now" (2013). Also it is vigorous tool to maximize the pace of poverty reduction and meet aim of another country's strategy (National Strategy for Growth and Reduction of Poverty - NSGRP, 2005) on efforts to reduce poverty and enhance the Tanzania living standards. According to (Energy Visions 2050, 2009:11), energy services are needed to end poverty, hunger, education disparity, the marginalization of woman, major diseases and health service deficits as well as environmental degradation. This is directly related to Tanzania's national Energy Policy objective set with aim to provide an input in the development process by establishing an efficient energy production, procurement, transportation, distribution, and end-user systems in an environmentally sound manner and with due regard to gender issues (The National Energy Policy, 2003). It also complements and compatible with the national Vision 2025 that stipulates the need for the high quality livelihood, peace, stability and unity good governance, a well-educated and learning society, and a competitive economy capable of producing sustainable growth and shared benefits.

It should be understood, however, that sustainable, reliable and affordable supply of energy is critical for economic and social development (OTA, 1992). Tanzania has acknowledged this assertion through the National Energy Policy & Reforms (2003) that aimed "to ensure availability of reliable and affordable energy supplies and their use in a rational and sustainable manner in order to support national development goals" implying that supply of energy in rural areas is very crucial.

Tanzania is the largest country in East Africa by geography and by population. It has a total area of 954,000 square kilometers. It is located between 1^{o} South and 12^{o} South latitude and 30^{o} East and 40^{o} East. It bordered on the north by Kenya and Uganda, on the west by Rwanda, Burundi and the Democratic Republic of Congo, on the south by Zambia, Malawi and Mozambique, and on the east the Indian Ocean. Tanzania has a tropical type of climate which is advantageous to most kind of energy resource. In the highlands, temperatures range between 10^{o}C and 20^{o}C during cold and hot seasons respectively. The rest of the country has temperatures never falling lower than 20^{o}C. The hottest period spreads between November and February (25^{o}C – 31^{o}C) while the coldest period occurs between May and August (15^{o}C – 20^{o}C). Tanzania is the country of great lakes. It is bounded in the North by Lake Victoria, the source of River Nile, in the west is Lake Tanganyika, and the second deepest lake in the world and in the south is Lake Nyasa. (Kihwele, Hur and Kyaruzi, et. al. 2012)

Currently the country stands at a population growth rate of 2.9% (2012 Census). The 2012 census shows that the population of Tanzania has more than tripled from 12.3 million in 1967 to 44.9 million. The population is scattered into two main regions which are, the urban area and rural area. The rural area of the country accommodates the population of up to 70% with 30% living in urban areas (2012 Population and Housing Census - Tanzania)

1.1 Population and Energy Demand Correlations

Commercial energy consumption in developing countries is projected to triple over the next 30 years, driven by rapid population growth and economic development (OTA, 1992). According to United Nations Development Program (UNFPA, 2014), the youth population is growing fastest in the developing nations. UNFPA states that “Our world is home to 1.8 billion young people between the ages of 10 and 24, and the youth population is growing fastest in the poorest nations,” Tanzania is among them. Securing

higher living standards for the fast growing population requires rapid economic growth, further increasing the demand for energy services (OTA, 1992). This study focused on how minimalism of barriers of renewable energy private sector's investments in Tanzania is necessary to surmount raising level of energy demand due to the fastest population growth.

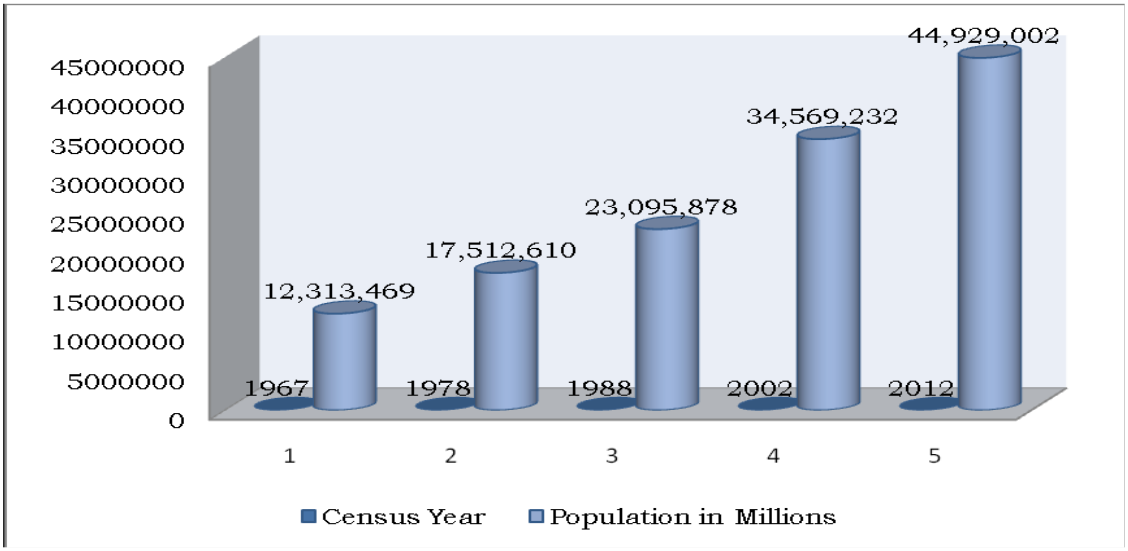


Figure 1: Tanzania Population Gradual Trends from 1967 – 2012. Adapted from National Bureau of Statistics (NBS), 2012 Tanzania Population and Housing Census Volume 1

1.2 Problem Statement

In Tanzania, the population, economic activities, and technological changes are increasing rapidly over the years making energy demand increase rapidly as well. The energy production in the country has been encountered with frequently blackout and brownout. The power supply irregularity is enormously affecting the economic activities and social development as well as business environment in many areas in Tanzania. The power irregularity is caused by over dependency to hydro as the primary energy production source to the national grid. The hydroelectric production sources are overwhelmed due to small amount of water available as a result of drought experienced in the past two decades. The drought is a consequence of huge consumption of solid biomass - charcoal and firewood in the country with no special programs for trees growing.

Growing energy demand, desire of Tanzanian for better living standard and growing of economic activities imply that there is need for deliberate actions to ensure Tanzanians a secure reliable supply of energy. But, although there is high energy demand in Tanzania caused by fast growing population, economic activities and lack of reliable energy supply, still no considerable efforts has been directed towards alternative energy sources such as renewable energy sources especially in identifying the investments inspirations. The gap between the energy demand and the energy supply is big and keeps on growing suggesting that justifiable efforts need to be deployed to ensure availability of affordable and reliable energy supply. Despite the current energy shortfall in Tanzania, in searching for energy sector investments' situation, it seems that only a few and not so detailed studies and reports have been documented. Unfortunately, even the little detailed studies available have been piloted for not for public benefits and are not in favor of private sector investments in energy sector for electrification and development of rural areas in Tanzania. This calls for more studies that can provide insights to attract investors.

All societies need energy services to encounter basic human needs and for better life style. So, the growing energy demand in Tanzania is great opportunity to anyone who wants to invest in energy sector. Surely, the growing energy demand and irregularity in power supply, requires the government to find ways to enhance energy investment interests especially from private sector to enter in energy generation and supply sector with focus on using renewable energy sources. Utilization of renewable energy resources will reduce power shortfalls and increase the country's security of the energy supply, energy competitiveness and energy sustainability. Ellabban, Abu-Rub and Blaabjerg, (2014) have urged that investing in renewable energy can have significant dividends for nation energy security.

1.3 Objective of the Study

Tanzania is facing a vast challenge on energy supply because the existing energy supply sources are overwhelmed with the growing rate of energy demand. The county is home to about 49 million people. The population and economic activities are increasing significantly over the years that making the energy demand to increase significantly as well. With growing energy demand, desire of Tanzanian for better living standard, and increased economic activities, this is clear opportunity for energy investment. According to (UNFPA 2014, State of World Population 2014) "rising demand for services provides significant investment opportunities and contributes to economic growth". Jain & Ohri, (2007: 29) stated that "higher the level of the demand, greater the size of the market and greater the inducement to invest". Despite the promising opportunities as highlighted above, there is no strong interest from private sector to invest in energy sector in Tanzania. It is for this reason this study was undertaken with objective *to deepen the understanding of the factors that contribute to making the investments in renewable energy resources in rural area in Tanzania to be more difficult, to uncover the causes and give suggestions as to what government should do for existing Renewable Energy SMEs to perform successfully and attract more investors.*

1.4 Research Questions

The study is targeting the following research questions to be considered in investigation and give suitable answers at the end of the study.

i. What are the factors that discourage or affect more to private sector's investments in Renewable Energy sector in Tanzania and how can they be mitigated?
ii. How viable investments in renewable energy will change the whole life of Tanzanian especially in rural area and what is its impact to economy and environment?

iii. Does the country policy framework facilitate Renewable Energy investment development? Does the existing policy in Tanzania support the existing RE SMEs and attract or influence more RE SMEs' entry?

iv. What are the crucial factors that should be adjusted in order to influence and assure more RE SMEs enter the markets or local companies collaborate with Global RE SMEs?

1.5 The Questions' Significances

1. The first question aims at identifying all factors that are barriers to private sector to invest in power generation and supply using the abundant renewable energy sources available in Tanzania and analyze how they can be mitigated. The study will give the suggestions according to findings from study survey.
2. The purpose of the second question is to reveal the impact of rural electrification by examining the general relationship between rural electrification and rural development, social life standard, employment and how it will reduce urbanization. The study will provide information on how sustainable private sector investments in renewable energy will change the whole life of Tanzanian in rural area. The questions will also insights on how rural electrification will enhance skills and education to rural society and impact the national economy and environmental concerns.
3. The third question is created with aim getting a roughly look at the national energy policy if are suitable for enhancing the investment in energy sector to assure security of energy supply to a nation. With reference to the existing investment policy and strategies the study will examine in what way the policy should be improved to support existing RE SMEs attract more investor in order to boost rural electrification program. It will also show how a favorable policy developments, support programs and minimization of investment and operating costs will creating a vigorous investment encouragement for renewable sources in off-grid locations.
4. The fourth question aims at determining the crucial factors that should be adjusted in order to create better understanding on how healthy the relationship

with the firm will support the accomplishment of the national overall goal or mission or strategies about how to rise availability, reliability, affordability and sustainable quality of energy supply through the private sector to invest in renewable energy sector. The question further investigates and unveils factors that should be put in place for RE SMEs in Tanzania to have a health collaboration network with global RE SMEs in order to improve their capability as well as competitiveness; examines how companies in collaboration will complement each other as opposed to competing?; how these companies fit together and what are the gaps?; How can the conflicts of interest be avoided in order to have mutual targets?; How can they smoothly work together to meet their targets?; and how external RE SMEs can enter the Tanzania market in win-win situation with great benefit to Tanzanian development?

1.6 The Thesis's Structure

This thesis is divided into six chapters. **Chapter one:** Presents an introduction to the study along with problem statement, objective of the study, research questions and significances of the research question. **Chapter two:** Presents a discussion of some literatures related to the subject under study. **Chapter Three:** Provides justifications for need of more energy investments in Tanzania. Among others, the chapter discusses the country's electrification status, continuous growing energy demand, energy deficit, frequent energy blackout and brownout. **Chapter Four:** Information about how this empirical study was conducted is provided in this chapter. It presents the Research Method, Sample Selection, Data Collection methods, Questionnaire Design and Data analysis approaches. **Chapter Five**: Presents the empirical study's findings analysis and discussions. The findings are analyzed and discussed in relation to the existing literatures. **Chapter six:** Presents the study's conclusions and recommendations that are drawn on the basis of study's findings, analysis and discussions.

Below is the summary of thesis structure in chart format

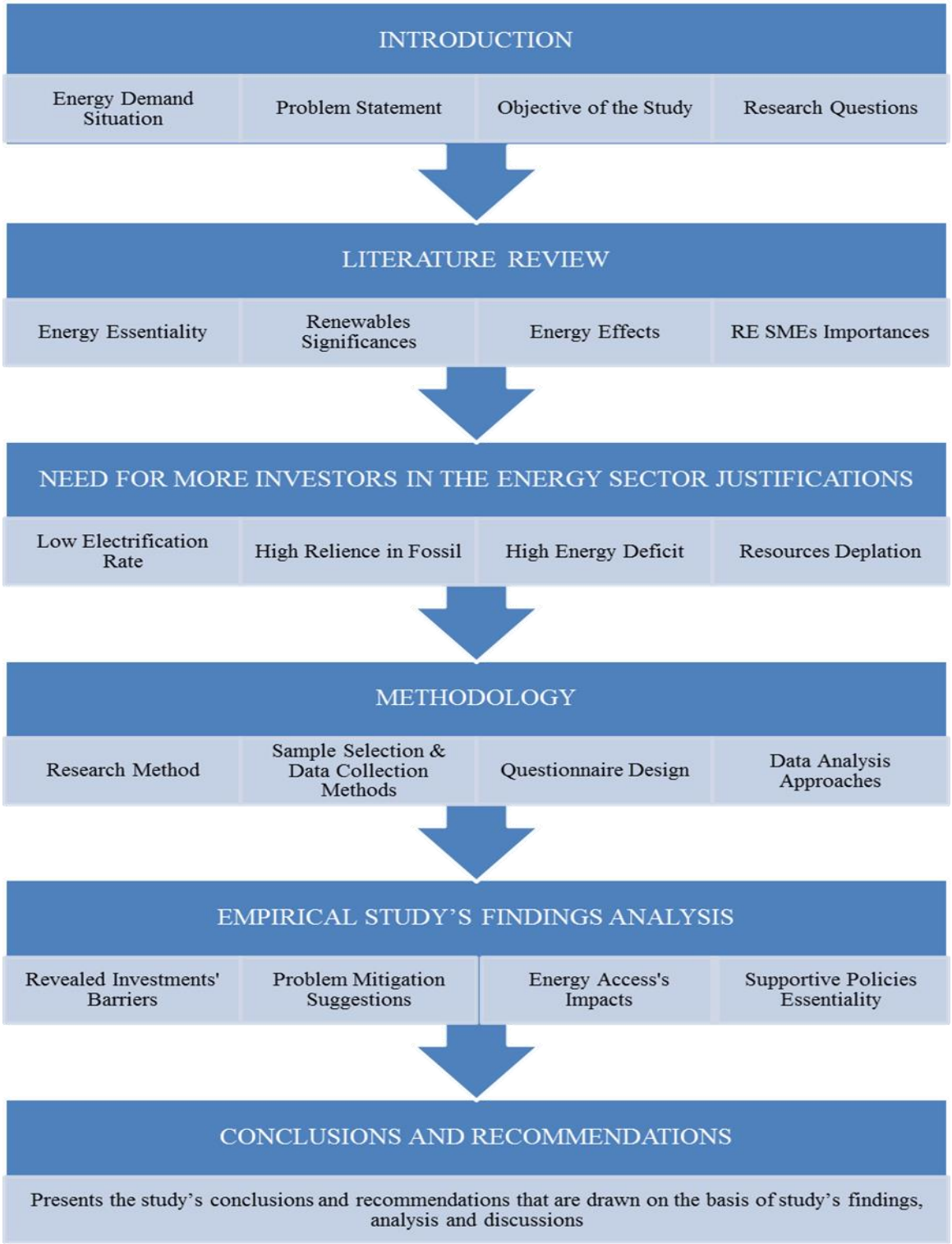


Chart 1: Thesis Structure in Summary

2. LITERARTURE REWIEW

This section provides some information on different literatures on renewable energy done by other researchers. Attention is put on specific literatures on energy essentiality, rural electrification impacts, correlation between population and energy demand, energy effects to environment as well as evidence of role of energy and its effects in human life. The section also reviews what others have discovered on how renewable energy serves as reliable, affordable and sustainable means for off-grid areas like Tanzania in an environmentally sound manner that justifies the essential for this study. Literatures on the role of RE SMEs to the national and global development are also reviewed.

Numerous sources of relevant existing materials such as relevant books, scientific journals, relevant articles, Newspapers, Environmental report, relevant magazines, RE research reports, RE databases, some companies' websites and other internet sources are used for completion of this section's objective. It is advisable to use the existing materials with much attention and specific target for reviews so that reliability and purpose of the study is not lost. Therefore, material of high quality and trustworthy have been used in order to have high quality study (Gummesson, 1993).

2.1 Energy Essentiality

Energy has strong correlation to human needs and economic activities all over the world. Unlike food and housing, energy is not valued in itself but on what can be done with it (Hinrichs & Kleinbach, 2013) Energy profoundly affects our economy, society, and environment (Dukert, 2009: 1). We are in the world where energy has become most needed attribute to communities to meet social and economic development, and enhance human comfort, wealth and health. Time after time, the world is changing; technology is changing as well as human lifestyle is changing (Kinlauri (1991). The development of technology will change societies and this will impact energy sector and the economy as well (Energy Vision 2050 – VTT Edita, 2009: 11). In this modern world of high use of

technologies, energy is essential to all societies and their daily activities to match with technology changes. It is clear that all societies demand energy services to satisfy basic human needs and to serve as means for the productive society and development processes. Almost everyone wants a higher standard of living, and energy serves as bridge between the two (Cocks, 2009: 6).

Kamal (2011: 16) emphasized the essentiality of energy towards human needs by highlighting that "energy is our basic means for survival". It is without doubt that all societies need energy services to encounter basic human needs and better life style. Energy serves as means to communities to meet social and economic development and enhance human well-being and health. Energy pervades all sectors of society – economics, labor, environment, international relations – in addition to our own personal lives – housing, food, health, transportation, recreation and more (Hinrichs & Kleinbach. 2013: 2). Energy is the irreplaceable part of almost every aspect of modern life from industry to transportation, heating and electricity, it is at the heart of human development and economic growth (IEA Website, 2014). In the same way, energy is needed to create goods from natural resources and to provide many services we have come to take for granted (Hinrichs & Kleinbach, 2013: 1). Electric energy is a crucial ingredient for creating wealth and comfort (Klimstra & Hotakainen, 2011: 47). Energy is needed to create jobs, for water pumping, health services, cooking, illumination and food processing (Energy Visions 2050 – VTT Edita, 2009: 11).

2.2 The Energy Demand Situation

World energy demand is projected to grow in the coming decades due to economy growth and increasing in population (Energy Vision 2050 – VTT Edita, 2009:11). Securing higher living standards for growing population requires rapid economic growth, further increasing the demand for energy services (OTA, 1992). Primary and final energy use will grow much less than the demand for energy services due to improvement in energy intensity (Nakicenovic, Grubler, & McDonald, 1998: 244). Demand for electric power will therefore drastically increase in the world during the

next decades (Klimstra & Hotakainen, 2011: 47). By 2020 the electrical energy demand will increase to about 1915 Tera Watt Hours, or almost double of what we generate today (Sunipod.com, 2015, Abhishek Gupta, 2013). Commercial energy consumption in developing countries is projected to triple over the next 30 years, driven by rapid population growth and economic development (OTA, 1992). In particularly Tanzania, demand is forecast to grow rapidly, nearly doubling in the next 3 years (NKRA Energy Lab Final Report, 2013: 11)

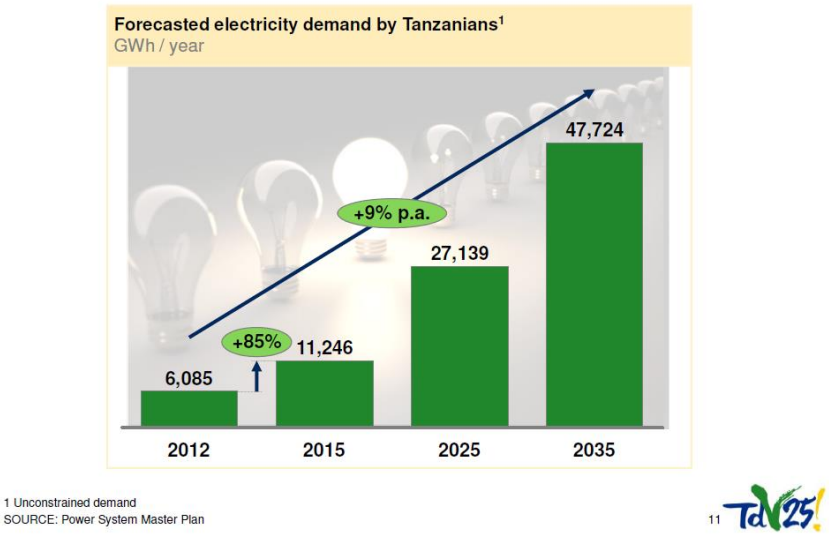


Figure 2: Forecasted Tanzanians' Energy Demand. Source: NKRA Energy Lab Final Report, 2013

2.3 The Population and Energy Relationships

According to Rosa (2009), the most serious problem that confronts human-kind is the rapid growth in population. The planetary has more than six billion inhabitants and the growth rate these last few decades has been around 1.4% per year. Population growth rate alone could account for a 1.4% annual increase in energy demand. Clearly, the rate of energy utilization is proportional to the planetary population, which has been growing at an accelerated rate. There is a reasonable correlation between the total energy utilization rate and the annual gross national product (Rosa, 2009). In the same way, the increase in services that energy provide is necessary and desirable, since energy services are essential for economic growth, improved living standards, and to

provide for rising populations (OTA, 1992: 17). With growing population and rapidly rising aspirations for higher living standards in developing countries, we will not only need more energy, but more water, more food, more mobility, more of everything for more people at affordable prices (Sioshansi, 2011: xxviii). “Allowing reasonable increase of the world’s populations it cannot simply return to a lower stage, unless some catastrophic event forces it that way” (Kainlauri, 1991) This is also supported by Cartiledge (1993: 37) who states that “when something grows, it gets quantitatively bigger and when it develops, it gets qualitatively better”, so, it is upon to responsible institutions to find the way to deal with growing population, energy demand and environmental degradation. According to OTA (1992), commercial energy consumption in developing countries is projected to triple over the next 30 years, driven by rapid population growth and economic development.

2.4 The Correlation between Energy and Development Activities

Development is about meeting today’s needs and assuring a brighter future for our children (Smil & Knowland, 1980: 14). Energy service is seen as one of the factors, which often have both direct and indirect impact on social and national interest to meeting today’s needs and assuring a brighter future development. Energy will play a central role in promoting development, and the energy sector will be a major stakeholder in the process (Nakicenovic, Grubler, & McDonald, 1998: 241). From some literatures, authors have provided us with some information that indicates the relationship between energy and development activities. Energy is such critical contributor to prosperity and national strength that we regularly worry about where it will come from in the future (Sioshansi, 2011: 31). The energy services are needed to end poverty, hunger, education disparity, the marginalization of woman, major dieses and health service deficits as well as environmental degradation (Energy Visions 2050 – VTT Edita, 2009: 11). Reliable and affordable supplies of energy are critical for economic and social development (OTA, 1992, Nakicenovic, Grubler, & McDonald, 1998: 97). We believe that adequate energy services are prerequisite for human

development (Nakicenovic, Grubler, & McDonald, 1998: 241). Conversely, inadequate or unreliable energy supplies frustrate the development process (OTA, 1992: 180)

2.5 The Correlation between Energy and Economy/Economic activities

Historically, the use of electricity has been almost linearly associated with rising incomes and productivity (Guyol, 1969). Energy has always been critical for economic growth, social development and poverty reduction (Dorf, 1978). "Energy is the life-blood of any economy" (Cartledge, 1993: 93). Energy and economy may be considered as a synonymous concept a there is no economy without energy (Sekimoto, 1991: 63). Economy growth is projected to rise per capital income and living standards (Nakicenovic, Grubler, & McDonald, 1998: 241). Similarly, other authors urged that economic development and improvement in standards of living are complex processes that share a common denominator: the availability of an adequate and reliable supply of energy (Hinrichs & Kleinbach, 2013: 1). Whatever development path is chosen, the energy supply sector is critical for economic development (OTA, 1992: 33). This is because we have become a very interdependent world, and access to adequate and reliable energy sources is central for economic growth (Hinrichs & Kleinbach, 2013: 2). On the supply side, improved operating producers and new technologies may well improve the reliability of energy supplies, and thus reduce the heavy economic losses caused by blackouts and brownouts (OTA, 1992: 32). Also Klimstra & Hotakainen (2011: 80) insisted that "failure in electric supply for even one hour per year can result in high financial loses for sensitive application."

