BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SOCIAL SCIENCES AND HUMANITIES

THE EFFECTIVENESS OF RENEWABLE ENERGY POLICIES IN PROMOTING CLEAN ENERGY ADOPTION: THE CACE OF ZIMBABWE AND SOUTH AFRICA

BY

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A Dissertation Submitted to the Department of Peace and Governance in partial fulfilment for the requirements for the Master of Science in Peace and Governance Degree

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Abstract

This research's purpose was to compare the effectiveness of energy policies in promoting clean energy adoption in Zimbabwe and South Africa. The study was guided by qualitative research design using policy analysis and case studies. The sampling method used was purposive sampling and it targeted key renewable energy policies and projects in Zimbabwe and South Africa. Data collection methods used were key informant interviews with documentary searches. Key informant interviewees were officials in the energy and climate change sectors. Government documents, investment reports and energy sector data were used and these included the integrated resource plan, national renewable energy policy and International Renewable Energy Agency reports on Zimbabwe and South Africa. The data that was gathered from the interviews was utilized to determine the participants' experience, knowledge, and perspectives on the study. Inductive reasoning is a type of data analysis in which the researcher takes detailed observations and then derives conclusions about larger, more general occurrences. Key findings include policy effectiveness with Zimbabwe and South Africa incorporating renewables into their energy mix and policies attracting investors at the same time creating jobs although the projects remain small scale projects. Challenges faced included aging infrastructure and tariff reduction being needed to attract independent power producers. Conclusions include the need to implement policies which attract independent power producer and there being need to replace aging infrastructure. The research recommends policy improvements as there can develop bilateral energy sharing agreements and also prioritize infrastructures, expanding tariff reductions for local and independent power producers and both countries having the potential to leverage regional platforms to increase clean energy integration.

Declaration form

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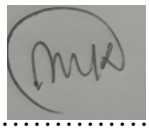
Signed…… 

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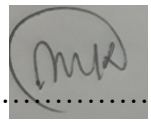
Signature .....…….. 

Dedication

I dedicate this humble research, to my loving parents, brothers and sisters who stood with me, supporting me and above all praying for me during my studies.

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Firstly, I would like to express my deepest gratitude to the Almighty God for guiding me throughout this academic journey. His grace and mercy were my source of inspiration.

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List of Abbreviations and Acronyms

AREI- African Renewable Energy Initiative

DMRE- Department of Mineral Resources and Energy

EPA- Environmental Protection Agency

EAPP- Eastern African Power Pool

IEA- International Energy Agency

IPP- Independent Power Producer

IPCC- Inter-governmental Panel on Climate Change

IRENA- International Renewable Energy Agency

LCOE- Levelized Cost of Electricity

NASA- National Social Security Authority

REIPPP- Renewable Energy Independent Power Producer Programme

SADC- Southern Africa Development Community

SAPP- Southern African Power Pool

SDG- Sustainable Development Goals

UNDP- United Nations Development Programme

UNFCCC- United Nations Framework Convention on Climate Change

WAPP- West African Power Pool

ZERA- Zimbabwe Energy Regulatory Authority

ZETDC- Zimbabwe Electricity Transmission and Distribution Company

ZIZABONA- Zimbabwe-Zambia-Botswana-Namibia

Contents

Abstract 2
Declaration form 3
Dedication 4
Acknowledgements 5
List of Abbreviations and Acronyms 6
CHAPTER ONE 1
1.0 INTRODUCTION 1
1.1 Background of the study 1
1.2 Purpose of the study 3
1.3 Statement of the problem 3
1.4 Research Objectives 4
1.5 Research Questions 4
1.6 Assumptions of the study 4
1.7 Significance of the study 5
1.8 Delimitations of the study 5
1.9 Limitations of the study 6
1.10 Definition of key words 6
1.11 Dissertation Outline 7
CHAPTER TWO 9
2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK 9
2.1 Introduction 9
2.2 Theoretical Framework 9
2.2.1 Green Theory 9
2.2.2 Energy Transition Theory 10
2.3 Climate change 11
2.3.1 Defining renewable energy 12
2.3.2 Sources of renewable energy 13
2.3.2.1 Wind power 13
2.3.2.2 Solar energy 14
2.3.2.3 Tidal waves 16
2.3.2.4 Geothermal Power 17
2.3.2.5 Biomass energy 18

2.3.2.6 Hydro Power 20
2.4 The reasons why countries should resort to renewable energy in the context of climate change 21
2.5 International, continental, regional and domestic policies on renewable energy 23
2.5.1.1 The Paris Agreement 23
2.5.2.1 African Union Agenda 2063 25
2.5.3.1 Southern Africa Development Community Renewable Energy Strategy 26
2.5.4.1 National Renewable Energy Policy (2019). 26
2.5.4.2 Integrated Resource Plan (2023) 27
2.6 Chapter Summary 28
CHAPTER THREE 29
3.0 RESEARCH METHODOLOGY AND DESIGN 29
3.1 Introduction 29
3.2 Research Philosophy 29
3.3 Research Methodology 29
3.4 Research Design 30
3.5 Population and Sample 30
3.6 Sampling method 31
3.6.1 Purposive sampling 31
3.7 Data collection methods 32
3.7.1 Key informant interviews 33
3.7.2 Documentary sources 34
3.8 Validity and Reliability 34
3.9 Data presentation and analysis 35
3.11 Chapter Summary 37
CHAPTER FOUR 38
4.0 DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS 38
4.1 Introduction 38
4.2 The opportunities for Zimbabwe and South Africa's energy policies in promoting clean energy adoption. **38**
4.3 The impediments in Zimbabwe and South Africa's energy policies promoting the transition to clean energy. 39
4.3 Arguments concerning Zimbabwe and South Africa's energy policies in promoting clean energy adoption. 41
4.4 The effectiveness of Zimbabwe and South Africa's energy policies regarding the issue of financing. 44
4.6 Chapter Summary 45

CHAPTER FIVE 47

5.0 SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH 47

5.1 Introduction 47

5.2 Summary 47

5.3 Conclusions 49

5.4 Recommendations 52

5.5 Areas for Further Research 52

LIST OF REFERENCES 53

Annexures 66

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

At global level, climate change has become a contemporary issue in the international system which needs immediate attention. Klein (2020) states that overreliance on fossil fuels globally has caused delayed rains, prolonged seasons and extreme weather conditions which are being experienced worldwide. According to the United Nations Framework Convention on Climate Change (2020), fossil fuels including coal, oil and gas are by far the largest contributor to global climate change, accounting over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions. The transition to clean energy is largely driven by international agreements including the Paris Agreement (2015), which seeks to reduce greenhouse gas emissions and invest in sustainable energy sources. The shift presents numerous opportunities including technology transfer, funding and international cooperation. According to the National Social Security Authority (2023), countries including Nigeria which has been experiencing flooding, India with higher temperatures together with Germany and Ethiopia which has been experiencing droughts have been affected the most by climate change.

Regionally (Africa), climate change has affected the weather with delayed rains, extended winters and recurring draughts which has caused hunger in the continent (Nicholson,2017). Africa has got an abundance of renewable sources of energy including wind, solar and hydro power but many countries still rely on fossil fuel. The African Union has recognized the importance of transitioning to clean energy to an extent that it adopted it into its agenda 2063 which aims for sustainable development and economic growth.

According to Eberhard (2019), due to greenhouse emissions, Africa is suffering because it has been contributing less to carbon emissions. This is because Africa is not as developed and industrialized as the developed world. This has caused Africa to be dependent more on developed countries as it cannot finance itself due to economic failures. Progress to shift to clean energy has stalled since African countries are reliant on technology transfer which developed countries are sometimes reluctant to share with the developing world. In Africa according to NASA (2023), Nigeria and Ethiopia have been the most affected by climate change.

In the Southern Africa Development Community, clean energy is crucial for enhancing energy security and promoting sustainable development (Mukwada,2019). The SADC community aims to increase access to modern energy services while promoting renewable energy sources. Zimbabwe and South Africa as members of the SADC have the opportunity to participate to curb issues including draughts, delayed rains and prolonged seasons which are being experienced in the region. Sebotisi (2019) opines that some of the energy sources that the Southern Africa Development Community can shift to include hydro power, solar power and tidal power. Due to climate change, hunger and poverty has been witnessed in the region which has caused social unrest. Mukwada (2019) states that delayed rains, and prolonged seasons have been responsible for the unrest in the region, and the region is mostly affected because there is still need for economic development for them to be able to shift to clean energy.

Zimbabwe and South Africa like many other African countries suffer significant challenges related to energy production and consumption. Due to abundance on fossils, Zimbabwe uses some of it including coal for electricity production. Chitongo (2019) is of the view that transition to clean energy is set to benefit Zimbabwe as it will create employment and can be used as an opportunity to export electricity, which is an income generating

project. Zimbabwe has set ambitious targets for increasing the share of renewable energy in its energy mix, particularly in solar and biomass. Zimbabwe has the potential to harness solar energy, addressing the issue of energy access. On the other hand, South Africa is exploring the use of tidal waves to generate power. Mukwada (2019), notes that challenges being faced in the fight to shift to clean energy include disparities in energy resources, varying levels of infrastructure development and regulatory barriers. To effectively shift to clean or renewable energy, Zimbabwe and South Africa must cooperate to try and address the challenges of shifting to clean energy. UNDP (2025) notes that climate change effects in Zimbabwe are related to water supply and food security, pointing that the geographical location of Zimbabwe makes it vulnerable to shifting rainfall patterns and water resources availability.

1.2 Purpose of the study

The purpose of the study is to compare the effectiveness of energy policies in promoting clean energy adoption in Zimbabwe and South Africa.

1.3 Statement of the problem

Zimbabwe and South Africa have been facing seasonal shifts, resulting in delayed rains, extended seasons and draughts due to carbon emissions (Ngwenya & Moeletsi,2018). Zimbabwe and South Africa have been facing draughts which is as a result of these carbon emissions by developed countries. According to SADC statistics (2023), maize production for Zimbabwe and South Africa have dropped by 54% and 25%, 5,5 million in Zimbabwe and millions in the rural area in South Africa have been facing food insecurity and the level of water in Lake Kariba have decreased by 12% as of 2023, and South Africa's Kloof dam decreased by 10%. This is a problem to the nation of Zimbabwe and South Africa, Southern Africa Development Community and the African Union as Zimbabwe and South Africa could have been a major player in trade and manufacturing at continental level. The problems are

being shown by power shortages, over reliance on fossil fuels and economic stagnation (Mukwada and Manatsa, 2018).

1.4 Research Objectives

1. To examine the opportunities for Zimbabwe and South Africa's energy policies in promoting clean energy adoption.
2. To analyze the impediments in Zimbabwe and South Africa's energy policies promoting the transition to clean energy.
3. To assess various arguments concerning Zimbabwe and South Africa's energy policies in promoting clean energy adoption.
4. To assess the effectiveness of Zimbabwe and South Africa's energy policies regarding the issue of financing.

