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The Green Energy Transition: A Threat to National Security in Southern Africa

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Abstract

The United Nations Development Program's Sustainable Development Goals and the African Union Agenda 2063 require states to transition from fossil-based to renewable energy due to the negative environmental impacts of these fuels. Based on the lack of adequate research into the negative implications of the energy transition, is it possible that through mitigating one threat, states are creating another threat? This research explores how the green energy transition can do as much good as it can equally cause harm, specifically in the example of Southern African countries. The research analyses the negative impacts of the green energy transition to both South Africa and Mozambique, two countries experiencing different electricity challenges, but affected similar by poor green energy transition considerations. Using the above country examples, the research concludes that the green energy transition has a high potential to threaten the national security of a country, as the examples give insight into the importance of adequate research and policy planning at government level. The research presents six recommendations to take into consideration at the policy making level to ensure that these potential threats to national security are addressed. The six recommendations include: 1. African Solutions for African Problems 2. Climate Adaptation over Climate Mitigation 3. Accountability 4. Policy Restructuring 5. Ensuring a Bottom-Up Approach 6. Job Redirection. These can be taken into consideration for further studies into mitigation strategies and policy formulation as they bring the focus back to ensuring the security of the state is taken into consideration at all levels.

Key Words: natural resource depletion; sustainability transitions; zero net; coal mining; hydropower; green jobs; energy security, national security.

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"No Man is an Island, Entire of Itself; Every Man is a Piece of the Continent, a Part of the Main" John Donne, 1624. To my personal continent, this one's for you.

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ABBREVIATIONS AND ACRONYMS

| | |
|--------|---|
| AFDB | African Development Bank |
| AU | African Union |
| COP | Conference of Parties |
| EAP | Presidential Energy Action |
| EDM | Electricade de Moçambique |
| ENAMMC | National Strategy for Adaptation and Mitigation of Climate Change |
| ESKOM | Electricity Supply Commission of South Africa |
| EVKOM | Elekrisiteitsvoorsieningskommissie |
| GDP | Gross Domestic Product |
| GHG | Green House Gas |
| Gt | Gigatonne |
| HCB | Hidroeléctrica de Cahora Bassa |
| HVAC | High Voltage Alternating Current |
| HVDC | High Voltage Direct Current |
| IEA | International Energy Agency |
| ILO | International Labour Organization |
| IRENA | International Renewable Energy Agency |
| ITA | International Trade Administration |
| JET | Just Energy Transition |
| JET-IP | Just Energy Transition Investment Plan |
| JETS | Just Energy Transition Strategy |
| MDG | Millenium Development Goals |
| NAP | National Adaptation Plan |

| | |
|--------|---|
| NDC | National Determined Contribution |
| NECOM | National Energy Crisis Committee |
| NELF | National Electrification Forum |
| NEP | National Electrification Program |
| OPEC | Organization of the Petroleum Exporting Countries |
| PCTE | Supporting Climate Policy and Energy Transition |
| SADC | Southern African Development Community |
| SAPP | Southern African Power Pool |
| SAPVIA | South African Photovoltaic Industry Association |
| SAWEA | The South African Wind Energy Association |
| SE4ALL | Sustainable Energy for All' |
| SDG | Sustainable Development Goals |
| SONA | State of the Nation Address |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WMO | World Meteorological Organization |

Chapter One: Introduction to Research

The Green Energy Transition as a Threat to National Security in Southern Africa.

1.1. Introduction to the Research theme

Energy is an important part of a states' national security agendas as they adopt global and regional policies to their own agendas such as the United Nations Developmental Programme's (UNDP) Sustainable Development Goals (SDGs), the United Nations International Labour Organisation's (ILO) Millennium Development Goals, and the African Union's (AU) Agenda 2063. Energy has been instrumental in conflicts, wars as well as the day-to-day running of states and societies. However, over the last decade, due to the increasing concerns over such as climate change, there has been an emerging focus on the impact that energy has on security, more specifically how climate change affects energy and the repercussions it has on the national security of a state. Fossil fuels, such as coal and oil, are non-renewable energy sources which make up almost 80% of the world's energy mix but contribute to over 75% of global greenhouse gas emissions, increasing global warming and worsening the impacts of climate change (Mohsin *et al*, 2022). This has led states to consider the shift from the use of fossil fuels for energy, to more renewable and clean sources of energy, or known as the green energy transition.

Though there has been an increased effort towards the shift to green energy, several variables have not been taken into consideration that can potentially harm or threaten national security. South Africa, as an example, has an energy intensive economy, which means its economy uses significant amounts of energy as part of its primary economic activities. South Africa largely relies on the use of fossil fuels to operate its economy, specifically coal to generate power to the country with 70-80% of South Africa's primary energy is supported by coal (ITA 2024). Though there have been studies conducted on how failure to meet the energy demand could threaten national security when it comes to the green transition in South Africa, there have been limited studies into how this transition could impact, as one example, the coal producing province of Mpumalanga, and increase the threat to national security.

This research explores how the transition from fossil fuels to renewable energy can have negative impacts, and if not mitigated, could potentially threaten national security.

The research focuses on Southern Africa following the creation of Agenda 2063¹ which states that one of the priority areas for African countries is “supporting renewable energy” (IRENA 2021: 19). Due to the limitations of the study, the research focuses on specifically the examples of South Africa and Mozambique.

1.2. Literature Review

This literature review focuses on the three core components that will assist in identifying the research problem. The literature review will briefly analyse national security, linking it to the issue of climate change and the green energy transition. As climate change and the green energy transition are new and emerging topics, the literature will mainly consist of working papers, online sources and news articles as there is a limited availability of published and edited books.

National security is described as the safekeeping of the nation as a whole or as “a state of security for the nation-state” (Grizold 1994: 41). This protection involves the safeguarding of a state’s national sovereignty, basic societal functions such as cultural and economic roles, protection of a state’s territory as well as the protection of the citizens within the state. The definition of national security was then revised to state that “National security is the ability of a state to cater for the protection and defence of its citizenry. This applies to [...] the people's protection from military and non-military threats” (Williams 2008). The revision of the definition allowed states to focus on more immediate threats to security such as the growing threat of climate change.

Climate change is defined as “Long-term shifts in weather patterns and temperature, both natural and human driven...however since the 1800s human activities, such as the burning of fossil fuels, have been the main drivers of climate change” (Mohsin *et al*, 2022). The increase of development globally has led to the accelerated rate of climate change resulting in increased natural disasters, scarcity of commodities and even increased health risks. This has also affected the rate of development in countries as one of the most impacted industries is within the realm of energy.

¹ Agenda 2063 is “Africa’s blueprint and master plan for transforming the continent into the global powerhouse of the future. It includes a set of initiatives implemented by the African Union. The agenda was proposed in 2013 as a plan for the next 50 years and officially adopted in the African Union’s Ordinary Assembly of Heads of State and Government in 2015” (German Developmental Cooperation 2023: 19)

Energy has become a key priority for states as they have begun to depend more on the access to energy. Fossil fuels, namely oil, gas, and coal, still make up the basis of the world's energy as "oil accounts for 34% of the world's energy supply, coal being second with 30%, and gas making up 24%" (Matsui & Kryukova 2021: 2). However, according to statistics, the burning of fossil fuels such as coal has contributed to "75% of greenhouse gas emissions and nearly 90% of all carbon dioxide emissions" (UN 2023). This has resulted in the creation of policies aimed at mitigating these negative implications to ensure the protection of the state and the lowering of carbon emissions contributing to climate change. This is known as the green energy transition which refers to the "global energy sector's shift from fossil-based systems of energy production and consumption- including oil, natural gas, and coal- to renewable energy sources like wind and solar" (S&P Global 2020). There are three main policies that have guided and promoted the green energy transition, namely the United Nations International Labor Organization Millennium Development Goals (MDGs), The UNDP Sustainable Development Goals and the African Union Agenda 2063.

Under the Millennium Development Goals, the 7th goal focuses on "ensuring environmental sustainability by promoting green jobs that reduce the consumption of energy, and limit greenhouse gas emissions" (ILO 2000). The SDGs, which came into effect in 2016, specifically address the energy transition campaign "Affordable and clean energy, sustainable cities and communities, and climate action" (UN 2015). These two policies were created at a global level to foster cooperation between states, however looking at a more regional approach, the AU Agenda 2063 is "the continent's strategic framework that aims to deliver on its goal for inclusive and sustainable development" (African Union 2015).

