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RESEARCH TOPIC

The link between Access to Renewable Energy and Development in Gutu District

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DEDICATION

This work is dedicated to my mother Mrs E. Maganga and to my late father Mr K. M Maganga.

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ABSTRACT

Ending poverty and underdevelopment in rural areas of Zimbabwe has been a challenge for quite a long time. Government and other development partners have come up with various policies, programmes and projects to address the various forms of poverty manifesting in rural areas. As the process of development is dynamic and ongoing, this research paper on the link between access to renewable energy and rural development seeks to examine the feasibility of harnessing renewable energy for rural development drawing its inspiration from the Rural Sustainable Energy Development programme in Gutu District. The paper seeks to promote the use of renewable energy as a solution to energy poverty and poverty in general by examining some of the benefits that access to renewable energy can offer towards the development of rural communities in Zimbabwe. This is a qualitative research providing a clear picture of the various economic, social and political development effects to society as well as environmental sustainability issues as well as Challenges faced by rural communities in Zimbabwe in adopting renewable energy technologies. Recommendations to these problems are also part of the research.

LIST OF ACRONYMS

NGOs	Non-Governmental Organisations
RuSED	Rural Sustainable Energy Development
SDGs	Sustainable Development Goals
SE4ALL	Sustainable Energy for All
RETS	Renewable energy Technologies
ISALS	Internal Savings and Lending Scheme
EU	European Union
IOM	International Organisation for Migration
CIS	Collection and information Centres
CEFs	Community Energy Funds
UN	United Nations

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INTRODUCTION

This research seeks to examine the nexus between access to renewable energy and rural development taking into consideration some of the services and opportunities brought about by access to renewable energy and their impact on rural communities that are affected by poverty, marginalisation, inequality and underdevelopment. This is typical of most African rural areas including Zimbabwe. The research will be an in depth analysis and evaluation of the Rural Sustainable Energy Development (RuSED) solar energy project implemented in Ward 13 of Gutu District, Masvingo Province in Zimbabwe. The research seeks to establish the link between access to renewable energy and rural development by examining closely the impact made by the RuSED project on transforming the lives of rural people by improving sustainable livelihoods, increasing access to basic social services such as health and education as well as promotion of economic enterprise and development. The research also seeks to examine the ability of the project in reducing energy poverty, reducing inequality; enhancing food security and promoting environmental sustainability that overall contribute towards community development. The other section will also look into the challenges that can be associated with harnessing renewable energy for rural development while some of the solutions and recommendations are also provide.

BACKGROUND TO THE STUDY

The Rural Sustainable Energy Development Programme (RuSED) is a project implemented by Oxfam in partnership with Practical Action in association with the Ministry of Energy and Power Development and the Rural Electrification Authority of Zimbabwe with support from the European Union (EU). The project was aimed at enhancing lives and livelihoods of poor rural people of Gutu and Himalaya by harnessing the power of the sun and running water to those remote and isolated communities in ways that are affordable and sustainable (Magrath, 2015). Such a project has increased access to energy for these rural communities while promoting the use of renewable energy, which is modern, affordable, sustainable and clean to meet the community's energy needs while offering social and economic services for the development of such rural communities not connected to conventional electricity grids.

Such an effort to bring energy to rural communities in Zimbabwe is a complement to government efforts of providing energy for rural development in the country through the Rural Electrification programme of 2002. The programme is guided by the Rural Electrification fund Act (2002) which resulted in the establishment of the Rural Electrification Agency (REA). Under this programme, the Minister of Energy and Power Development, honourable Samuel Undenge highlighted that 6 200 rural institutions in the form of schools, clinic, business centres, government extension offices, chiefs homesteads and farm lands have been electrified and several others are also to benefit (Chronicle, 2016). Such a development is a reaction to the country's energy needs, which has a bearing on the development of communities especially in rural areas. According to the Zimbabwe energy policy, only 13% of rural households have access to electricity in Zimbabwe and 94% of rural communities in the country meet their

cooking and other energy requirements from traditional fuels mainly firewood (Zimbabwe Energy Policy, 2012).

As part of achieving the global agreed Sustainable Development Goals (SDGs), access to affordable clean energy is one of the major targets and has a bearing on the achievement of other agreed goals such as SDG 1, 2, 3, 4, 5, 10, 11 and 13. The importance of clean affordable energy is also strengthened through United Nations (UN) resolution 65/151 which declared 2012 the International Year of Sustainable Energy for all (SE4ALL) and through resolution 67/2015 which declared 2014-2024 the UN decade for sustainable energy for all.

As part of academic research, this research paper seeks to examine the link between access to renewable energy and rural development considering the social, economic, political and environmental benefits and opportunities that people in rural areas can realise after adopting or having access to renewable energy for the development of their communities and achievement towards more sustainable green economies. The research also looks at the various problems that communities can suffer from, or which are related to lack of access to renewable energy such as effects on health, gender dynamics, and poor resource utilisation among others, which can affect development in rural areas. Much focus was on Gutu District because it is one of the rural areas in Zimbabwe affected by energy poverty and underdevelopment like several others across the world. Gutu District is also a beneficiary of the RuSED programme, a renewable energy project, hence a standard measure for evaluating the perceived development benefits towards rural development. In general, this research is in line with global efforts to recognise the importance of energy (clean, affordable and sustainable) as a solution to the long-standing rural development problem.

STATEMENT OF THE PROBLEM

For decades, people in rural areas have been suffering from both energy poverty and poverty in general. This has affected their daily productive activities, entrepreneurial capacity and their ability to access and utilise proper health and educational facilities. Most rural households still rely on traditional sources of energy such as wood, plant and crop residue, dung and petroleum fuels such as paraffin, which are inefficient and have various consequences on human life, health social and economic development. Various actors ranging from governments, NGOs, Development Partners and donors have come up with various programmes and projects to uplift the living standards of the rural people and improve their standards of living. All these effort have however failed to address the situation since poverty is still affecting the development prospects of rural communities in Zimbabwe. Recently, much recognition on the importance of improving rural people's access to modern energy as a solution to address the rural development problem due to the benefits attached to energy has become popular among various actors concerned with rural development. Renewable energy to be specific has received worldwide recognition as a modern, affordable and clean energy option hence this research seeks to examine the potential of harnessing renewable energy towards the elimination of rural poverty, improve rural people's access to clean and affordable energy as well as promoting environmental sustainability and green economies. All these are necessary components of rural development.

RESEARCH OBJECTIVES

- To unearth the levels of Development in Gutu ward 13 before the Implementation of RuSED.
- To examine the Levels of Development in Gutu Ward 13 after the Implementation of RuSED
- To examine some of the challenges being faced by rural communities in Zimbabwe in adopting renewable energy technologies as well as in utilising them towards the development of their communities.

➤ **RESEARCH QUESTIONS**

- ❖ What shows that Gutu ward 13 was underdeveloped before the implementation of RuSED project?
- ❖ What development changes were realised in Gutu ward 13 after the implementation of RuSED?
- ❖ What are some of the challenges faced by rural communities in Zimbabwe in adopting renewable energy technologies as well as in utilising them towards the development of their communities?

THEORETICAL FRAMEWORK

The perspectives of development have been changing over the years in a rapid fashion to accommodate themselves to changing needs and perceptions of the people and the economics accordingly, the proposals for solving the development problems have been large and varied in nature (Chari, Gupta et al 2003). In this research, the researcher used the modernisation Theory of development to determine and analyse the link between access to renewable energy and rural development in Gutu District. The theory of modernisation is a description and explanation of the process of transformation from traditional or underdeveloped societies to modern developed societies. In this case, it is used to describe and explain how traditional rural communities can transform into modern developed communities through access to renewable energy. In general, modernisation theorists are concerned with economic growth and they recognise technology as an ingredient in the process through industrialisation hence the importance of adoption of modern technology such as RETs for community development in light with the quest to understand the nexus between access to renewable energy and rural development.