1.5 Research Questions

1. What opportunities exist within Zimbabwe and South Africa's energy policies to facilitate the adoption of clean energy?
2. What are the key barriers and challenges in Zimbabwe and South Africa's energy policies that hinder the transition to clean energy?
3. What are the differing perspectives and debates surrounding the effectiveness of Zimbabwe and South Africa's energy policies in promoting clean energy adoption?
4. How effective are Zimbabwe and South Africa's energy policies in securing and managing financing for clean energy initiatives?

1.6 Assumptions of the study

1. Transitions to clean energy will pave way for development in various sectors of the Zimbabwean and South African economy.

2. Shifting to clean energy will reduce the carbon emission effects in Zimbabwe and South Africa.

1.7 Significance of the study

The research is important as it seeks to uncover the effectiveness of energy policies in Zimbabwe and South Africa in promoting the shift to clean energy. Beneficiaries of the study are academics, the Ministry of Energy, The Energy Sector including the Zimbabwe Energy Revenue Authority. Academics are beneficiaries of this study as this study can be referred to when conducting a study related to clean energy or clean energy policies. The Energy Sector including the Zimbabwe Energy Revenue Authority are stakeholders which are also other beneficiaries as renewable energy companies and investors gain insights into opportunities and challenges on the effectiveness of clean energy policies in promoting clean energy adoption Another benefit is that the study will inform strategies to improve energy security and reduced dependence on non-renewable energy (Mukwada,2019).

Furthermore, the Ministry of Energy is another beneficiary which will benefit as it can identify the gaps in current policies which will lead to the development of strategies that will accelerate clean energy adoption. Benefits that will occur from conducting this study include policy improvement as the study can help governments design more and effective energy policies, leading to faster adoption of clean energy. Also, the research can help Zimbabwe and South Africa attract technology transfer from developed countries concerning clean energy and cooperation to support Zimbabwe's transition to clean energy (Boyle, 2017).

1.8 Delimitations of the study

Delimitations refers to the specific boundaries or parameters set by the researcher to define the scope and focus of the research (Creswell & Creswell, 2018). In terms of focus, it will be on the effectiveness of renewable energy policies in promoting clean energy adoption

in Zimbabwe and South Africa. The study assesses the impact of these policies on renewable energy adoption. In terms of time, the study will focus on the period from 2015 to 2024. The timeframe capture the introduction and implementation of key renewable policies in both countries. The area being focused on is Zimbabwe and South Africa and they were chosen as they represent contrasting contexts in terms of renewable energy policy implementation and adoption. Issues closely related to the study which are not going to be covered include fossil fuel dependency, technology innovation and energy access and equity especially in urban and rural areas.

1.9 Limitations of the study

The study faced the challenge of data availability and data quality, since access to reliable data on renewable energy adoption was limited. Government Ministries and the embassy of South Africa might be reluctant to share sensitive information which was another challenge. Another challenge faced included the engagement with stakeholders being challenging due to conflicting interests. These challenges were countered by clearly communicating the purpose and benefits of the study to stakeholders. Another counter measure used was public available reports and policy documents as primary source of information. The study used multiple sources, including government reports, international organizations and academic studies and to conduct interviews and surveys with key stakeholders including policymakers and energy companies to fill data gaps as another counter measure.

1.10 Definition of key words

Carbon emissions- refers to the release of greenhouse gases, primarily into the atmosphere as a result of human activities (Intergovernmental Panel on Climate Change, 2013).

Climate change- According to the United Nation Framework Convention on Climate Change (2020), climate change refers to long term shifts in temperatures and weather patterns.

Renewable energy- The International Energy Agency, (2020) defines renewable energy as power generated from sources that are constantly being replenished.

Climate mitigation- are efforts to reduce or prevent the emissions of greenhouse gases that contribute to climate change, (United Nations Framework Convention on Climate Change 2020).

1.11 Dissertation Outline

Chapter one: Introduction. It contains the background of the study, the purpose of the study, the statement problem, research objectives, research questions, assumptions, significance of the study, delimitations of the study, limitations of the study, definition of key terms and dissertation outline.

Chapter two: Literature Review and Theoretical Framework. It contains major literature and validates the topic. It also contains principal theories upon which the research will be constructed. The major theories being the Green theory of international relations and the Energy transition theory.

Chapter three: Research Methodology and design. It contains the research methodology, research design, identified appropriate population, procedures to collect data, reliability and validity of specific instruments, how data is going to be analyzed and research instruments.

Chapter four: Data Presentation, Analysis and Discussion of Findings. It contains data presentation, some diagrams including figures, tables, graphs and pie charts, results and discussion then data analysis.

Chapter five: Summary, Conclusions, Recommendations and areas for further research. It contains the summary of the research from chapter one to chapter five. There are conclusions which are linked with the research objectives and suggestions of areas of further research to different climate change and energy departments.

CHAPTER TWO

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter contains discussions on the issue of the effectiveness of renewable energy policies in promoting clean energy adoption, the case of Zimbabwe and South Africa. The aspects include theoretical framework, the issue of climate change, renewable energy, sources of clean energy, reasons why states should shift to clean energy, international, continental, regional and domestic policies on renewable energy and the chapter summary.

2.2 Theoretical Framework

A theoretical framework is a foundational review of existing theories that serves as a roadmap for developing arguments one will use in their own work. (Vinz, 2022). Vinz (2022) goes on to state that they explain phenomena, draw connections and make predictions in their studies. It also justifies and contextualizes the later research.

2.2.1 Green Theory

The Green Theory of international relations highlights the interdependence between humans and the ecological environment. The green theory of international relations puts emphasis on protecting the environment and co-existence. Key theorists of this theory include Robyn Eckersley (2004), John S Dryzek (2013) and Andrew Dobson (1990). Climate change is the dominant environmental issue of our age, caused by the reliance on fossil fuels (Dyer ,2018). He goes on further to state that green theory helps to understand this in terms of long-term ecological value rather than short-term human interests. Green theorists including Dyer posits that climate change presents a clear case of injustice to both present and future humans who are not responsible for causing it and to the ecosystem as a whole. Hussian (2014) is

another green theorist who states that green theory puts emphasis on environmental issues being central to understanding the contemporary world order. Hussian further opines that green theory argues for a broader perspective that considers global justice, sustainable development and the limitations of the natural world. The strengths of this theory is that it advocates for multilevel governance, highlighting non-state actors roles and advocates for the restructuring of the global economy towards sustainability. It also promotes environmental justice in global politics concerning the environment.

This theory is relevant to the study as it underscores the need to shift from fossil fuels to clean energy sources so as to mitigate environmental degradation and climate change. In Zimbabwe and South Africa, energy production has been over-reliant on non-renewable sources of energy, but renewable energy policies align with green theory by promoting solar, wind, hydro-power amongst other sources as alternatives. This theory highlights the importance of preserving the ecosystem which is being threatened by fossil fuel extraction and use (Dryzek,2018). This theory also emphasizes the interconnectedness of human and natural environments. Ockwell and Byrne (2016), state that the adoption of clean energy can reduce the negative impacts of energy production such as health problems caused by air pollution. Renewable energy policies that prioritize decentralized energy systems for example solar panels for rural communities can empower local populations.

2.2.2 Energy Transition Theory

The energy transition theory examines the shift from fossil fuel based energy to renewable and sustainable energy sources. Key scholars of the energy transition theory include Frank Geels, Benjamin Sovacool and Arnulf Gruber. Geels (2019), a scholar of this theory states that there are phases of energy transition and these include new technologies and the eventual replacement of older systems. Sovacool (2016) is another energy transition theorist who opines that drivers to transition are multiple including technological

advancements, policy interventions, market forces and societal demand for sustainability. Gruber et al (2016), states that effective governance and policy frameworks are critical for facilitating energy transitions. Energy transition talks about decarbonization, where there is the reduction of carbon emissions by replacing fossil fuels with clean energy including solar, wind, hydro and geothermal power (Fouquet,2016). The strength of this theory is that it recognizes as socio-technical processes that involves technology, policy and markets. Another strength of this theory is that it provides frameworks for policymakers to design phased interventions including infrastructure upgrades.

This theory is relevant to the study as it helps to analyze the structural challenges needed to shift from fuel base systems to cleaner ones. It also provides insights into the design and implementation of renewable energy policies, for example South Africa's Renewable Energy independent Power Producer Programme and Zimbabwe's National Renewable Energy Policy 2019 (Baker & Phillips,2019). Also, this theory highlights the barriers that can be faced in the shift to clean energy which makes this theory relevant. Also, this theory is relevant as it underscores the importance of integrating renewable energy into existing energy systems in Zimbabwe and South Africa.

2.3 Climate change

Climate change is widely acknowledged as one of the most pressing environmental challenges of modern day. It is primarily driven by the pollution of the atmosphere, particularly through the accumulation of greenhouse gases such as carbon dioxide, largely due to human activities such as burning fossil fuels and deforestation, (Inter-governmental Panel on Climate Change,2021). According to Mann (2020), climate change extends beyond global warming to encompass a range of disruptions to the earth's climate system, including shifts in precipitation patterns, rising sea levels and an increase in the frequency and intensity of extreme weather events. As a global issue, climate change demands coordinated solutions,

yet its complex nature and far reaching impacts necessitate the active participation of stakeholders at international, national and local levels in developing and implementing effective policies.

Fossil fuels including coal, oil and gas are some of the largest contributor to global climate change, accounting for more than 75% of global greenhouse emissions and nearly 90% of all carbon dioxide emissions (UNFCCC,2020). The UNFCCC further opines that as greenhouse emissions blanket the earth, they trap the sun's heat, and this leads to global warming and climate change. Warmer temperatures over time are changing weather patterns and disrupting the usual balance of nature. The issue of climate change has gained significant attention worldwide due to its profound and multifaceted consequences on political, economic, social and environmental systems. Climate change poses numerous challenges, exacerbating stress on societies and ecosystems alike. From altering weather patterns that jeopardize food security to elevating sea levels that heighten the risk of devastating floods, its effects are both universal in reach and unprecedented in magnitude.

2.3.1 Defining renewable energy

Renewable energy is sustainable as it is obtained from sources that are inexhaustible, unlike fossil fuels (Cerezo,2020). It is clean energy and it is non-polluting. They can also be called inexhaustible energy sources and these are those sources which can be harnessed without depletion. Most of these resources are free from pollution and some of them can be used at all places. These renewable energy sources are also known as non-conventional or inexhaustible or energy sources. Clean energy is energy that comes from renewable, zero emission sources that do not pollute the atmosphere when used, as well as energy saved by energy efficiency measures. Renewable energy as power generated from sources that are constantly being replenished. According to the United Nations, climate change refers to long term shifts in temperatures and weather patterns. These shifts may be natural, such as through

variations in the solar cycle, although human activities and fossil fuels have been drivers of climate change. Cerezo (2020), notes that renewable energy sources include wind, solar, biomass, geothermal and hydro, all of which occur naturally on our planet. Human activities practically through emissions of greenhouses gases have unequivocally caused global warming, (IPCC,2023). Greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use. Climate change can also be defined as the shift in average weather conditions, including measures such as temperatures, humidity, rainfall, cloudness and wind patterns and changes in the frequency or severity of these conditions.