Mozambique makes use of hydroelectric systems to produce electricity, however, more than 50% of the country does not have access to energy due to affordability and lack of infrastructure. The growing social crisis in Mozambique has also affected energy accessibility with crises such as in the insurgency in Cabo Delgado which has seen the displacement of millions as a result of the ongoing dispute involving a non-state armed group, the Islamic State Mozambique and perceived socio-economic exclusion. Mozambique's President Nyusi stated in his Conference of Parties (COP28) UN climate conference address that "the mission is to leverage Mozambique's

abundant renewable and natural resources to accelerate the trajectory of low-carbon socio-economic development” (African Development Bank 2023). Based on four pillars, Mozambique aims to increase their clean energy capacity using hydroelectric projects and solar and wind power plants as well as promote green transport through the introduction of electric vehicles.

There are several challenges that will hinder the two countries’ proposed transition and adaptation of green energy. The most common problem between the two countries is focused on finances. The green energy transition will require large investments to build the necessary equipment to sustain their current energy supplies as they work on the transition to renewable energy (International Trade Administration 2023). This also brings up the questions of whether these challenges could be highlighting potential negative impacts to the green energy transition.

Using the example of South Africa, coal production and mining is one of the main economic activities within the province of Mpumalanga (International Trade Administration 2023). South Africa’s carbon emission emanates from the use of coal for power generation. According to the International Trade Administration (ITA), “approximately 85 percent of the nation’s electricity is generated via coal-fired power stations” (International Trade Administration 2023). If the green transition is implemented, the loss of job security as well as economic stability could potentially lead to civil unrest which could have serious implications to the security of the state as these civil disruptions often lead to heavy looting and destruction of facilities, such as the July unrest of 2021 in South Africa fueled mainly by job lay-offs and economic inequality.

This study therefore analyses the risks that are present within the research of the green energy transitions, as without careful consideration into the potential negative impacts, there is a high probability of creating yet another threat to security in attempting to solve the existing one. In order limit the scope of which the research analyses climate change, as it is an extensive topic, there was a need for the research to be grounded in a theoretical framework.

1.3. Theoretical Framework

Ravitch and Riggan (2017), define a conceptual framework as:

“The identification of presumed relationships among key factors or constructs to be studied, and the justification for these presumptions may come from multiple sources such as one’s own prior research or ‘tentative theories’ as well as established theoretical or empirical work found in the literature”.

This research is grounded in the conceptual framework of national security. According to seminal authors such as Joseph Nye (1999:4), the concept of security prior to the Cold War was seen as “...the study of the threat, use and control of military force...the conditions that make the use of force more likely, the ways that the use of force affects individuals, states and societies”. It was only after the Cold War that scholars noted that though military threats are usually the most serious threat to a nation’s security, it would be naïve to believe that they are the only dangers a state faces. Buzan, Waever and de Wilde (2007:35) broadened the definition of security by suggested five sectors of security, “military, environmental, economic, social and political security”. By broadening the definition of security and national security, scholars acknowledged that the current concepts were unequipped to deal with the issues of the 21st century, such as global warming and climate change, brought about by globalization.

Global warming and climate change have increasingly become a national security concern as “climate change is the leading factor in the increase of natural disasters, and conflicts on the basis of resources, obtaining the potential to exacerbate and create tensions.” (UN 2015) This has resulted in efforts to combat these climate changes issues with initiatives such as the green transition. Looking at the green initiative through the conceptual framework of national security assisted in firstly limiting the parameters of which climate change is to be discussed as it is a broad topic, as well as answering the research problem.

1.4. Research Problem

The United Nations Development Program’s Sustainable Development Goals and the African Union Agenda 2063 require states to transition from fossil-based energy sources to renewable sources of energy due to the negative environmental impacts of these fuels. Based on the lack of adequate research into the negative implications of the green energy transition itself, is it possible that through mitigating one threat, states are creating the potential for another threat?

1.5. Research Question

What are the national security considerations within the green energy transition?

This question led to three sub-questions to be answered:

- a) What is the link between national security and energy?
- b) What are the negative implications of the energy transition for national security?
- c) What should policymakers consider to mitigate the negative implications to national security within the energy transition?

1.6. Research Methodology

This research made use of deductive research methods as the research is grounded within a theoretical framework as explained in the prior paragraphs. It is important to also identify a research design to work in hand with the deductive research method selected in the research. A research design according to Ali (1998:7) is “the overall plan for connecting the conceptual research problems to pertinent (and achievable) empirical research”. This study applied an exploratory research design as the scope of the study as well as the research questions were determined based on an extensive literature study. This literature study was used throughout to investigate the identified gaps derived from the research. The research made use of a qualitative research methodology which refers to the collection of non-numerical data. Felkins et al (1993:229) defines qualitative research as “producing descriptive data that helps in understanding the ‘why’ of different attitudes and the underlying structures of values and perceptions affecting change which can include group and individual interviews, focus groups, observation, trend analysis and issues monitoring”. Sources such as reports from relevant organization, as well as working documents and news reports were used alongside seminal works to inform the research.

One of the limitations of this study was, due to the recency of the topic around energy transition, several policies are still being formulated which will require the attainment of the most revised version of the policy documentation being used. It is also important to note that limited research has been carried out on the negative implications of the energy transition, which is what motivated the aims of this research.

There are no ethical implications of the study to be considered. No human subjects were used throughout the study and all the sources of information used are available in the public domain and were used with the requirements for academic writing.

1.7. Structure of research

Chapter 1: Introduction – This chapter introduces the research topic and provides a brief understanding of green energy and its impact within security. This chapter explains the methodological approach to the research explaining what research design, research approach as well as methodological approach were used.

Chapter 2: National Security and Energy – This chapter introduced the main concepts of the research, specifically national security, and energy, providing a deeper understanding of both to create a conceptual framework for the research. This also provides a deeper understanding of the link between national security and energy.

Chapter 3: Green Energy Transition and its Implications – This chapter looked at the concept of energy transition, specifically looking at electricity and the impacts of the transition within the domain of electricity as a form of energy. This chapter also explored the current green energy transition efforts in both South Africa and Mozambique.

Chapter 4: The Green Energy Transition and its Negative Impacts – The research identified the main discoveries brought forward by the study, building from the analysis of South Africa and Mozambique's environments. The chapter looks at the negative impacts of the current green energy transition implementations in South Africa and Mozambique.

Chapter 5: Recommendations to the Implementation of the Green Energy Transition- The chapter tied up the research by providing recommendations and key points for policy advisors relating to the implementation of the green energy transition going forward in future and providing guidelines and potential future research into the green energy transition.

Chapter Two: Defining National Security and Energy

2.1. Introduction

This chapter will introduce the main concepts within the research, specifically national security, and energy, providing a deeper understanding of both to create a conceptual framework for the research. The chapter will begin by conceptualising national security, highlighting the key characteristics and determinants of national security in the 21st century. Through this the developments and shifts of the parameters of security over the years will be explained, to provide an understanding into the link between national security and energy, and how this can influence national security. The chapter will also unpack the concept of energy, conceptualising and exploring the link between energy and electricity further narrowing down the realm to be covered by the research. A brief explanation as to the importance of energy to national security will also be covered in this chapter, linking the two concepts together in order to inform further chapters and explain their relevance to the field of security studies.

2.2. National Security

Dymtro Kuleba, Ukraine's Minister of Foreign Affairs stated in an interview that "The West has to realise the era of peace in Europe is over, but it's not just Europe" (Hiebert 2024). As like many other concepts within the discipline of international relations there is no one universal definition for the concept of national security, however, over the years the characteristics and determinants of national security have changed. Authors have developed new definitions as the discipline and its concepts have evolved with the rise of new threats far from the traditional dangers to security we saw as far back as the First World War. However, to clearly understand national security, it is important to explore the concept of security as a starting point.

2.2.1. Security

The Roman origins of the term 'security' link it to being in a state of "no worries" (Stripple 2012:183). However, over the years, defining security has not been as simple as in the Roman ages. The concept of security remains contested, as scholars have struggled to narrow down one universal definition of the concept as the term security means different things to different people. Adhikari (2024:1-2) suggested that this is due to a lack of coherence and as a result of the subjectivity of the concept itself. It

can be argued that the changing determinants of security have greatly contributed as well to the lack of one clear definition of the term. This has not stopped scholars from trying to produce a definition of security that encompasses the new evolutions throughout the years. A frequently used definition of security is by Arnold Wolfers who defines security as “the absence of threats to acquired values” (Wolfers 1952:485). However, this definition then raises the questions of what exactly is considered as an acquired value, and what threats are we protecting it from? Buzan argues that a definition of security that does not specify a ‘referent object’ or what is being protected, does not make much sense (Buzan 1991:91). This is because traditional security was understood on the basis of three pillars, who is in danger or who is being protected (the referent object), what are they in danger from or what are we protecting the referent object from (the threat) and how to respond or protect the referent object (responses) (Barnett 2001:57). Traditionally, the referent object in security focused on the state as the referent object, which meant that the threats and solutions discussed were mainly related to the referent object, the state. This limited the focus of security to primarily military threats to security providing a very narrowed definition of security to have a more state centered approach. Following the shift in the security environment after the Cold War, there was a need to broaden the agenda of security that could encompass solutions to the developing threats and challenges of the developing world.