The fundamental psychological law implies that when income increases people's consumption will also increase, but by less the increase in income (Keynes, 1936: 96). Exemplifying the argument, Sandmo referred Keynes (Economic Evolving; A History of Economic Thought) (Sandmo, 2011: 348) by elucidating how the fluctuations in investment demand transmit themselves to national income and employment. He enlightened that "the intuition is simple; an increase in investment of 1 Million pounds

will increase national income by 1 million plus the secondary increase in consumption that generated by increase in income" (Sandmo, 2011: 351).

Concerning the fluctuation on energy prices, literatures have talked much on how the changes in energy prices affect the whole economic activities. Klimstra & Hotakainen (2011: 81) urged that it is very important to know that a higher electricity price will make almost every element in the economy more expensive. Increasing energy prices stimulate inflation and reduce economy growth. Secure energy supply, reasonable energy prices, and self-sufficiency are key factors in the industrial sector (Energy Visions 2050 – VTT Edita, 2009: 69). Energy supplies are key limiting factors to economic growth, (Hinrichs & Kleinbach, 2013: 2). Energy is therefore an essential part of production and a production cost among other costs, such as row material, personnel, machinery etc. Energy is also a factor of competitiveness (Energy Vision 2050 – VTT Edita, 2009: 69) Therefore decisions about the way energy should be produced and supplied have a wide-scale impact on society (Klimstra & Hotakainen, 2011: 81)

2.6 The Correlation between Energy and Environmental Concerns

One of the most important issues facing the humanity today is the prospect of global climate change, brought about primarily by our prolific energy use and heavy dependence on fossil fuel (Evans, 2007: 181). Energy, environmental and economic development is closely linked (Hinrichs & Kleinbach, 2013). The new energy challenges include energy security, environmental integrity, climate change, and economic prosperity (Sioshansi, 2011: 367). Energy consumption determines how much and how severely we can affect our environment, how damaging or healing our interactions with it are (Cartiledge, 1993:11) Fulfilling reduced energy demand by utilizing primarily renewable energy resources (Energy Visions 2050- VTT Edita, 2009: 69). A primary source of energy may be considered renewable when natural conditions all its replacement in a short time span (Goldemberg & Lucon, 2010: 46). (Power Production and energy use can bring about significant adverse environmental effects (Hinrichs & Kleinbach, 2013: 233). The use of our energy resources is one of the major

factors affecting the environment (Hinrichs & Kleinbach, 2013:4). The role of energy in environmental degradation is complex. On the one hand, energy, used wisely, can potentially provide several important environmental benefits (OTA, 1992). A better understanding of pollution sources and their emissions is essential for formulating policies capable of reducing or abating them, (Goldemberg & Lucon, 2010: 184).

2.7 Understanding Resources' Depletion

Renewable energy is renewable (Ma, Chen, & Li et al., 2013). Twidell & Weir (2006) has defined renewable energy as the energy acquired from the perpetual or recurring flows of energy occurring in the environment. An important factor in estimating the lifetimes of energy resources is the growth rate of consumption (Hinrichs, 1992: 11). It is useless to state the lifetime of a resource if nothing is said about how fast the use of that resource is increasing or decreasing (Hinrichs, 1992: 15). Worldwide, oil imports are increasing, setting the stage for future energy crises (Hinrichs, 1992: 20). Energy policy should be concerned not only with finding new resource and reducing energy consumption, but also with weighing the effect of new technologies and energy related lifestyles on our lives and on our planet (Hinrichs, 1992: 24). To establish an energy policy, one must know how large these resources are and how long the will last (Hinrichs, 1992: 11). To remain strong economically, we must acknowledge the limits of our resources (Hinrichs, 1992: 14). Renewable energy is a domestic resource which has the potential to contribute to or provide complete security of energy supply (Wrixon, Palz & Rooney, 1993: 2).

Understanding energy means understanding energy resources and their limitations, as well as the environmental consequences of their use. You must have some idea of how large each energy resource is and how long it will last (Hinrichs & Kleinbach 2013: 3 & 27). Lack of appreciation of this finiteness is certainly one element responsible for the energy crisis (Hinrichs, 1992: 14). Energy-production technologies ought to be simple, reliable easily repairable and especially suitable for energy-efficient use as well as from environmentally friendly methods (Energy Visions 2050 – VTT Edita, 2009: 69).

Human conditions and values can be damaged as much by having too much energy, too soon, as by having too little, too late (Hinrichs & Kleinbach, 2013: 30). It is useless to state the lifetime of a resource if nothing is said about how fast the use of that resource is increasing or decreasing (Hinrichs, 1992: 15)

2.8 SMEs Importance and Challenges

The SME sector has differences from one region to the other. In some regions, this sector is dynamic with some support from the governing bodies while in other regions SMEs are lacking support and access to major needs for improving their local and global competitiveness. This situation is causing SMEs difficulties to cope with technological changes. Most of the SMEs are having difficulties in developing technologically due to lack of support, although another reason is lack of resources such as skilled personnel and bad management. Some SMEs' owners are not good risk takers. Most of them are anxious to invest in innovation or borrow money for the improvement of their business.

Burns (2001) urged that for SMEs to stay in competitive business they may have to borrow money but the barrier and the main problem for them is access to loan and the borrowing rate determined by loan institutions such as banks and other agencies. According to Harvey & Lee (2002: 10), lack of access to loans and shortage of funds have a big impact on SMEs' growth as they caused them to fail to upgrade their technology in order to improve service quality or production. This situation reduced the ability of SMEs to ensure their future which causes difficulties in getting and retaining skilled labor. Shortage of funds creates difficulties for SMEs to establish efficient business networks that will help them to acquire information on the global market and share experience in international business practice. The Organization for Economic Cooperation and Development (OECD) (1997) elucidated that in global activities, companies can increase their revenue by reducing business cost and risks if they will manage to create business channels and enter new markets. The OECD report revealed

that if SMEs are well organized and connected to international activities they will have a major influence on the economies of the world.

There is a need of the policies that support SMEs to promote innovation activities and success in the SME sector. SMEs are small in terms of capital, assets and annual revenue. Small income is a barrier to SMEs to innovate and improve their growth and gain competitive advantages (Hewitt-Dundas, 2006: 257-277). The policies should be able to manage, to measure, define and understand the real challenges facing Small and Medium-sized Enterprises (SMEs) and provide the right solution for the improvement. Roper, (2011) discussed how SMEs can stay in business for a long time even in hard times such as an economic crisis if they have good customer relationships and well-focused future strategies that make them flexible and innovative. They urge that innovation supporting policies for small firms in developed economies have created a huge and significant contribution to economic growth as well as to the survival of SMEs. For the support of their claim they use evidence from Monk, Shaver, & Yeung (1997: 2) that "smaller firms are better at creating radical innovations because they better protect the innovator's property rights". There is a need of government authorities to support the SMEs because they are a vital aspect of job creation, economic growth as well as have a significant contribution to individuals and overall world development (Hewitt-Dundas, 2006: 257-277).

Chandra, (2003) quoted Harvey & Lee (2002) as they urged governments to give priorities to the SME sector by introducing the policies that will support SMEs to break through the low technology verge through effective innovation and start a new edge of developed technology in order to improve their growth capability and competitiveness. The authors revealed that government should institute long term policies to enhance the life span of SMEs through support programs and provision to access to funding aids and banking institutions. Government policies and assistance measures save SMEs from dying or going bankrupt or dying due to lack of innovation.

3. NEED FOR MORE INVESTORS IN THE ENERGY SECTOR JUSTIFICATIONS

3.1 Energy significance and Country's Energy Status

Access to energy adds vitality to human life. Energy is crucial aspect to meet our everyday needs for heating, cooking, lighting, and personal care. Access to energy make people enjoy the life, feel good, feel respectable, look good and smart, and get more out of life as well as enhance their daily economic activities. What Tanzanians need energy much for? They need energy for better living standards, better education and its conducive studying environment, recreation and entertainments, and for boosting their income to conquer their health problems, defeat poverty, and all other difficulties related to consequences of energy deficits.

3.1.1 The Country's Electrification Status

Tanzania is rich in natural resources, human resources as well as stable in political issues. It is surrounded by ocean, lakes and rivers. The country is well endowed agriculturally and has vast mineral resources in the western part of the country, a huge amount of natural gas in Southern part of the country, as well as there is a possibility of oil discovery. It has abundant energy resources that can be exploited to produce electricity for domestic and industrial utilization to meet energy demand as well as to ensure security of the energy supply, energy competitiveness and energy sustainability.

Despite the country's location benefit, be rich in natural resources, the country's electrification rate is terrible. Less than 15% percent of the country population has energy access and in rural areas, it counts to less than 2% energy access (REA Report, 2010; MEM Report, 2014). Absence of electricity in households means poor utilization of energy resources (Answathanarayana, Hirikrishnan, & Thayyib Sahini, 2010: 314)

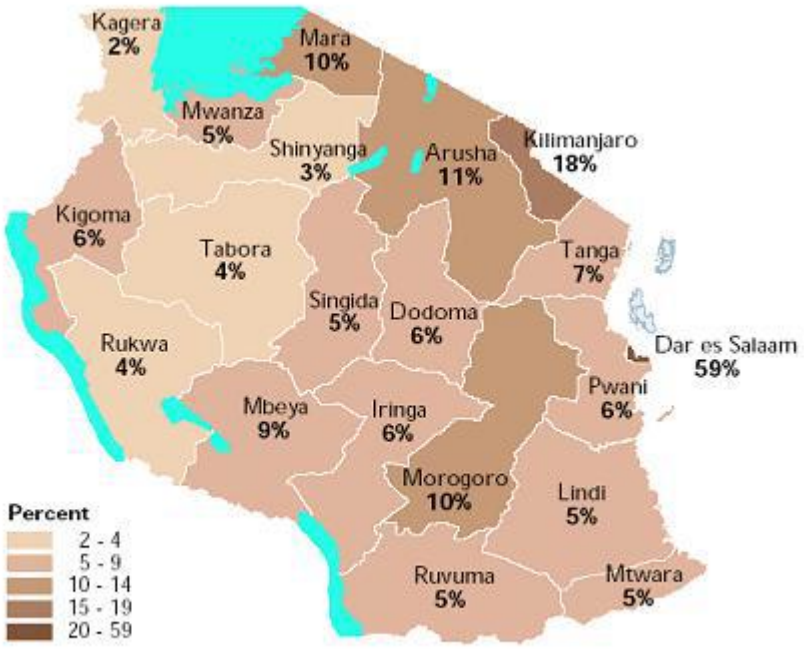


Figure 3: The Country Electrification Situation. Adapted from REA Report, 2011

This low energy access has raised the energy demand in both area of the country, particularly rural area. Low energy access is caused by increasing demand every year while the current energy sources are the same over years and not improved to match or to overcome the growing rate of energy demand. The gap between the energy demand and the energy supply is big and keeps growing, suggesting that a justifiable effort needs to be deployed to ensure availability of affordable and reliable energy supply. The figure below shows the existing installed energy production capacity against the real situation demand and forecasted energy demand in Tanzania.

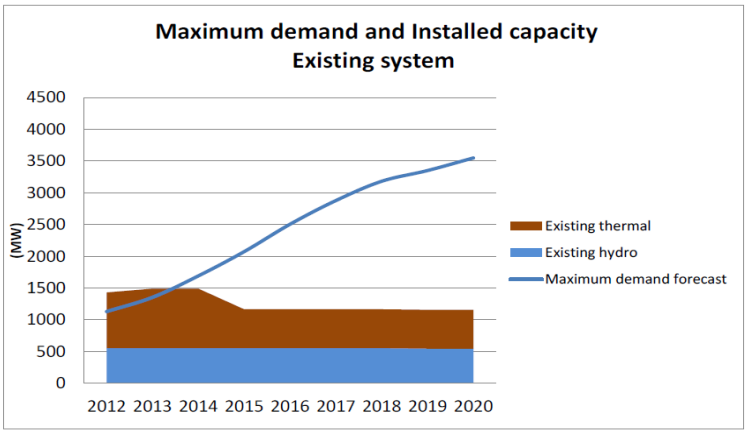


Figure 4: Development of Existing Generation System and Maximum Demand Forecast. Source: MEM & SIDA; Joint Energy Sector Review (JESR) report 2012/13

3.1.2 High Reliance on Expensive Power Generation Sources

As explained in several parts above that low availability and power outage has made the country's energy demand to increase day to day. Tanzanians are in really needed of energy for improving their living standard, for cooking, heating, lighting, transportation and for the social and economic activities. For several years now, the country suffers from frequent power outages and it seems like it will continue to suffer because its energy supply is still vulnerable. The country's company responsible for power generation, supply and distribution, TANESCO mostly depends on hydropower but in some session of the year the have been experienced the low availability of water that results in Tanzanians to suffer from frequent power outages.

Also, in the 1990's and then in 2006, 2007, 2009 and 2011 the country experienced severe drought-related power crises that increased the rate of frequent brownouts and blackouts. To combat the situation, the government opted to install fuel and gas generated electricity. This situation forced the country to depend on expensive generation sources that has caused the energy prices to go high and affects the whole national economic activities as well as has made TANESCO to suffer financially, and lost its trustworthiness to Tanzanians. According to the NKRA Energy Lab Final Report (2013), "in 2012, almost 20% of generated electricity came from EPPs and IPTL, running on expensive fuel, cost 5-8 times more than TANESCO or IPP gas plants and 3-4 times more than current tariff levels". Unfortunately, the situation is still the same to date. On the other hand, worldwide, oil imports are increasing, setting the stage of for future energy crises (Hinrichs, 1992: 20)

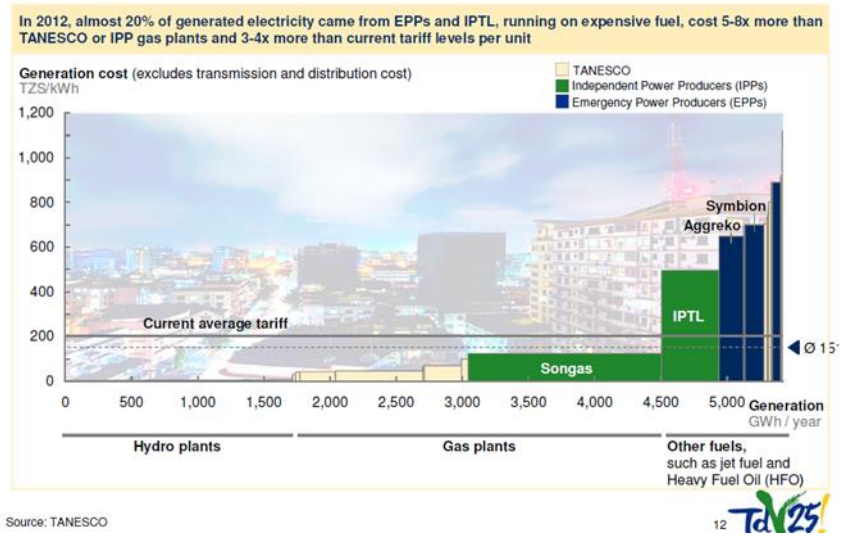


Figure 5: Generation Cost per Respective Power Generators: Adapted from NKRA Energy Lab Final Report, 2013

3.1.3 Energy Sustainability Analysis - The Grid Energy Supply Situation

Tanzania Electric Supply Company (TANESCO) is the country's main firm carrying out for power generation, transmission, distribution supply and responsible for security of electric supply to all parts of the country. TANESCO was founded in 1930, and is 100% owned by state. It is under the Ministry of Energy and Minerals. It is operating the national grid and isolated supply system in some regions in the country. At the moment, TANESCO is generating 98% of the energy in the country. The company is mainly depending on hydro-power, oil related and gas as source of the power generation.

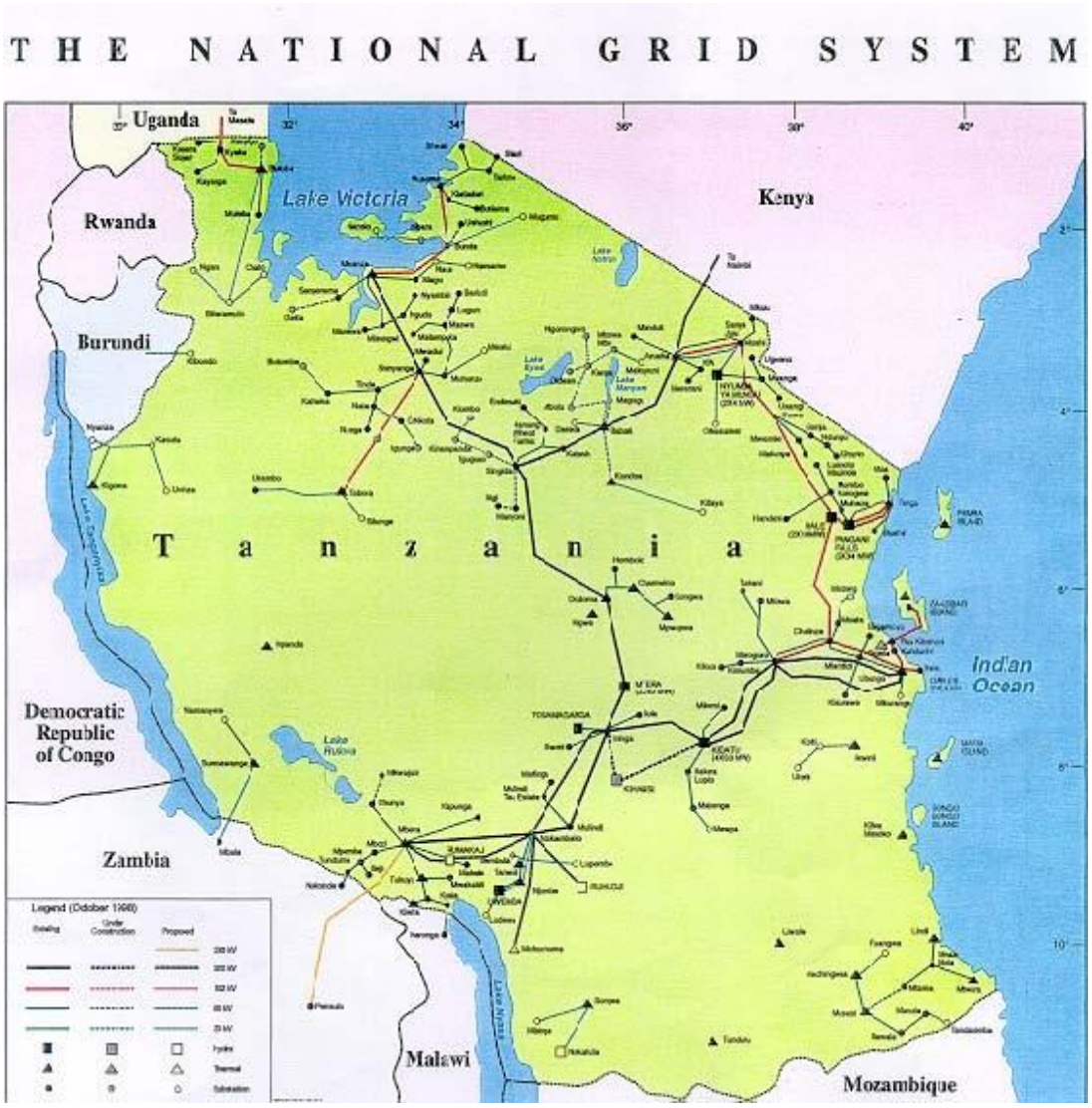


Figure 6: The National Grid System. Adapted from National Energy Grid of Tanzania

TANESCO has shown incapability to serve the energy production and supply demand. Special effort is needed to deal with an increased demand for power for both industrial and domestic consumption and as such, calls for more companies to invest in power generation and supply ventures. Attracting Renewable Energy Small and Medium-sized Enterprises (RE SMEs) investments is proper effort because RE SMEs will serve as a driver to reduce energy demand especially in rural areas. A successful support to RE SME sector would have a direct and positive impact on employment, environmental, living standards in Tanzania as well as on its economic growth and stability. This is because; Small and Medium-sized Enterprises (SMEs) all over the world are known to

play a major role in the development of individual and social economies. This is apparently the case of developed countries, where SMEs contribute considerably to employment creation, income generation and stimulation of growth countrywide in both urban and rural areas.

Despite the importance of RE SMEs in electrification and economic growth which influences the development of the nation and individuals, it seems that Tanzania has not given priority to programs that support RE SMEs. The importance of SMEs is inversely proportional to the support they are getting from government and funding institutions in most regions. This is a problem that needs to be identified in order to have a reliable, affordable, and sustainable energy supply to reduce energy demand crisis while increasing electrification rate, supporting economic growth, improving productivity, living standards and reducing poverty especially in rural areas.

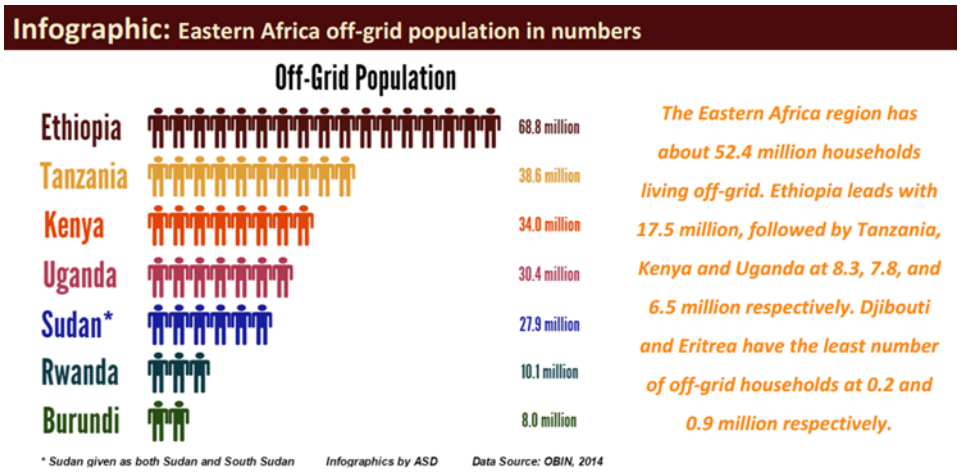


Figure 7: The Off-grid Population in Eastern Africa: Source: RE Trends East Africa. Quarter 1, 2015

The number of off-grid population indicates need for respective nations to find the way to enhance interest in investment in energy supply, especially in renewable energy. According to (SIDA Department for Africa, 2014) “one of the key barriers to development of the country’s renewable energy resources has been the lack of a suitable regulatory framework that sets out clear rules and responsibilities for grid-connected and off-grid renewable energy developers”.