2.3.2 Sources of renewable energy

Sources of renewable energy refer to the different types of clean energy that can be used for different purposed including power generation. Unlike fossil fuels, these types of clean energy do not pollute the air making it more effective. Sources include wind power, solar power, biomass, geothermal power, hydro power and tidal waves.

2.3.2.1 Wind power

The Environmental Protection Agency (2016), notes that wind power is the fastest growing energy resources in the world since 1990. Since wind turbines use the wind, a renewable source of energy to generate electricity it has little to no impact on the environment, (Environmental Protection Agency,2016). The United States Department of Energy (2016) opines that the usage of wind turbines cut water consumption in the power sector by 36.5 gallons in 2013 alone. The usage of these wind turbines in 2013 reduced carbon emissions approximately by 115 million metric tons, which equals the emissions of 20 million cars during the year (Wind benefits,2015). However, Kaddo (2016) argues that there are some challenges that face wind power and one main challenge us that birds and bats have

been killed from flying into the spinning blades. Kaddo (2016) suggests that a solution of this is to avoid building turbines in areas where there is a high concentration of migrants. Another solution is to make wind turbine blades rotate only above certain wind speed.

More so, Wind power is a cost-effective land based utility-scale. Alemzero (2021) is of the view that wind is one of the lowest-priced energy sources available today, costing 1–2 cents per kilowatt-hour after the production tax credit. Present day study uses measured wind data from meteorological stations installed by the Djibouti Centre for Research and Studies at five locations which are Moulouhlé, Khor Angar, Yoboki, Gobaad and Petit Bara located in different parts of the country. Building just a few already proposed transmission lines could significantly reduce the costs of expanding wind energy. Potic et al (2021), notes that in present times, the greatest potential for using wind is for the production of electricity. Wind turbines like wind mills are mounted on a tower to capture the most of the wind energy. Wind mills can be used to drive generators to producing electricity.

2.3.2.2 Solar energy

Solar energy is the energy from the sun and it is abundant and inexhaustible. Solar energy is used to generate high temperature heat or electricity. Solar collectors in sunny places can produce high temperature heat to spin turbines for producing electricity but the cost of such devices is high (Maka & Alabid,2022). Several solar thermal systems can collect and transform radiant energy received from the sun into high temperature energy, which can be directly or converted into electricity. The use of solar in Africa and this will help cut power cuts or load shedding in African states including South Africa and Zimbabwe.

An example of this is the Africa Clean Energy Corridor, a regional initiative to accelerate the development of renewable energy potential and cross-border trade of renewable power within the Eastern Africa Power Pool (EAPP) and Southern African Power

Pool (SAPP) (IRENA,2015). West African Clean Energy corridor is a regional initiative supporting the creation of a regional power market in the West Africa Power Pool (WAPP). The African Union Commended member states and regional bodies to integrate the concept of Clean Energy Corridors into their renewable energy and climate change agendas as well as in the design, implementation and update of regional and continental initiatives and programmes to support the continent's transition to more suitable, reliable and low carbon power markets.

Solar energy does not release carbon in the air which will affect the ozone layer which will result in drastic climate changes like what the world is experiencing. Makonese (2016) opines that solar energy is one alternative that can be used to improve energy generation mix. Zimbabwe and other African countries have embarked on the use of solar energy. According to Sangita (2021), the solar farm in Zimbabwe is located 40kms west from the capital Harare. The project is being funded by the National Social Security Authority (NSSA)(2023) and Old Mutual to enable economic growth, focusing on renewable energy, agriculture value chain and infrastructure development. The solar farm can light up to 700 high density houses, and there are efforts to expand it such that it can power up to more than 7000 high density houses. The Zimbabwean government has set the target is to generate 2000 MW of power from renewable sources by 2030, which would not be reached without adequate funding.

The government has previously announced a number of mega-deals that are yet to take off. Mambondiyani (2023), opines that Zimbabwe continues to face power challenges owing to outdated infrastructure and droughts which have affected hydroelectric plants. Baumli and Jamasb (2020), notes that the coming of private investors into the energy sector would alleviate electricity problems. In addition, there are other solar plants in other African countries including the 580MW Noor Ouarzazate Solar complex, located 10km from Ouarzazate, Morocco. It is the largest plant on the continent. The Benban Solar PV power

station located in Benban, Egypt, has a total capacity of 1.8 GW is another solar plant in Africa. Also, De Aar Solar Power is a 175 MW power plant located 6km outside of the town of De Aar in the Northern Cape Province of South Africa.

2.3.2.3 Tidal waves

Tidal power projects attempt to harness the energy of tides as they flow in and out. The main criteria for a tidal power generation site are that the mean tidal range must be greater than 5m. It is harnessed by building a dam across the mean entrance to a bay or estuary creating a reservoir. As the tide rises, water is initially prevented from creating the bay. Then when tides are high and water is sufficient to run the turbines, the dam is opened and water flows through it into the bay, turning the blades of turbines and generating electricity. IRENA (2015), notes that tidal energy is produced by the surge of ocean waters during the rise and fall of tides and tidal energy is a renewable source of energy. Mtukushe and Ojo (2021) are of the view that during the 20th century, engineers developed ways to use tidal movement to generate electricity in areas where there is a significant tidal range the difference in area between high tide and low tide.

All methods use special generators to convert tidal energy into electricity. Tidal energy production is still in its infancy (IRENA,2015). The amount of power produced so far has been small. There are very few commercial-sized tidal power plants operating in the world. Rtmi et al (2022), notes that the first was located in La Rance, France. The largest facility is the Sihwa Lake Tidal Power Station in South Korea. The United States has no tidal plants and only a few sites where tidal energy could be produced at a reasonable price. Internationally, China, France, England, Canada, and Russia have much more potential to use this type of energy.

More so, it is well known that a vast amount of energy is stored in the ocean (Rtmi et al,2022). Tidal energy is a form of ocean energy which is yet to be exploited in South Africa and it can be considered as an alternative energy resource or renewable energy sources. The implementation of tidal technology can address the electricity crisis in the country and also minimizes the huge reliance on coal for power generation. Tidal energy has its advantages as it is environment friendly (Ganesh,2023). A highly predictable energy source, high energy density, operational and maintenance costs are low and an inexhaustible source of energy. However tidal energy has its disadvantages as high tidal power plant construction is costly, it has negative influence on marine life forms, and there are location limits and the variable intensity of sea waves.

2.3.2.4 Geothermal Power

Geothermal energy is a type of renewable energy taken from the earth's core. Ribeiro and Souza (2023) notes that it comes from heat generated during the original formation of the planet and the radioactive decay of materials. This thermal energy is stored in rocks and fluids in the centre of the earth. The difference between the temperature in the earth's core and the surface drives a continuous conduction of thermal energy from the centre to the exterior of the planet. High temperatures of over 4000°C cause some of the rock in the centre of the Earth to melt and form hot molten rocks called magma. These heats also cause the mantle to behave plastically and portions of it to convert upwards, since it is lighter than the surrounding rock. The rock and water in the Earth's crust can reach heats of around 370°C. Thermal energy contained in the rocks and fluids can be found from shallow depths right down to several miles below the Earth's surface. Five countries including Ethiopia, Uganda, Rwanda, Tanzania, and Kenya sit atop the East African Rift, one of the world's richest geothermal resources. Although the geology knows no borders, only Kenya has successfully

harnessed its power, gleaning more than 25 percent of its electricity from geothermal (Ochieng,2016).

Geothermal is also particularly suitable for powering the commercial and industrial sectors, causing economic development to follow quickly. The main advantages of geothermal energy are environmental as it produces just one-sixth of the carbon dioxide emitted by a clean natural-gas power plant. Marsh (2021), notes that geothermal is also cheaper than conventional energy, with savings of as much as 80% compared with fossil fuels. Unlike other renewable energy sources, such as solar and wind, it is constantly available. Despite being inexpensive, sustainable and environmentally-friendly, geothermal is not without its drawbacks as its production is limited to areas near tectonic plate boundaries. In addition, some locations may cool down after decades of use. Visser (2022) is of the view that although it is cheaper than fossil fuels once a plant has been built, the drilling and exploration of these sites is expensive. This is in part due to the amount of wear experienced by drills and other tools in such aggressive environments. Geothermal plants can release hydrogen sulphide, a gas that smells like rotten eggs. Finally, some geothermal fluids contain low levels of toxic materials which need to be disposed of.

2.3.2.5 Biomass energy

Biomass is an organic material that comes from living organisms such as plants and animals, (Mohammed,2021). Pyrolysis is a related method of heating biomass. During pyrolysis, biomass is heated to 200° to 300° C (390° to 570° F) without the presence of oxygen. This keeps it from combusting and causes the biomass to be chemically altered. Pyrolysis produces dark liquid called pyrolysis oil, a synthetic gas called syngas, and a solid residue called biochar. All of these components can be used for energy. Pyrolysis oil, sometimes called bio-oil or bio crude, is a type of tar. It can be combusted to generate

electricity and is also used as a component in other fuels and plastics (Lora et al,2019). Scientists and engineers are studying pyrolysis oil as a possible alternative to petroleum. Syngas can be converted into fuel such as synthetic natural gas. It can also be converted into methane and used as a replacement for natural gas.

African countries including Kenya, Zimbabwe, South Africa, Tanzania, Ghana and Ethiopia have embraced the use of these biomass crops as energy sources in addition to the use of forest biomass, residues and other forms of wastes. Jingura et al (2011) state that biomas supplies about 66% of total energy consumption in Zimbabwe. In recent times there has been an increasing interest in the country to increase the utilization of biomass resources for energy purposes. The major biomass materials found in Zimbabwe are fuelwood, crop and forestry residues, animal dung, energy crops, municipality and industrial. According to the Manic Post (2022), Chipinge Town Council, Zimbabwe, has begun a biogas digester project to produce biogas using biodegraded waste from the marketplace to meet the energy needs of local businesses and residents. The project is conducted in partnership with the United Nations Development Programme (UNDP).The bio-digester is 95% complete, and is expected to be commissioned in the near future. Once completed, the bio-digester will produce methane gas that will be used by nearby restaurants and homes for cooking.