Some of the major assumptions attached to the modernisation process are that, modernisation is a phased process and in this case, access to renewable energy, which is affordable, clean and sustainable, can be realised as a phase in the development process since it is a necessary but insufficient condition for rural development. On the other hand, modernisation is Irreversible; desirable, systematic and transformative hence as communities move towards modernity they replace traditional structures and values with more modern values, which build change in communities. In rural Zimbabwe including Gutu District, this implies that communities will move from the use of traditional fuels, tradition modes of production and low standards of living

towards modern energy, modern modes of production and a better standard of living. Modernisation theory was used in this research because it classifies clearly the various stages that can be used to evaluate development, from primitive societies to societies of high mass consumption. Such differences in stages can be used to identify and evaluate changes in society, which can then be used to monitor and evaluate the impact made by an intervention in society, which in this case is the introduction of renewable energy.

Modernisation theory also emphasizes on the importance of considering the channels followed by and quality or current state of developed societies known as Islands of modernity. These serve as models of development, which can be used in analysing the ability of an underdeveloped state to reach such progress as well as acting as a model to which underdeveloped states should resemble for them to be identified as developed. Hence, it is very important in this research because this research is meant to identify levels and standards of development, which underdeveloped rural communities should reach in order for them to be classified as developed communities.

CONCEPTUAL FRAMEWORK

The three objectives of development according to Todaro and Smith (2012) are,

- I. To increase the availability and widen the distribution of basic life sustaining goods and services such as food, shelter, health and protection.
- II. To raise levels of living, including in addition to higher incomes, the provision of more jobs, better education and greater attention to cultural and human values all of which will serve not only to enhance material well-being but also to generate greater individuals' and national self-esteem.

III. To expand the range of economic and social choices available to individuals and nations by freeing them from servitude and dependency not only in relation to other people and nation states but also to the forces of ignorance and human misery.

These objectives are an introduction to their definition of development, which define development as a multidimensional process involving major changes in social structures, popular attitudes and national institutions as well as the acceleration of economic growth, reduction of inequality and the eradication of poverty. The International Organisation for Migration (IOM) on the other hand define development as growth, advancement, empowerment and progress which is aimed at building human capabilities and enlarge human choices, equity, sustainability and productivity. Such definitions of development contribute towards our understanding of rural development, which according to Champers (1997) is a strategy to enable a specific group of people, poor rural women and men to gain for themselves and their children more of what they want and need. The world bank (1975) also define rural development as a strategy aimed at the improvement of economic and social living conditions focusing on a specific group of poor people areas. In this regard, the process of rural development is more of improving rural people's quality of life by improving their standards of living through access to basic needs and wants of individuals and the community at large in ways that are economically, socially and environmentally sustainable. The process should also improve the quality and quantity of labour, empower women and other marginalised groups towards the attainment of equality in the community and enterprise development should be part of the whole process giving the people in rural areas an opportunity to participate in all efforts at all levels on issues concerning the development of the community.

Such a development can be realised when the community has access to modern clean and affordable energy, is food secure, the community is health and safe, receiving clean safe water, which improves hygiene. There is peace and security, use of Modern machinery for production, children are going to school and are healthy, public service institutions like clinics and schools are offering services effectively, there is enterprise development and the people are able to save and invest. All this will improve the standard of living, reduce poverty and is giant step toward rural development.

Such a development is aimed at developing communities that are nonurban with little or no urban infrastructure such as tarred roads, piped water and electricity, the population is usually sparsely distributed with a heavy reliant on primary sources of economic production particularly agriculture. Such areas in Zimbabwe constitute of communal areas and those areas formerly colonial reserves, resettlement area as well as farming communities both commercial and communal farms.

The most critical aim of development is to eliminate poverty; Poverty according to Todaro and smith (2012) is the situation of being unable or barely able to meet the subsistence essentials of food, clothing and shelter. World Bank (1990) concluded that poverty is a multidimensional problem, which requires a holistic but integrated solution. Some of its characteristics include low levels of income, lack of basic needs among others hence if such a situation exist in a rural setup it becomes rural poverty. On the other hand, Energy poverty is the lack of adequate modern energy for basic needs of cooking, warmth and lighting and essential energy services for schools, health centres and income generation (Practical Action). It is lack of or poor access to energy resources that are important for day-to-day services such as cooking, heating and lighting. People

are regarded energy poor when they do not have access to energy services completely or have limited access to traditional fuels, which are not efficient enough to meet their energy needs such as wood, cow dung and plant residue.

Sustainable energy on the other hand is energy from sources that replenish themselves naturally, for example, energy from the sun, wind, water, earth's heat and plants. Renewable energy technologies (RETs) turn these fuels into usable forms of energy such as electricity, heat, chemicals or mechanical power. Hence renewable energy technologies are energy providing technologies that utilise energy sources in ways that do not deplete the earth's natural resources and are environmentally benign as possible. "These sources are sustainable in that they can be managed to ensure they can be used indefinitely without degrading the environment" (Renewable Energy Association, 2009). Renewable energy has gained popularity because it is cheap, clean and sustainable. Access to Modern energy is the household's ability to obtain an energy service, should it decide to do so. Access is a function of availability and affordability, for energy to be considered available to a household, the household must be within the economic connection and supply range of the energy network of supplier. Affordability refers to the ability of the household to pay the upfront connection cost and energy usage costs (UNCTAD, 2010).

RESEARCH METHODOLOGY

Flick, (London School of Economics, 2000) define a qualitative research as a method of inquiry that takes as a starting point the belief that there are benefits to exploring, unpacking and describing social meanings and perceptions of an issue or programme. In this research, the researcher used the qualitative research design in terms of collecting information.

Approach: In this research, the researcher used the qualitative research method because it provides a clear picture of the research findings based on clearly described and explained information concerning the RuSED project. The Information was acquired through close interactions between the researcher, the community in Gutu district composed of both beneficiaries and non-beneficiaries of the RuSED project, other stakeholders in the project as well as primary information from documented material.

Design: The researcher used Gutu District Ward 13 as a case study to examine the link between access to renewable energy and rural development. This is because the area under study is a rural area which also benefited from a renewable energy project which creates a fertile ground for a clear study on the various elements of development that are important in analysing the impact that renewable energy can make towards rural development.

Population and Sampling: The researcher used a sample of 80 households randomly selected from the target population of more than 500 households, with information sources of more than 320 individuals representing men, women and children of different backgrounds and social groupings who have been affected in various ways by the RuSED project in the area. Staff from different institutions and other stakeholders also contributed during the research. This creates a

diverse source of information, which reduces any chances of bias, or misrepresentation, which might compromise the quality and quantity of information concerning the study.

Data collection: The researcher conducted surveys in which questionnaires were administered during data collection. The researcher also went on to make personal observations and conducted interviews with members of the community, staff at various institutions as well other concerned groups, which were the primary sources of information while material from Oxfam and other researchers formed the bulk of secondary data. All this Information was gathered through carefully crafted strategies to eliminate all the insecurities from the respondents and to create the best relationship between the researcher, respondents and the various personnel.

LITERATURE REVIEW

Recent interests in rural development has emphasised the importance of improving access to land and the promotion of agriculture as the mainstay in promoting rural development, this influenced research on rural development to such an extent that much of the literature on rural development is concentrated in this area. On the other hand, literature on promoting rural access to energy is also much concentrated on rural electrification even though interest is now shifting towards more sustainable sources of energy, which include renewable energy sources. Most insight on the economic benefits of rural electricity comes from literature on rural electrification through extension of central power grids. Studies clearly show the consumption benefits and improvements in quality of life through electrification (World Bank. 1996, W Zhong et al. 2006) Published studies of income generation and economic benefits from renewable energy are still limited and call further research (Kaundinya, et al, 2009.).

Researchers and interested groups are now producing research papers, books, journals and conference papers among others in the quest to establish the relationship between access to renewable energy and community development, which have contributed to several developments including this research and others to come. This research paper will add on the information already existing or it will exhume some new issues that will establish a foundation for future research. While this research owes much of its information and has similarities with information from John Magrath's research entitled *Transforming Lives in Zimbabwe* which is a research overview of the RuSED project with information on case studies from both Gutu and Mutare. Some of the information also used in this paper came from documentaries by Oxfam on RuSED however, this paper has much in common with Magrath's but it however differs from these sources of literature because draws special attention to ward 13 in Gutu district specifically as its case study.