One such attempt to broaden the agenda of security was the introduction of human security. The theory of human security was guided by the Universal Declaration of Human Rights under the United Nations General Assembly which states in Article 3 that “everyone has the right to life, liberty and security of person” (UN 1948). This understanding forced scholars and government to expand their outlook on what threats could threaten security as now security itself was redefined. Security was no longer about protecting the state from foreign or external threat but now protecting the citizens of a state from both internal and external threats. This led to the development and further classification of traditional and non-traditional threats as the latter threats could not be defended through military action.

This affirmed Buzan’s argument that security, in its most pure form, is equated to survival. This survival according to Buzan “consists of a range of concerns about the conditions of existence” (Buzan 1991:432). In summary, Buzan explains that security

is a complex notion and relies on the interworking of many parts and that concerns (political, economic, environmental or societal) do not work in isolation but rather in relation with each other. This is seen in the new understandings of security as they reflect how the security threats have changed due to; advancements in technology as well as the increase of trans-border interaction to mention a few reasons. Paul Rogers (2019), in his work 'The Triple Paradigm Crisis: Economy, Environment and Security' hints at a wave of 'new security' focused around the three most prominent drivers of insecurity over the next coming decades. He states that "a failing neoliberal system, climate disruption and its impact on human activity, as well as a security culture of using military force to respond to threats" are all issues encompassing the following decades that need to be addressed when discussing the security of both the state as well as the individuals in it. These issues in turn need to be addressed when creating new policies, as seen in the research below, as these could threaten or affect the referent object. This also means there must be a shift in the way national security, as one policy, should be regarded.

2.2.2. National Security

As with a majority of the concepts in security studies, national security is a contested concept. Often noted as one of the seminal authors within the discipline, Walter Lippman proposes that "a nation is secure to the extent to which it is not in danger of having to sacrifice core values if it wishes to avoid war and is able, if challenged, to maintain them by victory in such a war" (Wolfers 1952:484). According to Grizold (1994:40), "it was not only until World War 2 that the term national security acquired its place in the strategic dictionary amidst the traditional terms such as military affairs".

National security as a concept finds its assumptions in the old traditionalist school of thought, mainly realism. Many definitions associated with national security emphasize the protection of the state, as it is identified as the referent object, and the territorial and sovereign security of the state in relation to external military threats. With the emphasis remaining on the physical boundaries to do with the state, it is safe to state that there is a general assumption that national security begins and ends with a state's capability to deter and defend against a military attack. Fjäder (2014:117) explained national security to be understood as "above all maintaining security within a geographically defined territory in order to protect the survival of the state both against

both external and internal threats”. This focus on the traditional approach to security was further strengthened by Vojin Dimitrijevic, who explores the notion that there are five primary features which can be considered to be the basic elements of national security. The five features encompass “ensuring of the quality of life; embedding of the vital interest of the state within the national security policy; maintaining political independence; ensuring the existence of the state as a political community as well as the physical survival of its population; and protecting territorial integrity as the basic right of the state” (Dimitrijevic 1973:11).

National security cannot be explained without the mention of national interests as Goldman explains that “national security, whether understood as a process or as an objective, refers to the protection of core national interests from external threats” (Goldman 2004:45). This makes understanding national interest important in understanding national security. Joseph Nye states that national interest is “a set of shared priorities regarding relations with the rest of the world” (1999:23). These set of priorities are guided by the citizens as they decide over matters, they consider to be key in establishing their identity. Another key author in the definition of national interest is Nuechterlein (1976:247) as he explains national interest as “the perceived needs and desires of one sovereign state in relation to other operating states comprising the external environment”. It can therefore be concluded that national interests guide the national security of a state as it highlights some of the internal actors to take into consideration when protecting the state. However, this prior emphasis on the physical boundaries of security, seen earlier, saw the need for states to hold national power, another important concept when understanding national security.

National power is a recurring term within security studies as it is assumed to be vital for the survival of a state. Baldwin (1997:13) explains that “National security is thus specifically concerned with the maintenance of sovereignty and territorial integrity, and protection against threats predominantly arising from other states”. This alludes to the fact that national security is focused on the projection of a nation's external power within the international system, not taking into account the domestic aspect of national security.

Over the years, the definition of National Security developed as the boundaries of the concept of security shifted. Scholars such as Chandra and Bhonsle (2015:337)

consider the social aspects and mass issues in the definition of national security and redefine national security as “an activity to protect identity, existence and interests in the range of social capabilities”. This new understanding of national security emphasizes and focused on the individual deprivation of the basic human needs, as Richard Ullman explained the two dimensions of national security as

“a threat to national security is an action or sequence of events that: a) threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a states, or b) threatens significantly to narrow the range of policy choices available to the government of state or to private non-governmental entities (personal, groups, corporation) within the state” – Ullman 1983.

The broadening and deepening of the concept of security meant that concepts such as national security were also redefined. The growing threats to national security were beyond military control or intervention and the notion that the major threats to national security stem from other nations was abandoned. Brown, in her publication ‘Redefining National Security’ writes that “The new sources of danger arise from oil depletion, soil erosion, land degradation, shrinking forests and climate alterations...which affect natural resources and systems that nation’s economies rely on threatening not only the national economy and political security, but the stability of the international economy” (Brown 1986). Energy is an important component of national security as it influences economic growth which in turn affects both the society and politics as national security promotes the functioning of a society with access to affordable energy. Energy has evolved over the years, but its importance to the stability of a country has increased as well due to rising demands.

2.3. Energy

Since the early stages of human existence, energy has proven to be a key element in society’s everyday life and development. Energy is defined by scientists as the ability to do work. This is achieved when energy can be changed from one form to another form in order to complete tasks. Over the years and through development, energy has shifted from the use of wood and stone to create fire, to the usage of nuclear energy. Due to modernization, sources of energy have evolved from natural sources of energy such as the sun, water, to mining and extracting minerals such as coal from the earth.

These have been divided into renewable and non-renewable sources of energy. Renewable sources of energy refer to sources of energy that can be replenished such as the sun, wind, the growth of plants which are all natural occurrences. Most non-renewable sources of energy on the other hand are in limited supply due to accessibility. These include coal, petroleum, and natural gas. Both non-renewable and renewable sources of energy can be used as primary energy sources, which means the source is used without being transformed, and for secondary usage such as coal (primary state) being transformed to synthetic gas (secondary energy) which can further be converted to electricity (tertiary energy).

According to Azzuni & Breyer “human beings began to use energy for heating, cooking, and protection, securing access to these resources has been a key priority” (2018: 167). As societies continued to develop, the need and dependency on energy increased as its uses expanded, increasing the demand for non-renewable sources of energy as they provided immediate and quick solutions to catch up with the everchanging global dynamic. Looking back in history, coal replaced wood in 18th century Britain which led to the industrial revolution, decades later coal was replaced by oil as the main source of energy which then later changed again to natural gas (Yergin. 2020:42). According to Van de Graaf and Sovacool (2020:12), energy transitions throughout the years signified major transformations in the global order and “transformed the global balance of power in major ways”, however this growing increase in the global demand and supply of energy began to affect the international order as well as the relationship between countries due to varied levels of accessibility.

An example is the oil crises in the 1970’s where “the global dependency on oil from the Middle East (and the Organization of Petroleum Exporting Countries (OPEC)) facilitated the oil crises of the 70’s where the oil supply was restricted” (Bradshaw, 2009:192). This oil crisis led to various price increments throughout the Western states disrupting economies and increasing pressure on governments as well as the citizens. The result was the creation of the International Energy Agency in 1974, which attempted to assist states in coping with the oil disruption.

Energy is an important part of human activity and by extension state activity, however “although physical energy is usually not in short supply, the useful energy that people can use in the form of energy services is” (de Joode *et al*, 2010:48). As mentioned by

the above example of an energy crisis, it was clear to see that the world was more at risk of an energy crisis rather than a physical war breaking out, which led to the issue of securitising energy. Robert Lieber as cited by Aliaksandr Novikau stated that “energy became a security issue when the supply of oil and later the ability to pay for this oil became a matter of national survival [...] though the impact of access to natural resources on how and to what degree states interact with other states had been acknowledged before, the oil crisis highlighted the direct relationships between energy, security and foreign policy” (2022: 37). The interruption of energy supply as well as the values being jeopardised for the acquisition of this energy led to the securitization of energy as interruption and affordability were and are the primary threats to energy security (Yergin 2020:41). Energy can be considered secure when “a country has energy reserves, balanced supply and demand, as well as affordability” (Bajracharya et al, 2022 :24).