Furthermore, Chipinge Town Council chairperson councillor Mkwapati. L is of the view that the project seeks to generate electricity and methane gas for people who will be using the green market while excess product will be channeled to the open market. Usman and Sujarwo (2022) notes that biomass is advantageous as it is renewable, less dependent on fossil fuel and it is versatile. However it has its disadvantages as it is not completely clean, has high costs in comparison with other alternatives, production requires space and that deforestation is a possibility.

2.3.2.6 Hydro Power

This is the biggest appeal of any renewable energy source. Hydropower is a reliable source. By far, it is the most reliable renewable energy available in the world. Unlike when the sun goes down or when the wind dies down, water usually has a constant and steady flow all day long. It is emission free which means that the creation of hydroelectricity does not release emissions into the atmosphere (Sheihkh,2022). It is cheaper than thermal or nuclear power. Dams are built to store water at a higher level which is made to fall to rotate turbines that generate electricity. Hydro electricity is the fourth largest source of commercial energy production and consumption globally. According to Giaquinto (2020), hydro power is renewable, emission free, reliable, adjustable and it creates lakes. Another advantage of using hydro-electric power is that since hydro dams can only be built in specific locations, they can help develop the land for nearby towns and cities like Kariba in Zimbabwe. This is because it takes a lot of equipment to build a dam. To transport it, highways and roads must be built, which helps open new paths for rural towns. However, it has got its weaknesses as building of dams seriously disturbs and damages the natural habitats and some of them are lost forever.

African countries are using hydro power as a way to generate electricity. According to the Country Report (2020), currently hydropower accounts for 17% of the electricity generation in Africa on average. In some countries, such as the Democratic Republic of Congo, Ethiopia, Malawi, Mozambique, Uganda, and Zambia, the share of hydropower in electricity generation exceeds 80%. This share may potentially increase to more than 23% by 2040, as part of the ongoing effort towards clean energy transition and universal energy access in Africa. Zimbabwe with Zambia shares the Kariba dam as they use it to generate hydro- electricity. Egypt and Ethiopia uses the Nile river to generate hydro-electricity.

Hydro-electricity has its advantages as it is renewable (Giaquinto,2020). As a result, hydro plants are built to last. In some cases, equipment that was built to last 25 years like the Kariba dam in Zimbabwe is still operational after double the amount of time has passed.

2.4 The reasons why countries should resort to renewable energy in the context of climate change

With a lower use of water and land, less air and water pollution, reduced wildlife and habitat loss and far fewer greenhouse gas emissions, renewables seem like the clear choice for energy (Renewables Now, 2024). Clean energy holds benefits for the society, such as improved energy access, job creation in local communities through manufacturing, installation and maintenance of renewable systems, strengthened energy security and opportunities for community ownership and empowerment (Dhabi,2024). It is important to note that clean energy has got minimal to no impact on air quality and greenhouse gases. Replacing the current fossil fuel based energy system with a renewable one is the most urgent and efficient way to tackle harmful emissions and air pollution.

Another reason why countries should resort to renewable energy in the context of climate change is that renewable energy is carbon smart. Igini (2022) notes that renewable energy sources are a great ally in the race to reach zero net-carbon dioxide emissions in comparison to fossil fuels. Wind, solar, hydro power and geothermal power have a low environmental footprint throughout their life cycles. Besides minimal carbon emissions, states must resort to clean energy because renewables are getting cheaper. The International renewable Energy Agency (2020), notes that renewables were the cheapest energy source in 2020. They go on to state that the cost of renewable technologies solar and wind in particular is falling significantly. The rapid drop in costs of these technologies in recent times has enabled countries throughout the world to increase their renewable energy production

capacity. This couples with high fossil fuel prices Improves the competitiveness of these two renewable sources. The International Energy Agency (2020) supported the idea with solar power schemes now offering the cheapest electricity in history and predicted that by 2050, clean energy generation will keep on growing, with solar energy production skyrocketing and becoming the world's primary source of electricity.

States should resort to clean energy because of its abundance and sustainability. Renewable energy by definition is renewable. They rely on naturally occurring processes such as sunlight, wind and water flow which do no runout overtime. This contrasts starkly with finite fossil fuel reserves which are rapidly diminishing. Derrick (2024), notes that using renewable energy ensures sustainable and long term energy supply. Another reason for states to shift to clean energy is because of its energy security benefits (Bagher et al,2015).. Over reliance on fossil fuels often entails dependence on foreign resources and geopolitical conflicts. By transitioning to renewable energy, nations can enhance their energy security. Locally sourced resources reduce vulnerability to supply disruptions and price fluctuations in the global market.

Mitigation of health risks is another benefit of shifting to clean energy. The reliance on fossil fuels leads to improved air quality. This in turn reduces health risks associated with air pollution. Transitioning to renewables promotes public health and well-being. Also it is a step towards global responsibility. By selecting clean energy, as humans we contribute to a healthier earth for generations to come in the future (Bagher et al,2015). It is a commitment to leaving a positive legacy and mitigating the impacts of climate change. Another reason why countries should shift to clean energy is because clean energy preserves natural ecosystems. Hydropower, wind and solar installations often have a considerably smaller environment footprint than fossil fuel extraction and power generation. Derrick (2015) also notes that the pursuit of clean energy has spurred technological innovations. Breakthroughs in

solar panel efficiency, wind turbine designs and energy storage systems have made renewables more accessible and cost effective. These advancements benefit the energy sector and also various industries and consumers.

2.5 International, continental, regional and domestic policies on renewable energy

There are International, continental regional and domestic policies on renewable energy. These ensure that states in the international system adhere to international agreements to an extent that international policies will influence municipal decisions in the fight to shift to clean energy. These include the Paris Agreement (2015).

2.5.1.1 International policies on renewable energy

2.5.1.1 The Paris Agreement

Amongst other international policies, there is the Paris Agreement which was agreed upon by states in 2015. According to the UNFCCC (2020), the Paris Agreement is a legally binding international treaty on climate change. It was adopted by 195 states at the United Nations Conference Of Parties (COP 21) in France on December 12, 2015. Its main aim is to keep global temperatures rise under 2 degrees Celsius compared to pre-industrial times with a stronger target of 1.5 degrees Celsius if possible. But now, leaders are now agreeing that limiting warming to just 1.5 degrees Celsius by 2100 is crucial. It is important to note that the Paris Agreement is a landmark in the multilateral climate change process because for the first time, a binding agreement brought all nations together to combat climate change and adapt to its effects. The Paris Agreement works on a five year cycle of increasingly ambitious climate change carried out by countries. Since 2020, countries have ben submitting their national climate action plans which are known as Nationally Determined Contributions. They are meant to reflect a higher degree of ambition compared to the previous version.

The Paris Agreement encourages countries to create long term plans for reducing emissions. These plans help show how a country's short term climate actions fit into their bigger goals for the future. They help guide countries' development plans in a climate friendly direction. The Paris Agreement has got a framework for financial, technical and capacity building support to countries that need it. The Agreement reaffirms that developed countries should take the lead in providing financial assistance to countries that are less endowed and more vulnerable at the same time encouraging voluntary contributions by other parties. This finance is needed for climate change mitigation due to the fact that large scale investments are required to significantly reduce emissions. Finances are required to adapt to the adverse effects and reduce the impacts of a changing climate. In terms of finances, critiques argues that when the developed countries were industrialized, no one stopped them from industrializing at the same time them contributing the most to carbon emissions more, so they must finance developing countries such that they can mitigate to climate change effects.

There is also the issue of technology. The Agreement established the technology framework to carter for overarching guidance to the well-functioning technology mechanisms. The mechanisms accelerate technology development and transfer through its policy and implementation arms. Since not all developing countries have sufficient capacities to deal with many of the challenges brought by climate change, the Paris Agreement puts great emphasis on climate related capacity building for developing countries and requests all developed countries to enhance support for capacity building actions in developing countries. There are Enhanced Transparency Frameworks that trace progress. Starting in 2024, countries started to report transparency on actions taken and progress in climate change mitigation, adaptation measures and support provided or received.

2.5.2 Continental Policies on renewable energy

2.5.2.1 African Union Agenda 2063

The African Union has got their own frameworks that align with the Paris Agreement in term of climate adaptation and climate mitigation. There is the Agenda 2063 which regulates climate issues in the African continent. According to the United Nations Economic Commission for Africa (2022), the African Union's Agenda 2063 vividly points out that climate resilient communities and economies are an integral part of the continent's vision for an integrated, prosperous and peaceful Africa. The goal of the African Union Agenda 2063 is to generate 300GW of renewable energy by 2030. This is done through the promotion of solar, wind and hydro power projects across Africa. An example of this is the Africa Clean Energy Corridor, a regional initiative to accelerate the development of renewable energy potential and cross-border trade of renewable power within the Eastern Africa Power Pool (EAPP) and Southern African Power Pool (SAPP).

The West African Clean Energy corridor is a regional initiative supporting the creation of a regional power market in the West Africa Power Pool (WAPP). The African Union Commended member states and regional bodies to integrate the concept of Clean Energy Corridors into their renewable energy and climate change agendas as well as in the design, implementation and update of regional and continental initiatives and programmes to support the continent's transition to more suitable, reliable and low carbon power markets.

There is also the African Renewable Energy Initiative (AREI) 2015. This initiative is a transformational initiative founded and led by Africa to accelerate, scale up and utilize the continent's enormous renewable energy potential. The initiative focuses on developing integrated solutions to increase access to clean energy services, improve human well-being and put African countries on a path to sustainable and climate friendly development. When the initiative was launched in 2015, AREI aimed to install 10GW from renewable energy sources in 2020, which was the first phase and it was successful and at least 300GW in 2030.

2.5.3 Regional renewable energy policies

2.5.3.1 Southern Africa Development Community Renewable Energy Strategy

The Southern Africa Development Community too has got their regional renewable energy policies. There is the Southern Africa Development Community Renewable Energy Strategy (2016-2030). It targets a 35% renewable energy mix in the region by 2030. It complements the Southern Africa Power Pool which manages electricity planning and distribution for SADC countries aims to have a 32% renewable energy in the region's power supply by 2020 increasing by 2030 to 35%. As of now, Southern Africa's electricity amounts to 70 % from coal while hydro power amounts to 20%. This leaves renewables like wind and solar with a small role to play. Energy Ministers in the SADC community meet and they discuss such issues and they agreed on a regional center for renewable energy and energy efficiency to boost clean power development. They also agreed on faster power grid projects which speed up cross border electricity lines including Zimbabwe-Zambia-Botswana-Namibia (ZIZABONA).

Furthermore, these ministers discussed also issues to do with boosting investment. The SADC Infrastructure Master Plan was approved to attract funding for energy projects. There were goals set for energy security and these include more people having electricity access, the better use of the region's energy resources, more funding for energy projects and greener and more sustainable energy.