3.1.4 High Energy Deficit

In developing countries there are still one and half billion people without access to modern energy services (Energy Vision 2050 – VTT Edita, 2009: 11). Shortage of power supply and the demand of power have caused a huge gap that has directly affected the development of industrial and agricultural production (Smil & Knowland, 1980). Lack of access to modern energy services contributes to poverty and deprivation, and limits economic development (IAEA, 2005: 30). Tanzania is among the developing countries with high electricity access deficit with more than 83% of its population living with no access to electricity as indicated on figure 8 below that shows Tanzania has a huge electricity access deficit. This inadequate access to energy is barrier to Tanzanian societies to meet their goals of reduced poverty and hunger and getting an improved living standard and equalities, increase chances for employment, better education and its environment, improved health and combat to diseases as well as ensured environmental sustainability. There is direct relationship between the absence of adequate energy services and many poverty indicators such as infant mortality, illiteracy, low life expectancy and total fertility rate (IAEA, 2005: 30).

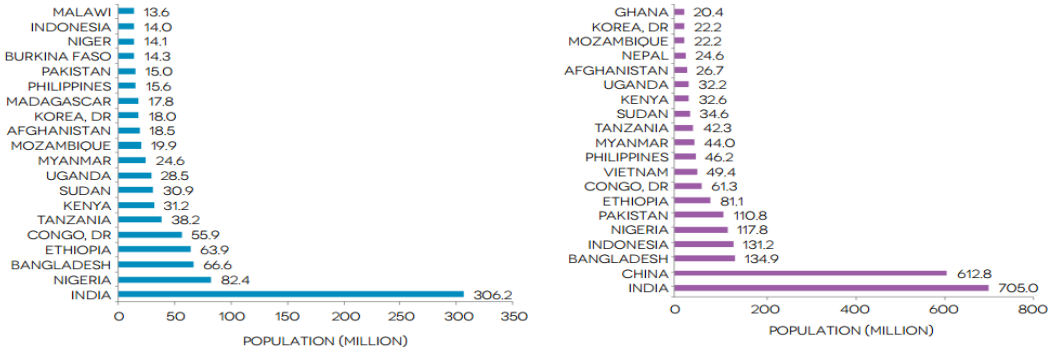


FIGURE O.4A **THE 20 COUNTRIES WITH THE HIGHEST DEFICIT IN ACCESS TO ELECTRICITY, 2010, POPULATION MILLION**

FIGURE O.4B **THE 20 COUNTRIES WITH THE HIGHEST DEFICIT IN ACCESS TO NON-SOLID FUEL, 2010, POPULATION MILLION**

SOURCE: WORLD BANK GLOBAL ELECTRIFICATION DATABASE, 2012; WHO GLOBAL HOUSEHOLD ENERGY DATABASE, 2012.
NOTE: DR = "DEMOCRATIC REPUBLIC OF."

16 GLOBAL TRACKING FRAMEWORK

Figure 8: Source: Sustainable for all the (SE4ALL); Global Tracking Framework Full Report 2015

Due to the increasing in economic activities, electricity demand, growing power consumption and the government's electrification plans required more firms for the energy supply sector. The country should put effort into finding ways to enhance interest in investment in energy supply in a sustainable and reasonable way to meet the rapid and steady electricity demand. The government should set out new policy and law to allow institutions other than TANESCO to perform power generation, transmission, distribution and supply of electricity energy especially for rural electrification. Also, the government must set regulations to manage, control and monitor them as well as policy to promote private sector firms and other stakeholders in energy sector.

3.1.5 Huge Consumption of Solid Biomass - Charcoal and Firewood

Rising in population, low per capital energy availability also leads to poor industrialization and heavy dependence on traditional methods of agriculture, and consequent deforestation (Answathanarayana, Hirikrishnan, & Thayyib Sahini, 2010: 312). This is case of Tanzania in which the country is overwhelmed by the rising population and increasing economic activities. The increment has created difficulties not only to government, but to entire Tanzanians society. There is an open correlation between increasing in population and economic activities and environmental degradation. The rising population usually goes hand in hand with the depletion in the natural resources and deforestation in most of developing countries. This is also seen in Tanzania were increase in population and economic activities has added the challenges to society on their fighting against poverty, environmental degradation, and climate change. The poverty and lack of access to energy has made Tanzanian to destroy the environment through many ways such as deforestation for firewood, building houses or sale as timber locally or as exports.

Kleinbach (2013: 529) has defined the biomass energy as that "energy derived from living matters such as field crops (corn, wheat), trees and water plants; it is also agricultural and forest wastes (including crop residue and manure), and municipal solid wastes". In Tanzania, the solid biomass fuel (the wood material) is the one that

consumed mostly. Several researches have revealed that most of Tanzanians depend on Biomass especially Charcoal as their source of energy mostly for cooking and residential needs counting to more than 90% of energy used. The rural areas consume over 80% of the total country's energy consumption. The studies had also shows that about 35% of households' income is normally spent on accruing domestic energy. The study has seen this situation is not acceptable for family income of the family from the country where 37% of the population living below the poverty line to consume that amount of money for the single cause which is not perfect for their health concerns as well as not compatible to their combat in enhancing their living standards and not even brings the ecological benefits. (MEM, 2013, https://mem.go.tz/energy-sector/, cited on 04.04.2015)

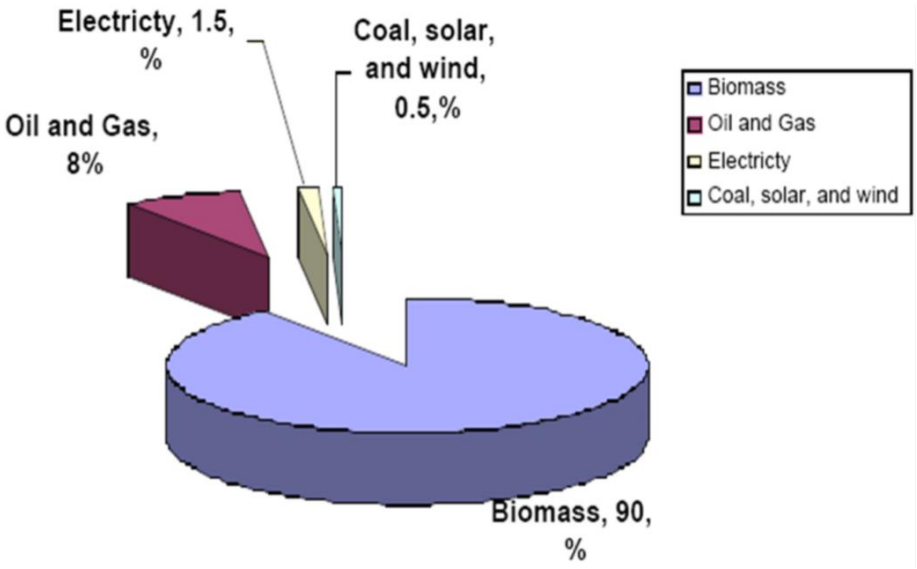


Figure 9: Energy Consumptions share in Tanzania. Adapted from: Energy sources in Tanzania (2009/2010). Sources: MEM, WB 2009 and others

3.1.6 High Fossil Fuels Consumption/ High dependence in Fossil Fuel

One of the most important issues facing the humanity today is the prospect of global climate change, brought about primarily by our prolific energy use and heavy dependence on fossil fuel (Evans, 2007: 181). From the figure 9 above, the second portion of energy consumption is from oils and gas that account to 8% of energy

consumption in Tanzania. The country has to find the way of avoiding fossil fuel costs and fossil effects to the environment especially by promoting utilization of renewable energy technology. Evans, (2007: 18) stated that "there is little doubt that the large-scale utilization of fossil fuels is putting significant stress on the environment". It is important that energy services supplies fuel or energy with low environmental impact and low greenhouse (GHG) gas emission. High utilization of combustion goods as source of energy is environmental unfriendly. The effects of combustion products on air quality and climate are both local and global in nature (Robert L. Evans, 2007: 18)

Fuel	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Hydro	79%	59%	49%	40%	60%	60%	55%	50%	38%	31%	32%
Gas		11%	31%	36%	30%	34%	42%	45%	51%	50%	44%
Jet A-1	1,0%	3,0%								4,0%	8,0%
Diesel	2,5%	3,3%	2,6%	3,9%	7,9%	5,6%	1,5%	1,5%	3,2%	5,9%	8,0%
Coal	0,5%	0,4%	0,3%	0,2%							
HFO	15%	22%	16%	18%	0,9%		0,8%	2,2%	5,9%	7,5%	6,7%
Biomass	0,1%	0,2%	0,2%	0,1%				0,2%	0,2%	0,4%	0,1%
Imports	1,3%	1,4%	1,4%	1,7%	1,4%	1,2%	1,3%	1,1%	1,1%	1,1%	1,0%

Table 1: Fuel Mix for Power Generation 2003 – 2012 (2013 until the end of July). Source: MEM & SIDA; Joint Energy Sector Review (JESR) report 2012/13

From the table1above, Tanzania dependence in fossil fuel that imported from producers seems to have a significant growth each year. According to the Central Bank of Tanzania, "the share of oil to total value of goods import increased to 39.1 percent in 2013 compared to 33.0 percent in the year ending November 2012." The Table1 shows that the country has high dependence in thermal power generation in which it counts about 70% of the total installed capacity in energy generation by end of 2013. Tanzania does not produce oil. The oils used in power generation in the country are normally imported. Oil imports costs much and needs huge amount of foreign currency to be involved in business that has huge effects to energy generation cost, energy prices as well as depletes foreign exchange reserves and cause high inflation rate that justify its burden to national economy growth. This is real problem to national economy growth, environmental concerns as well as to social economic and development growth. According to Hinrichs & Kleinbach (2013: 29) "the world's strong dependence on oil will continue to be factor in limiting economic growth, especially in developing

countries, and the oil supply will still be vulnerable to the political situation in the Middle East". This is what Tanzania has to take off for the future concern.

3.1.7 Resources Depletion and Environmental Concerns

Ideally, we want affordable energy to be available in ample quantities from reliable sources that are safe and environmentally benign when we want it (Dukert, 2009: 9). Energy resources provide some of the crucial building blocks of a modern society and make possible many of the conveniences that we enjoy today (Hinrichs & Kleinbach, 2013: 233, 1992: 362). Energy is such critical contributor to prosperity and national strength that we regularly worry about where it will come from in the future (Sioshansi, 2011: 31)

"Energy consumption determines how much and how severely we can affect our environment, and how damaging or healing our interaction with it are" (Cartiledge, 1993: 11) and "an important factor in estimating the lifetimes of energy resources is the growth rate of consumption" (Hinrichs, 1992: 15). The high biomass consumption especially charcoal as main source for household cooking activities in most part of country – Tanzania, has caused a huge loss of forest. The 2014 annual report from the Environment Department in the Vice President's Office, shows that at least 44 million hectares of forests have been lost annually to land degradation. It also states that loss of forest cover from charcoal production, with nearly 1 million tons consumed annually, is estimated at about 100,000 to 125,000 hectares. Overall forest cover fell by 15 percent between 1990 and 2005, while the rates of deforestation increased significantly since 2000, (The Environmental Department Report, 2014). Also SIDA in their Joint Energy Sector Review (JESR) 2012/13 final report has mentioned that "currently Tanzania's forests are reduced by 130,000 - 500,000 hectares per annum or roughly 1% per year". This is strong evidence that growing energy use in form fuelwood mostly in rural areas and high use of charcoal in urban areas of Tanzania risks damaging the environment and changing global climate. (OTA, 1992: 37) claimed that "Rural areas are experiencing deforestation, desertification, soil erosion and air pollution" Therefore there is need to

provide the Tanzanian society with energy of higher levels of more efficient, cleaner, and less damage to our environmental in present and future.

The study has seen this massive consumption of charcoal and firewood with no sufficient tree growing as setting the stage for desert as well as future energy crises and environmental crises. For the future apprehensions, environmental and land degradation, and global warming concerns, the alternative energy source is crucially needed to save this deterioration for the future regards. Carttiledge, (1993: 11) stated that "Energy is the key term in our relations with our environment". With the growing consumption of energy, new source of primary energy beside fuelwood and charcoal are essentially needed (Goldemberg & Lucon, 2010: 45). The study is eventually suggests that it is right time now for the state to promote a wisely and more sustainably uses of biomass while strongly support and enhance investments in other renewable energy sources that bring ecological benefits by reducing deforestation and land degradation, as well as improving the social benefits and health by reducing indoor air pollution.

3.1.8 Low Energy Consumption

There is stable relationship between consumption and national income, and social economic development. Developing countries today comprises almost three-quarters of the world population but consume only one-quarter of the total energy used (Hinrichs & Kleinbach, 2013: 79). The low energy consumption in some developing countries and their poor economic situation is basic fact to justify or confirm the relationship between poverty and the availability of energy and electricity (Aswathanarayana, Harikrishnan, & Thayyib-Sahini, 2010: 312). The figure 10 below shows electricity consumption from few selected countries. The figure implies that in order to stabilize the relationship between consumption and national income, and social economic development in Tanzania, there is need for more efforts because the electricity consumption is very low hence hinder the national income and social economic development. The country has very low energy consumption with annual kWh consumption of 97 per capita (figure 10 below). Low energy consumption is not obviously the only cause of poverty and

underdevelopment, yet it is a good indicator for many of its causes, such as unsatisfactory education, inadequate health care, and sacrifices impose on woman and children (Goldemberg & Lucon, 2010: 90). Low energy consumption especially electricity is the biggest infrastructure bottleneck for alternative income generation and industrial development (Aswathanarayana, Harikrishnan, & Thayyib-Sahini, 2010: 312).

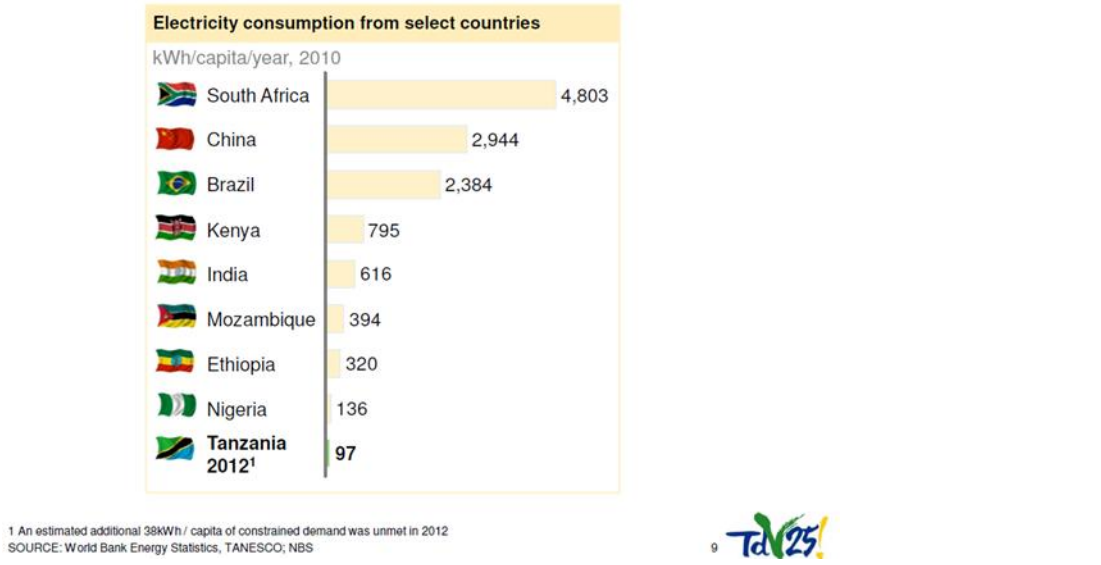


Figure 10: Energy Consumption From selected countries. Adapted from NKRA Energy Lab Final Report, 2013

3.1.9 Frequent Energy Blackouts, Brownout and Energy Rationing

Literatures suggest that "electricity supplies in many developing countries are characterised by disruptions, including blackouts, brownouts, and sharp power surges" (OTA, 1992). The energy disruption has caused a huge loss to respective countries as it stated that failure in supply electricity for even one hour per year can result in high financial losses for sensible application – especially in developed countries (Klimstra & Hotakainen, 2011: 80). The unreliability and poor quality of energy supplies lead to large costs to the economy through waste materials, slowdown or stoppage of operations, and investment in standby equipment (OTA, 1992: 31). It should now conclude that energy acts therefore as an effective lever for the economy (Klimstra & Hotakainen, 2011: 80).

In Tanzania there has been inconsistency power supply for over the past two decades or thereabouts. The power supply irregularity is enormously affecting economic and social development as well as business environment in many areas in Tanzania. Energy is the link to development. Energy serves as means to communities to meet social and economic development and enhance human well-being and health (Hinrichs & Kleinbach. 2013: 2). The more growth of social and economy activities, population and technological changes the more reliable and affordable power supply is needed. Adequate supply of energy is needed to encounter or correspond to increasing level of energy demand to form a strong base of national economic growth. The existing power producer and supplier to some extent have seen to be incapable. It is important to recognise that a developing nation like Tanzania needs help of development partners or private investors because of the fact that energy generation and supply is a hugely capital intensive venture. It's for that case, motivating more RE SMEs investments will help to reduce energy shortage, frequent energy blackouts and reducing energy rationing.

The power inconsistence has created a lot of problems to national economic development and to whole Tanzanian's societies including visitors/tourists, investors, students, and patients. As Klimstra & Hotakainen (2011: 80) suggested, uninterrupted supply of energy is required especially for data handling centres and operating theatres in hospitals. It is problem especially when you think about what number of people lost their lives in the hospitals due to frequent energy blackouts or irregularity or absence of power supply. Think about how many data handling centres failed to operate properly or missing some data from other centres due to interruption in energy supply.

The future of Tanzanians and the national Vision 2025 that stipulates the need for a well-educated and learning society is in risk when we think about number of students in Tanzania who failed their exams because they could not revise in the night due to lack of electricity or frequent energy blackouts and energy rationing programs. This is unacceptable situation as UNFPA 2014; State of World Population Final Report 2014 stated that *"education is critical. The skills and knowledge young people acquire must be relevant to the current economy and enable them to become innovators, thinkers and*

problem-solvers". Also, although there might be no readily evidences up in the field in Tanzania, energy crises in the country clearly suggests that many businesses that needs energy for their daily production activities are failing to meet their daily target. This implies that many people are losing and or are in the danger of losing their jobs or their daily earning because of energy blackout, brownout, rationing or other related power outage. As a result, Tanzania should be losing many investors or visitors in every year due to insufficient and unreliability of energy.

An illuminate home is not a luxury to be desired, it is a basic necessity (Answathanarayana, Hirikrishnan, & Thayyib Sahini, 2010: 314). It is hard to comprehend that in Tanzania, the country with various energy sources; still many households neither have reliable electric power supply for lighting nor for cooking. In rural areas, most of families have no access to power in their houses for either watching television or playing some music; not even for listening national news. Also, most of their social buildings or social clubs has no power supply for them at least to have special entertainments during special festive season or special occasion. Think about security especially during night and how many crimes were committed when the blackouts occurred. Think about how Tanzanians are suffering many crimes, getting pissed off and inconvenienced due to energy blackouts, low energy access or power deficit in their regions especially in rural area. This situation is totally different from the national Vision 2025 that demands the need for the high quality livelihood, peace, stability and unity good governance; as a result, citizens are losing their loyalty to government and policymakers. The study has seen this situation and suggests that there might be future crisis if no vigorous effort is taken to solve the problem, as backed up by OTA book, (1992: 32) that urged that "on the supply side, improved operating producers and new technologies may well improve the reliability of energy supplies, and thus reduce the heavy economic losses caused by blackouts and brownouts" and study has agreed with them. Also, Answathanarayana, Hirikrishnan, & Thayyib Sahini, (2010: 283) mentioned that "even though the technology for different electricity generation methods have advance with time, the absence of a corresponding advancement in grid technology is the reason for causing problem in electricity transmission such as blackouts, brownouts, outage, transmission loss and theft".

3.2 Serving Today and Future Generations

The search for solutions for energy problems requires an understanding of what are the existing source alternatives and choosing the best one (Goldemberg & Lucon, 2010: 65). In Tanzania, investment in renewable energy resource has clear capability to serve as solution for rural electrification as well as rural development. To meet the global requirement on environmental issues, the nation should focus particularly on energy resources or technologies that could serve energy demand while minimizing the environmental impacts.

The investment in Renewable energy is accelerative to rural electrification as well increasing the generating capacity of the national grid. When the supply of fossil energy cannot meet the demand for energy, the economy has to fill the energy gap by the production of renewable energy. Renewable energy sources are abundant in sub-Saharan Africa and are considered to have a large potential to supply the rural society with energy. Renewable energy systems could be a cheaper alternative than grid extension (Karekezi, 2002).

The use of fossil fuels raises serious environmental concerns. But the efficiency use of renewable energy is vital in ensuring sustainable supply of affordable and reliable energy and contributes to conserving the environment and natural resources. Energy producers should find a way to deal with environmental pollution by producing energy using less emission energy sources. Power Production and energy use can bring about significant adverse environmental effects (Hinrichs & Kleinbach 2013: 233). The efficient production of energy from the renewable energy source is appropriate to reduce deforestation, air pollution, reduce direct effect on human life, animals and plants as well as to enhance climate change recovery. To reduce environmental ruin, renewable energy should be utilized and practiced effectively as globally applicable and sustainable energy source.

3.2.1 Renewables are Sources for Energy Sustainability

What is Motivating the Interest in Renewables? According to Hinrichs & Kleinbach (2013: 3 & 27), "understanding energy means understanding energy resources and their limitations, as well as the environmental consequences of their use" The delivery of energy services should be safe and have low environmental impact for sustainable development. Renewable energy sources play a role in supplying energy services in a sustainable environment. The renewable energy is renewable, that provide the usefulness, flexibility, cleanliness and rural economy improvement. Hinrichs & Kleinbach, (2013: 4) stated that "the use of our energy resources is one of the major factors affecting the environment. You must have some idea of how large each energy resource is and how long it will last." Renewable energy is renewable (Ma, Chen & Li et al., 2013).

Renewable energy is any form of energy from solar, geophysical or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use (Wu & Zhao, et al., 2010). In the same way, Twidell and Weir (2006) defined renewable energy as "the energy acquired from the perpetual or recurring flows of energy occurring in the environment". A primary source of energy may be considered renewable when a natural condition allows its replacement in a short time span (Goldemberg & Lucon, 2010: 46). There is little doubt that renewables are the energy resources of the future, for the simple reason that, unlike the fossil fuels, they do not get depleted when used (Aswathanarayana, Harikrishnan, & Thayyib-Sahini, 2010: 7).

Also, Cleveland & Morris (2006: 371) defined Renewable Energy as: "any energy source that is naturally regenerated over a short-time scale and either derived directly from solar energy (solar thermal, photochemical, and photoelectric), indirectly from the sun (wind, hydropower, and photosynthetic energy stored in biomass), or from other natural energy flows (geothermal, tidal, wave, and current energy)" (IPCC-WGIII, 2007: 814). Compared to conventional energy sources, Renewable energy resources are boundless and offer environmental sustainability.