Due to its area of specialisation, this paper has much in common with *Promoting Renewable Energy Technologies for Rural development in Africa* (2008) by Orleans Mufune and Emmanuel K Boon and *Renewable Energy Technologies for Rural Development* by UNCTAD (2010). They altogether focus on promoting rural development through the impact of renewable energy with differences in that, this paper focuses on the impact of renewable energy services on rural communities while the two focus on renewable energy technology. The research by UNCTAD covers a wide area drawing case studies from various countries such as Nepal, Eritria, China Argentina and Guatemala, which produces a wide variety of information compared to this paper, which draws information from Zimbabwe alone. On the other hand, Mufune and Boon produced literature based on their study of Zambia, which is also a completely different location from the one in this research. Mufune and Boon's period of study is eight years ago, considering the

various changes that have happened along these years, this paper comes as a fresh sources of literature based on current events and information different from what was in 2008.

Another source of information on energy and rural development is Kerekedzi and Kithyoma's *Renewable energy strategies for rural Africa: Is a PV-led renewable energy strategy the right approach for providing Morden energy to the rural poor of Sub-Saharan Africa*. In this paper, Kerekedzi and Kithyoma's focus is confined on the impact of solar PV led energy projects, examining their impacts in rural sub-Saharan Africa. Similarly to this paper, the researcher will be examining the impact of a solar project but is however not limited to solar alone in his brooder analysis of the impact of renewable energy , the researcher acknowledges other renewable energy sources but not through an in-depth analysis which comes in as a unique feature in this piece of literature. Of importance also is the research methodology, the researcher used a qualitative research design while other researchers preferred a qualitative research which makes the quality of our observations and results different.

Renewable energy for rural development in Ethiopia: The case for new energy policies and institutional reforms by W. Wolde-Ghiorgis is also another source of important information on renewable energy and rural development. The author argues the case for introducing new energy policies in Ethiopia that will ensure energy initiatives for rural development meet the desired expectations citing issues such as budgetary allocations where the rural energy sector in the country has not received a fair share of public investment. He also made recommendations for commitment from concerned authorities to use the renewables for spurring rural development through increasing the budget allocations to rural energy, modification of existing institutional frameworks for rural energy delivery and the design and implementation of appropriate rural

energy initiatives suitable for productive activities and sustainable development. This paper has much in common with chapter three of this research paper that seeks to identify some of the challenges associated with the adoption and use of RETs in Zimbabwe as well as a section on some of the solutions to these barriers. However, the only difference is that his study is on Ethiopia while this research is on Zimbabwe. This research also adopted a case study of a solar energy project while His paper had a general overview of information, which involved the various renewable energy sources in Ethiopia.

Another piece of Literature concerning renewable energy and rural development is Ravider Rena's work entitled, *Renewable energy for rural development- A Namibian Experience*. In the research, the Author attempts to provide an overview of some of the issues surrounding the use of RETs to increase access to Modern energy services in rural areas in Namibia. This is similar to this Research in that they both look at the potential renewable energy impact on rural livelihoods and standards of living with however a slight difference on that the Namibian paper is an overview of the potential of RETs on increasing access to energy. The Author dealt much on the various forms of Renewable energy sources ranging from wind, solar, biogas and Hydropower while this research is much of an examination of the potential results that a community can realise after adopting renewable energy.

Studies on renewable Energy and Rural development in Zimbabwe include *Energy for Rural Development in Zimbabwe* in *Energy, Environment and Development in Africa* by Beijer Institute and *A Case study of Zimbabwe in - Opportunities and Barriers Implementing of Renewable Energy Technologies* by Painuly and Fenhann. The first piece one between these two pieces of literature on Zimbabwe lays out the goals of rural development in Zimbabwe and the

energy implications of these goals. It stresses the need to supply energy for subsistence and development purposes and it offers critique of common energy planning approaches as well as discussion of the most relevant policy issues in rural energy. This is a very important piece of work in examining the link between access to renewable energy and rural development especially in Zimbabwe. It has some of the major highlights concerning the issues surrounding energy and development in Zimbabwe and it is a well-detailed piece of work in this area of study. It is broad in terms of information covering the whole country, which differentiate it from this paper, which only has one case study of Gutu District. It was also published in 1998 which is more than a decade ago hence due to the dynamics of development in the area under study this research will complement the 1998 work while providing a current insight on the discussion concerning renewable energy and rural development. Because this research is mainly focusing on renewable energy, it is more of a specialised piece of work different from the 1998 case which was a an overview of energy in general incorporating information on both renewable and non-renewable sources of energy in discussing rural development in Zimbabwe.

The second source of Literature by Painly and Fenhann is published case study on Zimbabwe analysing the barriers to the implementation of RETs in the country to strengthen institutional capacity for analysis and implementation of RETs projects in the country and bring out experiences on RETs. This study is a knowledge base for further study and analysis as well as project feasibility studies. This makes it a unique and important source of information, which can be used to assess the link between access to renewable energy and development of rural areas. The paper highlights some of the benefits that people in Zimbabwe can realise by harnessing RETs for community development as well as challenges that people in the country face in adopting RETs. With all these sources of Literature already occupying space on the area under

study. This research is more of a development emanating from the shortfalls associated with existing work. It is going to increase academic knowledge, provide a basis for further study in the area of renewable energy and development, provide a detailed example, which can be used as evidence to authenticate the feasibility of harnessing renewable energy for development among others. In this regard, this paper is going to add on to the existing literature while at the same time introducing new information on the nexus between access to renewable energy and rural development.

CHAPTER 1

THE STATE OF DEVELOPMENT IN GUTU WARD 13 BEFORE THE IMPLEMENTATION OF RUSED

Introduction

Chapter 1 is going to look at the state of development In Gutu District before the implementation of the Rural Sustainable energy Development Programme. Such an overview will firstly look at the general information concerning poverty and development in Zimbabwe before looking at Gutu district specifically. Much focus shall be on areas of energy poverty as well as on the economic, social and political indicators of underdevelopment in the area to lay a clear foundation to assess the impact of RuSED on alleviating poverty and promoting rural development in Gutu District.

Energy poverty and Rural Poverty in Zimbabwe

From independence in 1980, the government of Zimbabwe with support from various development partners has come up with various programmes aimed at improving the lives of rural people to raise them out of poverty. Such initiatives managed to make reasonable impact but it was not enough as shown by Zimstats statistics that out of the estimated 12 million Zimbabwean population, 62,2% households are living in poverty while 16, 2 households are extremely poor. In rural areas, five out of every ten rural households are regarded as extremely poor making a total of 76 % poor households and 30, 4 % of the total rural population extremely poor (Zimstats, 2013). The same report also established that in those rural areas, communal lands and resettlement farms have the poorest people as they all rely on unpaid family labour, 84,1% of the economically active population while 83% households are headed by communal farmers makes them more prevalent to poverty.

Such levels of poverty clearly indicate the various challenges that rural people in Zimbabwe have to come across in terms of meeting their basic needs such as food security, clean safe water, basic social services such as health and education as well as other activities, which can enhance their livelihoods such as agriculture and enterprise development. One of the major factors that contribute to this high level of poverty in rural areas across Zimbabwe is the general lack of access to clean, affordable and sustainable energy. Despite efforts by the Government to provide electricity to rural communities, which saw 6200 institutions, benefiting in the form of 2125 primary schools country wide; 1178 secondary schools; 783 rural health care centres; 329 government extension offices; 218 chiefs' homesteads; 909 business centres, 705 small scale farms and 415 institutions where solar systems have been installed(Chronicle, 2016).

The majority of rural Zimbabweans still rely on traditional energy sources for their day-to-day energy needs such as firewood, dung and crop residue. According to the 2009, National Energy Balance wood fuel provides the bulk, 61% energy supply, followed by liquid fuels 18%, electricity 13% and coal 18% (Zimbabwe National Energy Policy, 2012). In light of this, The Zimbabwe Energy Policy also established that only 13% of rural households have access to electricity and 94% of them meet their energy requirements from traditional fuels mainly firewood (Zimbabwe Energy Policy, 2012). In light of this it is clear to note that quite a number of people in Zimbabwe are affected by both energy poverty and poverty in general especially those residing in the rural parts of the country.