2.5.4 Domestic renewable energy policies in Zimbabwe and South Africa

2.5.4.1 National Renewable Energy Policy (2019).

In Zimbabwe, there is the National Renewable Energy Policy (2019). This policy aims to promote the sustainable use of renewable energy sources to enhance energy security at the same time reducing greenhouse emissions. Objectives of this policy are to increase the share of renewable energy in the Zimbabwean national mix, promote investments in renewable

energy technologies, improved energy access especially in rural areas and to reduce reliance on fossil fuels and lower carbon emissions. According to the National renewable Energy Policy (2019) ‘Its target is to achieve 16.5% renewable energy contribution to the electricity mix by 2025 excluding large hydro-power plants.’ In terms of institutional frameworks, there are lead agencies and these include the Ministry of Energy and Power Development and the Zimbabwe Energy Regulatory Authority.

Its key focus is to invest in different sources of clean energy. In solar power, it aims to promote utility scale solar plant, rooftop solar and solar mini-grids. In wind energy, it aims to promote wind farms, biomass energy, hydro-power and geothermal power. It is important to note that the Ministry of Energy is responsible for overseeing the implementation and the Zimbabwe Energy Regulatory Authority oversees licensing and regulation. This policy aims to reduce carbon emissions through clean energy and social benefits expected include local employment, skills development and improved energy access.

2.5.4.2 Integrated Resource Plan (2023)

In South Africa there is the Integrated Resource Plan (2023). Integrated Resource Plan (2023)’s purpose is ‘ To ensure reliable, affordable electricity while meeting climate goals,’Its objectives is to ensure energy security by addressing load shedding and aging coal plants, diversifying the energy mix to include more renewables, gas and battery storage and reduce carbon emissions in line with South Africa’s climate commitments. Its strengths include that it aligns short term actions with long term visions and its clear procurement rules reduce project risks. It has got its own weaknesses as only 60% of the Integrated Resource Plan targets were met by 2023 due to debts by Eskom and over-reliance on fossil fuels.

Key projections from this policy are that it proposes for a gradual shift from coal to renewable energies including solar, wind, nuclear and hydro power. Just like Zimbabwe’s

National Renewable Energy policy (2019), the Integrated Resource Plan encourages rooftop solar through tax incentives. It aims to get its funding through the Just Energy Transition.

2.6 Chapter Summary

This chapter examined two major theories that are going to be used in this research, namely the Green theory of International Relations and the energy transition theory, highlighting their significance in the research. The chapter highlighted the concept of climate change, highlighting the different types of clean energy which are solar, wind, hydro, tidal waves, biomass energy and geothermal power. This chapter also explains the reasons why countries must shift to clean energy in the context of climate change and different frameworks from international, continental, regional and domestic policies on renewable energy. The next chapter will present the research methodology, outlining the approach, methods and the techniques employed to address these gaps and examine the specific dynamics of the effectiveness of renewable energy policies in promoting clean energy adoption.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY AND DESIGN

3.1 Introduction

This chapter contains the research philosophy, research methodology, the research design, population sample, sampling method which is purposive sampling and data collection methods. It also contains sections on data presentation and analysis, research ethics and the chapter summary.

3.2 Research Philosophy

Research philosophy refers a system of beliefs and assumptions about the development of knowledge, (Saunders, Lewis & Thornhill, 2015). A research philosophy is very crucial because it shapes the methodology used and the type of knowledge obtained. This research is guided by the interpretivist philosophy in explaining the research topic, comparing the effectiveness of renewable energy policies in promoting clean energy adoption in the case of Zimbabwe and South Africa. Interpretivist philosophy is important as the research will be focusing on how policymakers, businesses and communities view policy effectiveness. It explores stakeholders' perspectives, it is flexible and adaptable to distinct socio-political and political landscapes.

3.3 Research Methodology

Research methodology is a way to systematically solve the research problem. The study will be guided by qualitative research design so as to compare to compare the effectiveness of renewable energy policies in promoting clean energy adoption in the case of Zimbabwe and South Africa. Qualitative research is a type of social science research that collects and works with non-numerical data and that seeks to interpret meaning from these

data that help us understand social life through the study of targeted populations or places (Crossman, 2019). It uses questionnaires and interviews to collect, analyse, and evaluate data Zohrabi (2013). Bryman (2016) notes that using the qualitative methodology is important as it allows for a deeper exploration of stakeholder's views and it uncovers barriers and unintended consequences through interviews which quantitative methodology cannot uncover alone. Also, qualitative methodology captures the different reasons why certain policies in Zimbabwe and South Africa fail and succeed.

3.4 Research Design

A research design is viewed as a structure with a strategy for how the research will be carried out. According to McCombes (2021) a research design is a strategy for answering your research questions using empirical data. The research design which is going to be employed in this research is a case study. Yin (2015) defines a case study research method as an empirical inquiry that investigates a contemporary phenomenon, focusing on the dynamics of the case, within its real-life context. The study focused on comparing the effectiveness of renewable energy policies in promoting clean energy adoption in the case of Zimbabwe and South Africa. The reason for this type of research design is to have an in-depth, up-close and detailed analysis the comparing of the effectiveness of renewable energy policies in promoting clean energy adoption in the case of Zimbabwe and South Africa. Other reasons include that it allows a detailed examination of the precise instances of climate- induced displacement and policy responses. Case study design often provide direct involvement with stakeholders in affected communities and government officials

3.5 Population and Sample

According to Lavrakas (2023), population refers to the complete set of individuals, objects, events or measurements that share at least one common characteristic and are a focus of a research study. The Ministry of Environment, Climate and Wildlife, Ministry of lands,

Agriculture, Fisheries, Water and rural development, the Ministry of Energy and Power development and the South African Embassy. These ministries, departments and the embassy were chosen because they are involved in policy making and clean energy adoption in Zimbabwe and South Africa. There was also chosen to take part in responding to the questions as they deal with climate related issues. Lavrakas (2023) defines a sample as a subset of individuals, cases or observations selected from a larger population to represent it in a research study. The study selected 12 participants from the study population and among these are government officials from both Zimbabwe and South Africa, academics and policy influencers. The study reached saturation at 12 participants as further interviews replicated existing patterns. It also ensured a balanced perspective on policy implementation.

3.6 Sampling method

Sampling is the process of selecting a subset of the population that meets specific criteria for the purpose of conducting a study. It is a systematic process of selecting a subset from a larger population to represent it in research (Lavrakas,2023).

3.6.1 Purposive sampling

Patton (2015) defines purposive sampling as a non-probability sampling method where researchers intentionally select participants based on specific characteristics, expertise or relevance to the research question. This method is common in qualitative research or case studies. Members were open to considering and discussing this information. The Ministry of Environment Climate and Wildlife, Ministry of Lands, Agriculture, Fisheries, Water and Rural development, the Ministry of Energy and Power development and the South African Embassy were realized to be the most dependable source of in-depth knowledge, with 12 participants making up the entire sample. These participants were selected through categories, for example, there were categories of government and policy makers, private sector and investors and academics and researchers. They were selected for qualitative depth,

stakeholder representation ensuring all critical voices were heard and practical constraints including time, access and resource limitations. This study employed the purposive sampling method because it is rich in data relevant to the study and nuanced data from key informants as well as affected population which enhances the quality and depth of the research findings. This is because in qualitative research, sampling is guided by the principle of saturation, which is a point at which new data no longer yields additional insights rather than statistical representativeness, policy research often uses small or targeted samples of key informants and that ministries and embassies have limited personnel, so practicality must be considered.

In The Ministry of Energy and Power development, participants are going to be the Permanent Secretary, Zimbabwe Energy Regulatory Authority, Director of Renewable Energy and the Energy Planning and Development Unit. In the Ministry of Environment Climate and Wildlife participants are the Director of Climate Change and the Environmental Management Agency. In the Ministry of Lands, Agriculture, Fisheries, Water and Rural development participants are the Director of Mechanization and irrigation and the Agro-Energy officer. Participants representing the South African government in Zimbabwe are the Policy Attaché, the Trade and investment desk and the economic counsellor. Information the researcher would be looking for includes renewable policies that are already in place in both countries, the implementation of these policies, private sector role in effectiveness of renewable energy policies, outcomes of these policies and the challenges faced and how to mitigate them. This information is important as it complements the research objectives, whilst answering the research questions.

3.7 Data collection methods

Primary and secondary data are the types of data that were used in the study. This section outlined the methods used to gather the primary and secondary data as well as the

validity of the information obtained using these techniques. The researcher is going to be using key informants and documentary searches to collect data.

3.7.1 Key informant interviews

A key informant interview is a qualitative research method that involves interviewing individuals who have specialized knowledge, expertise about a particular topic. An interview is a structured, semi structured or unstructured conversation between a researcher and participants, designed to collect qualitative or mixed methods data through direct engagement. (Brinkmann & Kvale, 2018; Roulston,2022). Interviews are a form of orally administered survey whose effectiveness is seen in their ability to survey special populations and gaining in-depth information. Key informant in-depth interview was employed for this study in order to get the perception of the study's participants.

In The Ministry of Energy and Power development, participants were going to be the Permanent Secretary, Zimbabwe Energy Regulatory Authority, Director of Renewable Energy and the Energy Planning and Development Unit. In the Ministry of Environment Climate and Wildlife participants are the Director of Climate Change and the Environmental Management Agency. In the Ministry of Lands, Agriculture, Fisheries, Water and Rural development participants are the Director of Mechanization and irrigation and the Agro-Energy officer. Participants representing the South African government in Zimbabwe are the Policy Attaché, the Trade and investment desk and the economic counsellor. Key informants are significant as they provide context specific challenges and successes and these informants provide information on the barriers to clean energy adoption. The researcher would be looking for information on policy design and implementation, market opportunities, comparative policy analysis and the social and environmental impact on South Africa and Zimbabwe. The inclusion criteria is based on participants being involved in policymaking for example being a director, being involved in renewable energy programs and participants

representing government bodies in this case representing ministries and bodies that deal with the protection of the environment, EMA.

3.7.2 Documentary sources

Documentary research is a form of research that uses records to get accurate information about a particular subject **(**Kayode-Sanni ,2023). Kayode-Sanni (2023) goes on to state that it is a systematic investigation and analysis of existing records or documents. These documents can be in written form, visual or audio material, photographs and books. The purpose of documentary research was to review existing documents to have insights into research problems or questions. Documentary researches which were used include the National Renewable Energy Policy in Zimbabwe (2019), Ministry of Energy annual reports, Integrated Resource Plan of South Africa (2023) and the International Renewable Energy Agency profiles on Zimbabwe and South Africa. The study also used the Paris Agreement which was agreed upon by states in 2015. There is the Agenda 2063 which regulates climate issues in the African continent also being in line with the Southern African Power Pool (SAPP).