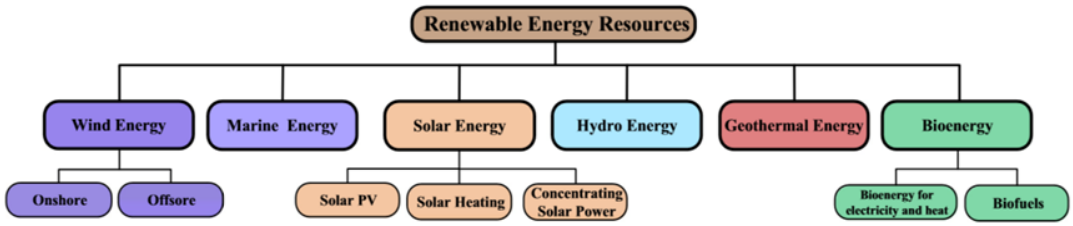


Figure 11: Overview of Renewable Energy Sources. Adapted from Ellabban, Abu-Rub and Blaabjerg, (2014). Ellabban et al. / Renewable and Sustainable Energy Reviews 39 (2014) 748–764)

3.2.2 Environmental Sustainability Concerns

Energy sources, energy consumption and planetary population possess serious environmental problems globally. Increasing global environmental pollution mainly is caused by improper use of energy sources as well as raise in energy demand and consumption due strong growth of global population and economic activities. Clearly, the rate of energy utilization is proportional to the planetary population, which has been growing at an accelerated rate (Rosa, 2009). The challenge lies on how to balance the growth with the environmental sustainability concerns. Globally use of renewable energy will serve as one of the major aspect contributing to lessen environmental problems. All environmental problems are usually having direct effect on human life, animals and plants. Impacts of inappropriate use of energy sources are causing water pollution, air pollution, deforestation that consequently causes climate change. This is why this study promotes use of renewables as source for sustainable energy production and supply. Renewables utilization promotion and utilization is compatible to Tanzania's National Environmental Policy (1997) and the Environmental Management Act Cap 191 which its main objective is to ensure sustainability, security and equitable use of resources for meeting the basic needs of the present and future generations without degrading the environment or risking health and safety.

The figure below shows the Correlation between Population, Climate and sustainability.

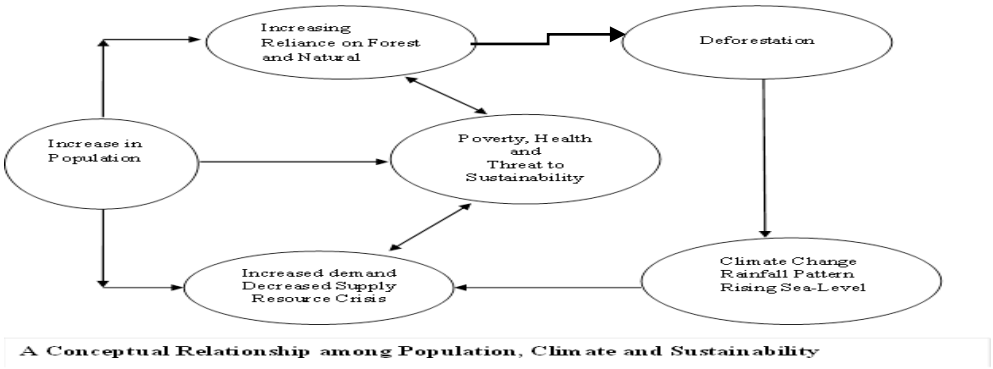


Figure 12: Conceptual Relationship among Population, Climate Change and Sustainability. Adapted from (Shiv Tripathi, 2013)

The use of our energy resources is one of the major factors affecting the environment (Hinrichs & Kleinbach, 2013: 4). Energy efficiency and conservation are vital in guaranteeing sustainable supply of affordable energy and contributes to conserving the environment and resources. The efficient production of energy from the Renewable energy source is pertinent to guarantee and enhance climate change recovery, reduce air pollution, reduce deforestation and reduce direct effect on human life, animals and plants. Understanding energy means understanding energy resources and their limitations, as well as the environmental consequences of their use (Hinrichs & Kleinbach, 2013: 3). The author has also quoted Richard Balzhiser, the former president of Electric Power Research Institute states that "the fundamental goals we should have in mind are a healthy economy and a healthy environment (Hinrichs & Kleinbach, 2013: 3)

Finally, in concluding about need of more investors in the Tanzanian's energy sector, this study agrees with Klimstra & Hotakainen (2011: 80) who urged that "it is therefore safe to state that areas with multiple local generating units can have the highest reliability and availability of energy supply". Hence, the study urged Tanzania government to support investments from different sources but Renewable Energy resources should be considered as a large potential to supply the rural society with energy in affordable, reliable manner and in environmental sociable. Furthermore, "adequate, affordable and reliable energy services are necessary to guarantee sustainable economic and human development" (IAEA, 2005: 30)

4. METHODOLOGY

This was an exploratory study that combined both qualitative and quantitative methods. To acquire enough data enough to generalize the expected result, and to support and enrich the study, the exploratory study carried out using a questionnaire survey method. Questionnaires were sent to selected Renewable Energy Small and Medium Enterprises (RE SMEs) in Tanzania, experts as well as some officials from government authorities and private institutions around the country. The overall objective of this research was to identify potential barriers to Small Scale Renewable Energy investors to invest in rural area in Tanzania. The population of the country is about 49 million people. .

4.1 Research Method

In performing research, there are different methods available depending on the type of study, design and the objective of the study. Researchers have freedom option to choice the best method that will ensemble or fit with objective of the study as well as to produce better way of data analysis in accordance with the research purpose and target of the study. Mainly, there are two major approaches to research called qualitative and quantitative Research Methods. These two methods differ on study focus as well as on form of data collection and analysis. For this study to provide a more complete understanding of research problem a combination of the two research methods was employed. The mixed method, pragmatism opened the door to multiple methods, different world views, and different assumptions, as well as different form of data collection and analysis (Creswell, 2013)

Creswell (2013: 4) defined mixed method research as an approach to inquiry involving collecting both qualitative and quantitative data, integrating the two forms of data, and using distinct design that may involve philosophical assumptions and theoretical frameworks in a single study or program of inquiry. But what is qualitative and quantitative Research Method? Denzin & Lincoln (1994: 2) as noted from Neergaard

and Ulhøi, (2007: 5) has defined qualitative Research method as a multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural setting and it provides answers to the questions like what, why and how by attempting to make sense of interpret phenomena in terms of the meanings people brings to them. Quantitative research method is the scientific investigation that includes both experiments and other systematic Methods that emphasize control and quantified measures of performance (Hoy, 2010: 3) quoted Proctor & Capaldi, (2006). It is essentially about collecting numerical data to explain a particular phenomenal on how many, how much, and how often in particular questions seems immediately suited to being answered statistically. Generally, the quantitative view is described as being *"Realist" or some "Positivist"* while the world view underlying qualitative research is viewed as *"subjectivist"* (Denzin & Lincoln 1994: 2)

4.2 Sample Selection and Data Collection

The data gathered through the questionnaires, interviews, emails, phone calls from selected samples, from TAREA database and from ministry of energy and mineral in Tanzania (MEM). The study opted to select a sample in order to get respondents who have a great deal of understanding the aim of the study. Largely, a survey questionnaire was used as the major instrument for data collection. The questionnaires were sent to 200 respondents through the online survey web (the monkey survey.com online software). 68 responses out of 200 were filled and returned/submitted to which 47 were thoroughly successful for data analysis. Fowler (2009: 1) urged that the collected information or data is used afterwards to produce statistics or numerical inscriptions which will form as the basis to make inferences about the whole population. It is hoped too that the study have got enough number of the respondents to produce statistical inscriptions and as well as enough to generalize the results.

Occupation level Answered: 64 Skipped: 4 Showing 64 responses Executive Director 8/26/2015 4:20 PM View respondent's answers SENIOR VOCATIONAL TEACHER 5/4/2015 8:33 AM View respondent's answers Gas Plant Superintendent 4/21/2015 11:18 AM View respondent's answers Sales Consultant 4/10/2015 12:38 PM View respondent's answers Sales consultant renewable energy 4/10/2015 11:42 AM View respondent's answers Energy Engineer 4/2/2015 6:06 PM View respondent's answers MASTERS IN SOLAR ENERGY ENGINEERING 4/2/2015 5:22 PM View respondent's answers CONSULTANT 4/2/2015 3:33 PM View respondent's answers Project engineer 4/2/2015 7:28 AM View respondent's answers DIRECTOR GENERAL 4/1/2015 10:18 AM View respondent's answers Advisor- Renewable Energy 3/31/2015 10:08 AM View respondent's answers 6 3/30/2015 8:05 PM View respondent's answers jljljlkjl 3/30/2015 4:51 PM View respondent's answers DIRECTOR 3/30/2015 1:33 PM View respondent's answers Principal Level 3/30/2015 1:21 PM View respondent's answers Engineer 3/30/2015 12:58 PM View respondent's answers DMC 3/30/2015 12:37 PM View respondent's answers Specialist Medical Doctor 3/30/2015 11:48 AM View respondent's answers Monitoring and Evaluation Officer 3/30/2015 11:43 AM View respondent's answers Managing Director 3/30/2015 11:10 AM View respondent's answers ENERGY ENGINEER 3/30/2015 9:16 AM View respondent's answers Management level lll 3/29/2015 2:23 PM View respondent's answers Engineer 3/29/2015 1:46 PM View respondent's answers Engineer 3/29/2015 1:10 PM View respondent's answers Management level lll 3/29/2015 12:55 PM View respondent's answers Executive Director 3/26/2015 4:44 PM View respondent's answers Executive Director 3/26/2015 4:32 PM View respondent's answers Management Level lll 3/26/2015 9:48 AM View respondent's answers Civil Engineer 3/24/2015 9:51 PM View respondent's answers Technician 3/24/2015 1:22 PM View respondent's answers	MECHANICAL ENGINEER 3/24/2015 1:11 PM View respondent's answers Director 3/23/2015 7:13 AM View respondent's answers MECHANICAL ENGINEER 3/22/2015 1:17 PM View respondent's answers Mid-level 3/20/2015 5:30 PM View respondent's answers Principal Engineer 3/20/2015 2:24 PM View respondent's answers Institutional Capacity Building Advisor 3/20/2015 1:21 PM View respondent's answers Electrical Engineer 3/19/2015 6:22 PM View respondent's answers Lawyer 3/19/2015 4:28 PM View respondent's answers Program Manager 3/19/2015 8:34 AM View respondent's answers Agroforestry and Seeds Officer 3/18/2015 11:10 PM View respondent's answers ENGINEER 3/18/2015 1:49 PM View respondent's answers ENGINEER 3/18/2015 1:47 PM View respondent's answers Program manager 3/18/2015 10:07 AM View respondent's answers Advisor- Renewable Energy 3/18/2015 9:42 AM View respondent's answers Mechanical Engineer - retired - volunteering 3/17/2015 3:22 PM View respondent's answers Electrical Engineer 3/16/2015 4:55 PM View respondent's answers Senior Researcher 3/16/2015 9:58 AM View respondent's answers Survey Officer 3/16/2015 5:32 AM View respondent's answers Survey Officer 3/16/2015 5:32 AM View respondent's answers Regional Construction Engineer 3/15/2015 8:32 PM View respondent's answers LEAD MECHANICAL ENGINEER 3/15/2015 7:05 PM View respondent's answers Engineer 3/15/2015 4:52 PM View respondent's answers Engineer 3/15/2015 3:47 PM View respondent's answers Managing Director 3/15/2015 12:15 PM View respondent's answers Partner 3/15/2015 8:37 AM View respondent's answers Business Consultant 3/14/2015 2:26 PM View respondent's answers ENGINEER 3/14/2015 1:01 PM View respondent's answers GRADE ONE IN ELECTRICAL ENGINEERING 3/14/2015 12:42 PM View respondent's answers Managing Director 3/14/2015 8:28 AM View respondent's answers ENGINEER 3/14/2015 7:32 AM View respondent's answers Regional Construction Engineer 3/14/2015 6:27 AM View respondent's answers Logistics Engineer 3/13/2015 9:04 AM View respondent's answers Student 3/7/2015 10:43 PM View respondent's answers Maintenance Engineer

Table 2: The Respondents' occupation Level as per their responds on Survey Software.

The Use of Questionnaire and Physical Interviews Benefit: The study preferred mostly questionnaire and physical interview in order to get proper data with opinion of respondents that helped to generalize the study result. The web-based survey was preferred in order to speed up the data collection process, reduce cost and data collection time. It also provided the quality in data collection and easy questionnaire filling. The study preferred online questionnaire because it provided flexibility to respondent to do what they want to do and also provide easiest means of sending questionnaires and receiving the answers from respondent. It has also reduced or eliminated the problem of handling huge amount of papers. Reducing amount of paper can be considered as secondary aim of the he study because the study is environmental concerned and hence opted online questionnaire instead of paper in order to reduce environmental pollution. Case (1999: 201) has explained how papers pollute the global from its manufacturing to its end uses. Paper manufacturing requires large volume of water and after this water become effluent which requires treatment before it is discharged off-site. Paper production commonly is done using fossil fuel - oil as source of heat required to dry paper during manufacturing process. And at end use, improper handle of paper, commonly cause environment pollution.

4.3 Questionnaire Design

The study created questionnaire that used as data collection tool through monkey survey.com software. All questions in questionnaire were somewhat guided to volunteers, too structured guidance was avoided to ensure free will of all participants. Furthermore, questions and filling method were shortly explained to ensure correct way of filling and completing the work. The questionnaire was designed with three main parts. The first part of the questionnaire concerned respondents' basic information such as respondent's name, name of organization, education level, work or occupation level and work experience in field of study. This part was created with main aim of identifying the respondents' involvements in the phenomenon under study. The second part required the respondent to tick cross (X) or tick (√) the number corresponded to

respective factor according to how they can rank the factor from their own opinion and experience. The second part had a sub-part where respondent were requested to answer the given questions according to how they feel is appropriate in their own opinions. The third part was created with questions that offer respondent's free-thought and gather their inner insights about the phenomenon of renewable energy investment situation. It comprised open-ended questions in which respondent were required to give/write a brief explanation in their opinion concerning energy sector and its environment in the Tanzania's context. In addition to the questionnaire, qualitative data was also collected through phone calls interviews. Although others left them blank, but the study has received a huge number of valuable opinions from respondents who participated and took their time to fill the questionnaire provided to them through online web survey. (*Please refer the Questionnaire provided in* APPENDIX 1 *below*)

4.4 Dataset Tables

In order to solidify the study results, the set of data provided is to enhance the transparency of the processes applied to data collection, treat and analysis helping readers to comprehend the study. This also provides more information for future studies. The tables 3, 4, 5 and 6 below show the respondents' profile and the number of participants in a particular variable.

Variable	Category	Participants	Descriptions
Education Level	Diploma	7	Answered: 67 Skipped: 1
	Bachelor	31	
	Masters	24	
	Doctorate	3	
	Others	2	
Working Experience (professional wise) in terms of years	Between (1 - 3	5	Answered: 65 Skipped: 3
	Between (3 - 6)	16	
	Between (6 - 9)	15	
	Between (9 - 12)	6	
	More than 12	23	
Occupation Level	Directors	10	Answered: 64 Skipped: 4
	Senior Managers	19	
	Managers	14	
	Supervisors	17	
	Others	4	
Please enter your Organization name	Open-Ended Question	67	Answered: 67 Skipped: 1
Please enter your name	Open-Ended Question	66	Answered: 66 Skipped: 2
Occupation level	Open-Ended Question	64	Answered: 64 Skipped: 4

Table 3: The respondents' profile and their participation in some entities

In questionnaires, the study provided shown variables on the table below in which respondents were requested to click to mark (√) on the answers they feel was appropriate in their own opinions. The specific values or attributes on particular variables were different as shown in questionnaire Appendix 1 below.

Variable	Category	Participants	Descriptions
In your opinion, Please evaluate on how the below Factors have Effect to Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas.	Closed-Ended Question	48	Answered: 48 Skipped: 20
Currently, in Tanzania, Electrification/Energy demand is higher than supply.	Closed-Ended Question	46	Answered: 46 Skipped: 22
To what extent Tanzanian demanding power supply?	Closed-Ended Question	46	Answered: 46 Skipped: 22
Tanzania Electric Supply Company (TANESCO) is barrier to private sector to investment in energy generation using Renewable Energy resource because of worries of getting of business or losing customers	Closed-Ended Question	46	Answered: 46 Skipped: 22
Is costs of Renewable Energy Electrification match with the real life of Tanzanian?	Closed-Ended Question	46	Answered: 46 Skipped: 22
To what extent you value the cost of Renewable Energy Electrification?	Closed-Ended Question	46	Answered: 46 Skipped: 22
Do you think Tanzanian are aware of using renewable energy sources?	Closed-Ended Question	46	Answered: 46 Skipped: 22
If Yes or No, to what extent do you think Tanzanian are aware or not aware of using Renewable Energy Resources as means for Electrification?	Closed-Ended Question	46	Answered: 46 Skipped: 22
To what extent do think the "Big Result Now" program will enhance the support and attraction to Private sector to investment in Renewable Energy?	Closed-Ended Question	45	Answered: 45 Skipped: 23

Table 4: The number of Respondents involved in evaluating the attributes on particular variables

Table 4 below shows the number of respondents who were participated open-ended questions. The open-ended questions were prepared in order to offer respondent's free-thought and gather their inner insights about the phenomenon under study. To the researcher, open- ended questions offered a room to dig more from respondents' reply as they were requested to give explanations in their own opinion rather than as in structured questions.

In your opinion, please explain briefly the following questions			
Variable	**Category**	**Participants**	**Descriptions**
In Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?	Open-Ended Question	35	Answered: 35 Skipped: 33
In your opinion, how do you think about the country policy frameworks facilitate Renewable energy investment development and its support offerings? As an energy sector expert/investor/stakeholder, are you satisfied with the current government's programs/performance for rural area electrification?	Open-Ended Question	32	Answered: 32 Skipped: 36
What could be the investors' biggest problem in their current investment procedures? With reference to the existing investment policy and strategies, and in what way improve to attract more investor in order to enhance rural electrification?	Open-Ended Question	32	Answered: 32 Skipped: 36
What are the factors that affect more private sector to invest in Renewable energy sector in Tanzania and how they can be mitigated? / What could be the main challenges Renewable Energy SMEs facing when delivering the services?	Open-Ended Question	31	Answered: 31 Skipped: 37
In your opinion, what are the important factors in that can attract or influence the Renewable Energy investors in energy sector?	Open-Ended Question	31	Answered: 31 Skipped: 37
Is Government encouraging and facilitating Research in Technologies aimed at promoting Renewable Energy SMEs and the power sector in whole?	Open-Ended Question	32	Answered: 32 Skipped: 36
Is media and government put effort toward promoting, creating awareness, and information dissemination on Renewable Energy SMEs and Renewable energy sources?	Open-Ended Question	32	Answered: 32 Skipped: 36

Table 5: Open-Ended Question with number of who were answered the questions

3/7/2015 10:42 PM View respondent's answers **Please enter your Organization name** **Answered: 67 Skipped: 1** Showing **67** responses Power4africa 8/26/2015 4:20 PM View respondent's answers VETA 5/4/2015 8:33 AM View respondent's answers Tanzania Petroleum Development Corporation 4/21/2015 11:18 AM View respondent's answers Freelancer 4/10/2015 12:38 PM View respondent's answers Freelancer 4/10/2015 11:42 AM View respondent's answers Tanzania Industrial Research and Development Organization (TIRDO) 4/2/2015 6:06 PM View respondent's answers KAHORORO SECONDARY SCHOOL 4/2/2015 5:22 PM View respondent's answers Independent Consultant 4/2/2015 3:33 PM View respondent's answers Rural Energy Agency 4/2/2015 7:28 AM View respondent's answers Rural Energy Agency 4/1/2015 10:18 AM View respondent's answers SNV 3/31/2015 10:08 AM View respondent's answers INTRA PROFESSIONS EAST AFRICA LTD 3/30/2015 9:09 PM View respondent's answers WIB - Electrical and Solar Power Work 3/30/2015 8:05 PM View respondent's answers kll 3/30/2015 4:51 PM View respondent's answers EWURA 3/30/2015 1:33 PM View respondent's answers Ministry of Industry and Trade 3/30/2015 1:21 PM View respondent's answers Worley Parsons Resources & Energy 3/30/2015 12:58 PM View respondent's answers Confederation of Tanzania Industries 3/30/2015 12:37 PM View respondent's answers Dr. A Bernard May Cancer Care Centre 3/30/2015 11:48 AM View respondent's answers Rural Energy Agency (REA) 3/30/2015 11:43 AM View respondent's answers Kikwajuni Zanzibar Solar Shop 3/30/2015 11:10 AM View respondent's answers MINISTRY OF ENERGY AND MINERALS 3/30/2015 9:16 AM View respondent's answers East African Cables (T) Ltd 3/29/2015 2:23 PM View respondent's answers Worley Parsons Resources & Energy 3/29/2015 1:46 PM View respondent's answers Worley Parsons resources & energy 3/29/2015 1:10 PM View respondent's answers East African Cables (T) Ltd 3/29/2015 12:55 PM View respondent's answers Power4africa 3/26/2015 4:44 PM View respondent's answers Power4africa 3/26/2015 4:32 PM View respondent's answers East African Cables (T) Ltd 3/26/2015 9:48 AM View respondent's answers Ardhi University 3/24/2015 9:51 PM View respondent's answers Tanzsolar 3/24/2015 1:22 PM View respondent's answers TANZANIA BREWERIES LTD	3/24/2015 1:11 PM View respondent's answers UVIKIUTA 3/23/2015 10:03 PM View respondent's answers Voltzon 3/23/2015 7:13 AM View respondent's answers TBL 3/22/2015 1:17 PM View respondent's answers Ministry of Energy and Minerals 3/20/2015 5:30 PM View respondent's answers Tanzania Geothermal Development Company Limited 3/20/2015 2:24 PM View respondent's answers Management Sciences for Health 3/20/2015 1:21 PM View respondent's answers TANESCO Ltd 3/19/2015 6:34 PM View respondent's answers TANESCO Ltd 3/19/2015 6:22 PM View respondent's answers Foundation karibut 3/19/2015 4:28 PM View respondent's answers SNV - Netherlands Development Organization 3/19/2015 8:34 AM View respondent's answers Vi Agroforestry Tanzania 3/18/2015 11:10 PM View respondent's answers TANESCO 3/18/2015 1:49 PM View respondent's answers TANESCO 3/18/2015 1:47 PM View respondent's answers Appropriate Rural Technology Institute 3/18/2015 10:07 AM View respondent's answers SNV Netherlands Development Organization 3/18/2015 9:42 AM View respondent's answers Twende 3/17/2015 3:22 PM View respondent's answers L's Solution ltd 3/17/2015 12:13 PM View respondent's answers TANESCO Ltd 3/16/2015 4:55 PM View respondent's answers COSTECH 3/16/2015 9:58 AM View respondent's answers Rural Energy Agency 3/16/2015 5:32 AM View respondent's answers Rural Energy Agency 3/16/2015 5:32 AM View respondent's answers TANESCO 3/15/2015 8:32 PM View respondent's answers Tanzania Cigarette Company LTD 3/15/2015 7:05 PM View respondent's answers Lappeenranta University of Technology 3/15/2015 4:52 PM View respondent's answers Chloride Exide.(t) Ltd 3/15/2015 3:47 PM View respondent's answers RESCO (T) LTD 3/15/2015 12:15 PM View respondent's answers Frontier Investment Management 3/15/2015 8:37 AM View respondent's answers SIM International 3/14/2015 2:26 PM View respondent's answers RENERG T LTD 3/14/2015 12:42 PM View respondent's answers Power Providers Company Limited 3/14/2015 8:28 AM View respondent's answers ML ENGINEERING 3/14/2015 7:32 AM View respondent's answers TANESCO 3/14/2015 6:27 AM View respondent's answers HS Kuljetus Oy 3/13/2015 9:04 AM View respondent's answers University of Vaasa 3/7/2015 10:43 PM View respondent's answers Individual 3/7/2015 10:42 PM View respondent's answers

Table 6: The Companies/Institutions/Firms participated in Research Survey

4.5 Data analysis

Data analysis was done by the researcher with aid of statistical analysis software provided by Survey monke.com. The software produced quantitative analysis in terms of graphs and percentage as can be seen in graph 1 and table 4 attached in following chapters. As stated before, the study is partly quantitative and to some extent qualitative. The analysis of qualitative part of the study was done by researcher using a word for word transcription from respondents.