The state of Development in Gutu ward 13 before the before the implementation of RuSED

Gutu District ward 13 is located in Masvingo Province, Zimbabwe. It is 70km East of Mupandawana Growth point and 20km away from the main electricity grid. It is also part of the agro ecological regions 4 and 5 and part of its livelihood zone covers parts of Masvingo and Manicaland. A bulk of the people rely on rain fed communal farming , small scale livestock production while remittances from migratory labour, artisanal mining, market gardening, sale of traditional beer and casual labour being some of the major income source (Oxfam, 2015). Being 20km away from the main electricity grid and 70km away from the nearest urban centre, Ward 13 is one of the remotest rural communities in the district. The majority of the people survived on traditional sources of fuel such as firewood, dung and plant residue for cooking and other energy needs while on the other hand villagers relied on paraffin lamps and candles for lighting.

Energy poverty

Before the introduction of solar products in Gutu District, people relied entirely on traditional and unsustainable sources of energy for their daily energy needs such as cooking, heating and lighting. The bulk of these services relied on firewood with the support of other sources such as cow dung, plant and crop residue as well as paraffin and candles for lighting. Due to such conditions, the villagers of Gutu were energy poor since they lacked access to clean, affordable and sustainable energy. Women and Children in particular walked long distances to collect firewood and consumed much of their productive time in the process. This was something which was very difficult because cutting down of trees is regulated in the area. The villagers were also exposed to accidents as they were collecting firewood or during open fire cooking and use of paraffin lamps with the risk of contracting respiratory diseases as well. On the other hand, because most of the families in the area did not have access to energy. They were cut off from

the rest of the world in terms of access to information because they did not have access to radios and televisions and only a considerable number had cell phones working all day since they did not have access to power, which would enable them to utilise these facilities for communication and accessing information. This also means that there was no family time and entertainment which was later brought by home solar systems and solar lanterns which provide light and enough power to watch television, listen to radios, use cell phones and enable school children to study at home in the evening. Oxfam established that life was not easy for several villagers who had to make a total expenditure of between \$8 and \$15 on candles and kerosene per month. Making a total of \$100-\$200 per year which was still not enough (Magrath, 2015). This made access to energy for many people in the area considering the high levels of poverty that was prevailing in the area hence the high cost of living also worsened the ability of many to access energy in the area.

Previous efforts to deal with this energy problem at major service centres were made, which include installation of solar facilities at several clinics but they had developed problems and had ceased to function due to lack of maintenance hence the energy problem was still haunting the area . This made access to basic social services such as health and education difficult in the area while teachers and nurses faced many challenges carrying out their duties due to problems linked to lack of energy in schools and clinics. For example, pupils and teachers at Gomba high school could not use their library at night because there was no lighting. They could not use computers, projectors and other teaching aids as well as perform some administration duties that required printers and photocopiers among others. Nurses at Mazuru clinic also could not properly work at night especially with helping delivering pregnant mothers, there were also no storage facilities for medicine and vaccines such as solar powered vaccine refrigerators brought about by RuSED.

At Gomba Agro Business centre and Ruti there was little economic activity while agriculture was too physical and rain fed which made production levels low and they only had one farming season hence they realised little income from the various livelihoods in the area which was not enough to meet basic living and improve the quality of life. All these problems were a result of the lack of affordable, reliable, clean, renewable and sustainable energy in the area hence before RuSED, people in Gutu district were seriously affected by energy poverty.

Economic Conditions

Due to energy poverty and other related factors that were later addressed by the various opportunities brought about by the RuSED project, the majority of people in Gutu were living in poverty conditions characterised by little or no income; very little or no savings; unfavourable conditions for investment and business development; little opportunities for cooperative and enterprise development. There were very little opportunities for capital accumulation, which resulted in very low economic activity and development in the area. Before RuSED, people in Gutu relied on unsustainable income and livelihood sources such as rain fed agriculture, small-scale livestock production, and remittances from migratory labour, artisanal mining, market gardening, sale of traditional beer and casual labour (Oxfam, 2015).

These were the major income sources for the majority of people both men and women but they were not adequate to raise them out of poverty and most of them survived with less than US\$1 per day. They did not provide enough income to meet the daily financial and social needs such as food, health and education. They survived more on natural resources such as water from the river and community wells, used firewood for energy and relied more on second hand clothes and the majority of them visited the business centre to buy once or twice a month and spent little on

travelling outside the village. Most families could not afford to have more than two meals a day and they struggled to have a balanced diet. They also could not afford to visit the clinic whenever need arise and on time due to lack of financial resources especially cash. Most of the families could not feed their children well and pay their school fees. Some could not provide proper uniforms and provide enough stationery as well as lights for evening night study at home due to lack of money and rewarding sources of income as testified by most farmers who benefited in the Ruti irrigation scheme and those benefiting from services provided at and opportunities at the Gomba agro business centre. They also could not afford to buy Morden furniture while radios and televisions were regarded as luxuries because most households could not afford them. The economy was running on butter trade of agricultural commodities such as maize, peanuts and round nuts while credit among families was a norm and most of them could not pay back. The little income was also not enough to save or invest in more rewarding projects. Hence, the people were surviving from hand to mouth a sign that the majority of people in Gutu were living in extreme economic conditions characterised by high levels of poverty and unfavourable economic conditions, which affected them from enjoying an average standard of life.

Social Conditions

Before the RuSED project and its various benefits and services, people in Gutu District were also struggling socially. Magrath (2015) notes that most of the villagers had nothing to do and they spent most of their time consuming traditional beer and were unoccupied. They were also in deep poverty, which incapacitated them from accessing basic social goods and services for their welfare. Their heavy reliance on rain fed agriculture contributed to poverty and food insecurity

especially considering the fact that Gutu is in agro ecological region four, which is semi-arid and usually affected by droughts and has unfavourable climatic conditions for the production of maize, which is the staple food crop in Zimbabwe. This means that rain fed agriculture, as a livelihood source was not sustainable since it could provide only one farming season with not sufficient food to last until the next harvest, which made it both economically insecure and insecure in terms of food security in general. As a result, most families survived on less than two meals a day and they could not afford to have a balanced diet, something which disappeared after RuSED irrigation project at Ruti dam which doubled the farming season and increased production of maize along other crops like wheat, beans and vegetables for sale and diet.

Due to lack of energy and resources, services such as access to clean safe water were difficult in the area compromising the water and hygiene safety standards in the Area. Before RuSED, Pupils, teachers and surrounding communities at Gomba High school were facing a challenge in accessing the most precious liquid and they had to travel a considerable distance carrying buckets, which had a negative effect especially on children who had to study as well as the moral of teachers. The same situation also prevailed at Mazuru clinic where nurses and patience especially expecting mothers suffered the same conundrum. They were at risk of suffering from the spread of waterborne diseases hence before the drilling of solar powered boreholes at these institutions life was not easy.

On the other hand, Before RuSED, Life at Mazuru clinic was not a walk in the park. Due to lack of electricity, Service delivery was quite a challenge especially at night without adequate light, without a nearby source of clean safe water and a storage facility for vaccines and medicine, which affected the community from attaining the health goals and maternal health and child

welfare desirable standards. Due to lack of lighting work at night was difficult especially for those who had to help delivering pregnant woman, while vaccination of children and storage of medicine was difficult without a refrigerator. This affected the quality of service and moral of workers at the clinic, which made basic health a challenge to some extent.

At Gomba high school, due to lack of energy work was not easier either. Before RuSED the library was not functional in the evening, there was no access to information technology because there were no computers and the internet and there was no clean safe water. Administration work was also difficult while the use of other teaching aids like projectors was not popular. According to the headmaster, they relied on an old duplicating machine to provide exam material for the pupils. The school could also not conduct evening studies due to lack of lighting. On the other hand, qualified teachers also shun such a remote institution. All this had a strong bearing on the work of both teachers and children, which later resulted in low pass rates. It also limited exposure to information, news and current affairs, which has become a right and integral component of Modern day learning and life globally.