3.8 Validity and Reliability

According to Creswell and Poth (2013), validity refers to the degree to which a sample of test items accurately reflects the test's content. Any measurement device must have it as a necessary component. It has to do with how suitable the tools used are in terms of methodological soundness. It shows how well the data collection and analysis for the study capture the reality being studied (Mahajan,2017). Assessing the quality and acceptability of research is significantly influenced by its validity. To gather primary data, assess the study's validity of the study, and employ the panel of experts' judgment, semi-structured interviews were used. Based on the suggestions that were made, additional questions were included.

Reliability is the consistency, stability and repeatability of research measurement or findings, (Taherdoost,2022). Creswell and Poth (2023), notes that a reliable method produces similar results under consistent conditions, ensuring that the data is dependable and free from random error. Mahajan (2017) comments that data that is dependable, genuine, trustworthy, sure, infallible, authentic, and reputable. Reliability was ensured through structured interview guides, recording of how participants were selected, interviewed and analyzed to allow replication, sharing preliminary findings with a few participants to confirm accuracy and triangulation by comparing interviews with policy documents and academic studies.

3.9 Data presentation and analysis

Data presentation can be defined as the organized and systematic display of collected information in a visual, textual or tabular format to facilitate understanding, analysis and communication of research findings (Tufte,2020). Data is going to be presented using policy implementation timelines and qualitative analysis. The information that was gathered from the questions and interviews was utilized to determine the participants' experience, knowledge, and perspectives on the study. Inductive reasoning is a type of data analysis in which the researcher takes detailed observations and then derives conclusions about larger, more general occurrences. Data analysis is the process of systematically examining, cleaning, transforming and interpreting data to extract meaningful insights and to answer research questions. In this case, data analysis includes organizing and interpreting qualitative data to identify patterns, trends and key findings.

3.10 Ethical Considerations

Research ethics are defined by Resnik (2023) as the moral principles, guidelines and standards that govern the conduct of research to ensure integrity, accountability and protection for all participants, society and the environment. The study gained permissions to

conduct the study by submitting a letter from Bindura University so as to ask permission to be assisted and in some cases, they researcher had to write another letter asking for different ministries and departments for example the Ministry of Energy, the Ministry of Climate, The Zimbabwe Energy Regulatory Authority and the South African Embassy in Zimbabwe. The researcher used confidentiality, anonymity, no harm and informed consent as ethical considerations. The researcher faced problems of participants especially from Zimbabwean government including the director of climate change in the The Ministry of Environment, Climate and Wildlife and the Director of renewable energy in the Ministry of Energy and power development.

In addition to the above, they were concerned on what the information was going to be used for and their identities being known. Participants received a guarantee that their disclosure would be upheld. Any identifying information given to the researcher, including name, contact information and other particulars was not to be disclosed. The results were not to be discussed with anybody else, not even family and friends. The research design took into account the possibility of harm to participants as well as students, institutions, the public and the institution. Damages to the body, finances, emotions and reputation can all occur. The strategy was created to eliminate, separate and reduce the risk of damage. According to Emanuel et al (2023), obtaining informed consent is the foundation of ethical research. The members were clearly informed of what would be expected from them, how the data was going to be used and the consequences there could be. The participants gave explicit, active, signed consent to participate in the research which included their entitlement to their data and the choice to withdraw from the research at any stage. The informed consent was viewed as the agreement between the researcher and participants.

3.11 Chapter Summary

This chapter contains the research philosophy which was used in the study and in this case it was the interpretivist philosophy. It contains the research methodology used which was qualitative research, with the research design which was a case study, with population samples, sampling methods, data collection methods used and these were key informant interviews and documentary sources. This chapter also discussed validity and reliability, data presentation and research ethics that were used to gather data by the researcher. The next chapter presented, analyzed and discussed the data collected from the interviews and document analysis, offering valuable insights and drawing conclusions based on the findings.

CHAPTER FOUR

4.0 DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter focuses on the presentation, analysis, interpretation and discussion of all the data collected from the study area during the research period. The collection of data was done using interviews and key documents relating to the issue at hand. Qualitative approached was used to gather the results about the effectiveness of renewable energy policies in promoting clean energy adoption in the case of Zimbabwe and South Africa. This information helps in answering the research objectives and questions. The findings were linked to the existing literature with special reference to the objectives of the study. Data analysis was collected through secondary sources including documentary researches to be used include the National Renewable Energy Policy in Zimbabwe (2019), Ministry of Energy annual reports, Integrated Resource Plan of South Africa (2023) and the International Renewable Energy Agency profiles on Zimbabwe and South Africa. The chapter aligned the research objectives with and existing literature whilst showing the question asked and the responses in quotation.

4.2 The opportunities for Zimbabwe and South Africa's energy policies in promoting clean energy adoption.

One of the questions asked includes:

What opportunities exist for Zimbabwe and South Africa to adopt clean energy through policy investments?

The participants revealed that ;

‘Zimbabwe and South Africa have the opportunity to make clean energy adoption effective and this is supported or complemented by regional collaborations. There is the Southern African Power Pool (SAPP) and it facilitates cross border electricity among its 12 member states.’

Participants noted that South Africa is the largest energy producer and consumer in SAPP. Zimbabwe has got untapped solar and hydro potential but it lacks infrastructure for large scale exports.

Mukono and Bischof-Niemz (2022) are of the view that the SAPP could mandate renewable energy priority access to the regional grid, incentivizing Zimbabwe to develop solar and wind farms for export to South Africa during peak demand. The Zimbabwean IPPs could sell power directly to Eskom via SAPP improving project bankability. Also, regional grid upgrades involves joint investments in transmission infrastructure for example Zimbabwe, Zambia, Botswana and Namibia interconnectors to reduce congestion.

In terms of opportunities, the SAPP plays a crucial role as it has got a role to harmonize renewable energy policies. This faces challenges including divergent regulations as South Africa’s REIPPP is auction based whilst Zimbabwe’s relies on bilateral deals. Masiyiwa & Kaseke (2022) opines that there are mismatched standards as there are differences in licensing, tariffs and grid codes hinder seamless integration. Possible solutions include adapting uniform technical standards for grid connected renewables

4.3 The impediments in Zimbabwe and South Africa’s energy policies promoting the transition to clean energy.

Amongst some of the questions asked, one of them included:

What challenges hinder Zimbabwe and South Africa’s shift to clean energy?

One of the key informants stated that;

‘Renewable energy sources are subject to fluctuations due to weather conditions or time of day, posing challenges to grid stability. Effective energy storage solutions are necessary to store energy during peak production for use during low period.’

Participants noted that as much as Zimbabwe and South Africa are trying to adopt clean energy, there are some challenges these two countries are facing. Zimbabwe adopted the National Renewable Energy policy (2019) with the aim to promote sustainable use of renewable energy sources to enhance energy security and reduce greenhouse emissions. It encourages private sector participation as independent power producers to meet energy demand. However, Zimbabwe faces intermittency and variability.

Furthermore, another key informant noted that cost and economics are another challenge that is faced in the bid to adopt clean energy. They stated that;

‘While renewable energy costs have decreased over time, initial capital investments remain high. The levelized cost of electricity (LCOE) for renewables must be competitive with fossil fuels to encourage broader adoption. Continued advancements in technology and economies of scale are crucial for cost reduction.’

Amongst other factors, infrastructure and grid integration has also proven to be a stumbling block. Other key informants concluded that;

‘The transition to renewable energy requires extensive infrastructure development, including expanding transmission networks to connect remote renewable resources to population centers. Upgrading existing grids to accommodate bidirectional power flow, and balancing supply and demand is vital for smooth integration.’

Other scholars including Derrick (2024), notes that using renewable energy ensures sustainable and long term energy supply. Over reliance on fossil fuels often entails dependence on foreign resources and geopolitical conflicts. By transitioning to renewable energy, nations can enhance their energy security. Locally sourced resources reduce vulnerability to supply disruptions and price fluctuations in the global market.

In addition, some informants stated that governments often support nuclear programs, since 2015 at COP 21 states decided to shift to clean energy. America provided statistics of how much power it gets from nuclear. However, financing remains unclear on such programs due to other factors such as currency instability, financing, bureaucratic delays and grids needing upgrades to handle new renewable energy projects (Mangwengwende, 2022).

More so, in both nations Eskom of South Africa and the ZETDC face grid limitations, with both countries facing transmissions bottlenecks. There are also financing gaps with South Africa heavily relying on International climate finance for example the JETP 8b and Zimbabwe's lack of creditworthiness deters large scale investments.

4.3 Arguments concerning Zimbabwe and South Africa's energy policies in promoting clean energy adoption.

Another question asked is :

How effective are Zimbabwe and South Africa's policies in promoting clean energy?

In terms of policy execution and institutional capacity, there are strengths and challenges. Eberhard and Kolker (2022) opines that;

'In South Africa, the strengths are that REIPPP has been highly structured with six successful bidding rounds since 2011 attracting about 14b in investments. There are also strong public-private partnerships with private IPP contributing 6000Mw to the grid.'

However, there are some challenges which are also being faced by the South African government in its bid to adopt clean energy and these include Eskom's financial and operational instability which delays grid integration. Another challenge is that there is the phasing out of coal is slow due to political reasons and labour resistance.

In Zimbabwe, the strengths include recent reforms including the 2024 solar exemption which shows the political will to attract investment. Participants noted that

‘Decentralized energy models including mini-grids and solar home systems improving the rural electrification.’

Sangita (2021) notes that the solar farm in Zimbabwe is located 40kms west from the capital Harare. The project is being funded by the National Social Security Authority (NSSA) and Old Mutual to enable economic growth, focusing on renewable energy, agriculture value chain and infrastructure development. In as much as much as there are strengths, there are also weaknesses or challenges, with weak institutional capacity, with ZERA struggling with slow licensing. There is also the issue of lack of competitive auctions like South Africa’s REIPPP, leading to ad-hog project approvals.

Baumli and Jamasb (2020), notes that the coming of private investors into the energy sector would alleviate electricity problems. In comparison, South Africa has a higher effectiveness advantage over Zimbabwe in terms of execution as this is due to structured procurement and strong institutions whilst Zimbabwe lags due to inconsistency in policy enforcement and financing gaps.

More so, it is worth comparing the renewable energy adoption and market growth basing on renewable capacity, % of energy mix and private sector role. Key Participants noted that;

‘In terms of renewable capacity, South Africa has achieved 11 000MW from solar wind and hydro energy.’

This is supported by existing literature as Alemzero (2021) is of the view that wind is one of the lowest-priced energy sources available today, costing 1–2 cents per kilowatt-hour after the production tax credit. At the same time, Zimbabwe has achieved 500MW mostly from hydro and solar energy and this is supported by Makonese (2016) who noted that solar energy is one alternative that can be used to improve energy generation mix and in terms of energy mix, South Africa increased by 10% in 2024 targeting 42% by 2030 with Zimbabwe

having an energy mix of 5% targeting 26.5% by 2030. The private sector plays a crucial role with South Africa being dominated by 102 IPP projects with Zimbabwe being limited to a few IPPs for examples the Nyangani renewables. South Africa's REIPPP driven growth is far more effective in scaling renewables with Zimbabwe's slow adoption reflecting political bottlenecks and financial constraints.