Therefore, the use of these two types of data collection and analysis has given confidence to the researcher that the study had high level of validity and reliability. The data were carefully assessed and interpreted in order to make the study findings more truthful and reliable.

5. EMPIRICAL STUDY'S FINDINGS ANALYSIS

This study was conducted to meet specific objectives in which four research questions were formulated basing on the study objective. The objective of the study was to deepen the understanding of the factors hindering investments in renewable energy resources in rural area in Tanzania, to uncover the causes and give suggestions as to what government should do for existing Renewable Energy SMEs to perform successfully and attract more investors. To acquire enough data to generalize the expected result, and to support and enrich the study, this exploratory study was carried out using a questionnaire survey method. About 200 questionnaires were sent to respondents with a great deal of understanding the field of the study in order to gather their inner insights about the phenomenon under study.

The study has provided robust statistical indicative results for policy makers, academics, researchers and practitioners to aid a better understanding of investments in Renewable Energy resources and more effective programs for encouraging investments processes of Small Scale Renewable Energy firms in rural area in Tanzania.

5.1 Respondents' Backgrounds

The respondents' education level and work experience (professional wise) were asked build evidence for reliability of study findings and make the study findings to be more truthful. Here below are tables that show the respondents' education levels and their experience in field of study in percentages and number of participated respondents per each level. The number under the percentage shows the number of respondents responded in a particular level.

Q4: What is your Education Level?

	Diploma	Bachelor Degree	Masters	Doctrate	Other	Total	Weighted Average
(no label)	9.23% 6	47.69% 31	35.38% 23	4.62% 3	3.08% 2	65	2.45

Table 7: Survey Respondents' Education Levels

Q5: What is your Working Experience (Professional wise) in term of years?

	Between (1 – 3)	Between (3 – 6)	Between (6 – 9)	Between (9 – 12)	Between (12 and More)	Total	Weighted Average
(no label)	7.94% 5	25.40% 16	23.81% 15	9.52% 6	33.33% 21	63	3.35

Table 8: Survey Respondents' Work Experience (professional wise)

5.2 Research Questions Responses

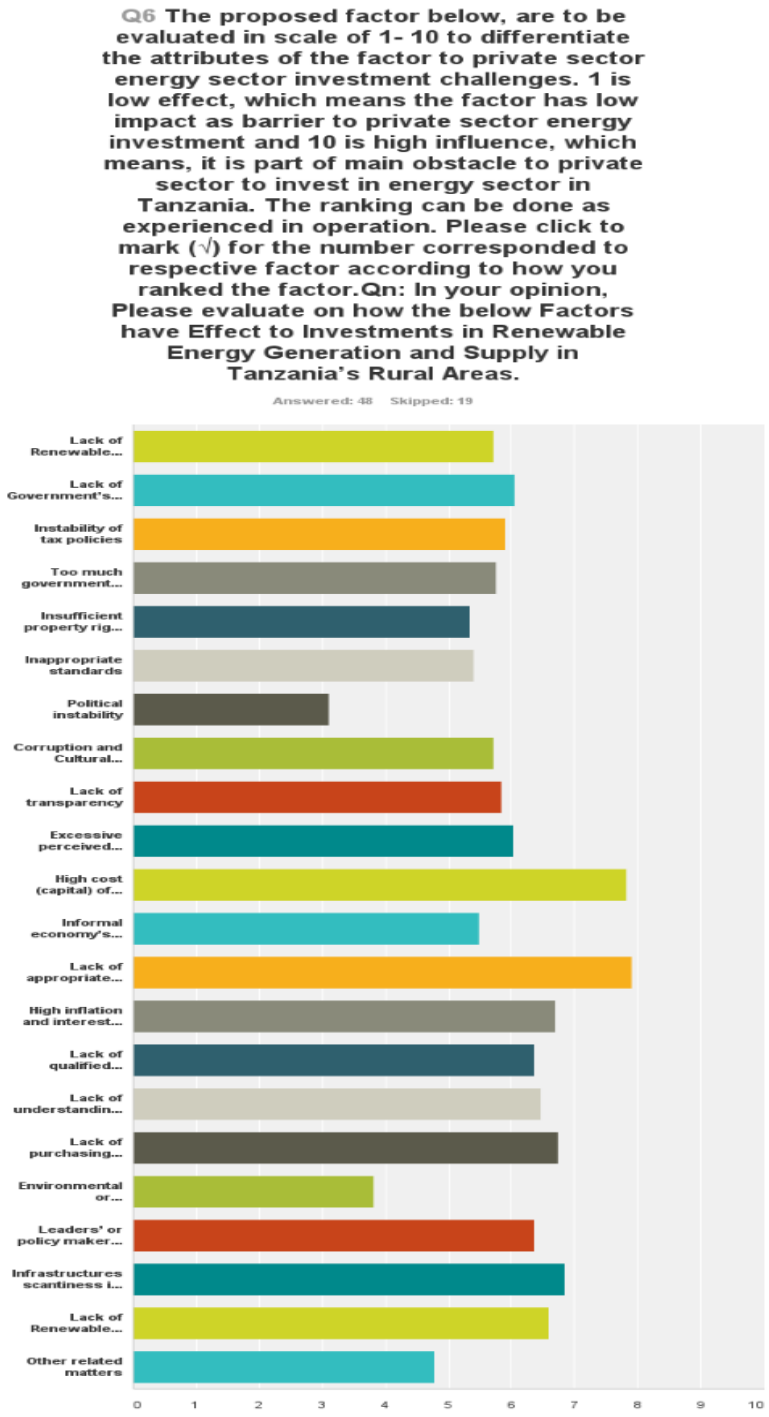
In the following sections a comprehensive presentation of the study's findings based on the research questions and the objectives of the study follows.

5.2.1 Question One: *What are the factors that discourage more private sector's investments in Renewable Energy sector in Tanzania and how can they be mitigated?*

The aim of this question was to identify all factors that are barriers to private sector to invest in power generation and supply using the abundant renewable energy sources available in Tanzania and analyze how to mitigate them. The study set 22 factors to be investigated as can be seen in APPENDIX 1 part two A below

i. Revealed Main Barriers Factors

From the research survey findings, it was observed that there are four main barriers to investments in Tanzania for both local and international investors. High cost (capital) of investment and innovation that rated to 78.3%, lack of appropriate source of finance or loans that ranked to 79.1%, infrastructures scantiness in rural area that counts 68.5% and lack of purchasing power due to low income in rural societies and graded at 67.4% were mentioned (Table 4 below) as important dynamic aspects of the problem.



Graph 1: Result bars for question six. Shows how respondents evaluated or weighed the factors according to their respective effect to investments.

From the questionnaire, the study had ***Q6*** that asked; ***"In your opinion, Please Evaluate on how the below Factors have Effected Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas*"*.** The responds are as in this table below

	1	2	3	4	5	6	7	8	9	10	Total	Weighted Average
Lack of Renewable Energy policy	10.64% 5	10.64% 5	10.64% 5	8.51% 4	8.51% 4	10.64% 5	6.38% 3	4.26% 2	8.51% 4	21.28% 10	47	5.72
Lack of Government's R&D and technology policy	4.26% 2	10.64% 5	10.64% 5	2.13% 1	19.15% 9	8.51% 4	10.64% 5	6.38% 3	8.51% 4	19.15% 9	47	6.06
Instability of tax policies	8.33% 4	12.50% 6	6.25% 3	6.25% 3	14.58% 7	6.25% 3	8.33% 4	10.42% 5	10.42% 5	16.67% 8	48	5.90
Too much government regulation (bureaucracy)	10.42% 5	10.42% 5	14.58% 7	0.00% 0	6.25% 3	4.17% 2	20.83% 10	10.42% 5	12.50% 6	10.42% 5	48	5.77
Insufficient property rights and sabotage risks	10.64% 5	12.77% 6	12.77% 6	6.38% 3	10.64% 5	10.64% 5	2.13% 1	12.77% 6	12.77% 6	8.51% 4	47	5.34
Inappropriate standards	2.17% 1	13.04% 6	15.22% 7	10.87% 5	15.22% 7	10.87% 5	6.52% 3	6.52% 3	10.87% 5	8.70% 4	46	5.41
Political instability	45.65% 21	19.57% 9	4.35% 2	4.35% 2	6.52% 3	2.17% 1	2.17% 1	6.52% 3	4.35% 2	4.35% 2	46	3.11
Corruption and Cultural attitudes to bribery	10.42% 5	12.50% 6	8.33% 4	8.33% 4	12.50% 6	4.17% 2	4.17% 2	12.50% 6	8.33% 4	18.75% 9	48	5.73
Lack of transparency	11.11% 5	11.11% 5	8.89% 4	2.22% 1	8.89% 4	6.67% 3	6.67% 3	22.22% 10	15.56% 7	6.67% 3	45	5.84
Excessive perceived economic risks	6.67% 3	6.67% 3	6.67% 3	6.67% 3	17.78% 8	4.44% 2	15.56% 7	15.56% 7	11.11% 5	8.89% 4	45	6.04
High cost (capital) of investment and innovation	2.17% 1	0.00% 0	2.17% 1	4.35% 2	4.35% 2	8.70% 4	13.04% 6	19.57% 9	21.74% 10	23.91% 11	46	7.83
Informal economy's negative impact on investment	10.87% 5	2.17% 1	8.70% 4	6.52% 3	23.91% 11	10.87% 5	10.87% 5	17.39% 8	4.35% 2	4.35% 2	46	5.50
Lack of appropriate source of finance or loans	4.26% 2	0.00% 0	2.13% 1	2.13% 1	6.38% 3	6.38% 3	2.13% 1	25.53% 12	27.66% 13	23.40% 11	47	7.91
High inflation and interest rates	2.13% 1	4.26% 2	2.13% 1	4.26% 2	17.02% 8	14.89% 7	17.02% 8	10.64% 5	19.15% 9	8.51% 4	47	6.70
Lack of qualified personnel	4.35% 2	0.00% 0	15.22% 7	2.17% 1	17.39% 8	8.70% 4	6.52% 3	21.74% 10	19.57% 9	4.35% 2	46	6.37
Lack of understanding of the market	2.17% 1	6.52% 3	8.70% 4	6.52% 3	15.22% 7	8.70% 4	6.52% 3	15.22% 7	19.57% 9	10.87% 5	46	6.48
Lack of purchasing power (low income)	6.52% 3	6.52% 3	4.35% 2	4.35% 2	2.17% 1	13.04% 6	17.39% 8	17.39% 8	8.70% 4	19.57% 9	46	6.74
Environmental or environmentalist condemnation	17.78% 8	17.78% 8	11.11% 5	8.89% 4	24.44% 11	8.89% 4	6.67% 3	2.22% 1	2.22% 1	0.00% 0	45	3.82
Leaders' or policy makers personal interests	8.51% 4	8.51% 4	4.26% 2	6.38% 3	10.64% 5	8.51% 4	8.51% 4	10.64% 5	17.02% 8	17.02% 8	47	6.36
Infrastructures scantiness in rural area	4.26% 2	0.00% 0	8.51% 4	10.64% 5	10.64% 5	4.26% 2	6.38% 3	23.40% 11	17.02% 8	14.89% 7	47	6.85
Lack of Renewable Energy awareness/ information	0.00% 0	12.77% 6	10.64% 5	4.26% 2	8.51% 4	4.26% 2	8.51% 4	21.28% 10	10.64% 5	19.15% 9	47	6.60
Other related matters	15.00% 6	17.50% 7	2.50% 1	7.50% 3	22.50% 9	10.00% 4	7.50% 3	2.50% 1	5.00% 2	10.00% 4	40	4.78

Table 9: Results as Ranked by Respondents

Also from open-ended question in the questionnaire with question ***"in Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?***", the findings confirm that four mentioned factor above are main cause as emphasized by a number of respondents in their answers they wrote in their opinions. About 21 out 33 respondents who answered the question have mentioned those factors, although, high investment cost has dominated as the main reason for investors to hesitate in taking the opportunity. For example respondent # 33 mentioned that "*Factors affecting private sector investment in RE in Tanzania includes off-taker risks, high initial costs, obtaining capital, land and other permits (could be streamlined*)" and respondent # 62 stated that *"the main problem is lack of soft loans for Renewable Energy Projects. To attract investors, there should be soft loans for RE projects as well as reducing Bureaucracy"*. But the study has seen from their answers that the main source or specific reason is lack of fair suitable source of finance or loans and lack of assurance in investment return due to low purchasing power of targeted customer (rural society in Tanzania). From the vicious circle of poverty (mentioned in the next subsection) the effect of low income to investment is shown clearly as supported by findings in table 4 above.

Respondents have ranked lack of purchasing power (low income) at 67.4% as a barrier to investments in energy sector. This percentage is huge enough to justify that lack of purchasing power or low income of rural society is main barrier to investment interests. Also from open-ended question, respondent # 42 has mentioned that "*the rate of investment capital return is not adequate on investment-volume".* This means due to low purchasing power it will take investors many years to claim back their money in which most of investors are not ready for that and bad enough no guarantee on their investment. Respondent # 33 has explained that *"Most investors seek guarantees from the Government to lower their business risks arising from risky off-taker".*

ii. Elucidations of Low Purchasing Power Effect

Low purchasing power of rural society in Tanzania is seen to have huge effect in investments, and social and economic development. Here are some more answers from some of respondents concern the question; ***In Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?*** Respondent # 65 had argued that "*the high demand in energy does not say anything in the purchasing power of people. Mostly this demand is in rural areas where people are highly affected with income poverty and also depending on single income from agriculture, this makes investment in renewable energy unattractive for Investors"*. This is true because in business market is made if there are enough people to cover the costs of the intended market offering (Kotler et al 2009: 12). In Tanzania, rural area accommodates the majority of the population counting to 70% but does not guarantee a market fortune or availability and investment prosperity unless there is purchasing power attached to them. Here below is Vicious circle of the poverty that shows how low income of the society affects the investment and whole development process.

Low Income ⇒ Low Purchasing Power ⇒ Low Level of Demand ⇒ Limited Size of the Market ⇒ Low Inducement to Invest ⇒ Low Investment ⇒ Low Production ⇒ Low Income

Vicious circle of the poverty extracted from Jain & Ohri, (2007: 17)

The purchasing power and uncertain investment cost repayment was mentioned again by respondent # 09 who stated that, *"there are many challenges, but to me a key challenge is that the average rural Tanzanian does not have money to buy solar products, even when they are offered on a payment package over 2-3 years".* The statement has supported by respondent # 62 who stated that "*the main reason is the high initial investment cost with few chances of getting loans for Renewable Energy Projects and uncertain investment return".* The information is backed by other respondent # 61 who argued that *"the opportunity for renewable energy is in rural areas where the purchasing power is lower causing many companies to make very low progress and some die away*". This annotation is supported by (Sioshansi, 2011: 13) who stated that

"we need new investment, and investment needs growth". These statements have shown that although opportunity is there but investors need to see a clear investment fortune that will guarantee their investment successful growth and repayment. It seems there is correlation in their information because others such as a respondent # 45 has argued that *"the private sector are not taken a strong interest to invest in energy generation and supply because, the capital to invest is too high while there is no clear support or policy which favor the energy generation and supply, then to make profit you need to sell energy in price which seemed that majority of Tanzanian in rural area could not afford"* This has underlined by respondent # 56 who explained that "*Many investors are risk averse and do not trust the Off-take for wholesale or do not want to risk customers not afford".* From literatures, the effect of lack of purchasing power has emphasized by Goldemberg & Lucon (2010: 38) as they lectured that "a large number of people in rural areas in developing countries have no access to commercial energy due to the lack of purchasing power, or for the other reasons".

The study suggests that strategic investment in human means in rural area and improved capability in earnings that will raise their income and purchasing power as well as to serve as a tool to combat rural area poverty. Also, rural area has seen as potential area for energy investment. Despite low purchasing power, the rural area of Tanzania accommodates the majority of the population counting to 70%. This population tally and low access to energy (energy demand) is clear opportunity for energy market. Sometimes, the low purchasing power in the rural areas is also contributed by high energy prices as indicated in the next subsection. It is better for investors to set affordable price. The price might be with little profit but through plenty customers available at end of day they will end up with huge profit and business sustainability.

iii. Need of Conducive Business Environment

The fairness environment in all business involvements is mentioned as vital aspect to be well framed in creating a vigorous investment encouragement for renewable sources.

Instability of taxation policies, bureaucracy, corruption, lack of transparency were revealed by respondents as factors that deter degree of fairness in energy business in Tanzania. From Table 4 above, the findings shows that effect of instability of taxation policies be ranked to 58.3%, too much government regulations (bureaucracy) rate at 57.4%, corruption and attitude to bribery counts about 60%, and lack of transparency and inappropriate standards rated at 58% as barriers to investments. But what may be the cause for those barriers? It seems to be caused by leaders or policymakers personal interests. This is because the mentioned barriers are normally outcome of entities' behaviors. From the study responds has rated leaders or policymakers personal interests to 63% which is fairly high to seem as main causal of the problem.

Also from open-ended question in the questionnaire respondents have shown their disapproval of the gloomy business environment. **Corruption Effect:** For instant, respondent # 11 has claimed *"that the process of getting permits to generate electricity takes a long time and they involve significant costs and sometimes bureaucracies with responsible organizations might deter investors' efforts"*. Respondent # 06 pointed that *"the interest is there but offset by high risk perception, corruption, too much bureaucracy, unstable grid and cost of doing business".* Corruption is one of the most constraint to development that affecting the economies of both societies in Tanzania. Its rate keeps growing in almost everything in Tanzania and it seen as inevitable phenomenon which in future everybody will be forced to participate in order to get any service. It is unfair phenomenon that contributes a lot to deter development activities. In energy business market, corruption was mentioned by some respondents as factor that is causing them to stay away from any government sponsored programs because they cannot be able to compete with high wealth companies with high level of corruption behavior. Mbaku, (2010: 10) claimed that "Corruption is a market outcome determined by a market behavior of those participating in the market. Thus to change such an outcome, it is necessary to change the behavior of market participants". The study has agreed with this literature because some respondents described that corruption goes with behaviors. They mentioned that investors coming from less corruption countries, they normally not involve their self in corruption matters to avoid being involved in any corruption scandal which is against to their behavior and their countries harmony.

Here is what identified by respondent # 6 who argues that "*international companies cannot engage in corrupt practice even if they wanted to because of very sting anti-corruption legislation in their home countries".* Therefore, to stop corruption practices, it is essential for government to find way to change the behavior of entire Tanzania's societies. Langseth et al. (1997), Langseth, (1997) urged that "undermining the legal framework, national integrity, and regulatory system, corruption destabilizes the trust and confidence of entrepreneurs or business owners". An effectively way to deal with corruption will create trust, integrity and confidence to local and global investors and that will attract more foreign investors, who could deliver skills, techniques, knowledge and technologies that Tanzania societies need to improve domestic macroeconomic enactment. Consequently, the living standard of the rural society in Tanzania in which most of them suffer from high rate of poverty due to low income caused by low economic and production activities will be improved. Being the lifeblood of all productive activity, energy and its uninterrupted availability ensures success of such projects aimed to empower the rural poor (Answathanarayana, Hirikrishnan, & Thayyib Sahini, 2010: 313)

Lack of Transparency Effect: Transparency especially from decision makers is another factor that should be taken to account in order to produce trustworthy and conducive business environment of openness and accountabilities. Bennis, Goleman & O'Toole, (2008: 7) defined transparency as aspect that "encompasses condor, integrity, honesty, ethics, clarity, full disclosure, legal compliance, and a host of other things that allow us to deal fairly with each other". Respondent # 65 mentioned that *"lack of transparency and lack of better, reliable source of information for renewable energy sub sector is big challenge for attracting new investors in the sector". Respondent # 03 stated that in Tanzania there is "no strong support from the respective institutions as well as any clear standard or procedure on where to start and where to end. It's hard to set time frame to get through new investment registration procedure".*

iv. Respondents' Suggestions on How to Mitigate the Problem

Respondent # 03 urged that *"the government should be required to set easy procedures and supporting programs to existing investment as well as encouraging strategies to new investors"*. Respondent # 11 suggested that "*investment in rural areas can be reached by decentralized energy systems but that is not done because of low income of potential customers, a subsidy element is required for the investor to come in"*. Respondent # 02 advised that the country needs to have *"more supportive policies, skilled personnel, infrastructure improvement, and financial support for low income people.* Respondent # 31 pointed that *"the biggest challenge will be pricing due to high tax rates therefore the government should consider lowering taxes if we really need to electrify our rural* Respondent # 51 urged that *"more incentives on rural energy investments should be put in place and investors must be assured of their return on investments".* Respondent # 62 sees that *"to attract investors, there should be soft loans for RE projects as well as reducing Bureaucracy", w*hile respondent # 33 stated that *"promoting RE investment requires clear subsidy mechanism form usually from the Government".* However, respondent # 59 expressed that although *"government promotes RE investment through subsidies (matching grants, performance grants, etc. More needs to be done)".*

Study Suggestions: To provide a constructive effect on renewable energy investment, the study has recommended the government to provide investors with easy access to loans, business stimulus, incentives and wisely designed tax exemptions or reduction. Also reduction in unnecessary procedure- bureaucracy, improved transparency, improved infrastructures and with additional to country's political stability the more investors will get attracted. Empowering rural society to improve or boost their income through starting businesses and small industries in order to enhance their purchasing power is another crucial factor to take care of. Purchasing power has mentioned as main doubt to investors to invest in rural area of Tanzania so improved purchasing power will provide energy market sight to investors as well as be assured in their investment return. "One among the major reasons of rural poverty is lack of alternative income generation

opportunities other than agriculture" (Answathanarayana, Hirikrishnan, & Thayyib Sahini, 2010: 313)

5.2.2 Question Two: *How viable investments in renewable energy will change the whole life of Tanzanian especially in rural area and what is its impact to economy and environmental?*

The elucidation given in this part presents an overview of the energy impact and its benefit or service it offers to whole entire society. It provides the role of energy and its impacts with respect to human Life, environmental, and regional development. Essentially, there is a massive impacts associated with electrified rural area as described here below.

i. Improved Social and Economy Welfares

Access to reliable and affordable energy service such as electricity is vital aspect that normally revolutionizes the life of societies in many different ways. It plays a vital role for the social and economic development of entire society in the present time and for the future. It helps to defeat poverty in rural area of Tanzania that has been using solid biomass as source of energy caused deforestation and environmental unfriendly. "Reliable supplies of efficient, modern fuel for agricultural processing, operating pump sets, farm transportation, and operating domestic and workshop appliances would be needed in rural areas" (OTA, 1992). As we have seen n previous chapter, a rural area of Tanzania has a very low access to electricity that count only 2% of population, it justify that Tanzania needs viable investments in energy sector to revolutionize the life of its societies. Energy investments have positive impact in all aspect associated with better life. Specifically in Tanzania, electrification of rural areas will contribute in creating

jobs and create equality in national living standards by contributing to efforts to reduce urbanization and unnecessary movement of people from rural areas to towns or cities.