As if this was not enough, due to lack of energy, the people in Gutu were also not connected to the rest of the world because they did not have access to information, as they could not use facilities such as televisions, radios and cell phones. This affected general access to information while at the same time affecting the people from accessing other services such as mobile money transfers and entertainment, which are equally important towards human development and community development in general. This also resulted in several social problems associated with lack of information and ignorance. Lack of entertainment, recreational activities and economic activities coupled by the drinking of traditional beers and frustrations associated with poverty

also posed a threat to the peace and sustainability of societies. They usually resulted in domestic violence, which affected women and children mostly, as well as dependency in the home on the part of women who had to depend on men for survival since they could not do much rewarding economic activities. This affected the attainment of gender equality, emancipation and empowerment of women in the area.

Before the introduction of solar as a reliable energy solution and the use of home solar systems and solar lanterns, Women and children in Gutu were the worst affected by energy poverty which had a trickle-down effect on their social life due to their responsibilities and position in society. Women and Children were the bearers of the community, it was their responsibility to collect firewood, cook on open fires, and they spent much time in the home using paraffin lamps especially the girl child. This means that they had to walk long distances to collect firewood and the spent their precious time in the process instead of investing it in other rewarding activities or schoolwork. They were also at greater risk of being affected by respiratory infections from cooking in closed kitchens and use of paraffin lamps as well accidents and abuse during firewood collection as well as accidents from fires and explosion of paraffin lamps.

In light of all this, clearly it shows that people in Gutu district were seriously affected by poverty. They could not effectively access basic social goods and services, which affected their welfare and the community was characterised by various forms of inequality, violence and insecurity. This contributed towards the low levels of human development and the subsequent development of the community.

Political Conditions

The socio economic conditions that prevailed in Gutu before the implementation of RuSED had a strong bearing on the political development of the community. It affected the levels of democracy, protection and upholding of human rights as well as peace and security in the community, which determined the ability of the people to contribute meaningfully towards the development of the community without fear and in a just, peaceful and secure environment. An over view of Gutu before RuSED showed that people struggled to meet basic rights such as access to energy, education, health, clean safe water as well as access to information. As shown by the widespread use of firewood and other traditional sources of energy, which people struggled to procure and they had to use them economically, the struggles parents had to overcome to send their children to school and for their welfare by providing school fees paid on time, complete uniforms and stationery among others.

To note also is the failure of most people to get treatment at the local clinic due to financial constrains as well as the inefficiencies caused by lack of power and other important resources such as refrigeration of vaccines which affected the effective health service delivery at Mazuru clinic. The same also is to mention about the challenges faced at Gomba high school before RuSED came up with solar energy at the institution, which affected the educational outcomes at the school. The community was also a victim of food insecurity as well as poor water and sanitation conditions among others. All this had a bearing on the effective protection and upholding of various human rights and various forms of human security.

On the other hand, Access to information was a challenge as people had very little access to information resources such as print and electronic media a situation that improved after RuSED.

There was also inequality in terms of gender as well as dependency in the society, which resulted

in abuse of women, which resulted in lack of power to contribute politically, economically and socially. In General poverty in the area had several downstream effects which affected the political development of Gutu District as the majority of people could not contribute manfully in the development process, lacked a voice, were not well informed, lacked basic rights and there was no equality in the community which are clear indicators of political underdevelopment .

Environmental Conditions

The high dependency on wood fuel by the majority of villagers in Gutu resulted in deforestation, which had its impact on land degradation and biodiversity loss in the area. On the other hand burning of fossil fuels also contributed towards air pollution, which also damaged the environment. This shows that environmental degradation was also of marked significance due to the various human social and economic activities in the area, which had a negative impact on the environment.

Chapter summery

This chapter has highlighted some of the challenges that people in Gutu district were facing before the implementation of RuSED project in the area. The people were facing various social economic and political challenges, which resulted in poverty and underdevelopment. There was also energy poverty that which was closely linked to environmental degradation in the area. All this and others affected human development and community development in Gutu District. The chapter managed to capture the various elements of poverty and underdevelopment that include energy poverty, low levels of income, poor sanitation and hygiene, food insecurity, poor health

and education standards as well as low levels of democracy and protection of human rights. This will help us in understanding the nature and extend of development in Gutu Before RuSED was implemented in the Area.

CHAPTER TWO

THE STATE OF DEVELOPMENT IN GUTU DISTRICT WARD 13 AFTER THE IMPLEMENTATION OF RUSED

Introduction

Chapter 2 is going to highlight on the state of development in Gutu District ward 13 after the implementation of RuSED. Firstly, this chapter will give an overview of the RuSED programme and its roll out. Specific information on promoting rural access to modern, affordable and clean energy and improvement on livelihood options is also provided in this chapter with relevant examples from Gomba high school and business centre, Ruti irrigation scheme and Mazuru clinic. This will be the foundation on the analysis of RuSED in terms of promoting rural development.

Overview of the Rural Sustainable Energy Development Programme (RuSED) in Zimbabwe and its roll out.

The Rural Sustainable Energy Development Programme (RuSED) is a project implemented by Oxfam in partnership with Practical Action. In association with the Ministry of Energy and Power Development and the Rural Electrification Authority of Zimbabwe with support from the European Union (EU). The European Union and Oxfam funded the project to a value of 2 Million Euro over a four-year period from August 2011 to July 2015 (Oxfam, 2015). The project was aimed at enhancing lives and livelihoods of poor rural people of Gutu and Himalaya by harnessing the power of the sun and running water to those remote and isolated communities in ways that are affordable and sustainable (Magrath, 2015).

The project is currently running in Gutu district Wards 12, 13, 14 and 15 and in the Mutare district in ward 22. In Gutu, the project is promoting the community's increased uptake and

access to solar powered renewable energy products while in Mutare the project promoted enterprise development and improved livelihoods options from electricity supplied through a micro hydro power plant (Oxfam 2015). The renewable energy access work of Oxfam and Practical Action in the Ruti and Himalaya communal areas has improved health outcomes; widened access to education; increased production and boosted business and enterprise; strengthened livelihoods and enhanced quality of life (Magrath, 2015). Such a project has increased access to energy for these rural communities while promoting the use of renewable energy, which is modern, affordable, sustainable and clean to meet the community's energy needs while offering social and economic services for the development of the communities especially those in remote rural areas not connected to conventional electricity grids.

Statistics by Oxfam revealed that the number of people who benefited from the programme in one way or another as pupils, patients, farmers, entrepreneurs among others is nearly 32 000. The number constitute more than 300 households who benefited in both Ruti and Himalaya irrigation schemes, Pupils from 2 schools, and dozens of people who receive serves from both the school and 4 clinics and 6 energy kiosks set up in the project areas (Oxfam, 2015). In ward 13 Gutu District alone, the project has made an impact to the estimated population of more than 7000 people and more than 1850 households.

RuSED and the Development of Gutu ward 13

Energy Development

In ward 13 Gutu District, the project made a remarkable progress in in enhancing access to modern, affordable and sustainable renewable energy and promoting the use of efficient solar

energy technologies for the improvement of socio economic activities of the rural population. This was through the installation of solar systems at Gomba high school, Mazuru clinic, Gomba agribusiness centre and Ruti irrigation facilities while communities also adopted home solar systems and solar lanterns for domestic energy needs.

In terms of reducing energy poverty, The RuSED project can be accredited for its impact on the lives of people in Gutu District ward 13. People in the district now have access to cheap, clean and sustainable energy using solar powered lanterns and home solar system. These solar systems were also installed at public institutions such as Gomba high school, Gomba agribusiness centre and Mazuru clinic. Such a service was made possible through a well-planned solar system, which was aimed at creating a self-financing and sustainable solar energy market via a virtuous circle of demand and supply. Through this energy system, the community was able to make well-informed decisions in terms of the products they wanted, make a clear list of priorities and come up with organised Internal Savings and Lending Schemes (ISALS) registered with previously established collection and information centres (CICs). The community was also able to come up with community energy funds (CEFs).