National security needs a state to have access to affordable energy as this supports the economic growth as well as the basic running of the state as it allows social and economic activities to be carried out without disturbance. As energy became a growing threat, it was now important to question the security of energy. This led to questions such as “energy security from who? energy security from what threats? Energy security for which values and energy security by what means?” (Cherp and Jewell 2011:236). However, this also presents the issue of which component exactly of energy needs to be protected in this instance and what are the threats and how will this energy component be protected.

2.3.1. Electricity

Electricity is defined as a “type of energy that consists of the movement of electrons between two points when there is a potential difference between them, making it possible to generate what is known as an electric current” (Repsol 2024:2). Electricity is an essential in our day-to-day processes as it plays a significant role in the betterment of human life. It is considered as an accessible, versatile, and easily transportable form of energy. Electricity is proven to be present in nature and its generation is separated in two groups, renewable and non-renewable generation.

As defined earlier in the chapter, renewable energy refers to the extraction or sourcing of energy from natural resources that do not have availability limitations on their access, such as wind, water, and sun as sources of energy.

Electricity accounts for one fifth of primary energy use in today's society having a 24/7 indispensability rate. The Covid-19 pandemic of 2020 highlighted just how important electricity was in the day to day running of society from the running of medical equipment in hospitals to the importance of IT systems for conducting teleworking (IEA, 2023:1). The IEA World energy Outlook reports that the final energy consumption of electricity is set to grow as "having increased from 15% in 2000 to 20% today, it is believed that by 2040 it would have grown to 24%" showing the increasing importance of electricity as an energy source. Electricity is important to states as it is linked to key sectors that influence the running of a state as well as the livelihoods of the people within the state. Electricity links residential activities, industrial and commercial activities, medical activities as well as the oil and gas industry, communication, finance, travel, and other industries, increasing the need for electricity security. Electricity security is defined as "security of supply" as the main outcome of electricity security is to "provide electricity to customers reliably and at reasonable cost or when the electricity system's capable to ensure uninterrupted availability of electricity by withstanding and recovering from disturbances and contingencies" (IEA 2023:2). This has resulted in governments and groups looking for ways to produce electricity in a way that does not create another security issue, such as the use of renewable sources of electricity.

When looking at renewable sources of electricity there are three main sources that are used for the generation of renewable electricity, mainly wind energy, photovoltaic solar energy, and hydropower (Zhang & Kong, 2022). Wind energy utilizes wind turbines to capture the kinetic energy of air currents, transforming it into electrical energy. Photovoltaic solar energy involves the conversion of sunlight into electrical energy through the use of solar panels. This is the most common used form of electricity next to hydropower. Hydropower is the most traditional and sustainable practice and the most demanded renewable source of electricity; however, its infrastructural requirements make it a less attractive choice. It is based on the creation of dams or dykes as well as the need for the hydraulic turbines that use the force of moving water to harness and produce electricity (Pablo-Romero *et al*, 2021:138). Though renewable

sources of energy are an attractive and clean solution to power generation, a common disadvantage through all the renewable sources of energy is their dependence on suitable atmospheric conditions. For example, the solar panels work at full capacity depending on the intensity and visibility of the sun, as well as wind energy that relies on specific weather conditions (Repsol 2024). This has resulted in the need for alternative quicker solutions to electricity generation that are not based or limited by uncontrollable weather situations.

Non-renewable energy sources use limited natural resources to generate electricity. These resources are limited as they are not easily or universally accessible as they are found in specific parts of the world, for example coal, which is largely found in the United States of America, Russia, and China with Africa contributing to 3% of the global share (Matsui *et al*, 2021). They are also classified into two separate groups: energy from fossil fuels and energy from nuclear fuels. Electricity is generated from fossil fuels by burning oil, natural gas, or coal. Electricity can also be generated from nuclear fuels through a process known as nuclear fission which is the most known for producing energy (Sokulski *et al* 2022). Uranium is known as the common nuclear fuel used to produce electricity. Non-renewable sources of energy, though limited in terms of availability of resources, are well known as emitters of harmful greenhouse gases into the atmosphere. This has resulted in a global initiative to move away from these harmful methods of energy generation to cleaner and renewable forms of energy that are accessible to all. This is known as the green energy transition.

2.4. The Importance of National Security and Energy to Security Studies

Energy has increasingly become an important topic within the realm of national security as well as security studies as a discipline after what some scholars believe to be two decades of relative silence on the matter. It is self-evident that energy is critical to the survival and security of a state. Mahalik & Mallick (2014:143) highlights that one of the major reasons to this is the growth in demand of energy globally. After the Second World War due to nationalisation of oil by governments, the price of oil and other natural resources rose to heights last recorded during the beginning of the Third Industrial revolution. Hughes & Lipsey (2013: 319) record that “Global prices increased from an average of \$2.48 in 1972 to \$11.58 by 1974, and between 1979-80 prices increased to \$36.83, and to \$41.00 by 1991”. Energy has also become a topic of interest due to the increased focus on climate change. Climate change has been

defined as a transboundary issue, meaning that not a singular country generated or is being affected by this issue, but rather climate change is a global issue requiring the collaboration of states. One of the largest components of greenhouse gas emissions, which are the cause of climate change, is the consumption of fossil fuels which are used globally, for example, as energy generators (O'Hara, 2023: 4).

Energy, specifically electricity, is important for a nation's economic growth and development as it powers industries, businesses, households as well as transportation. It allows nations and individuals to manufacture goods, provide and carry out various services as well as transactions (Johnson & Boersma 2015: 172). Electricity also improves the quality of life of citizens through personal use, i.e., laptops, stoves for cooking, as well as ensuring the health and safety of individuals within a country as electricity is vital for healthcare facilities, the operations of medical equipment and surveillance systems for rapid emergency communications. According to Zakharov (2017: 187), the "energy security of the country is a state of protection of the economy and the population of the country from all possible threats to national security in the field of energy". The scarcity of energy resources has been proven to be a serious threat to the functioning of both individuals and society, making energy a safety determinant for states. Lee and Wang (2022: 3) state "Depleting natural resources has become the most important and worrying issue for policymakers worldwide because this trend seriously affects economic stability and energy security". Though it can tremendously affect economic stability and energy security which in turn impact national security, the nexus between resource depletion and national security remains an unexplored avenue in literature till this day.

Phillip Cornell attempts to explain the importance of energy in national security by making use of a three-tier model of national security. He suggests that "(1) national security as the functionality and success of security services at the primary level; (2) as the functioning of critical domestic services at the secondary level; (3) and as economic well-being and prosperity at the tertiary level" (Cornell 2009:63). Based on his classifications, energy at a primary level can be seen with energy in the military from tasks such as transporting weapons for troops to the development and working of fighter jets. At the secondary level, energy makes for most of modern-day societies infrastructure, "Electrical power drives everything from communications, transportation, and water distribution to the oil and gas systems that produce that

power” (US Department of Defence, 2007:11). Finally, energy in national security, at the tertiary level requires reasonable pricing to be used by the public in terms of demand of energy. From this perspective, consumer economies thrive when energy prices remain stable, avoiding excessive burdens on productivity, consumption, and overall inflation. The international public policy focus should thus be on price stability (US Department of Defence, 2007:12).

2.5. Conclusion

This chapter has focused on defining both national security as well as energy, broadly giving insight into what can be expected in the following chapters as they narrow down the focus of energy and its role in national security. The above chapter introduced the concept of national security focusing on its development through the years from a basic and realist school of thought that viewed national security in the military context, to a school of thought that took into consideration matters such as environmental threats as potentially disturbances to a state’s national security. The chapter then delve deeper into environmental threats to focus of the concept of energy as it has become one of the biggest environmental topics within security studies, mainly its accessibility and its long-term survival. The realm of energy being too broad a topic, lead to the focus on electricity within the context of energy and a brief definition as well as the processes of electricity. The chapter then ends by linking national security and energy within the discipline of security studies, thus providing a basis to the research of the implication of the green energy transition on national security.

Chapter Three: The Green Energy Transition in Action

3.1. Introduction

Driven by the growing and urgent need to address the worsening climate crisis, the global energy landscape is witnessing a transformation. With the consequences of global warming being experienced, energy production and its consumptions have taken a drastic turn. The following chapter delves into the concept of the green energy transition as an alternative to fossil fuels. As energy production currently accounts for up to two-thirds of global greenhouse gas emissions, it is more now than ever imperative that a sustainable alternative with minimal harmful after-effects is introduced. This transition not only highlights a change in technologies and minerals used in energy production, but also the policies and national security considerations, particularly in South Africa and Mozambique. The following chapter will explore the current energy landscapes of the two case studies analyzing their policies in order to understand the significance of the transition to renewable sources.