There is the issue of energy growth and capacity growth. South Africa's current renewable capacity stands at 11 000MW inclusive of wind, solar and hydro energy. Key drivers of this include the REIPPP with 6 bidding rounds since 2011. In Zimbabwe, current capacity stands at 500MW. According to the National Renewable Energy Policy (2019), Zimbabwe targets 26.5% energy mix by 2030. Its key drivers are IPP projects and mini-grids, for example Pungwe Hydro amongst others. After comparing the two nations' policies shows that South Africa's structured REIPPP outperforms Zimbabwe's ad hoc IPP approvals in scaling capacity. Also, Zimbabwe's growth is slow due to financing gaps and weak grid infrastructures.

In terms of investment and private sector participation, there has been a total of 14b investment in South Africa through REIPPP from 2011 – 2024 (Eberhard and Kolker (2022) and a 1b investment at the same time in Zimbabwe during the same period through grants and or donor funded. A key participant noted that;

'The private sector is playing a crucial role in both countries with 102+ IPP projects in South Africa and 10 major IPPs in Zimbabwe. In terms of investor confidence, it was high in South Africa as there are clear policy and stable auctions and a low one in Zimbabwe due to currency risks and bureaucracy. The REIPPP is a regional success model which attracts global investors whilst Zimbabwe struggles due to policy inconsistency and forex shortages.'

In terms of socio-economic impact, there has been employment creation and energy access. Independent Power Producer Office (2022) p34 notes that in South Africa, over 50 000 jobs were created in renewables only, mostly in construction and operations. In Zimbabwe, there were limited formal jobs with an estimate of 5000 but mini grids boost rural livelihoods. There is also energy access with South Africa achieving 85% electrification but rural to urban disparities persist and Zimbabwe has achieved 44% electrification with solar mini grids bridging gaps. South Africa's large scale projects create more jobs than in Zimbabwe but they struggle with local transition resistance, whilst Zimbabwe's decentralized solar improves access but lacks industrial scale employment.

Furthermore, there are environmental outcomes of these policies. DMRE (2023), notes that there has been the reduction of carbon emissions, with South Africa avoiding 40 million tons since 2011, with Zimbabwe having a minimal impact. In terms of coal dependency, there is a 75% of energy mix in South Africa but in Zimbabwe its 60% due to coal and hydro use. In terms of deforestation link, in South Africa coal mining damages the ecosystem and in Zimbabwe, biomass reliance affects forests. So, South Africa's renewables offset coal use but the transition is slow and Zimbabwe's small renewable energy sector has limited emissions impact reduces wood fuel dependence.

4.4 The effectiveness of Zimbabwe and South Africa's energy policies regarding the issue of financing.

In terms of the effectiveness of Zimbabwe and South Africa's energy policies regarding the issue of financing, the question asked is:

How is South Africa collaborating with Zimbabwe to access international climate finance for joint renewable energy initiatives?

Participants highlighted collaborative efforts between Zimbabwe and South Africa. They states that

‘Collaborative efforts include encouraging Zimbabwe and South Africa to submit joint proposals to the Green Climate Fund or Africa Development Bank for Zimbabwe and South Africa solar storage hybrid plants and cross boarder mini grid projects for rural electrification. They can facilitate technology and knowledge sharing. However, political mistrust, uneven benefits and infrastructure gaps are al challenges to regional gaps.’

Zimbabwe and South Africa can leverage from regional renewable initiatives such as the UN Joint SDG Renewable energy Fund. This program aims to catalyse local investments in renewable energy, leveraging partnerships with International organizations and local financing markets to support investment worth projects. The programme focuses on accelerating progress toward sustainable development goals 5,7,8,9,13 and 17. Zimbabwe has also been partnering with IRENA and its report, IRENA noted that it is working with Zimbabwe to boost energy adoption particularly in solar, hydro and biomass. It is through this initiative that Zimbabwe launched another solar plant which is the Glenwood solar project. IRENA supports decentralized systems solutions including mini-grids and home solar systems to improve rural electrification.

4.6 Chapter Summary

The above chapter looked into data collection, data analysis and the discussion of the findings. The data was collected through field work interviews and use of secondary data to analyze the data. The study purposively sampled those who were available at the moment the research was carried out. The study was formulated into themes from the findings and clearly analyzes them so that they can be easily understandable. Various issues were discussed which were addressing the research objectives and research questions. Questions asked to the

respondents and responses from key participants were indicated with literature supporting the responses.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

5.1 Introduction

This chapter contains the summary, conclusion, recommendations and areas for further research. Suggested recommendations will be based on the research findings that were carried out and data collected.

5.2 Summary

In chapter one, the study highlighted on the background to the study, purpose of the study, problem of the statement, objectives of the study, research questions and the significance of the study the research also presented the purpose of the study. Delimitation and limitations of the study were also highlighted. Chapter one presented the dissertation outline and definition of the key terms for the study.

In chapter two the research reviewed literature and theoretical frameworks relevant to the study. The research consulted what other scholars have said about the effectiveness of clean energy policies in promoting clean energy adoption. The researcher used the Green theory of International relations and the energy transition theory. The researcher then briefly discussed what climate change is, also talking about greenhouse gases and global warming. The researcher then talked about renewable energy, bringing out the different sources of renewable energy, being wind power, solar power, tidal waves, geothermal power, biomass energy and hydro power. The researcher discussed why countries should resort to renewable energy in the context of climate change.

In chapter three contained research methodology and design. The study looked at the research design and research methodology. The research used qualitative design and it used key informant interviews and documentary research to gather data from 12 respondents, in The Ministry of Energy and Power development, participants are going to be the Permanent Secretary, Zimbabwe Energy Regulatory Authority, Director of Renewable Energy and the Energy Planning and Development Unit. In the Ministry of Environment Climate and Wildlife participants are the Director of Climate Change and the Environmental Management Agency. In the Ministry of Lands, Agriculture, Fisheries, Water and Rural development participants are the Director of Mechanization and irrigation and the Agro-Energy officer. Participants representing the South African government in Zimbabwe are the Policy Attaché, the Trade and investment desk and the economic counsellor. There was the discussion of data sampling techniques, data collection methods, data collection procedures, data presentation, data analysis as well as research ethics that one has to consider when carrying out research.

Chapter four contains discussions of findings, and presentation. The chapter analyzed the effectiveness of renewable energy policies in clean energy policies in Zimbabwe and South Africa. It contains overviews of the renewable energy policies in South Africa and Zimbabwe. It is in this chapter where challenges and opportunities for both countries are discussed. Opportunities being that Zimbabwe and South Africa can end up having enough clean energy to export it to other countries in the region through the Southern Africa Power Pool. Other opportunities include local population benefiting through job creation which will curb the issue of job losses after reducing fossil fuel dependence. There are comparisons of policies from both countries so as to see which country is benefiting more than the other, with South Africa benefiting through Independent Power Producers more than Zimbabwe, with Zimbabwe needing to adopt the auction system to provide competition amongst investors. At

the same time South Africa needing to put in place policies that will enable the effectiveness of clean energy policies. This chapter also contains

Chapter five contains the summary of the dissertation, pointing out key highlights from the study. It also contains conclusions linking all the objectives and the literature, showing the link between the findings and literature.

5.3 Conclusions

The key findings of the study highlighted the need for Zimbabwe and South Africa to implement policies that will enable clean energy adoption. Key findings also highlighted some challenges being faced by Zimbabwe and South Africa in the shift to clean energy as there is overreliance on fossil energy but effective policies can be a solution as they will pave way for investors to invest in clean energy and become independent power producers. Benefits from these policies include job creation and both governments have implemented policies that favors clean energy equipment to be duty free, also supporting rooftop solar systems.

To examine the opportunities for Zimbabwe and South Africa's energy policies in promoting clean energy adoption.

The study revealed that both Zimbabwe and South Africa have significant opportunities to accelerate clean energy adoption through policy driven incentives. The major opportunities include tariff reductions to attract independent power producers and duty free importation of renewable energy equipment which have already supported rooftop solar adoption. South Africa's Renewable Energy Independent Power Producer Programme outperformed Zimbabwe's ad hog approach, attracting 14billion in investments. Although Zimbabwe is slower, it has go the potential through regional initiatives like the Southern African Power Pool to trade renewable energy.

Baumli and Jamasb (2020) are of the view that private sector participation is critical for addressing electricity shortages in emerging economies. Regional collaborations such as the African Clean Energy Corridor further enhance opportunities by enabling cross border renewable energy trade (IRENA,2015). Baker et al (2014) opines that South Africa's structured auctions demonstrate how transparent procurement can scale capacity, while Zimbabwe's mini-grid focus aligns with decentralized energy solutions for rural electrification.

To analyze the impediments in Zimbabwe and South Africa's energy policies promoting the transition to clean energy.

Zimbabwe and South Africa face challenges in transitioning to clean energy. These include grid stability due to variable renewable output for example solar and wind, high costs and aging infrastructure. In Zimbabwe, progress is further hindered by currency risks and bureaucratic delays in project approval, in contrast, South Africa struggles with coal dependency and Eskom's financial crisis. There is also wildlife conflicts such as bird fatalities from wind turbines pose as ecological challenges.

Kaddo (2016) notes environmental trade-offs of wind energy, recommending careful site selection to mitigate such incidents. Makonese (2016) emphasizes that grid modernization and storage solutions are essential to address intermittency. Eberhard and Naude (2021) opine that Zimbabwe's lack of financing mechanisms contrasts with South Africa's Renewable Energy Independent Power Producer Programme which mitigates risks through standardized power purchase agrements.

To assesses various arguments concerning Zimbabwe and South Africa's energy policies in promoting clean energy adoption.

Major arguments revolve around the issue of policy effectiveness. South Africa's Renewable Energy Independent Power Producer Programme is credited for its scalability with over 102 Independent power producers. At the same time, Zimbabwe's ad hog approvals lag due to financing gaps and weak grids. Investor confidence is higher in South Africa due to stable policies whereas Zimbabwe's currency volatility deters capital. Although both countries benefit from private sector involvement, Zimbabwe's localized solar projects show a big potential for rural access. Makonese (2016) advocates for solar energy as a scalable solution for Africa's renewable energy mix. Sovacool (2017) warns that without grid upgrades, renewable energy remains challenging.

To assess the effectiveness of Zimbabwe and South Africa's energy policies regarding the issue of financing.

Financing is a major hurdle for Zimbabwe and South Africa. South Africa leverages blended finance for example green binds, whilst Zimbabwe relies on multilateral funds like the Green Climate Fund. Zimbabwe and South Africa are assessing joint proposals to unlock climate finance but Zimbabwe's lack of risk guarantees limit independent power producers participation. The Paris Agreement's financial mechanisms offer potential but disbursement delays persist.