This enabled them to buy solar lantern and other solar products from trusted suppliers, which would be sold at the CICs to the community, which increased their income especially for women who managed other businesses at the CICs such as cell phone charging and marketing of solar products. Through such initiatives and the community energy funds, the community was able to raise enough money to service various problems in the community, buy home solar systems, solar lanterns, install solar systems at Gomba agri-business centre and install a solar powered borehole at Mazuru clinic as well as buying a solar powered medical tool kit for the clinic. Gutu

District has become a green village through the use of solar energy for various energy needs such as lighting, refrigeration of medicine, pumping water, electricity for the introduction of information at Gomba high school and promotion of irrigation agriculture among others hence RuSED was an answer to the various energy needs of the people in Gutu ward 13.

Social Development

RuSED played an important role on the social development of Gutu ward 13. With access to affordable, clean and sustainable energy, the people in ward 13 now have solar rechargeable lanterns for light and others have home solar system, which provide electricity for various uses in the home. Light from these solar systems and solar lanterns is cheap as they can be bought from as little as \$15.00 while the most expensive is \$60.00. They live longer; they are also bright and robust. With such lighting, the community is now living in a safe environment and pupils can now read at home without any insecurities associated with candle use or paraffin lamps. Use of solar lighting has no health risks associated with paraffin lamps as well as accidents which can result in the burning and loss of property. This gives peace of mind and people live peacefully in the home and at the same time school children can improve in class, as they can now read more frequent at home.

On the other hand, home solar systems have made access to information easier for the community as they are providing an energy solution that enables families to watch televisions and listen to radios as well as charge their cell phones. This creates linkage with the rest of the world as it removes all the barriers associated with lack of access to information. the use of cell phones gives the people a platform for the people to communicate with friends, relatives and

business colleagues in other areas, which makes make business and other serves easier to access. Such benefits create an informed society, families now spent more time together during entertainment which contribute towards a peaceful, informed and happy society which is occupied and violent free

The provision of solar energy at Gomba High school made it possible for the pupils to learn and use Morden information technology equipment at the school computer lab. They can also conduct evening studies and use other teaching aids like overhead projectors and computers. It has also improved office work as the school now has printing and photocopying facilities on the school. Which according to Mr Zingeya the deputy headmaster has made work easier, improved pass rates and made it easier to provide scarce exam material to the pupils, while pupils like Edson Mabhiza, Evelyn Muneri and Knowledge Ushe applaud the project for linking students to current information through the use of the internet which has widened their source of information. Pupils, teachers and nearby villages now have access to clean safe water from a borehole powered borehole which is capable of saving more than 5000 people in the area which has improved water supply in the area. It has reduced distance travelled by women and children to fetch water and improved the health and hygiene status of the people on the school and surrounding villages. All these are contributors towards human development and subsequent community development.

RuSED also made access to health easier for the more than 1800 inhabitants of ward 13 Gutu district who are served at Mazuru clinic. The clinic now has a solar system that provides lighting, refrigeration and other basic services, a solar powered medical tool kit comprising of a blood pressure testing machine, small solar (PV) panel, battery charger, several LED lights and

headlamp, foetal heart monitor, outlet for 12Volt Direct Current medical equipment as well as battery and phone chargers. The clinic is also equipped with solar water pumping system. Service delivery has since improved, as storage of medicine is now possible within clinic premises. nurses are now cable of conducting sophisticated medical procedure such as delivery of pregnant women even in the middle of night, patience now have access to lighting throughout the night and are no longer bringing their candles which had deterred many patience from spending the night or sought treatment at the centre which compromised health delivery.

Both staff and patience now have access to clean safe water and are no longer travelling distances to fetch water especially pregnant women while surrounding villages are also benefiting from the water pumping facility, which also improves health and hygiene in the community. Refrigeration of medicine also improves vaccination rates while the general services brought about by access to energy have transformed the working environment, health of patience and morale of staff (Magrath, 2015).

Such benefits of access to cheap, clean, sustainable and renewable energy brought about by the RuSED project from family level to community level through giving people access to light, entertainment, access to information and improved health and education as well as economic benefits from agriculture and enterprise development are critical in the social development of the community. The create a happy, accident free, peaceful, prosperous, educated, healthy and well informed society that is productive and united which contribute towards human development and community development in general.

Economic Development

At Gomba Agro business centre RuSED came in as a catalyst to help women and the surrounding communities to become entrepreneurs which is essential towards savings, capital accumulation and investment which results in the economic development of the community. Gomba agribusiness centre is serving 46 members comprised of 44 women and 2 men heading an average of five people per household each (Oxfam). It is part of the collection and information centres (CICs) which was created under the Community Energy Committee (CECs) programme, under the Gomba Community Based Plan. It is aimed at addressing the community energy needs. The CIC is home to eight ISAL groups for economic activities and is an agribusiness centre for five community nutritional garden groups and an Aquaculture and fishery initiative under the support of the Zimbabwe Community Development association. Such initiatives are all being managed under one roof in a building equipped with a solar power system for lighting and cell phone charging and a 230Litre solar powered freezer.

The Gomba CIC is a centre where the eight ISAL groups converge to do their activities and conduct various businesses, The CIC is also an energy kiosk where solar products are sold and repaired. There is also a rent to buy facility on solar lanterns for those who cannot buy in cash. The women also charge a fee for cell phone and lantern charging in the energy kiosk. The business is run on a cooperative bases and the money is invested towards the energy needs of the community. For example from 2011 to 2015 the CIC managed to raise a remarkable \$16 865 and the money was used to buy a solar powered medical tool kit for Mazuru clinic, fitted the energy kiosk, built toilet blocks and bought a fridge. The Building is also being used as an agribusiness centre where produce from the five community gardens is collected and sold in bulk. The women's clubs and ISAL groups are also involved in poultry and fish farming since they now

have a solar powered freezer for preserving their products. A similar facility is also found at Ruti Irrigation scheme. There is an agro business centre for the marketing of the various produce produced by farmer in the irrigation scheme such as maize, beans and wheat. There is also an energy kiosk, which provides the same products and services as the one at Gomba business centre.

These agribusiness centres are promoting enterprise development in the area. They are also promoting women empowerment since most of the initiatives are promoting the participation of women in business and leadership in the community. By promoting enterprise development, RuSED is contributing towards the economic development of individuals, families and the community at large. This is to the benefit of the community since the majority of the people who are benefiting were previously unemployed, poor, could not make enough money from subsistence economic endeavours to save, invest, buy furniture or even send their children to school or provide a decent meal. They also received training on business management, which has motivated them to work hard and look for more opportunities, create market linkages and manage their business professionally.

At Ruti, the RuSED project also benefited 270 farmers who are utilising 60hectares of land for both subsistence and commercial agriculture. This was through the installation of a solar system that is capable of powering two booster pumps for irrigation facilities as well as an agribusiness centre with an energy kiosk and refrigeration facility. On average, the Ruti irrigation facility is supporting 270 families that are benefiting directly through diverse enterprise activities that will have positive impacts on the livelihoods of the community around the Ruti Community (Oxfam, 2015). These farmers are producing various crops for far and near markets such as maize, beans,

potatoes wheat and horticultural produce. This has become a viable livelihood option for these farmers and the community since they are producing enough to feed their families and are receiving income from the marketing of other produce. Most beneficiaries expressed happiness and gratitude towards what they have benefited through RuSED. Some families now afford proper meals, can send their children to school, can provide stationery and uniforms for their children, they are also able to save and invest, venture into other projects and buy furniture.

With such a wide range of opportunities and access to assets and enterprise development, the people in ward 13 Gutu district now have viable businesses, projects and other income options that are contributing towards the economic welfare and wellbeing of the community, which is a milestone achievement towards the economic development of the area.

Political Development

With the view that educated, healthy, empowered and prosperous people are active citizens who know their rights and are capable of contributing in various democratic processes. Who are also capable of expressing their concerns in decision making in matters concerning the welfare and development of the community, benefits from access to clean, affordable, sustainable and renewable energy through RuSED in ward 13 Gutu has contributed towards the political development of the area.

Through its benefit on education and health, RuSED contributed towards the attainment of the fundamental rights to health and education. On the other hand, through its benefits on access to information, RuSED contributed towards the achievement of the right to information, while through promoting enterprise development and women empowerment, RuSED contributed

towards the empowerment of marginalised groups into the mainstream economy and decision making spheres.