3.2. What is The Green Energy Transition?

Globally, the ongoing energy crisis has required more work and focus on important policy questions, most of which address how countries can stay fully committed to the green energy transition. It was agreed upon during the 28th Conference of Parties (COP28) that each country has a duty to promote the energy transition from fossil fuels to a more renewable and sustainable form of energy (Kim et al, 2024: 3). To fully comprehend what the green energy transition is, it is important to explain, as mentioned above, the current energy crisis as a basis to understanding the green energy transition.

3.2.1. The Current Energy Crisis

From as early as 1970, due to development, several drivers of human conflict were recognized, with environmental drivers gaining more importance within the global context. Brown & Dworkin (2010:180) identified drought, deforestation, ozone depletion as well as depletion of fisheries as some of the trending environmental issues in the later 1900's. However, at that time, issues concerning global warming were considered by policy makers as issues of 'marginal concern', meaning these

issues were not of any immediate threat to the livelihood and survival of states. Today, these environmental issues have evolved to potential security threats globally. According to a NOAA report, “over the last century, the burning of fossil fuels like coal and oil has increased the concentration of atmospheric carbon dioxide (CO₂)” (NOAA 2023:2). This is due to the industrial activities brought about by an increase in the global population as well as global industrialization. It is recorded that this has raised the atmospheric carbon dioxide levels by nearly 50% since 1750 (NOAA 2023:2). There are four main gases that have been found to be the majority contributors to the greenhouse effect², namely, methane, carbon dioxide, nitrous oxide, and chlorofluorocarbons. The Intergovernmental Panel on Climate Change, in their sixth assessment report, concluded that the “increase of CO₂, methane and nitrous oxide in the atmosphere during the industrial era is the result of human activities. The result of this increase is more commonly known today as climate change.

Climate change is described by the World Meteorological Organization (WMO) as the “buildup of greenhouse gases in the atmosphere during the 20th century as resulting from the growing use of energy and expansion of the global economy” (UNFCCC 2011). Climate change has had an impact regionally as well as globally as there has been a significant increase in the effects of climate change, such as the rise in sea levels and extreme weather conditions such as heat waves and heavy precipitation for example. The impact to the environment, in turn, affects the ecosystem, global health as well as the industries and societies globally. A sector that both largely impacts and is impacted by climate change is the energy sector.

Energy services are necessary for development and growth, however over the years, fossil energy conversions as well as their end use are recognized by the World Development Bank as “a major contributor to global warming” (World Bank 2023). According to IRENA (2018), the energy sector is “the source of two thirds of the global greenhouse gas emissions”. This is due to the global energy demand increasing over the years also because of both economic growth and the increase in population. There are three main components that make up energy production, namely transport, electricity, and heating. It is predicted that without secure policies to regulate emissions, “from annual emissions of 30 gigatonnes (Gt) of carbon dioxide in 2010,

² The Greenhouse effect is described as the “natural warming of the earth that results when gases in the atmosphere trap heat from the sun that would otherwise escape into space” (Denchak 2019:3)

projections indicate that...the energy supply sector and also the energy use in transport, industry and buildings would contribute 55-70 Gt of carbon dioxide per year by 2050” (IPCC, 2023: 5). This has brought the increasing need for a solution to global warming as the increased rate of global heating and its effects in turn threaten the future existence of the global population.

3.2.2. The Green Energy Transition as a Solution to the Energy Crisis

The International Renewable Energy Agency (IRENA) defines the energy transition as “a gradual and steady shift of global energy use from fossil-based sources to a zero-carbon system by 2050”. It is reported that up to 73% of the global greenhouse emissions come directly from the energy sector, which has resulted in the increase of global warming (IRENA 2018:14). Through the green energy transition, scientists aim to contain the projected 1.5 degrees Celsius rise in global warming as well as to reduce the emissions as a result of the use of fossil fuels which are key contributors to climate change. The energy transition encourages the shift of energy productions and consumption from materials such as oil, natural gas, and coal to renewable energy sources such solar, hydro, and even lithium-ion batteries (S&P Global, 2020). An example of the energy transition is within the realm of electricity. The main gas found in fossil fuel emissions is carbon dioxide, which is found predominately in the burning of fuels, mainly from the energy sector, but more specifically in the generation of electricity.

According to the World Bank ‘Climate Impacts on Energy Systems’ report (2023: 5), “today 70% of greenhouse gas (GHG) emissions come from fossil fuel combustion for electricity generation, in industry, buildings and transport”. According to the chart produced by the Energy Institute (Fig 1), globally coal is still the largest source of electricity production.

Electricity production by source, World

Measured in terawatt-hours¹.

Our World
in Data

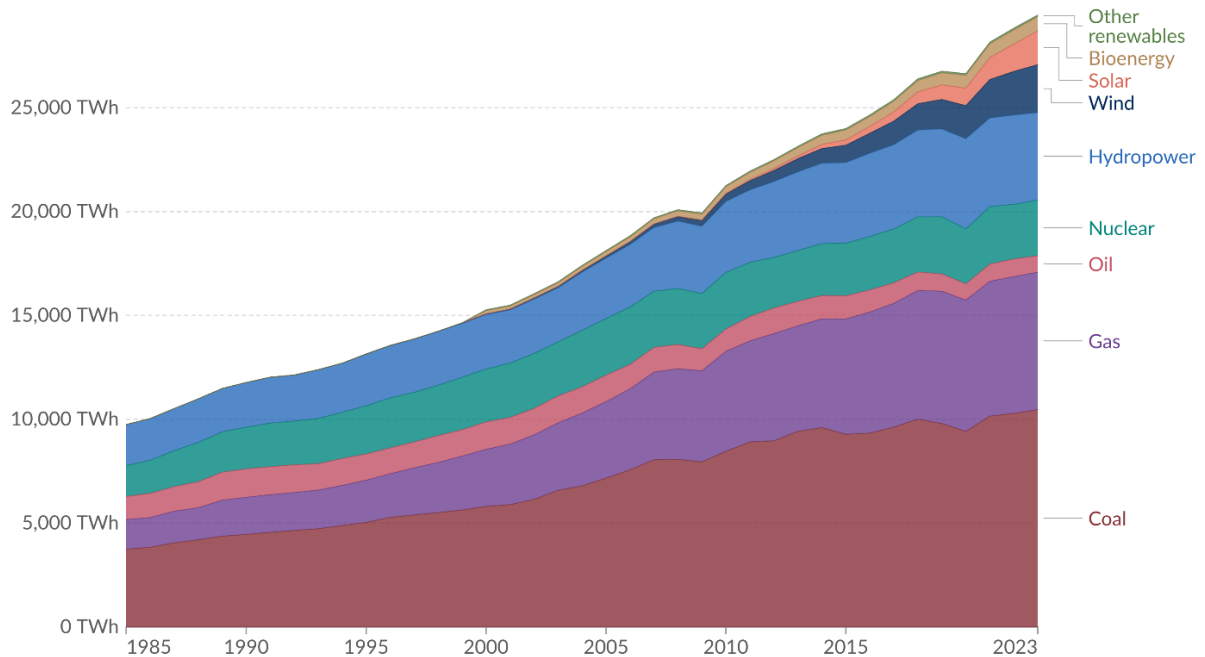


Figure 1. Global Electricity Production Chart (Energy Institute -Statistical Review of World)

However, with the call to transition to more low carbon emitting sources of energy production, there has been an increase in the use of wind and solar, with hydropower and nuclear power being the two leading sources of clean electricity production. It is also believed that digitalization can also tackle the lead that coal-fired power stations have as “the digitalization of electricity grids can usher in the age of smart grids [...] from the environmental perspective, renewable sources and electric mobility will reduce pollution significantly” (NCCC, 2024).

There has been an increasing need to promote the energy transition over the last decade due to the global energy crisis. In 2023, the United Nations World Meteorological Organization reported that “the global annual average temperature was nearly 1.5 degrees Celsius above the pre-industrial levels” (UNWMO 2023: 13). This is considered a global energy crisis as now the world is more interlinked than it was 50 years ago, and more over due to the terms of the Paris Agreement in 2015. During this conference, the COP21 held in Paris, it was agreed upon that states would aim to “limit the long-term temperature rise, which was the average for a decade rather than a single year such as 2023, to not more than 1.5 degrees Celsius” (Enel 2023:

23). This means that the projected rise in temperature for over an average of a decade was surpassed in a singular year. The ultimate success of the energy transition is largely dependent on the transformation of the global energy sector from “fossil based to zero carbon sources by the second half of this century, reducing energy related CO₂ emissions to mitigate climate change and limit the global temperature rise” (IRENA 2024: 2). It was reinforced at the COP28 held in the United Arab Emirates that there is need for a continued focus on increasing the investments towards renewable energy sources.