The United Nations Framework Convention for Climate Change (2020) notes that The Paris Agreement (2015) mandates developed countries to support developing nations financially, although voluntary contributions often fall short. South Africa's Renewable Energy Independent Power Producer Programme demonstrates how risk mitigation attracts private capital, while Zimbabwe's reliance on international aid reflects systemic gaps.

5.4 Recommendations

Towards various problems which were identified in this study, the following are stakeholders who can benefit from the topic.

The Ministry of Environment Climate and Wildlife: The researcher recommends that it is important for the creation of policies that will enable bilateral or multilateral energy sharing. Recognizing the effectiveness of renewable energy policies in clean energy adoption will help Zimbabwe and South Africa make better decisions when it comes to policy making concerning clean energy.

The Zimbabwe Energy Regulatory Authority: The researcher recommends understanding how competitive auctions work to attract private investments and reduce costs. Also the researchers recommends the phasing out of coal subsidies and then relocate funds to clean energy for modernization. Understanding how other players benefit from their policies is essential.

The Ministry of Energy and Power Development: Understanding how modern renewable energy technologies function is essential. There is need to harmonize grid codes via Southern African Power Pool to enable cross boarder clean energy trade, upgrade current transmissions to accommodate clean energy and to invest in battery storages for the stabilization of grids.

5.5 Areas for Further Research

The purpose of the study was to compare the effectiveness of energy policies in promoting clean energy adoption in Zimbabwe and South Africa. Further research is required to understand how corruption and bureaucratic inefficiencies impact renewable energy projects in both countries.

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Annexures

Participants consent form

My name is Antony Kudakwashe Ganje, a final year student at Bindura University of Science Education. I am carrying out research on the topic: The effectiveness of renewable energy policies in clean energy adoption in Zimbabwe and South Africa. You are kindly being asked to read this form and ask any questions that you may have before agreeing to the requirements of the research. The information to be collected is solely for academic purposes and the information that is going to be gathered will be kept private and confidential.

I kindly ask for your answers that will provide consistent and valid responses to my research. The information and data to be provided is going to be kept private and confidential, and only for the purpose of the study. The researcher assures privacy and confidentiality on the research information acquired and the research will not include any personal information that identifies the participant. The records will be accessed and be limited to the researcher only.

Key-Informant Interview guide

The Ministry of Energy and Power development

Permanent Secretary, Zimbabwe Energy Regulatory Authority, Director of Renewable Energy and the Energy Planning and Development Unit

Interview questions

1. How does Zimbabwe's National Renewable energy Policy (2019) align with the country's current energy demands and future sustainability goals, particularly in increasing renewable energy adoption?
2. What are the top 3 operational challenges in implementing renewable energy projects for example solar, wind and hydro, under the current policy framework?
3. What incentives are in place to attract private investment in renewable energy and how has it been effective?
4. How is the ministry addressing energy poverty in rural areas through decentralized renewable systems including solar mini- grids?
5. What steps are being taken to modernize Zimbabwe's grid to accommodate variable renewable energy sources like solar and wind?
6. Is Zimbabwe leveraging lessons or partnerships from regional renewable initiatives eg SADC's energy programs?

Ministry of Environment Climate and Wildlife

The Director of Climate Change and the Environmental Management Agency

Interview questions

1. How does the Ministry ensure Zimbabwe's renewable energy projects align with national environmental policies including the National Climate Policy (2021) and international commitments?
2. What specific environmental impact assessment requirements must renewable energy projects meet and how do these affect approval timelines?
3. How does the Ministry mitigate habitat disruption from large scale renewables eg solar farms in wildlife zones or hydropower on rivers?
4. What mechanisms exist to ensure local communities participate in local communities and benefit from renewable projects while protecting their ecosystems?
5. How is Zimbabwe leveraging global climate funds for example Green Climate Fund, to support renewable energy initiatives that also deliver environmental co-benefits?
6. What reforms are planned to strengthen the environmental oversight of Zimbabwe's renewable energy sector in 5 years to come?

Ministry of Lands, Agriculture, Fisheries, Water and Rural development

Director of Mechanization and irrigation and the Agro-Energy officer

Interview questions

1. What specific land allocation policies govern renewable energy projects eg solar and windfarms and how do the balance energy needs with agricultural land preservation?
2. How does the Ministry mediate conflicts between renewable energy developers and local communities over land use rights?
3. What lease and tenure security measures exist for renewable energy investors to ensure project viability while protecting national land interest?
4. How is the ministry promoting dual land uses that combine solar energy generation with agricultural production?
5. How do land allocation processes or energy projects differ across provinces and what standardizations are being implemented?
6. What amendments to Zimbabwe's land tenure system would most accelerate renewable energy development without compromising food security?

South African embassy

Policy Attaché, the Trade and investment desk and the economic counsellor

Interview questions

1. How could South Africa's Renewable Energy independent Power Producer Programme model be adapted to Zimbabwe's context?
2. What are the most common challenges South African renewable energy companies face when exploring Zimbabwean markets and how could bilateral agreements address these?
3. How might the Southern African Regional Powerpool be leveraged to incentivize Zimbabwe's renewable energy generation for exports to South Africa?
4. What specific embassy facilitated supports exist to connect Sa renewable firs with Zimbabwean opportunities?
5. Which failed South African renewable energy policies should zimbbawe avoid and which underutilized solutions deserve more attention?
6. How is South Africa collaborating with Zimbabwe to access international climate finance for joint renewable energy initiatives?

BINDURA UNIVERSITY OF SCIENCE EDUCATION

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DEPARTMENT OF PEACE AND GOVERNANCE

06/05/2025

TO WHOM IT MAY CONCERN

RE: REQUEST TO UNDERTAKE RESEARCH IN YOUR ORGANISATION

This serves to introduce **Antony Kudakwashe Ganje (B1953663)** is a student studying for a **Master of Science in International Relations Degree** in the Department of Peace and Governance, Bindura University of Science Education. To ensure the successful completion of this programme, the student is seeking for permission to carry out research in your organisation and also engage with relevant stakeholders within your network.

For any further details pertaining to the student, do not hesitate to contact the undersigned.

Your usual co-operation and assistance will be greatly appreciated.

Yours respectfully

BINDURA UNIVERSITY OF SCIENCE EDUCATION
DEPARTMENT OF PEACE AND GOVERNANCE
CHAIRPERSON
06 MAY 2025
FACULTY OF SOCIAL SCIENCES & HUMANITIES
PRIVATE BAG 1020, BINDURA, ZIMBABWE

J.KUREBWA (DR)
Acting Chairperson

ZERA
ZIMBABWE ENERGY REGULATORY AUTHORITY

14th Floor Century Towers, 45 Samora Machel Avenue, Harare
P.O Box CY308, Causeway, Harare, Zimbabwe
Tel: 242 780010, 253461 Fax: 250696
Email: admin@zera.co.zw **Website**: www.zera.co.zw

FAD/KK/TN//352
When calling ask for E.T Mazambani

15 May 2025

Antony Kudakwashe Ganje
B1953663
Bindura University of Science Education
Department of Peace and Governance
Private Bag 1020
Bindura

Attention: Mr. Antony .K. Ganje

RE: Permission to Conduct Research at ZERA

We are pleased to inform you that permission has been granted for you to conduct your research titled **"The Effectiveness of Renewable Energy Policies in Promoting Clean Energy Adoption: The Case of Zimbabwe and South Africa"**, using the Zimbabwe Energy Regulatory Authority (ZERA) as your case study.

We acknowledge the significance of your research and the potential contributions it may make to our **Technical Department.** In support of continuous learning and development, we kindly request that you share a copy of your final research findings with our Knowledge Management Centre upon completion.

We wish you success in your academic endeavor.

E.T. MAZAMBANI
CHIEF EXECUTIVE OFFICER
ZIMBABWE ENERGY REGULATORY AUTHORITY

Request to undertake research

Inbox

Dr. Benjamin... 13 May

to me

Good morning. Kindly note that the department has no objection to you undertaking your research. kindly note that ethical clearance is a critical. You can therefore communicate with me directly regarding this matter. The department is ready to assist you.

Hope to hear from you soon.

Mandevere Benjamin (PhD)
Climate Change Management Department
Ministry of Environment, Climate and Wildlife
1st Floor Mukwati Building
Harare
Zimbabwe
+263 773 235 572
+263 713500082

+All correspondence should be addressed to "The Secretary"

Telephone: +263 242 791761-9,

Website: www.energy.gov.zw

Email: energy@energy.gov.zw

ZIMBABWE

Ministry of Energy & Power Development

John Boyne House, 2nd floor

Cnr. Inez Terrace and Speke Av

Private Bag 7758, Causeway

Harare, Zimbabwe

REF:

22 May 2025

Bindura University of Science Education
P. Bag 1020
Bindura

Attention: Mr. A. Ganje

RE: REQUEST TO UNDERTAKE RESEARCH AT THE MINISTRY OF ENERGY AND POWER DEVELOPMENT

The Ministry acknowledges receipt of your letter dated 6 May 2025, in which you were requesting to conduct research at our Ministry. We are supportive of academic research initiatives and acknowledge the potential of your study to advance knowledge in the energy sector.

As per your request, we have prepared answers to your questions. Please find attached the responses to each question.

Dr. G. S. Magombo
SECRETARY FOR ENERGY AND POWER DEVELOPMENT

ENVIRONMENTAL MANAGEMENT AGENCY

All communications should be addressed to "The Director General"
685/686 Lorraine Drive/Faber Road, Bluffhill,
P O Box CY 385, Causeway, Harare
Harare
Telephone 08677006244; E-mail: registry@ema.co.zw

Ref: 23/1/35

11 May 2025

University of Bindura
P. Bag 1020
Bindura
Zimbabwe

Att: Mr Antony Kudakwashe Ganje

Cell : 0775937405
E-mail: antonyganje@gmail.com

REF: AUTHORITY TO COLLECT DATA FOR RESEARCH PURPOSES

In response to your request seeking permission to collect data for your research titled "***The effectiveness of renewable energy policies in promoting clean energy adoption: The case study of Zimbabwe and South Africa.***", the Environmental Management Agency acknowledges and supports environmental research and technological innovations aimed at fostering a clean, safe, and healthy environment. Accordingly, permission to conduct your research is hereby granted.

Please ensure that your activities remain within the scope of your stated objectives and adhere to established research ethics. All information collected must be used solely for academic and research purposes.

A. Chigona

ENVIRONMENTAL MANAGEMENT AGENCY
P.O. BOX CY 385, CAUSEWAY
HARARE, ZIMBABWE
11 May 2025
TELEPHONE: 08677006244

Director General- Environmental Management Agency