A typical example include the participation of women in various initiatives, which include agriculture and entrepreneurship, as well as occupation of leadership positions. Direct examples include the participation of 44 women out of 46 members managing the Gomba agribusiness centre and the occupation of two seats by women out of the six sitting committee members in the Ruti Phase 3 Irrigation scheme. In general, Access to renewable energy in Gutu district also contributed towards the political development of the area.

Environmental Sustainability

The project is also a milestone achievement towards the promotion of sustainable green economies since it promotes the use of affordable green energy. The project is a successful example of how economies can adopt clean, affordable and renewable energies but still realise excellent development benefits, which contribute towards the achievement of sustainable development. The project promotes the adoption of solar energy as a substitute for fossil fuels as well as the promotion of LED power saving bulbs, which contribute towards the attainment of sustainable development.

Chapter summery

This chapter was able to shed light on the implementation of RuSED in Zimbabwe and in Gutu specifically. It also managed to show some of the economic, social and political changes that can be attributed to the programme and its contribution towards the development of the area. The chapter also showed how RuSED has contributed towards eradicating energy poverty and RuSED contribution towards environmental sustainability and promotion of a green economy in Gutu District.

CHAPTER THREE

RENEWABLE ENERGY AS A MAINSTREAM CATALYST OF RURAL DEVELOPMENT IN GUTU

Introduction

This chapter is an analysis of how renewable energy can be regarded as a mainstream catalyst of rural development generally and in Gutu district specifically. It also seeks to address some of the challenges of renewable energy from a rural development perspective.

Renewable Energy as a mainstream catalyst of Rural Development

Because Africa is undergoing unprecedented and sustained growth (IRENA, 2013). By 2050, the continent will be home to at least two Billion people, twice as many as today with 40% of them living in rural areas (UNHSP, 2010 in IRENA 2013). In 2010 about 590 million African people (575 of the population) had no access to electricity and 700 Million (86% of the population) was living without clean cooking facilities (IRENA, 2013). If these current energy trends continue, in 2030 there will be 655 Million people in Africa (42% of the population) without access to power and 866 Million (565 of the population) without clean cooking facilities, depriving the majority of opportunities to pursue a healthy productive life (IRENA 2013).

This energy divide is also gendered with women in most developing countries experiencing energy poverty differently and more severely than men according to United Nations Women (2011). Without access to modern energy services women and girls spend most of their day performing basic subsistence tasks, including time consuming and physical draining tasks of collecting biomass fuel, which constrain them from accessing educational opportunities and livelihood enhancing options as well as limits their options for social and political interaction outside the household (Danielson, 2012). At the same time, cooking from biomass is particularly

detrimental to the health of women and children of the estimated two million annual deaths attributed to indoor air pollution generated by fuels such as coal, wood, charcoal and dung, 85% are women and children who die from cancer, acute respiratory infections and lung diseases (WHO & UNDP, 2009). Infect illnesses from indoor pollution result in more deaths of women and children annually than HIV/AIDS, malaria, tuberculosis and malnutrition combined (IISD, 2013; UNIDO & UNWOMEN). Other important direct health impacts from dirty energy use and indoor air pollution include lifelong or chronic diseases such as asthma, burns to children, injuries to women from carrying wood and increased violence against women and girls because of lack of street lighting at night (ESMAP, 2004; UNIDO & UNWOMEN).

Access to energy is also directly linked to the promotion of sustainable rural livelihoods. Champers and Conway defined a sustainable rural livelihood as one comprising of the Capabilities, Assets (Stores, resources, claims and access) and Activities required for a means of living. Sustainability is measured by the ability to cope with and recover from stress and shock, maintain or enhance capabilities and assets and provide sustainable livelihood opportunities for the next generation and which contributes net benefits to other livelihoods at the local and global levels in the short and long term (Champers and Conway, 1992). In the context of renewable energy, sustainable rural livelihoods include energy services provided by access to energy, which include cooking, heating, lighting, access to information and entertainment among others through clean, affordable, renewable and sustainable means. With access to energy also comes access to various social, economic, political and environmental benefits which are essential elements for rural development that contribute towards poverty reduction, wide shared growth, household, national and global food security as well as sustainable natural resource management.

In this regard, renewable energy can be regarded as a mainstream catalyst of rural development because access to renewable energy is affordable hence, most rural communities can adopt renewable energy technologies compared to conventional electricity grids. In Gutu district the community had access to lighting and communication and entertainment facilities, clean borehole water as well as other benefits at low cost as compared to the price of connecting to a conventional electricity grid. Access to energy on its own is a sustainable rural livelihood and a critical element in the rural development system, which is a critical component of development in terms of infrastructural development, which is both a mark, and enabler of development. In this regard, access to energy in Gutu ward 13 one can view renewable energy as a component as well as potential catalyst of rural development.

However, rural development is not just about access to energy or renewable energy. Whilst it access to renewable energy is a very important dimension of rural development, it is also supported by other components such as agricultural growth and development, the non-farm sector which includes other economic but viable activities, rural infrastructure such as roads, energy and water and lastly health and education. Such elements of rural development are however closely linked to access to renewable energy, By accessing energy rural communities can have improved health and education services such as the case at Mazuru clinic and Gomba high school after RuSED.

With access to renewable energy, rural communities can improve agriculture and enterprise development and off farm activities such as the case at Ruti irrigation scheme, Ruti and Gomba agribusiness centres and energy kiosks. Access to energy communities can benefit from infrastructural development directly or indirectly from the economic benefits associated with

using renewable energy sources. Access to energy also promotes happy, united and integrated families and communities at large with a higher quality of life and socially sustainable communities. Typical examples can be picked up from the quality of life and standard of living of the more than 500 families who have benefited in either way from the RuSED project in Gutu ward 13. Access to renewable energy is also a milestone achievement towards rural environmental sustainable development. The use of clean energy is an ultimate progress towards sustainable green economies.

This is can be supported by the United Nations report by the secretary general on the UN decade of Sustainable energy for all (UNSE4ALL) which highlighted that “Modern energy services stand at the centre of global efforts to induce a paradigm shift towards green economies, poverty eradication and ultimate development. ” UNIDO (2002) also notes that access to energy is a critical enabler for economic and social development, once a community has access to modern energy services; the impact on human development is significant, from cleaner indoor and improved health to more income generating opportunities. The importance of renewable energy in development is also supported by the UN General Assembly through resolution 65/151 which declared 2012 the International Year of Sustainable Energy for all and through resolution 67/215 which declared 2014-2024 the Decade of Sustainable Energy for all. So generally, Access to renewable energy has the potential to stimulate Rural Development to some reasonable Extent.

Challenges to and suggestions to address the adoption of renewable energy

Rural communities in Zimbabwe are facing several challenges in adopting renewable energy technologies as evidenced by the low uptake of these technologies as well as the time taken to adopt and even the level of interest that most rural communities have over the importance and

use of RETs. These challenges can be observed from a national level perspective if not regionally or internationally. Kerekedzi and Kithyoma (2003) noted, “Despite the recognition that RETs are important sources of energy they have attracted neither the requisite level of investment nor tangible policy commitment.” Although national and international resources that have been allocated to developing, adapting, and disseminating RETs in the last two decades may appear substantial, the total amount is still insignificant compared to that allocated to the conventional energy sector according to Kerekedzi and Kithyoma. The major barriers to the adoption and use of RETs in Rural Zimbabwe can be classified into Financial and economic, Policy and Legal as well as technical barriers.

Financial and Economic

One of the major barriers affecting rural communities in Zimbabwe from accessing RETs is the general lack of resources particularly financial resources. This is one of the major problems affecting rural communities because they are the most affected by poverty. In this regard, many people cannot afford to buy RETs such as Solar panels, Solar (PV) cells and equipment as well as pay installation fees for home solar systems among others hence they continue to rely on traditional fossil fuels and sources of energy, which they can afford or get free of charge. For example under the RuSED, project lanterns can be accessed at a considerable cost from \$15 up to \$60. A price, which is unaffordable for most rural families who are living in poverty. On the other hand, the other hand the government is not financially endowed to meet the rising energy demand as shown by its inability to complete the rural electrification process since 2002. The government is also prioritising access to electricity through conventional power grids at the expense of RETs as shown by the disparity in households, institutions, business centres

connected conventional electricity, and those using RETS. There is also little investment in other renewable energy strategies such as the establishment of micro hydro power stations and biogas digesters among others. This leaves much of the investment and work to other players in the energy sector such as NGOs and other development partners to support communities' access renewable energy.