The energy transition does not only impact the environment, but also politics, the economy as well as society. The energy transition will lower the global carbon emissions reducing global warming as well as limiting the impacts of climate change such as droughts and flooding from extreme weather conditions, for example (Enel 2024, 25). This would also affect society as reduced effects of global warming includes reduced pollution levels, inevitably reducing the number of diseases caused by polluted environments, and as a result improving global health as well. IRENA (2021) also estimates that long term, the energy transition could “reduce energy bills and industrial costs [...]and the evolution of renewable technologies will create up to 13 million new green jobs by 2030”. The transformation of the energy sector is reliant on urgent action being taken on a global scale altering both national and regional commitments.

In Africa, one of the key goals of the African Union’s Agenda 2063 ³is the eradication of poverty in one generation and the building of “shared prosperity through social and economic transformation of the continent” (AU 2023). Energy plays a large role in this goal as up to 46% of Africans do not have access to electricity in their homes. It will require a strong political initiative for the energy transition within Africa in order to tackle the challenges to the energy production and availability in a sustainable manner. In Southern Africa, as well as in Africa as a whole, South Africa has been known as a leader in implementing ambitious renewable energy policies as well as leading the discussions on the advancement of the Just Energy Transition agenda through its Presidential Climate Change Commission (Chevallier and Marais, 2022). Mozambique is also considered an African country with the highest green energy capacity as

³ The African Union Summit held in January 2013 adopted the agenda 2063 – “The Africa We Want” as a blueprint and plan for sustainable development and economic growth within the African Continent.

Mozambique is known to use almost “100% green and sustainable energy [...] with hydropower accounting for the vast majority of its installed capacity with the remainder being made up of solar, gas and other sources” (Cristovao *et al* 2021). However, given the separate challenges brought about by the energy sector, especially the electricity component of the energy sector, it is possible that short term, and with the possibility of long-term effects, if not carefully mitigated the green energy transition could do more harm than good to these two states.

3.3. South Africa

Energy is an important component in the development within Southern Africa. According to the Southern African Development Community (SADC), apart from its daily life usage, “fuel and electricity catalyze infrastructure projects that drive both Regional Integration and economic growth” (SADC 2022). In an attempt to address the energy challenges being faced in the region, SADC began by implementing the Protocol on Energy in 1996. This document serves as a framework guiding the co-operation of states when it comes to the formation of energy policies, ensuring the emphasis is on the need for “security, reliability and sustainability of the energy supply...and development of low-cost energy sources” (SADC 2022). During the Protocol on Energy review in 2019, the Southern African Power Pool (SAPP) ⁴committed to the implementation of up to 15 power generation projects in eight countries, specifically Angola, South Africa, Mozambique, Zimbabwe, DRC, Eswatini, Namibia and Malawi (ETG 2023:2). South Africa was noted in the review as a country that has taken a leading role in the production of biomass energy plants. This is not the only instance where South Africa has been highlighted in taking a leading role in environmental issues.

Apart from their lead role as being one of the African countries recognized globally for their climate change policies, South Africa has gained momentum on the global stage in the last decade for both good and bad. According to Igamba (2023:11) not only is South Africa the highest emitter of carbon dioxide in Africa but it is also amongst the “top 25 greenhouse emitting countries globally, this is the case as the country’s energy

⁴ The Southern African Power Pool is a cooperation of the national electricity companies in Southern Africa under the governance of SADC. They are responsible for coordinating and planning and operation of the electric power system among member utilities.

and electricity supply majorly originates from coal (nearly 90 % of it)". However, South Africa is also well known for their 'ambitious' energy transition policies as their proposed energy transition strategy would require an investment of USD\$99 billion, which South Africa cannot afford alone (African Energy Chamber).

3.3.1. What is South Africa's National Security Policy?

As South Africa does not have an official national security strategy, the 'Framework Document on South Africa's National Interest and its Advancement in a Global Environment' will be used to convey South Africa's global position and interests. The Framework Document defines South Africa's national interest as "the protection and promotion of its national sovereignty and constitutional order, the well-being, safety and prosperity of its citizens, and a better Africa and world" (Government of South Africa 2022:9). This is expressed in the beginning of the Framework Document as the Government of South Africa states that their policies are influenced by their various international agreements. The Framework Documents highlights the impacts of environmental change as it acknowledges that:

"... the fact that climate change presents an existential threat to humanity becomes ever more real as the world breaks maximum temperature records with increasing regularity; rising sea levels threaten coastal cities and towns; wildfires devastate lives, livelihoods and landscapes; and we witness increasingly unpredictable, intense and frequent extreme weather events and their tragic consequences" – Framework Document on South Africa's National Interest

The Framework Document brings to attention the need for international cooperation between states and non-state actors as well as the dire need for global leadership when it comes to mitigating the effects of climate change. Though the Framework Document leaves a lot to be desired in explaining South Africa's energy transition policies, the South African government in November 2023 launched what is known as the Just Energy Transition Implementation (JET). The JET was created as a guideline to reduce the country's reliance on coal power production by the year 2027 to more renewable options (Amansure 2024). It was created under the umbrella of the

Presidential Climate Commission⁵ established by President Cyril Ramaphosa. President Ramaphosa describes the commission as “an independent, statutory, multistakeholder body whose purpose is to oversee and facilitate a just and equitable transition towards a low-emissions and climate resilient economy” (Presidential Climate Commission 2023). The goal of the JET reiterates the importance on the focus on climate change highlighted in the Framework Document as it was established to address the global risks of climate change which directly implement the livelihood as well as the economy of South Africa.

In addition to the above, South Africa’s Defense Review of 2015, a document that provides a long-term defense policy and defense strategic trajectory to be pursued by the country, emphasizes the need to protect the environment. It highlights the three main objectives, the Triple-Ps to be followed when pursuing South Africa’s national security. These three objectives focus on the people, the planet and prosperity of the country as the government’s goal is to “protect the planet and manage climate change to ensure sustainability for future generations” (Government of South Africa 2015: 94). This is supported by the sub-objectives listed in the Defense review as the third objective focused on “ensuring the security of internal and external strategic resources and infrastructure such as minerals, energy and water including the safe and secure delivery, processing and distribution thereof” (Government of South Africa 2015: 96)

South Africa has entered many climate change treaties as well as adapted and approved key climate actions such as the few mentioned above. These are all in attempt to create a more sustainable future but more importantly, to mitigate the current energy environment in the country as it is well known for its national power cuts or ‘loadshedding’⁶. It is important to understand the electricity environment of South Africa as it plays a large role in seeing the success or failure of the green energy transition in a country that is a large emitter of carbon dioxide but also greatly involved in various climate change agreements.

⁵ The Presidential Climate Commission is a “multi-stakeholder body established by the President of the Republic of South Africa to advise on the country’s climate change response and pathways to a low carbon climate resilient economy and society” (TIPS 2021:1)

⁶ Loadshedding is the local South African term used to describe when load is removed from the power system due to an imbalance between the electricity available and the demand.

3.3.2. The current electricity environment

Riskonet, a risk consultancy agency, identified “political upheaval, the ongoing energy crisis [...] and an increase in violent crime” as immediate risks to South Africa in 2023 (Mungabe 2022). One of the major ongoing energy crises within South Africa is specifically in the field of electricity.

The goal of Eskom was to rapidly industrialize the economy through “the provision of low-cost power and the development of steel and iron works” (Kitzing *et al* 2024). However, it is important to note that this led to the systematic exclusion of the African population, which was a majority, as the focus was the public provision of electricity to ‘white-only’ neighborhoods. Kamanzi states that “the establishment of Eskom (now Eskom) relied on the development of municipal plants for domestic consumption, more crucially, it relied on providing cheap power for electric rail” (2022:12). The increased expansion and usage of electricity increased national productivity from extraction of minerals to the transportation. Between 1968 and 1990, the need for electricity continued to grow with the increase of industrialization within the country. It is reported that “during the 1970s and 1980s, there was a rapid and significant increase in the demand for electricity boosting South Africa’s industrialization efforts [...] the electricity demand rose at a rate that would require Eskom to double its capacity every 8 years” (SANews 2023:3). This saw the need for several new power stations to support the increasing need for electricity, such as the construction of the Koeberg Nuclear Power Station which was amongst the largest in the world at the time.