Improved Education Level: Access to electricity as well as reliable and affordable energy contributes much in rising level of education (knowledge and skills) and reduces education disparity by providing students, among others, with reading light, energy for running lab and other teaching/learning equipment and electrifying teachers' houses. Lack of electricity is among the factors that have made rural schools to be regarded as being difficult environment for teachers to stay and work in Tanzania. From table 4 above, respondents had rated lack of qualified personnel to high rank of 67.1% as a barrier to investments in Tanzania rural. It means there is a huge need of improvement of rural societies' education level. Education is critical to development process. The knowledge, skills and techniques rural societies will acquire will enable them to become innovators, thinkers and problem-solvers towards productivity activities. It will also be a tool to improve information obtainability that will reduce lack of understanding of the business market and lack of renewable energy awareness (information) than mentioned to contribute to deter investments interests to rate of 65.1% and 65.4% respectively as barriers to investments (table xx above). According to the Energy Vision 2050 – (VTT Edita, 2009: 21) "education has been one of the primary drives of economy growth in the developed world. When the overall level of education of the labor force rises, it tends to contribute directly to productivity growth".

Improve Business Environment: Access to affordable, reliable and sustainable supplies of energy plays a huge role in business establishments. The business establishment and production of goods locally will help to reduce goods importation rate in the country. Low importation of goods will help to lower inflation rate. From study, (table 4 above) respondents have mentioned high inflation rate as a barrier to investments in Tanzania, ranking it at 67%. Generally, access to affordable, reliable and sustainable energy will boost or enhance level of business activities and employment in rural areas. Consequently, it reduces poverty, unemployment rate, urbanization rate, social riots and a series of other hitches. This coincides with Answathanarayana, Hirikrishnan, & Thayyib Sahini, (2010: 315) that suggests that, access to continuous supply of electricity will enable small workshops, industries, and other commercial and

business establishments to run without stopping. It will improve the overall socio-economic and cultural wellbeing of the people. It will give more employment opportunities and capabilities, which is a way out of poverty and underdevelopment.

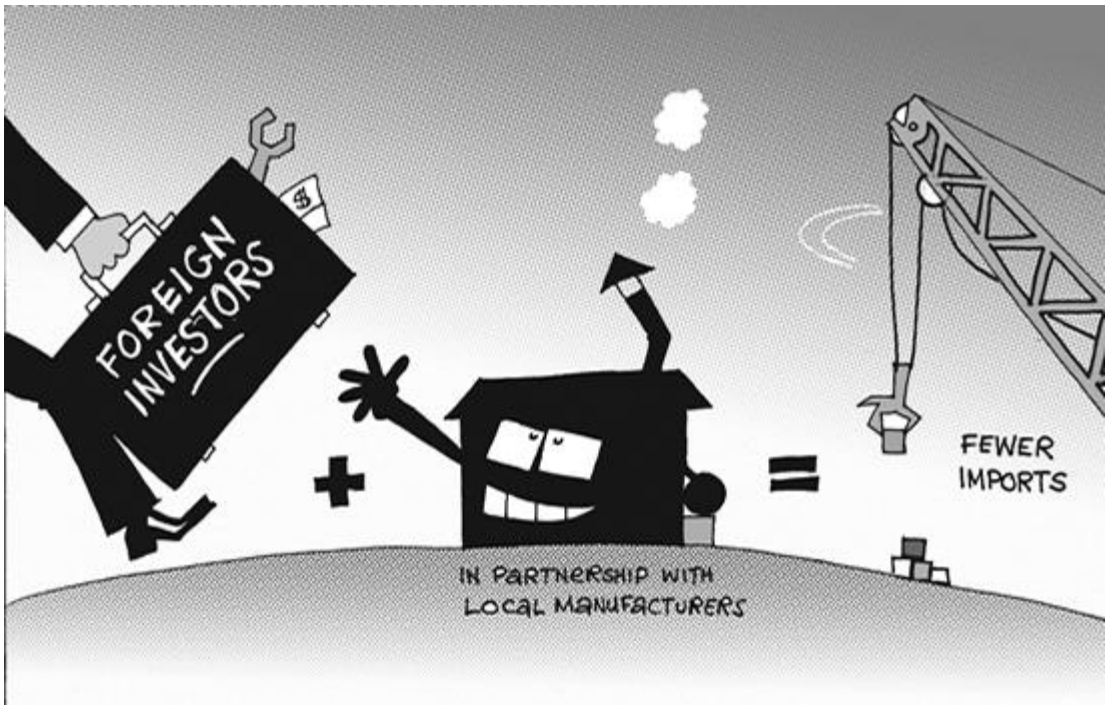


Figure 13: Foreign and Local Investors Collaboration's Effect. Adapted from IPP Media, 2015

Jobs Creation: The study findings suggest that small and medium entrepreneurs in renewable energy will serve as mechanism for rural electrification and development as well as key for rural and national economic growth. "Economic growth has been connected with increased use of energy and natural resources. The economic growth also distributes new wealth with which opportunities are created to lift out of poverty" (Energy Vision 2050 – VTT Edita, 2009: 23). Certainly, affordable, reliable and sustainable supplies of energy such as electricity directly and indirectly create jobs to the people in specific area that enhance the economy prosperity to both stakeholders.

The Directly Jobs Opportunities: It would be created for energy experts or personnel such as energy engineers, technicians, artisans, and other energy craft workers. It also provide direct job to other energy stakeholders such as manual labours who would be involved in constructions of energy production and supply infrastructures. It will also

create direct jobs to those who will be involved in land acquisition for plants such as for wind power farm, as well as for those who will be dealing with supplies of renewable energy products such as solar energy supplies.

Indirectly Jobs Opportunities: these are jobs that are created as consequences of availability and accessibility to energy. Through renewable energy accessibility, some entrepreneurs will take opportunity to start-up business and macro industries in rural areas that would create job opportunities for rural inhabitants. The more the production activities in business increases, the more it would lead to the hiring of more employees and more demand in production materials. This process will create a remarkable and sustainable income fortune and development to both rural societies and local and national economic development in general.

Study Overview: Energy is one of our major building blocks of modern society (Hinrichs & Kleinbach, 2013). The sustainable investments in renewable energy will enhance electrification rate that will enable health care by reducing pollution and major dieses associated with energy service deficits. It will provide rural society households with reliable power supply for lighting and cooking. It also provides them access with power in their houses for watching television, playing some music and even access events associated with need of electricity. It will increase access to information sharing and communications within specific society. It will boost security services and enhance trade, collaboration, peace that creates a state of mutual harmony between people in the rural area. Sioshansi, (2011: 367) states that "renewable energies has multiple benefits to local and global environmental benefits, health and education co-benefits, energy security and balance of trade importing countries, the support for the local employment"

ii. Improved Environmental Concerns

Inappropriate use of energy sources is one of the major contributing substances to increasing global environmental pollution. Energy sources possess serious environmental problems that are encountered by both developing and developed

nations. These environmental problems and impacts are pressing and concurrent to global issues; varying from deforestation, climate change, air pollution, water pollution and aesthetics, have direct effect on human life, animals and plants. Majority of Tanzanians rely on polluting fuels such as kerosene, firewood and charcoal with severe consequences for health and the environment. Lack of access to energy has caused a massive deforestation caused by cutting of trees for firewood, and for making charcoal which is used as the main energy source for the majority of the population while no program for planting more trees in respective areas. The study is confidently that utilization of energy from renewable sources will play a big role to serve environmental pollution.

Eased Political Matters: It have seen that the availability and access to clean energy supply will easy political issues. Hinrichs & Kleinbach, (2013: 3) argued that "we live in age of environmental awareness. Politicians would have a hard time getting elected if they did not at least state they had a concern for the environment". Pollution reduction is a global vital matter therefore it needs politicians to address the problem and show the way on how to deal with it. They might be admired by their voters if they promote renewable energy to serve as sustainable sources of energy production due to its friendly nature to environment. Klimstra & Hotakainen, (2013: 131) claimed that "investors in new power plant as well as political decision makers face huge challenges with respect to attaining a secure, affordable and clean electricity supply". Certain level of lapses emerge from energy production at the source due to the challenges of material used as source of energy involve in energy production process, and of which such lapses has a direct effect on the environmental. Energy producers encounter a great deal of task with appreciable cost in dealing with environmental pollution. However, the efforts of energy manufacturing companies to efficiently manage energy production sources have not resulted in a conclusive solution. "Our major air pollutants originate from other sources besides power production" (Hinrichs & Kleinbach, 2013: 244)

The figure14 below is summary of political, economic, social technological and environmental benefits of using renewable energies as sustainable energy source.

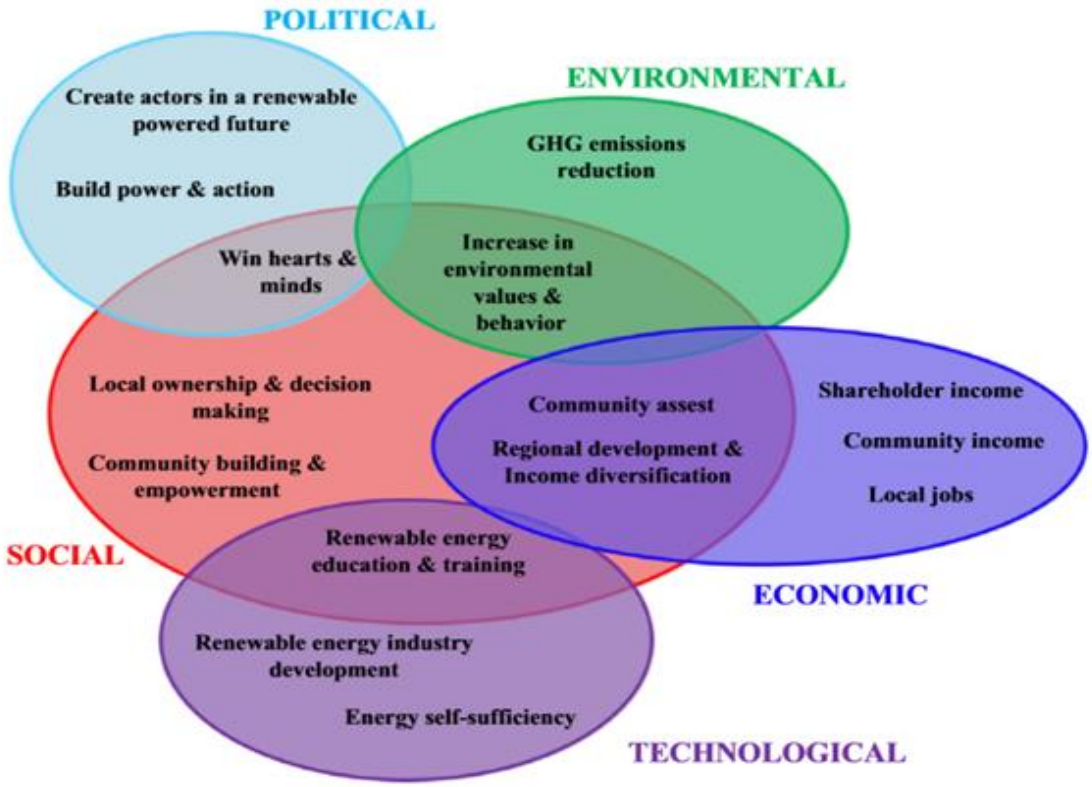


Figure 14: Summary of the Global benefits of renewable energies production: Adapted from Ellabban, Abu-Rub and Blaabjerg, (2014)

5.2.3 Question Three: *Is country policy frameworks facilitate Renewable Energy investment development? Is existing policy in Tanzania support the existing RE SMEs and attract or influence more RE SMEs' entry?*

This question was created to get a roughly look at the national energy policies if are suitable for enhancing investment in energy sector to assure security of energy supply to a nation. Here below are arguments from survey that show how a favorable policy developments, support programs and minimization of investment and operating costs will create a vigorous investment encouragement for renewable sources in off-grid

locations. With respect to the survey respondents, the study has presented opinions on what and how should energy policy be improved to support existing RE SMEs attract more investor in order to boost rural electrification program, and economy and development activities.

i. Need of Supportive Programs

As explained in previous chapter, investments in energy sector are more capital intensive so any difficulties in attracting capital for energy investments can discourage investors. For investor to get engaged to energy market, they need to be assured with some means of supports and market prosperity. From study survey, supportive investment policies have identified essential tools to attract and encourage investments. As respondent # 63 outlined that *"investments are very attracted from the policy point of view so the government should implementation support on monitoring and evaluation as well as measurable indicators on policy implementation".* The description got support from respondent # 26 who delineated that *"high capital needed in investment and there is no clear policy which favor the energy generation and supply is vast challenge to investors*". Also, respondent # 63 indicated that *"high investment cost in REs, the government must come out with an innovative financing structure to REs"* The elucidation the government must come out with an innovative financing structure to REs is important to be taken into consideration for investments inspirations. Also respondent # 32 declared that *"the government is struggling to have a framework to facilitate the renewable energy investment"* so it indicate that there is need for means to facilitate RE investments. The information corresponds to respondent # 31 mentioned weaknesses in existing policy claiming that *"the current policy framework lacks innovation; it is a straight forward looking into hydro, fuel and now gas"*. In the same way, respondent # 09 *has identified that "the government's policies in regards to renewable energy don't seem to be moving"* that indicate needs for policy amendment.

ii. Openness Prerequisites

Respondent # 14 identified that *"the policy is not clear to the community and the leaders take the advantage to import for higher cost for their benefit"* Respondent # 38 believed that the corrupted system is barrier to investors efforts towards energy investment by recommending that *"transparency in energy policy required - avoiding corruption in the system"* Respondent # 42 suggested openness activities by suggesting that *"government should further come up with transparent policies & conduct transparent activities"* This is clear that Tanzania needs improvement in policy framework as argued by respondent # 56 that *"the country policy is not good, they have to amend the policy first and invite for the investors. Rather than that the performance for rural area electrification will be too shallow"* These statements show that for rural electrification successfulness, a well framed policy is very important to be deployed.

iii. Lack of Awareness on Renewable Matters - Information Gap

In Tanzania, it seems renewable energy is not promoted significantly as evidenced by some respondents such as respondent # 09 who stated that *"Tanzanians are not aware towards renewable energy and its policy - although they are becoming more aware that it exists".* The study has discovered that majority of Tanzanians are not aware about renewable energy investments, policy and it important to rural development. Example is respondent # 21 who affirmed to be *"not aware of any government policy regarding private sector engagement in rural electrification. Their own stated policy is good but I do not expect it to be realized".* The respondent stated that the policy is not expected to be realized because it is not supportive to fully participation of private sector in the energy electricity business. Respondent # 11 acknowledged that *"the policy supports renewable energy promotion and encourage private sector participation but the framework is not in place on how this can be implemented".* Meanwhile, respondent # 03 showed dissatisfaction with support schemes as seen in from the statement below

states that *"in my opinion, the government support to investors is almost nothing because no applicable or suitable policy framework that attract investors".* The descriptions got back-up from respondent # 38 who specified that *"more efforts needed resources available but policy and implementation planning not adhered effectively".*

Based on respondents opinions in the presence or lack of policy, some have said there is no policy, others have said they are not aware of the policy existence and others have said there is policy, but the framework is what is missing. This clearly confirms that policy awareness is very low. The study suggested introduction on strategical programs that will raise awareness on renewable matters and remove the information gap by filling in the gaps about renewable energies.

iv. Subsidies and Stimulus as Essential Tool to Balance Energy Market

Respondent # 57 urged government to amend policy and create means of enabling poor society to manage to buy renewable energy products and services. Respondents pointed out that subsidies and stimulus packages are essential tools to balance energy markets. For example *"the government has put less effort in renewable they must have created a good policy on renewable energies. They have to provide subsides to renewable energies companies and subsides on poor people".* The statement correlate with what discussed in previous chapter that empowering or the prices subsidizing will boost energy market in the rural area of Tanzania. But subsiding prices should be well planned so that investors will be able to operate successful and make profit from the services they provide. At the beginning, the government can set price subsides and investment stimulus but after some time, after their income is grown, the inducements will be removed gradually. This process needs government to dedicate to rural electrification with wisely planned policies and strategies as argued by Nakicenovic, Grubler, & McDonald, (1998: 246) that "to include today's poor in the energy markets, poverty must be eradicated, and that requires policy action that goes beyond energy policies alone". The study is confident that availability of energy in rural area of

Tanzania will enhance establishment of macro enterprises that will contribute to combating to eradicating of poverty in the areas.

5.2.4 Question Four: *What are the crucial factors that should be adjusted in order to influence and assure more RE SMEs to enter the markets or local companies to collaborate with Global RE SMEs?*

The study has identified that for the great benefit to Tanzanian economic and social development, companies' collaboration in crucial aspect for them to share expertise, for business sustainability and successful performance. Furthermore, collaborations play big role because it helps them to improve companies' capability and effectiveness. "No business is an island" (Håkansson & Snehota, 1989). The author highlights that for any business success, the business needs beneficial relationships and complimentary cooperation between companies. Once companies work together in concord manner, there will be no conflict of interest, no unhealthy competition, but there will be a win-win situation with great mutual benefit to both companies. Consequently, each company in collaboration would generate demand for the other that will boost their market and revenue. Well balanced energy market free for everyone to compete is vital to companies' cooperation. Once again, in this section, poor infrastructure, lack of transparency, leader personal interests, corruption, lack of proper standards and lack of understanding the market fairness play had mentioned as main barriers to for RE SMEs in Tanzania to have a vigorous mutual benefit collaboration network locally and with global RE SMEs in order to improve their capability as well as competitiveness.

Some respondents have claimed that some big companies are entering the country's energy business under the NGO umbrella to avoid some taxes. For example, respondent # 09 has claimed that "*large NGOs are killing the private sector renewable energy market in Tanzania because they have a lot of money and can afford to operate in ways that a private business cannot afford"*. He also stated that at the moment so called *"NGO sector is overwhelming the market.* The claim was supported by respondent # 09

with the following explanation; *"As a manager of a Tanzanian owned SME which sells a range of solar products and fuel efficient stoves, we are struggling the large western NGOs who are coming into the country and who are offering long term payment plans. Some of these NGOs begin with millions of US$ and are so far ahead of the Tanzanian owned and operated SME from the very beginning".* The markets dominance from big NGOs or big company is not acceptable situation, the government should also support local investors for local and economic development. Respondent # 09 suggested that *"the market needs to be balanced so that everyone can compete. The Tanzanian bureaucracy is not always easy to work, so sometimes it feels like it would be easier to operate elsewhere in the world".* Also, Sioshansi, (2011: 31) sees the importance of balanced market and requests for its effectiveness in energy policy. He argued that "no government leaves its energy supply solely to the marketplace, and stake holders have strong opinions about both the ends and means of energy policy". The study has agreed with the advice that Tanzania needs to have a balanced energy market free for everyone to compete. The fairness and equal opportunity to both stakeholders is essential for investment encouragement.

Furthermore, respondent # 53 suggested that *"combat corruption, clear example is sugar industry(s) which have inbuilt excess capacity of generating electricity through burning bagasse. These do not need investment but they cannot sell their full excess power due to corruption/ monopoly/ bureaucracy".* With respect to respondent # 53 information, the effect of bureaucracy and corruption can be identified as a clear example of barrier investors are facing and can be taken as clue to find the way for future investments betterment. The study suggests decision makers to create business environment of full disclosure, accessibility to legal information and allow both stakeholders to deal fairly with each other because transparency serve as a base for business successful and mater of survival.

Respondent # 33 suggested that *"main challenges for SMEs when delivering services is servicing their credit facilities since their revenue is highly affected by the lone utility which is in bad financial shape".* Respondent # 11 *"main Challenge affecting RE SMEs including affordability of consumers due to high cost of generation and low technical support for the new technologies"* Respondent # 09 shared that *"any energy project*

developer on a large scale has to enter agreement with TANESCO in order to supply electricity because it owns infrastructure for transmission and distribution to the end-users. Sometimes costs of generation are higher than what TANESCO is ready to pay. The information was supported by respondent # 07 who mentioned that the country has *"poor energy infrastructure and unfair pricing of the product"* so from there we can see reliability of information provided by respondent # 9 reads that *"it is therefore difficult for investor to enter the venture without guaranteed return.*

Returns in the energy sector do not always compare well with those of other infrastructure investments. So government policies can make a difference by restructuring subsidies that reduce investment risks consistent with long-term development targets, by encouraging energy prices that reflect real costs, by separating monopoly activities from potentially competitive activities (Nakicenovic, Griibler, & McDonald, 1998: 101).

However, respondent # 09 acknowledged that *"the Renewable Energy Feed in Tariffs have been finalized with the regulator that will allow investors to charge tariffs based on the type of technologies that differ in investment cost"* and sees it as good news to investors. This study nevertheless has doubt in low purchasing power of rural societies. The low purchasing power will still hinder the energy market and suggests well balanced prices setting to be introduced, that will be affordable and would not be below average operating costs. Also this study acknowledges that, improvement of infrastructures is essential because it will play a big role in investors' attraction. Nakicenovic, Griibler, & McDonald, (1998: 116) stated that "infrastructure is backbone of the energy system, the impact of technological change can be particularly slow because of the slow rate of capital turnover, so there is the importance of improving and expanding infrastructures for clean grid-dependent energy forms"

5.2.5 Some More Questions and Responses

The following part presents some questions involved in questionnaire and respondents responses. The number under the percentage shows the number of respondents replied in a respective attribute.

Q7: *Currently, in Tanzania, Electrification/Energy demand is higher than supply*.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Total	Weighted Average
(no label)	**55.56%** 25	**35.56%** 16	**2.22%** 1	**4.44%** 2	**2.22%** 1	45	1.62

Table 10: Results on Energy demand justification in Tanzania

Q8: *To what extent Tanzanian demanding power supply?*

	Very High	High	Moderate	Low	Very Low	Not at All	Total	Weighted Average
(no label)	**42.22%** 19	**46.67%** 21	**6.67%** 3	**4.44%** 2	**0.00%** 0	**0.00%** 0	45	1.73

Table 11: Results on Energy demand situation in Tanzania

Q9: *Tanzania Electric Supply Company (TANESCO) is barrier to private sector to investment in energy generation using Renewable Energy resource because of worries of getting of business or losing customers*

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Total	Weighted Average
(no label)	**17.78%** 8	**22.22%** 10	**17.78%** 8	**33.33%** 15	**8.89%** 4	45	2.93

Table 12: TANESCO as Barrier to Private Sector Investment Results

Q10: *Is costs of Renewable Energy Electrification match with the real life of Tanzanian?*

	Yes	No	Total	Weighted Average
(no label)	22.22% 10	77.78% 35	45	1.78

Table 13: Results about how RE costs match with the real life of Tanzanians

Q11: *To what extent you value the cost of Renewable Energy Electrification?*

	Very High	High	Medium	Low	Very Low	No Idea	Total	Weighted Average
(no label)	20.00% 9	60.00% 27	15.56% 7	4.44% 2	0.00% 0	0.00% 0	45	2.04

Table 14: Result on cost extent with respect to real life of Tanzanians.