In light of this, stakeholders in the energy sectors should come up with strategies to provide RETs through introducing affordable equipment that can be accessed by those in rural areas as well as raise awareness on the importance and viability of renewable energy to deal with the negative attitude towards RETs and to eliminate bias towards conventional electricity. On the other hand as part of the current rural electrification drive ZESA should promote RETs as an equal source of energy, that is capable of reducing energy poverty and promote rural development the same as what can be achieved through conventional power. Stakeholders in the energy sector should also come up with a policy and invest in community micro hydropower projects, wind fields, biogas digesters as well as solar fields. They should also promote green energy to reduce high dependents on the national power grids and the use of fossil fuels since these can also play a major role in terms of promoting rural access to energy and subsequent development.

Policy and Legal

On the other hand, the country lacks a clear-cut policy and legal framework, strategies and action plans that promotes the access to renewable energy since the existing policy is over shadowed by the general policies such as The Energy Policy launched in 2012 and Rural Electrification Programme. This results in the unpopularity of RETs and affects direct investment on RETS

project which will eventually contribute towards the unpopularity of RETs and eventually result in little uptake of RETs especially among rural communities which require more of this service. To solve this problem, policy makers must come up with long term and sustainable policy that promotes the use of renewable energy, Encourage communities to adopt and popularise renewable energy technologies.

Technological

Technological barriers on the other hand limit most rural communities from accessing RETs. Zimbabwe. Zimbabwe in general and most rural areas in particular lack proper infrastructure and technology as well as knowledge and skills that allows the fast adoption of renewable energy technologies especially considering the fact that these are new technologies in the country. On the other hand, the local industry does not provide enough equipment and services to repair RETs hence much of the equipment ranging from Solar panels and solar (PV) equipment as well as Lanterns are imported from other countries. For example, all the equipment and solar components that were introduced by RuSED are not locally produced and they had to be imported from as far as France and Germany. Such a technological disaster also inhibit rural people from accessing RETs because they cannot afford the imported goods, they cannot repair them when they develop a fault and in some cases replacement parts are scarce. The situation is also worsened by the lack of skilled technicians in the rural areas to repair these RETs components when the develop problems.

To deal with the problem, there is need for more investment on infrastructural development and transfer of knowledge and skilled labour in rural areas. This is a critical solution whenever a new form of technology is introduced. There is also need for a constant monitoring of the condition of

some of the machinery and equipped installed at various institutions, so as repair when they develop problems and replace worn out parts. This is after the realisation that some of these RETs cease to function once those who installed them are gone as most rural communities lack the capacity to maintain them.

Chapter Summery

This chapter managed to illustrate on how renewable energy can be a mainstream catalyst of rural development through its benefit to the community, which are important towards human development as well as economic, social political development of rural communities. Renewable energy is also a solution to the energy poverty affecting most rural areas as well as an enabler of a sustainable green economy which is critical towards environmental sustainability. On the other hand the chapter also managed to touch on some of the issues concerning the use and promotion of renewable energy technologies in rural areas raising the challenges as well as salutations that can be put in place to alleviate the various challenges.

CONCLUSION

Development is a multidimensional process involving major changes in social structures, popular attitudes and national institutions as well as the acceleration of economic growth, reduction of inequality and the eradication of poverty. (Todaro and Smith, 2012). The three major objectives of development are to increase the availability and widen the distribution of basic life sustaining goods and services such as food, shelter, health and protection. To raise levels of living including in addition to the provision of more jobs, better education and greater attention to cultural and human values, all of which serve not only to enhance material wellbeing but also to generate greater individual and national self-esteem. To expand the range of economic and social choices available to individuals and nations by freeing them from servitude and dependence not only in relation to other people and national states but also to the forces of ignorance and human misery. (Todaro and Smith, 2012)

In light of this, access to renewable energy can be regarded as catalyst to the development of in Gutu ward 13 because of its impact on more than 32 000 people benefiting in one way or another from solar power across the district as farmers and entrepreneurs, students and patients (Magrath, 2015). Access to renewable energy, through the RUSED project in Gutu ward 13 has improved health outcomes, widened access to education, increased agricultural production and boosted business and enterprise, strengthened livelihoods and enhanced the quality of life in the area thereby contributing towards rural social, economic and political development as well as environmental sustainability and achievement towards a sustainable green economy. Through access to renewable energy, the people in Gutu district now have access to sustainable livelihood, better living conditions, access to clean affordable and renewable energy and thereby realising the development results and potential of renewable energy in rural Zimbabwe.

It is also important to note that access to renewable energy is not sufficient towards the development of rural areas hence the importance of considering other elements of development which are equally important such as infrastructural development in the form of roads, dams among others. Promotion of agriculture, promoting the non-farm activities among others, which also contribute towards the social, economic and political development of the rural communities. There is also need for the full participation of all stakeholders ranging from the community, government, NGOs, Donors, Cooperate world and other development partners.

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APPENDICES
MIDLANDS STATE UNIVERSITY

ACADEMIC RESEARCH QUESTIONARE FOR TAFADZWA MAGANGA

(R133151W)

INTRODUCTION

My name is Tafadzwa Maganga. I am a student at Midlands State University pursuing an Honours Degree in Development Studies. I am conducting a research on **the link between access to renewable energy and rural development in Gutu district** as part of the programme requirements. Your contributions, views and opinions are appreciated and they will be used for academic purposes only. You are also assured that confidentiality will be highly observed and your identity kept anonymous.

Please answer all the questions in the given space and give explanations where necessary.

Demographic data

Age	<input type="text"/>			
Sex	Male <input type="checkbox"/>	Female <input type="checkbox"/>		
Marital status	Married <input type="checkbox"/>	Single <input type="checkbox"/>	<input type="checkbox"/>	
Education Level	Nil <input type="checkbox"/>	Primary <input type="checkbox"/>	Secondary <input type="checkbox"/>	<input type="checkbox"/>
Tertiary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Knowledge about the RUSED Programme

Do you know about the RuSED project? Yes No

If Yes, give a brief knowledge about the project that you know?

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.....

Did you find the Programme helpful? Yes No

Give reasons for your answer above

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What are some of the problems that you encountered before RuSED in terms of access to energy in your area?

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Has RuSED Managed to solve these Problems? Yes No

Give Reasons for your answer above

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Give a list of any institutions that Benefited from the project and ways in which they benefited in the table below.

Institution	How it benefited

How Has Services Brought by RuSED to these Institutions helped in developing the community?

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Do you think RuSED has contributed towards the development of the community?

Yes

No

Give reasons to your answer above.

Is there any problems that could be attributed to the inception of RuSED that are associated with access to energy in the area? Yes No

If yes, please explain

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MDLANDS STATE UNIVERSITY

TAFADZWA MAGANGA (R133151W)

INTERVIEW GUIDE FOR COMMUNITY HOUSEHOLDS AND INDIVIDUALS

1. What are some of the energy needs that you face in the area?
2. Which group is mostly affected and how?
3. Have you benefited from RuSED and in what ways?
4. What are some of the changes that RuSED has brought in the area which can highlight its impact to your lives?
5. Do you think RuSED has contributed to the Development of your area?
6. What are some of the advantages and disadvantages associated with the use of renewable energy in your area?
7. What are some of the challenges that you face, which affect you from accessing RETs?
8. What do you think is the solution to these problems?

INTERVIEW GUIDE FOR KEY INFORMANTS

1. What are some of the problem that can be linked to lack of access to energy that you face?
2. Has RuSED managed to solve some of these challenges?
3. Have you benefited from RuSED and in what ways?
4. If you have directly benefited from RuSED, what are some of the benefits that you can realise that are brought by access to renewable energy?
5. What are some of the advantages and Disadvantages of access to Renewable energy that you noticed?
6. Has access to renewable energy stimulated growth and development in your area?
7. What are some of the challenges affecting access to renewable energy in the area?
8. Can you offer solutions to these problems?