The domestic consumption of electricity grew globally, and in South Africa as electricity had now become a part of daily life. In July 1980, it is estimated that “roughly 600 workers, based at the Orlando Power Station in Johannesburg, led industrial strike actions over the wage dispute” (Kamanzi 2022:16). Following the end of the apartheid era, the National Electrification Forum (NELF) was created under the proposal of Charles Dinley through his work ‘Electricity for All: The Need and the Means’ (Dingley 1990). This was later renamed as the National Electrification Program (NEP), whose objective was to carry out the national electrification as a developmental imperative. It saw to the running of 260 projects by 1992 and between 1993 and 1996 “58.2% of households had electricity, and between 1996 and 2014, 4,3 million households were electrified” (Siyobi & Moosa 2022:1). These figures are important as prior to beginning

of the 1990's only 36% of households in South Africa has access to electricity (Siyobi & Moosa 2022:1).

As early as 1998, the new democracy under the ANC, drafted the Energy White Paper of 1998 to find solutions to South Africa's energy problems in the sustainability area. It promoted a new development model that focused on "economic efficiency, social equity, and environmental sustainability. However, though drafted, this bill was never implemented, foreshadowing one global obstacle when it comes to tackling climate change and environment sustainability laws. While attempting to create sustainable policies in the energy sector, a key moment in the development of Eskom was also occurring as the new policy structure, guided by the 1998 Energy Policy, looked at the possibility of Eskom becoming an independent power provider. Eskom was to be privatized which was strongly opposed by the ANC which opted for Eskom to become an 'instrument of state power'. This weakened Eskom and in 2001, following the Eskom Conversion Act, after being removed of its privileges of autonomy and cheap electricity though coal fired power stations remained. By 2003, South Africa was believed to have almost "double the electricity consumption per capita than the global average" as Eskom was providing large amounts of electricity (SAHistory 2019). Between 1994 and 2014, Eskom rapidly increased the amount of electricity provision due to the increase in demand due to industrialization. This rapid increase however, also led to severe system problems beginning with the failure of the Duvha Power Station of 2003 and the shutdown of one out of the two units at the Koeberg nuclear power plant in 2006 which saw the increase of blackouts within the Western Cape province by 2007 (Sahistory 2022). These blackouts were described as due to the deficiencies in the Eskom system; however, this was only the start as more crises continued to emerge over the years.

It was recognized by Eskom and its partners, that the trajectory of energy supply was not something they were prepared for with the current state and increase in energy generation capacity. This led to the creation of numerous proposals that included a greater increase in the use of nuclear and renewable energy sources, as well as fossil fuels such as coal which was the main resource used in the generation of electricity. In 2010, despite the global outcry for cleaner sources of energy, South Africa consolidated their 2005 resolutions to ensure the construction of three new power stations in the country with the two, Kusile and Medupi, being coal fired stations

(Akinbami et al 2021:5079). However, though failure to comply with global regulations to erect these power stations played a large role in showing one of the major downfalls of Eskom, financial issues in 2008 such as increased tariff rates and slower economic growth resulted in a lack of capital within Eskom. The poor quality of coal being used to power these stations was also a contributing factor to the electricity situation as by 2018 South Africa was facing a coal emergency due to under investment in coal collieries. Corruption is also an important factor as mismanagement of resources is a common occurrence with government officials in South Africa, as it is reported that “One billion rand, the equivalent of \$55 million, is being stolen from Eskom every month” (SARB 2024: 15).

The situation continued to worsen as in 2021, “91% of South Africa’s total energy supply has been based on fossil fuels, compared to the global figure of 80% fossil fuel usage” (IISD 2024:1). Though the amount of fossil fuel usage rose, this did not solve any of the country’s electricity problems as in 2023, the country reached a record high of scheduled blackouts with the country experiencing ‘loadshedding’ on 335 of 365 days of the year (IISD 2024:1). These rolling blackouts not only have an impact on the quality of life of the country especially through disruptions in health services for example, but also the on economy. It is recorded that “the South African Reserve Bank estimated that loadshedding has reduced economic growth as in 2023 economic growth dropped from 1.1% in 2022, to 0.3% in 2023” (SARB 2024:18). These figures should be of concern to the government as economic growth has reduced, however population has not decreased, contributing to further challenges such as higher rates of unemployment which South Africa is already struggling with. The rolling blackouts have also resulted in significantly increased crime response rates created by disrupted security systems and darker and less secure environments as many areas do not have backup power systems. A study carried out by the South African Police Services (SAPS) in 2020 revealed a “rise in the report of crime committed during loadshedding, particularly in residential burglaries and thefts” (SAPS 2020).

The increased reliance of fossil fuels for electricity production is believed to increase the risks as well as prove a failure to address long term energy security concerns within South Africa, requiring the country’s leaders to re-evaluate their policies to mitigate these risks.

3.4. Mozambique

3.4.1. What is Mozambique's National Security Strategy?

Mozambique is guided by a foreign policy that puts emphasis on the domestic needs of the country whilst fostering a spirit of partnership globally. In their foreign policies throughout the years, Mozambique reiterates their position as a state that prioritizes peaceful collaborations with states, as the motto for their Foreign Policy launched in 2010 stated “making more friends, promoting more partnerships” (Otto & Green 2014). This is also shown as Mozambique is considered as extremely dependent on donor support after gaining independence in 1975. In 1992, an estimated 70% of the gross domestic product (GDP) was made up of donor support and in 2012 this percentage dropped to a GDP composed of 39% of donor support (Cunguara & Hanlon 2012). This is mainly due to the Mozambican government intending to increase mining royalties on the other side. During his address at Chatham House, the Minister of Foreign Affairs of Mozambique, His Excellency Oldemiro Baloi expressed that the objectives of Mozambique's foreign policy could be summed up as “ensuring economic and social development of the country; strengthening the bonds of friendship and good relations of cooperation with all members of the international community; promotion of sustainable development; contribute to the solution of conflicts based on a negotiated process [...]” (UN News 2020). In his address, he also highlights that Mozambique's foreign policy expresses the efforts taken by the government to take part in the global efforts to address issues like climate change negotiations.

The National Development Strategy from 2015 to 2035 is a strategy based on the 2003 document ‘Agenda 2025’ created by a committee of counsellors in Mozambique to outline the countries visions and strategies for future development. To ensure these strategies the National Development Strategy was created, which focused on an approach to development that highlighted the importance of the structural transformation of the economy with industrialization at the center of this (Instituto Nacional de Estatística 2014). The National Development Strategy acknowledged the importance of the management and sustainability of natural resources, leading to the creation of the National Climate Change Adaptation and Mitigation Strategy Strategic actions. Through this strategy, the country saw new forestry measures, strategies to reduce deforestation as well as looking at promoting low-carbon agricultural practices (Serzedelo & Delgado 2019: 23). Several successes can be listed under the National

Development Strategy, such as the implementation of modernized programs such as the National Investment Plan for the Agricultural Sector (PNISA) as well as the improvement in the rate of unemployment as it dropped from 20.7% to 18.4% by 2023 (Club of Mozambique, 2024).

In June 2024, the Mozambican Government approved a new revision of the National Development Strategy, 'ENDE' for the next 20 years (2025-2044) which will be based on five pillars, “the structural transformation of the economy; social and demographic transformation; infrastructure, organization and territorial planning; governance, peace and security; environmental sustainability and climate change” (Club of Mozambique 2024). Looking specifically at electricity, in line with the Government of Mozambique’s Five-Year Plan, the Government has committed to devoting their focus to the electrification and access to power to the rural communities of Mozambique as well as the poor in the country in an attempt to improve national power coverage. The plan looks to “continue expanding access to electrify with a special focus on rural and peri-urban areas, raising the level to 64% by 2024 and to 100% by 2030” (African Development Bank, 2021).

Another response to tackling global issues, specifically climate change negotiations and promoting sustainable development, the Government of Mozambique saw to the creation of the National Adaptation Plan (NAP) which is based around the outcomes of the Paris Agreement; the principles of the United Nations Framework Convention on Climate Change; the Sustainable Development Goals (SDGs); as well as some foundations in the Mozambique National Development Plan. The NAP is focused on achieving the objectives of the National Strategy for Adaptation and Mitigation of Climate Change (ENAMMC) which are “to reduce the vulnerability of people and the economy [...] without neglecting the objective of promoting low carbon development” (Climate Change Laws, 2013).

The government of Mozambique is a member of several international conventions and collaborations that focus on the impacts and importance of biodiversity in order to promote sustainability in the country itself. Though its political history into its energy sector may not be as extensive as South Africa’s, the history in the energy sector plays a large role in understanding Mozambique’s current energy environment and crises.