Q12: *Do you think Tanzanians are aware of using renewable energy sources?*

	Yes	No	Total	Weighted Average
(no label)	77.78% 35	22.22% 10	45	1.22

Table 15: Results about Tanzanians awareness on renewable energy sources.

Q13: *If Yes or No, to what extent do you think Tanzanians are aware or not aware of using Renewable Energy Resources as means for Electrification?*

	Very High	High	Medium	Low	Very Low	No Idea	Total	Weighted Average
(no label)	2.22% 1	26.67% 12	55.56% 25	11.11% 5	4.44% 2	0.00% 0	45	2.89

Table 16: Results about to what extent Tanzanians' are aware about renewable energy sources

Q14: *To what extent do think the "Big Result Now" program will enhance the support and attraction to Private sector to investment in Renewable Energy?*

	Very High	High	Medium	Low	Very Low	No Idea	Total	Weighted Average
(no label)	4.55% 2	27.27% 12	31.82% 14	15.91% 7	15.91% 7	4.55% 2	44	3.25

Table 17: Results about to what extent Big Results Now will benefit RE investors

The study has involved these questions in this section in order to show the respondents' opinions on other factor correlated to energy sector investments. The answers gave the study wide understandings of the energy matters situations in Tanzania.

5.3 Revealed Country's Strength - Political Stability

From research findings, respondents identified the country being in high political stability which is a huge credit to country in case of investment attraction. From question asked to them on "*what factors have Effect to Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas*", political instability as barrier to investments was ranked lowest (only 30%) among all factors (table 4 above). That finding is essential to government efforts toward energy sector investment encouragement and rural economic and social development. The country should keep effort on keeping political stability. According to Nakicenovic, Grubler, & McDonald, (1998: 183), "regional prosperity will largely depend on political stability within the region, institutional reform to attract investment capital, and progress towards economic integration and cooperation", so political stability is vital to nation prosperity and it will play a huge role in nation electrification and economy progress plans.

Political stability will boost investment in renewable energy that will enhance energy availability and accessibility. Assurance in energy availability and accessibility in vital to nation harmony and revenues as Sayigh, (1998: 8) argued "energy scarcity tomorrow

can mean economic and political instability". The statement got endorsement from authors of OTA book, (1992) in which they mentioned that "international political stability depends on steady broad-based economic growth in developing countries, which in turn requires economic and reliable energy service" (OTA book, 1992:4)

5.4 Study Limitations

Despite tremendous findings from study survey, respondents' answers, the study has its limitations. The number of RE SMEs participated in the study were considered as limitation to study. Tanzania has about 167 energy actors including Government departments, Donors, NGOs, Universities, Religion institutions, Vocational centres and end users, etc.

The study managed to get responses from some Ministry of Energy and Minerals (MEM) 1, Ministry of Industry and Trade (MIT) 1, Confederation of Tanzania Industries (CTI) 1, Rural Energy Agency (REA) 5, Energy and Water Utilities Regulatory Authority (EWURA) 1, The Tanzania Commission for Science and Technology (COSTECH) 1, Tanzania Geothermal Development Company Limited (TGDCL) 1, Tanzania Industrial Research and Development Organization - (TIRDO) 1, Tanzania Electric Supply Company Ltd (TANESCO) 4, Tanzania Petroleum Development Corporation (TPDC) 1, Small Industries Development Organisation (SIDO) 1.

Others are Tanzania Renewable Energy Association (TAREA) 2, Technology Development and Transfer Centre (TDTC) 1, The Tanzania Traditional Energy Development and Environment Organisation (TaTEDO) 1, Centre for Agricultural Mechanization and Rural Technology (CARMATEC) 1, from Universities 3, and other education institutions such as VETA 6. Also got responses from industries with highly energy consumptions in Tanzania 3, forest sector 1, Worley Parsons Resources & Energy 1, Power4africa 2, Appropriate Rural Technology Institute 1, Health Care institutions 1, Management Sciences for Health – Institutional for Capacity Building 1, Agroforestry Tanzania 1, Independent Consultants 2 as well as Entrepreneurs or the RE

SMEs owners and other energy sector investors, NGOs etc., 12. This number of responses from both mentioned institutions was big enough to meet the study's objective.

The study appreciated the instrumental answers from respondents that study had convinced that they had great deal of understanding the field of the study and they have provided their inner insights about the phenomenon under study. But, to generalize the findings as the Tanzania's real situation about RE SMEs challenges the study could conclude the findings if the number of participants had been at least over half of the mentioned energy actors especially RE SMEs in Tanzania. However, despite the mentioned limitation above, reliability and validity of the study were set highly due to number of people participated whom study convinced that they better understanding of phenomenon on study and gave reliable information.

6. CONCLUSIONS AND RECOMMENDATIONS

Energy is our basic means for survival. To meeting our basic needs of the present and of the future generations with regards to environmental, health and safety matters we have to ensure sustainability, security and equitable use of energy resources. Access to the sustainable, reliable and affordable energy services is essential to sustainable social and economic development. To achieve this, the energy service providers must produce energy from energy resources with low environmental impact for sustainable development and matter of affordability should be taken in consideration as well. There is need of directive that will deal directly with security of energy supply such as security of electricity supply, security of oil supply and security of gas supply regulation. Certainly, to enforce energy production from low environmental impact for sustainable development and to ensure energy sustainability, directive on efficient utilization of renewable energy resources is needed. The resource value of Renewable energy cannot be realized unless utilization of Renewable energy resources is practiced effectively as globally applicable and sustainable energy source.

For the case of market competitiveness, special effort should be deployed to regulate and monitor market developments and take protections of any activities that may facilitate monopoly exercises of market power. Proper energy market regulation is needed to safeguard fair market to meet energy demand in applicable manner by preventing any market abuses. It will also need to make sure that the energy service or products must meet customer requirements in acceptable price and quality. To ensure fairness market competition in which should be well balanced energy market and free for everyone to compete. This kind of market fairness environment will create mutual collaboration between local renewable energy investors and global RE SMEs to work together in order to share expertise and successfulness practices and create a win-win situation for both stakeholders.

Due to high energy demand in Tanzania caused by fast growing population, economic activities and lack of reliable energy supply, the government should have considerable efforts to be directed toward renewable energy sectors especially in identifying the investments inspirations. The Government and its energy institutions should find the

way to promote private sector investment in order to have sufficient energy production, supply as well a security of supply. The government should strengthen or restructure the institutions responsible for energy generations and supply and ensure mutual cooperation with private sector in order to meet highly accelerated and existing energy demand. If there is no sufficient efforts in promoting RE SMEs to invest more in energy supply and production the energy demand will keep on growing year after year.

An appropriate strategy or policy framework that sets out clear guidelines and responsibilities for grid-connected and off-grid renewable energy developers must be introduced to reduce barriers to development of the country's renewable energy resources. The government should deepen the understanding of revealed factors that contribute to making the investments in renewable energy resources in rural area in Tanzania to be more difficult and find the way should do for existing renewable energy actors to perform successfully and attract more investors. The country should encourage and facilitate research in Renewable technologies or other technologies aimed at supporting local and global RE SMEs efforts towards energy sector investments and dedicate more in finding and understanding more factors that extremely discourage the private investors to invest in energy.

The empirical result shows that High cost (capital) of investment and innovation that rated to 78.3%, lack of appropriate source of finance or loans that ranked to 79.1%, infrastructures scantiness in rural area that counts 68.5% and lack of purchasing power due to low income in rural societies and graded at 67.4% were revealed (table 4 above) as important dynamic aspects of the problem. The study suggested the government to provide investors with easy access to loans, business stimulus, incentives and carefully and wisely planned tax exemptions or reduction. Also study recommended reduction of unnecessary procedure (bureaucracy), improved transparency, improved infrastructures and with additional to country's political stability the more investors will get attracted. It also suggested need of appropriate policies and strategies that support RE SMEs to perform successfully and be more efficient in their servicing proving efforts.

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APPENDICES

APPENDEX 1: Research Questionnaire

RENEWABLE ENERGY RESOURCES AS A RELIABLE AND SUSTAINABLE SOURCE FOR RURAL ELECTRIFICATION AND DEVELOPMENT IN TANZANIA:

CHALLENGES OF RENEWABLE ENERGY PRIVATE SECTOR INVESTMENT IN TANZANIA

Part One

Background Information of the Respondent/Informant

Name_____

Organization's Name_____

_____

Occupation Level_____

Education Level

☐ Diploma ☐Bachelor Degree ☐Masters ☐Doctorate ☐Others

Working Experience (Professional wise) in term of years

☐Between (1 – 3) ☐Between (3 – 6) ☐Between (6 – 9) ☐(More than 9)

Part Two (A):

The proposed factor below, are to be evaluated in scale of 1- 10 to differentiate the attributes of the factor to private sector energy sector investment challenges. 1 *is low effect, which means the factor has low impact as barrier to private sector energy investment and* 10 *is high influence, which means, it is part of main obstacle to private sector to invest in energy sector in Tanzania. The ranking can be done as experienced in operation. Please mark* ***(X)*** *or tick (√) the number corresponded to respective factor according to how you ranked the factor.*

In your opinion, Please evaluate on how the below Factors have Effect to Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas.

Factors to Evaluate	**Ranking/Weight**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Lack of Renewable Energy policy	1	2	3	4	5	6	7	8	9	10
Lack of Government's R&D and technology policy	1	2	3	4	5	6	7	8	9	10
Instability of tax policies	1	2	3	4	5	6	7	8	9	10
Too much government regulation (bureaucracy)	1	2	3	4	5	6	7	8	9	10
Insufficient property rights and sabotage risks	1	2	3	4	5	6	7	8	9	10
Inappropriate standards	1	2	3	4	5	6	7	8	9	10
Political instability	1	2	3	4	5	6	7	8	9	10
Corruption and Cultural attitudes to bribery	1	2	3	4	5	6	7	8	9	10
Lack of transparency	1	2	3	4	5	6	7	8	9	10
Excessive perceived economic risks	1	2	3	4	5	6	7	8	9	10
High cost (capital) of investment and innovation	1	2	3	4	5	6	7	8	9	10
Informal economy's negative impact on investment	1	2	3	4	5	6	7	8	9	10
Lack of appropriate source of finance or loans	1	2	3	4	5	6	7	8	9	10
High inflation and interest rates	1	2	3	4	5	6	7	8	9	10
Lack of qualified personnel	1	2	3	4	5	6	7	8	9	10
Lack of enough information on technology	1	2	3	4	5	6	7	8	9	10
Lack of understanding of the market	1	2	3	4	5	6	7	8	9	10
Lack of purchasing power (low income)	1	2	3	4	5	6	7	8	9	10
Environmental or environmentalist condemnation	1	2	3	4	5	6	7	8	9	10
Leaders' or policy makers personal interests	1	2	3	4	5	6	7	8	9	10
Infrastructures scantiness in rural area	1	2	3	4	5	6	7	8	9	10
Lack of Renewable Energy awareness/ information	1	2	3	4	5	6	7	8	9	10
Other related matters/factors	1	2	3	4	5	6	7	8	9	10

Part Two (B):

*Please mark **(X)** or tick (√) on the answer you feel is appropriate in your opinion for the given questions below*

Currently, in Tanzania Electrification demand is higher than supply.

☐Strongly Agree ☐Agree ☐Not Sure ☐Disagree ☐Strongly Disagree

To what extent Tanzanian demanding power supply?

☐Very High ☐High ☐Medium ☐Low ☐Very Low ☐Not at all

TANESCO is barrier to private sector to investment in energy generation using Renewable Energy resources because of worries of getting of business or losing customers.

☐Strongly Agree ☐Agree ☐Not Sure ☐Disagree ☐Strongly Disagree

Are costs of Renewable Energy Electrification match with the real life of Tanzanian?

- ☐ Yes
- ☐ No

To what extent we value the cost of Renewable Energy Electrification?

☐Very High ☐High ☐Medium ☐Low ☐Very Low ☐No Idea

How long (month/s) the Electrification processes take place to customer to get connected?

☐ Between (1 – 3) ☐between (3 – 6) ☐between (6 – 9) ☐(9 – 12) ☐Others

Do you think Tanzanians are aware of using renewable energy sources?

- ☐ Yes
- ☐ No

To what extent do you think Tanzanians are aware of using Renewable Energy Resources?

☐Very High ☐High ☐Medium ☐Low ☐Very Low ☐No Idea

To what extent do think the “Big Result Now” programme will enhance the support and attraction to Private sector to investment in Renewable Energy?

☐Very High ☐High ☐Medium ☐Low ☐Very Low ☐No Idea

Part Three

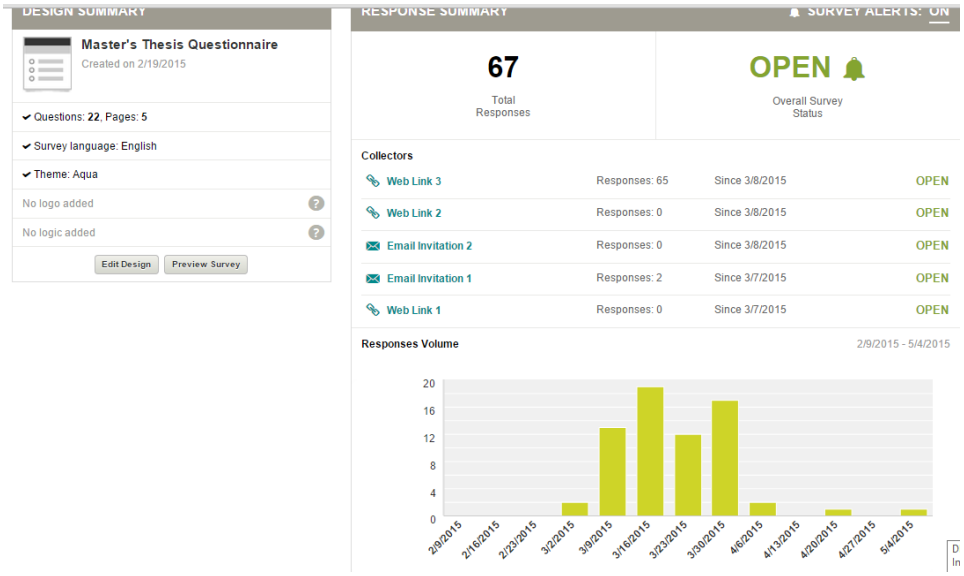
Interview's Questions/Open-ended Questions

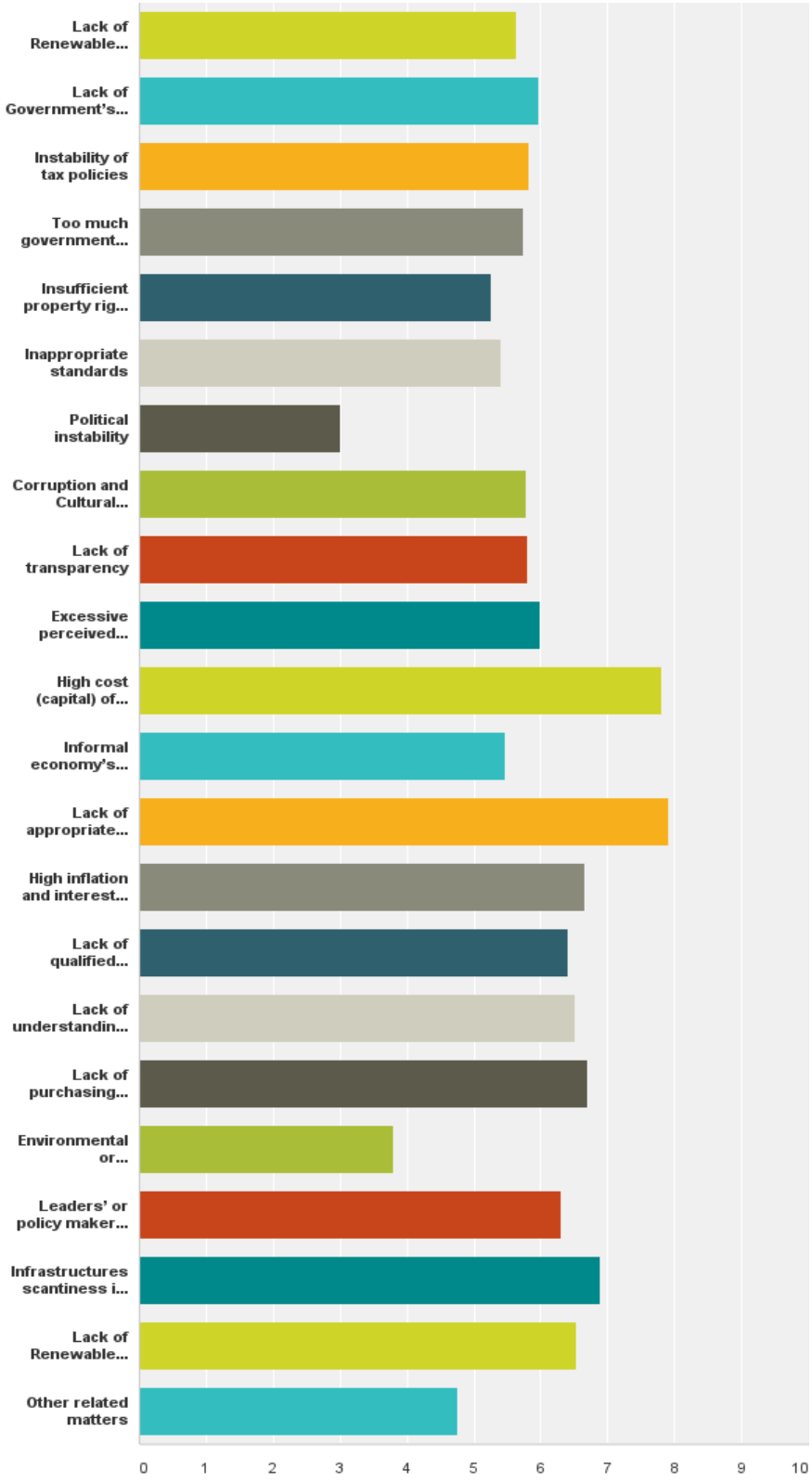
In your opinion, please give a brief explanation for the following questions

i. In Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?
ii. Is TANESCO barrier to Private Sector to invest in power generation and supply using Renewable Energy sources because of worries of getting out of business or losing customers?
iii. In your opinion, how do you think about the country policy frameworks facilitate Renewable energy investment development and its support offerings? As an energy sector expert/investor, are you satisfied with the current government's performance in rural area electrification?
iv. What could be the investors' biggest problem in their current investment procedures? With reference to the existing investment policy and strategies and in what way improve to attract more investor to enhance rural electrification?
v. What are the factors that discourage or affect more private sectors to invest in Renewable energy sector in Tanzania and how they can be mitigated? / What could be the main challenges RE SMEs are facing when delivering the services?
vi. In your opinion, what are the five (5) important factors in that can attract or influence the private sector to invest in Renewable Energy sector?
vii. In your opinion and experience, how sustainable private sector investments in renewable energy will change the whole life of Tanzanian in rural area and what its impact to economy and environmental?
viii. What are important changes that happened in the village after introduction of Renewable energy electrification program in rural areas? Mention just few.
ix. Are media and government put effort toward promoting, creating awareness, and information dissemination on RE SMEs and Renewable energy sources?
x. Is Government encouraging and facilitating Research in Technologies aimed at promoting RE SMEs and the power sector in whole?

THANK YOU FOR YOUR ANSWERS!

APPENDEX 2: The Results Charts





The results' Chart as analyzed from respondents' responses.

APPENDIX 3: The Results Table

	1	2	3	4	5	6	7	8	9	10	Total	Weighted Average
Lack of Renewable Energy policy	10.87% 5	10.87% 5	10.87% 5	8.70% 4	8.70% 4	10.87% 5	6.52% 3	4.35% 2	8.70% 4	19.57% 9	46	5.63
Lack of Government's R&D and technology policy	4.35% 2	10.87% 5	10.87% 5	2.17% 1	19.57% 9	8.70% 4	10.87% 5	6.52% 3	8.70% 4	17.39% 8	46	5.98
Instability of tax policies	8.51% 4	12.77% 6	6.38% 3	6.38% 3	14.89% 7	6.38% 3	8.51% 4	10.64% 5	8.51% 4	17.02% 8	47	5.83
Too much government regulation (bureaucracy)	10.64% 5	10.64% 5	14.89% 7	0.00% 0	6.38% 3	4.26% 2	19.15% 9	10.64% 5	12.77% 6	10.64% 5	47	5.74
Insufficient property rights and sabotage risks	10.87% 5	13.04% 6	13.04% 6	6.52% 3	10.87% 5	10.87% 5	2.17% 1	13.04% 6	10.87% 5	8.70% 4	46	5.26
Inappropriate standards	2.22% 1	13.33% 6	15.56% 7	11.11% 5	15.56% 7	8.89% 4	6.67% 3	6.67% 3	11.11% 5	8.89% 4	45	5.40
Political instability	46.67% 21	20.00% 9	4.44% 2	4.44% 2	6.67% 3	2.22% 1	2.22% 1	4.44% 2	4.44% 2	4.44% 2	45	3.00
Corruption and Cultural attitudes to bribery	10.64% 5	12.77% 6	6.38% 3	8.51% 4	12.77% 6	4.26% 2	4.26% 2	12.77% 6	8.51% 4	19.15% 9	47	5.79
Lack of transparency	11.36% 5	11.36% 5	9.09% 4	2.27% 1	9.09% 4	6.82% 3	6.82% 3	20.45% 9	15.91% 7	6.82% 3	44	5.80
Excessive perceived economic risks	6.82% 3	6.82% 3	6.82% 3	6.82% 3	18.18% 8	4.55% 2	15.91% 7	13.64% 6	11.36% 5	9.09% 4	44	6.00
High cost (capital) of investment and innovation	2.22% 1	0.00% 0	2.22% 1	4.44% 2	4.44% 2	8.89% 4	13.33% 6	20.00% 9	20.00% 9	24.44% 11	45	7.80
Informal economy's negative impact on investment	11.11% 5	2.22% 1	8.89% 4	6.67% 3	24.44% 11	11.11% 5	8.89% 4	17.78% 8	4.44% 2	4.44% 2	45	5.47
Lack of appropriate source of finance or loans	4.35% 2	0.00% 0	2.17% 1	2.17% 1	6.52% 3	6.52% 3	2.17% 1	23.91% 11	28.26% 13	23.91% 11	46	7.91
High inflation and interest rates	2.17% 1	4.35% 2	2.17% 1	4.35% 2	17.39% 8	15.22% 7	17.39% 8	8.70% 4	19.57% 9	8.70% 4	46	6.67
Lack of qualified personnel	4.44% 2	0.00% 0	15.56% 7	2.22% 1	15.56% 7	8.89% 4	6.67% 3	22.22% 10	20.00% 9	4.44% 2	45	6.40
Lack of understanding of the market	2.22% 1	6.67% 3	8.89% 4	6.67% 3	13.33% 6	8.89% 4	6.67% 3	15.56% 7	20.00% 9	11.11% 5	45	6.51
Lack of purchasing power (low income)	6.67% 3	6.67% 3	4.44% 2	4.44% 2	2.22% 1	13.33% 6	17.78% 8	15.56% 7	8.89% 4	20.00% 9	45	6.71
Environmental or environmentalist condemnation	18.18% 8	18.18% 8	11.36% 5	9.09% 4	22.73% 10	9.09% 4	6.82% 3	2.27% 1	2.27% 1	0.00% 0	44	3.80
Leaders' or policy makers personal interests	8.70% 4	8.70% 4	4.35% 2	6.52% 3	10.87% 5	8.70% 4	8.70% 4	10.87% 5	15.22% 7	17.39% 8	46	6.30
Infrastructures scantiness in rural area	4.35% 2	0.00% 0	8.70% 4	10.87% 5	8.70% 4	4.35% 2	6.52% 3	23.91% 11	17.39% 8	15.22% 7	46	6.89
Lack of Renewable Energy awareness/ information	0.00% 0	13.04% 6	10.87% 5	4.35% 2	8.70% 4	4.35% 2	8.70% 4	21.74% 10	8.70% 4	19.57% 9	46	6.54
Other related matters	15.38% 6	17.95% 7	2.56% 1	7.69% 3	20.51% 8	10.26% 4	7.69% 3	2.56% 1	5.13% 2	10.26% 4	39	4.77

The results' Table as analyzed from respondents' responses.

APPENDIX 4: Dataset Summary table

Variable	Category	Participants	Descriptions
Education Level	Diploma	7	Answered: 67 Skipped: 1
	Bachelor	31	
	Masters	24	
	Doctorate	3	
	Others	2	
Working Experience (professional wise) in terms of years	Between (1 - 3	5	Answered: 65 Skipped: 3
	Between (3 - 6)	16	
	Between (6 - 9)	15	
	Between (9 - 12)	6	
	More than 12	23	
Occupation Level	Directors	10	Answered: 64 Skipped: 4
	Senior Managers	19	
	Managers	14	
	Supervisors	17	
	Others	4	
Please enter your Organization name	Open-Ended Question	67	Answered: 67 Skipped: 1
Please enter your name	Open-Ended Question	66	Answered: 66 Skipped: 2
Occupation level	Open-Ended Question	64	Answered: 64 Skipped: 4
In your opinion, Please evaluate on how the below Factors have Effect to Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas.	Closed-Ended Question	48	Answered: 48 Skipped: 20
Currently, in Tanzania, Electrification/Energy demand is higher than supply.	Closed-Ended Question	46	Answered: 46 Skipped: 22
To what extent Tanzanian demanding power supply?	Closed-Ended Question	46	Answered: 46 Skipped: 22
Tanzania Electric Supply Company (TANESCO) is barrier to private sector to investment in energy generation using Renewable Energy resource because of worries of getting of business or losing customers	Closed-Ended Question	46	Answered: 46 Skipped: 22
Is costs of Renewable Energy Electrification match with the real life of Tanzanian?	Closed-Ended Question	46	Answered: 46 Skipped: 22
To what extent you value the cost of Renewable Energy Electrification?	Closed-Ended Question	46	Answered: 46 Skipped: 22
Do you think Tanzanian are aware of using renewable energy sources?	Closed-Ended Question	46	Answered: 46 Skipped: 22
If Yes or No, to what extent do you think Tanzanian are aware or not aware of using Renewable Energy Resources as means for Electrification?	Closed-Ended Question	46	Answered: 46 Skipped: 22
To what extent do think the "Big Result Now" program will enhance the support and attraction to Private sector to investment in Renewable Energy?	Closed-Ended Question	45	Answered: 45 Skipped: 23
In your opinion, please explain briefly the following questions			
In Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?	Open-Ended Question	68	Answered: 35 Skipped: 33
In your opinion, how do you think about the country policy frameworks facilitate Renewable energy investment development and its support offerings? As an energy sector expert/investor/stakeholder, are you satisfied with the current government's programs/performance for rural area electrification?	Open-Ended Question	32	Answered: 32 Skipped: 36
What could be the investors' biggest problem in their current investment procedures? With reference to the existing investment policy and strategies, and in what way improve to attract more investor in order to enhance rural electrification?	Open-Ended Question	32	Answered: 32 Skipped: 36
What are the factors that affect more private sector to invest in Renewable energy sector in Tanzania and how they can be mitigated? / What could be the main challenges Renewable Energy SMEs facing when delivering the services?	Open-Ended Question	68	Answered: 31 Skipped: 37
In your opinion, what are the important factors in that can attract or influence the Renewable Energy investors in energy sector?	Open-Ended Question	31	Answered: 31 Skipped: 37
Is Government encouraging and facilitating Research in Technologies aimed at promoting Renewable Energy SMEs and the power sector in whole?	Open-Ended Question	32	Answered: 32 Skipped: 36
Is media and government put effort toward promoting, creating awareness, and information dissemination on Renewable Energy SMEs and Renewable energy sources?	Open-Ended Question	32	Answered: 32 Skipped: 36

The Data set summary table

APPENDIX 5: Example of Respondents' Answers

6#6: COMPLETE

- **Collector:** Web Link 3 (Web Link)
- **Started:** Saturday, March 14, 2015 8:26:33 AM
- **Last Modified:** Saturday, March 14, 2015 8:50:59 AM
- **Time Spent:** 00:24:26
- **IP Address:** 41.220.136.227

PAGE 1: Master's Thesis - Research Survey

Q1: Please enter your Organization name *Power Providers Company Limited*

Q2: Please enter your name (*Detached)*

Q3: Occupation level *Managing Director*

Q4: Education Level *Bachelor Degree*

Q5: Working Experience (Professional wise) in term of years (*Between 6 – 9)*

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Q6: The proposed factors below are to be evaluated in scale of 1- 10 to differentiate the attributes of the factor to private sector energy sector investment challenges. 1 is low effect, which means the factor has low impact as barrier to private sector energy investment and 10 is high influence, which means, it is part of main obstacle to private sector to invest in energy sector in Tanzania. The ranking can be done as experienced in operation. Please click to mark (√) for the number corresponded to respective factor according to how you ranked the factor.

Question: In your opinion, Please evaluate on how the below Factors have Effect to Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas.

• Lack of Renewable Energy policy 3	• Informal economy's negative impact on investment 5
• Lack of Government's R&D and technology policy 3	• Lack of appropriate source of finance or loans9
• Instability of tax policies 10	• High inflation and interest rates 7
• Too much government regulation (bureaucracy) 8	• Lack of qualified personnel 9
• Insufficient property rights and sabotage risks 10	• Lack of understanding of the market 2
• Inappropriate standards 5	• Lack of purchasing power (low income) 3
• Political instability 5	• Environmental or environmentalist condemnation 3
• Corruption and Cultural attitudes to bribery 10	• Leaders' or policymakers' personal interests5
• Lack of transparency 5	• Infrastructures scantiness in rural area 5
• Excessive perceived economic risks 8	• Lack of Renewable Energy awareness/ information 5
• High cost (capital) of investment and innovation 8	•Other related matters 3

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Q7: Please click to mark (√) on the answer you feel is appropriate in your opinion for the given questions below

Currently, in Tanzania, Electrification/Energy demand is higher than supply. *Strongly Agree*

Q8: To what extent Tanzanian demanding power supply? *Very High*

Q9: Tanzania Electric Supply Company (TANESCO) is barrier to private sector to investment in energy generation using Renewable Energy resource because of worries of getting of business or losing customers. *Strongly Agree*

Q10: Is costs of Renewable Energy Electrification match with the real life of Tanzanian? *No*

Q11: To what extent you value the cost of Renewable Energy Electrification? *Very High*

Q12: Do you think Tanzanians are aware of using renewable energy sources? *Yes*

Q13: If Yes or No, to what extent do you think Tanzanians are aware or not aware of using Renewable Energy Resources as means for Electrification? *Medium*

Q14: To what extent do think the "Big Result Now" program will enhance the support and attraction to Private sector to investment in Renewable Energy? *Low*

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In your opinion, please explain briefly the following questions

Q15: In Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?

The interest is there but offset by high risk perception, corruption, too much bureaucracy, unstable grid and cost of doing business

Q16: In your opinion, how do you think about the country policy frameworks facilitate Renewable energy investment development and its support offerings? As an energy sector expert/investor/stakeholder, are you satisfied with the current government's programs/performance for rural area electrification?

We stay away from any government sponsored programs because of corruption but I hear that REA is a relatively 'honest' performer. The renewable energy regulatory framework in Tanzania promises to be very good if it will ever be properly rolled out.

Q17: What could be the investors' biggest problem in their current investment procedures? With reference to the existing investment policy and strategies and in what way improve to attract more investor in order to enhance rural electrification?

Land ownership and security - this is particularly relevant to solar. Having to use the TIC and derivative rights to land ownership is clumsy and insecure.

Q18: What are the factors that affect more private sectors to invest in Renewable energy sector in Tanzania and how they can be mitigated? / What could be the main challenges Renewable Energy SMEs facing when delivering the services?

The market remains nascent and immature. Efforts to drive the market are thus pioneering and come at a cost. This cost can be high and increases risk. Local companies are hamstrung by burdensome and complex tax structure, many of which are avoided by less scrupulous competitors. International companies cannot engage in corrupt practice even if they wanted to because of very sting anti-corruption legislation in their home countries. A weak power grid means large grid tied installations of solar etc. are not cost effective and the cost of installation and distribution for independent mini-grids is high because of the highly dispersed nature of rural communities while their buying power is low

Q19: In your opinion, what are the important factors in that can attract or influence the Renewable Energy investors in energy sector?

Improved, fuss free access to sensible commercial loans

Clear, straightforward and fair regulatory and investment environment

Political will to address corruption which is endemic at all levels

Improved and clear Tax environment Greater investment in education

Q20: Is Government encouraging and facilitating Research in Technologies aimed at promoting Renewable Energy SMEs and the power sector in whole?

Not that I am aware of.

Q21: Is media and government put effort toward promoting, creating awareness, and information dissemination on Renewable Energy SMEs and Renewable energy sources? *It is starting but is still weak and poorly informed.*

8#9: COMPLETE

- **Collector:** Web Link 3 (Web Link)
- **Started:** Saturday, March 14, 2015 2:24:42 PM
- **Last Modified:** Saturday, March 14, 2015 2:37:25 PM
- **Time Spent:** 00:12:43
- **IP Address:** 41.204.133.90

PAGE 1: Master's Thesis - Research Survey

Q1: Please enter your Organization name *SIM International*

Q2: Please enter your name (*Detached)*

Q3: Occupation level *Business Consultant*

Q4: Education Level *Bachelor Degree*

Q5: Working Experience (Professional wise) in term of years (*Between 12 and more)*

PAGE 2

Q6: The proposed factors below are to be evaluated in scale of 1- 10 to differentiate the attributes of the factor to private sector energy sector investment challenges. 1 is low effect, which means the factor has low impact as barrier to private sector energy investment and 10 is high influence, which means, it is part of main obstacle to private sector to invest in energy sector in Tanzania.

The ranking can be done as experienced in operation. Please click to mark (√) for the number corresponded to respective factor according to how you ranked the factor.

Qn: In your opinion, Please evaluate on how the below Factors have Effect to Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas.

• Lack of Renewable Energy policy 1 • Lack of Government's R&D and technology policy 2 • Instability of tax policies 2 • Too much government regulation (bureaucracy) 3 • Insufficient property rights and sabotage risks 2 • Inappropriate standards 3 • Political instability 2 • Corruption and Cultural attitudes to bribery 5 • Lack of transparency 6 • Excessive perceived economic risks 7 • High cost (capital) of investment and innovation 7	• Informal economy's negative impact on investment 8 • Lack of appropriate source of finance or loans 8 • High inflation and interest rates 9 • Lack of qualified personnel 8 • Lack of understanding of the market 6 • Lack of purchasing power (low income) 10 • Environmental or environmentalist condemnation 2 • Leaders' or policymakers' personal interests 5 • Infrastructures scantiness in rural area 8 • Lack of Renewable Energy awareness/ information 8 • Other related matters 1

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Q7: Please click to mark (√) on the answer you feel is appropriate in your opinion for the given questions below

Currently, in Tanzania, Electrification/Energy demand is higher than supply. *Agree*

Q8: To what extent Tanzanian demanding power supply? *Low*

Q9: Tanzania Electric Supply Company (TANESCO) is barrier to private sector to investment in energy generation using Renewable Energy resource because of worries of getting of business or losing customers. *Not Sure*

Q10: Is costs of Renewable Energy Electrification match with the real life of Tanzanian? *No*

Q11: To what extent you value the cost of Renewable Energy Electrification? *High*

Q12: Do you think Tanzanians are aware of using renewable energy sources? *Yes*

Q13: If Yes or No, to what extent do you think Tanzanians are aware or not aware of using Renewable Energy Resources as means for Electrification? *Medium*

Q14: To what extent do think the "Big Result Now" program will enhance the support and attraction to Private sector to investment in Renewable Energy? *Very Low*

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In your opinion, please explain briefly the following questions

Q15: In Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?

The NGO sector is overwhelming the market. They have a lot of money and can afford to operate in ways that a private business cannot afford. NGOs are killing the private sector renewable energy market in Tanzania.

Q16: In your opinion, how do you think about the country policy frameworks facilitate Renewable energy investment development and its support offerings? As an energy sector expert/investor/stakeholder, are you satisfied with the current government's programs/performance for rural area electrification?

I don't see much happening. TANESCO continues to expand the grid, but most people cannot afford to join it. The government's policies in regards to renewable energy don't seem to be moving Tanzanians towards renewable energy - although they are becoming more aware that it exists.

Q17: What could be the investors' biggest problem in their current investment procedures? With reference to the existing investment policy and strategies and in what way improve to attract more investor in order to enhance rural electrification?

There are many challenges. A key challenge is that the average rural Tanzanian does not have money to buy solar products, even when they are offered on a payment package over 2-3 years.

Q18: What are the factors that affect more private sectors to invest in Renewable energy sector in Tanzania and how they can be mitigated? / What could be the main challenges Renewable Energy SMEs facing when delivering the services?

As a manager of a Tanzanian owned SME which sells a range of solar products and fuel efficient stoves, we are struggling the large western NGOs who are coming into the country and who are offering long term payment plans. Some of these NGOs begin with millions of US$ and are so far ahead of the Tanzanian owned and operated SME from the very beginning.

Q19: In your opinion, what are the important factors in that can attract or influence the Renewable Energy investors in energy sector? *The market needs to be balanced so that everyone can compete. The Tanzanian bureaucracy is not always easy to work, so sometimes it feels like it would be easier to operate elsewhere in the world.*

Q20: Is Government encouraging and facilitating Research in Technologies aimed at promoting Renewable Energy SMEs and the power sector in whole? *I don't honestly know. I don't see many signs of it besides conferences.*

Q21: Is media and government put effort toward promoting, creating awareness, and information dissemination on Renewable Energy SMEs and Renewable energy sources? *Not that I can see. All of the advertising I see comes from players in the market.*

9#11: COMPLETE

- **Collector:** Web Link 3 (Web Link)
- **Started:** Sunday, March 15, 2015 12:13:48 PM
- **Last Modified:** Sunday, March 15, 2015 12:50:01 PM
- **Time Spent:** 00:36:12
- **IP Address:** 197.152.31.162

PAGE 1: Master's Thesis - Research Survey

Q1: Please enter your Organization name *RESCO (T) LTD*

Q2: Please enter your name (*Detached)*

Q3: Occupation level *Managing Director*

Q4: Education Level *Masters*

Q5: Working Experience (Professional wise) in term of years (*Between 12 and more)*

PAGE 2

Q6: The proposed factors below are to be evaluated in scale of 1- 10 to differentiate the attributes of the factor to private sector energy sector investment challenges. 1 is low effect, which means the factor has low impact as barrier to private sector energy investment and 10 is high influence, which means, it is part of main obstacle to private sector to invest in energy sector in Tanzania. The ranking can be done as experienced in operation. Please click to mark (√) for the number corresponded to respective factor according to how you ranked the factor.

Qn: In your opinion, Please evaluate on how the below Factors have Effect to Investments in Renewable Energy Generation and Supply in Tanzania's Rural Areas.

• Lack of Renewable Energy policy 9	• Informal economy's negative impact on investment 3
• Lack of Government's R&D and technology policy 9	• Lack of appropriate source of finance or loans 10
• Instability of tax policies 2	• High inflation and interest rates 5
• Too much government regulation (bureaucracy) 2	• Lack of qualified personnel 6
• Insufficient property rights and sabotage risks 2	• Lack of understanding of the market 4
• Inappropriate standards 2	• Lack of purchasing power (low income) 10
• Political instability 1	• Environmental or environmentalist condemnation 4
• Corruption and Cultural attitudes to bribery 10	• Leaders' or policymakers' personal interests10
• Lack of transparency 8	• Infrastructures scantiness in rural area 3
• Excessive perceived economic risks 8	• Lack of Renewable Energy awareness/ information 3
• High cost (capital) of investment and innovation 9	• Other related matters 2

PAGE 3

Q7: Please click to mark (√) on the answer you feel is appropriate in your opinion for the given questions below

Currently, in Tanzania, Electrification/Energy demand is higher than supply. *Agree*

Q8: To what extent Tanzanian demanding power supply? *High*

Q9: Tanzania Electric Supply Company (TANESCO) is barrier to private sector to investment in energy generation using Renewable Energy resource because of worries of getting of business or losing customers. *Disagree*

Q10: Is costs of Renewable Energy Electrification match with the real life of Tanzanian? *No*

Q11: To what extent you value the cost of Renewable Energy Electrification? *High*

Q12: Do you think Tanzanians are aware of using renewable energy sources? *Yes*

Q13: If Yes or No, to what extent do you think Tanzanians are aware or not aware of using Renewable Energy Resources as means for Electrification? *Medium*

Q14: To what extent do think the "Big Result Now" program will enhance the support and attraction to Private sector to investment in Renewable Energy? *Very Low*

PAGE 4

In your opinion, please explain briefly the following questions

Q15: In Tanzania, the energy demand is high, why there is no strong interest from private sector to take the opportunity to invest in energy generation and supply sector?

Any energy project developer on a large scale has to enter agreement with TANESCO in order to supply electricity because it owns infrastructure for transmission and distribution to the end-users. Sometimes costs of generation are higher that what TANESCO is ready pay. It is therefore difficult for investor to enter the venture without guaranteed return. However, Renewable Energy Feed in Tariffs have been finalized with the regulator that will allow investors to charge tariffs based on the type of technologies that differ in investment costs. In the past a fixed tariff was fixed for all technologies and therefore making other technologies uncompetitive. TANESCO has high expectation of gas as the future reliable cost effective source of energy that will limit considerations as priories of other energy sources in future.

Again, the process of getting permits to generate electricity takes a long time and they involve significant costs and sometimes bureaucracies with responsible organizations might deter investors' efforts. There is a problem of TANESCO failing to pay investors on time. Investment in rural areas can be reached by decentralized energy systems but that is not done because of low income of potential customers, a subsidy element is required for the investor to come in.

Again rural electrification planning is not well documented in such a way investors' fears extension of grid to rural areas before they recover their investment costs. Even now electricity tariffs in rural areas are heavily subsidized.

Q16: In your opinion, how do you think about the country policy frameworks facilitate Renewable energy investment development and its support offerings? As an energy sector expert/investor/stakeholder, are you satisfied with the current government's programs/performance for rural area electrification?

They haven't been many efforts towards on this.

The policies support renewable energy promotion and encourage private sector participation but the framework is not in place on how this can be implemented.

Last year they released road map for rural electrification but its implementation is not certain especially availability of funding of the initiative.

You can find this at www.rea.go.tz

Q17: What could be the investors' biggest problem in their current investment procedures? With reference to the existing investment policy and strategies and in what way improve to attract more investor in order to enhance rural electrification?

Respondent skipped this question

Q18: What are the factors that affect more private sectors to invest in Renewable energy sector in Tanzania and how they can be mitigated? / What could be the main challenges Renewable Energy SMEs facing when delivering the services?

- Lack of financing that can be addressed by availability of credit facilities for long-term investment,

- Clear long term (15+ years) master rural energy/electrification master plan that can still confidence to the investors.

Q19: In your opinion, what are the important factors in that can attract or influence the Renewable Energy investors in energy sector?

- Financial Incentives on investment costs

- Availability of clear target of electricity to be generated over number of years

- Availability of long term financing windows for RET investors.

Q20: Is Government encouraging and facilitating Research in Technologies aimed at promoting Renewable Energy SMEs and the power sector in whole?

Not much effort on this

Q21: Is media and government put effort toward promoting, creating awareness, and information dissemination on Renewable Energy SMEs and Renewable energy sources?

Not from media initiatives, but individual projects of rural electrification

APPENDIX 6: Energy Sector Responsible Institutions in Tanzania

Below are some institutions involved in energy sector in Tanzania as well as in the development of renewable energy projects for power generation:

- **The Ministry of Energy and Minerals (MEM**) is responsible for the whole energy sector including the development of renewable energy sources, in which small hydropower belong. MEM is also responsible for initiating legislation in the energy sector.

- **The Tanzania Electric Supply Company Limited (TANESCO)** is a government owned utility company. **TANESCO** is responsible for generation, transmission and distribution of electricity in Tanzania. It is also responsible for publishing standardized tariffs for renewable energy generation.

- **The Rural Energy Agency (REA**) is responsible for promoting new investments in modern energy for rural areas throughout Tanzania. It will collaborate with key service-sector institutions and ministries responsible for improving rural services such as energy.

- **The Rural Energy Fund (REF)** is the repository of financial resources for communities, companies, local governments and any investors in modern energy services.

- **The Energy and Water Utilities Regulatory Authority (EWURA)** is responsible for delivery of energy and water services through world class regulation for the enhancement of the welfare of the Tanzanian people.

- **The Centre for Sustainable Modern Energy Initiatives (TaTEDO)** is a development NGO based in Dar es Salaam, Tanzania. Its goals are to improve quality of life of Tanzanians by contributing to availability of improved and sustainable modern energy services, employment and income generating activities (for poverty reduction), reduce environmental

- **The Rural Energy Fund (REF)** is the repository of financial resources for communities, companies, local governments and any investors in modern energy services.

- **The Tanzania Petroleum Development Corporation (TPDC)** was established in 1969. Its mission is "to participate and engage in the exploration, development, production and distribution of oil and gas and related services; facilitate a fair trading environment; safeguard the national supply of petroleum products; at the same time developing quality and safety standards to protect people, property and the environment". Its aim is to conduct research relating to and develop the oil and gas industry in Tanzania as well as promoting, managing, monitoring, development and the exploration of oil and gas in Tanzania. Also, TDPC has role to undertake the management of strategic fuel reserves, undertake trading in petroleum products and to provide advice to the state on all matter related to oil and gas exploration and petroleum production. (The TPDC website)
- **Tanzania Renewable Energy Association (TAREA)** is a non-profit making, non-governmental organization that brings together actors in the renewable energy sectors to promote the accessibility and use of renewable energies in Tanzania. Its objective is to promote the sustainable development of Renewable Energy in Tanzania. It cooperates with all important enterprises in Tanzania, as well as (inter-)national organizations.