3.4.2. The Current Electricity Environment

The energy policy in Mozambique is believed to be shaped by its political history, particularly post-colonial rule in 1975 when Mozambique gained its independence. Two years after independence, the Electricidade de Moçambique (EDM), a state-owned utility created to promote industrial and agricultural development was created. The EDM was also tasked with improving domestic electrification throughout the country. However their efforts were hindered as just after independence, Mozambique fell into a period of instability. After independence, Mozambique's experienced a pause in the development of their infrastructure as they lost the civil engineering and utilities expertise when the Portuguese settlers left. This was further escalated by civil war between 1977 and 1992 between the Frelimo-led (Mozambique Liberation Front) state and the apartheid South Africa-backed Renamo (Mozambique National Resistance) rebels (Salite *et al* 2021: 104). During this period and specifically in the 80's, there was a significant decline in the economy as many citizens migrated from rural settlements to urban as a result of the ongoing conflict. This conflict led to the destruction of key infrastructure in the country such as telecommunication lines and transmission grids (Salite *et al* 2021: 104). In addition to the destruction of infrastructure, there was also a decline in the general population and life expectancy rates. During this time, the Cahora Bassa dam, a hydropower project on the Zambezi River which was meant to supply power to South Africa and Mozambique had just been completed in time with Mozambique's independence. The dam is a "2 075-Megawatt, 13 000-Gigawatt hour per annum hydropower project, using a 1400km HVDC transmission line", the largest arch dam and hydroelectric scheme in southern Africa. The destruction of property during the civil war, saw to the damage of the high voltage direct current (HVDC) transmission lines in 1981 which required repair before power could continue being provided to South Africa. Zimbabwe also used this opportunity to discuss power generation of their own, negotiating a share of the outputs of Cahora Bassa and the construction of "a high voltage alternating current (HVAC) transmission line which was commissioned in 1997" (Spalding-Fecher *et al.*, 2017).

The civil war came to an end with the signing of the General Peace Agreement in 1992 which brought a peaceful ceasefire between both opponents. Power in Mozambique was being supplied by the Cahora Bassa dam and also from Eskom, the electricity utility in South Africa, through their agreed upon buy-back arrangement. The Cahora

Bassa is currently under the operation of Hidroeléctrica de Cahora Bassa (HCB) which was majorly owned by the Portuguese government, and later was bought out by the Mozambique government. Demand for electricity in Mozambique was considered to be at a very low level using only “75 Megawatts of Cahora Bassa’s 2 075 Megawatts being set aside for domestic electricity needs” ((Spalding-Fecher et al., 2017)). One of the main reasons for this was Mozambique’s relatively low electricity access levels with “approximately 20 million, or 65% of inhabitants lacking a reliable source of electricity” (IRENA 2020).

Over the years, the government in Mozambique has attempted to tackle the electrification crisis as the rates continue to increase as the rate rose from “6% in 2001 to 29% in 2019, and from 34% in 2020 to 44% in 2022” (World Bank 2023). However, this access is heavily concentrated to the urban areas, with the only 5% of the rural population having access to electricity. Hydropower is not the only electricity source in Mozambique though it is the largest occupying 79% of the total energy mix, 16% being occupied by gas, heavy oil consuming 4% and solar taking up 1% of the total energy mix (Naidoo and Loots 2024).

Mozambique, though considered to have the highest power generation in all southern Africa with the country having a generation potential of 187 gigawatts, is still behind in the attempts to promote clean and sustainable energy. Due to poor infrastructure, lack of maintenance and financial constraints, electricity accessibility in Mozambique is limited as the country experiences frequent power cuts. Electricity is ranked fourth among the most important problems that the citizens of Mozambique want their government to address.

Mozambique is recognized as one of the African countries that is most affected by climate change, with the country facing significant climate related events in the last decade. There has been an increasing intensity of events such as floods, cyclones, tropical storms, and droughts, with Mozambique experiencing Cyclones Idai and Kenneth in 2019, and Cyclone Freddy in 2023 which collectively affected over 3 million people. The increase in devastating disasters has required immediate and effective measures to combat and reduce the impacts of climate change.

3.5. Conclusion

This chapter has explored the concept of the green energy transition by understanding the energy crisis that led to the need for a change in the energy sector. Throughout the years, environmental issues have taken centre stage political, economic and societal conversations as now more than ever, all three are at risk of the effects of global warming. This has resulted in a global initiative to promote a more sustainable and cleaner way of life to limit the negative effects of climate change as a result of global warming. One of these sustainable changes is found in the energy sector, as the burning of fossil fuels like coal and oil which are used in the production of energy, making the energy sector the source of two thirds of the global greenhouse gas emissions. This increase in the demand for energy increasing greenhouse emissions, is mainly the result of the global increase in population and economic growth, both of which are irreversible bringing about the need for more sustainable solutions to energy provision. The Green Energy Transition was introduced as a solution to the energy crisis as scientists aim to contain the projected 1.5 degrees Celsius rise in global warming and to reduce the emissions as a result of the use of fossil fuels which are key contributors to climate change. An example of the green energy transition in action is within the realms of energy as coal, the largest source of electricity production, is also one of the highest emitters of greenhouse gas. Through the transition, governments are encouraged to move away from fossil fueled production, to more sustainable cleaner sources such as wind, solar or hydro power.

The chapter then focuses more specifically on the examples of South Africa and Mozambique, exploring both their national security policies and their emphasis on the importance of the energy transition to show the growing interlink between national security and energy. After exploring the level of importance surrounding environmental issues to national security, the chapter research both countries current energy situation, specifically their electricity environments. This helps understand the why it is of importance that these countries transition away from fossil fuels to renewable and green energy sources.

In conclusion, the above chapter focused on the importance of climate change on the energy sector, specifically on the important of electricity to a countries development and survival as not only does electricity impact the society and economy, but also the political sector in a country. Climate change is a real phenomenon and has seen

countries come together in order to find solutions to limit the impacts of climate change such as the green energy transition. However, though the focus is on finding solutions to mitigate the effects of climate change, there needs to be a similar focus on ensuring adequate research has been done into the challenges and negative impacts of transitioning to green energy. The following and final chapter of the research will delve into the green energy initiatives being carried out in both South Africa and Mozambique. It will draw attention to the negative impacts to both governments transitioning to green energy.

Chapter 4: The Green Energy Transition and its Negative Impacts

4.1. Introduction

The effects of global warming such as extreme weather patterns like floods, wildfires, and drought, have required a combined effort in an attempt to minimize their impact. This combined effort has included an initiative to promote a shift from the use of fossil fuels to more renewable and sustainable materials. This is specifically seen in the electricity sector as coal, one of the largest contributors to global warming, is still one of the most used sources of electricity generation, specifically in both Mozambique and South Africa. These two Southern African countries are seen as leaders in the energy transition efforts as both countries are actively present in several commitments and co-operations aimed at reducing the risk of further disasters caused by climate change. Though both countries have adopted several policy changes in an attempt to combat climate change, both countries suffer several issues when it comes to the production and provision of electricity. Mozambique, for example as highlighted in the previous chapter, has a low national electrification rate as more than half of the population does not have access to reliable and adequate electricity resulting in the use of fossil fuels to conduct daily household activities. It is reported that in 2020, “75% of the urban population had access to electricity compared to about 5% of the rural population” (World Bank 2023). This is a significant challenge as it highlights the imbalance between rural and urban electrification as the majority of Mozambique’s population (62% in 2021) lives in rural areas. Their electrification issues are due to several reasons, some of which include poor infrastructure and lack of adequate funding.

South Africa, though with a higher electrification rate than Mozambique, mostly due to the increased economic activity within the country, also experiences several electricity related problems because of insufficient electricity provision, poor infrastructure as well as poor governance. To address their energy crises, both South Africa and Mozambique have committed to promoting and adopting a green energy transition to reduce greenhouse gas emissions and to provide sustainable, clean, and affordable electricity to their citizens. Though the green energy transition could lower the effects of global warming, it can be argued that the research being conducted when

considering renewable options of energy is not always country specific, paving ways for potential risks as to be discussed in this chapter.

The chapter of this research will analyse the green energy transition initiatives in both South Africa and Mozambique, highlighting potential risks of the green energy transition, to the national security of both countries. As concluded in previous chapters, environmental issues have now more than ever become matters of politics, and in turn matters of governance. It is the duty of a government to ensure the well-being of its citizens and the survival of the state as a whole. Zarkharov stated that “the energy security of the country is a state of protection of the economy and the population of the country from all possible threats to national security in the field of energy” (2017:1).

4.2. The Green Energy Transition as a National Security Threat

4.2.1. South Africa

In 2023, the President of South Africa declared that “the energy crisis being experienced in the country constituted a national state of disaster” (Ramaphosa 2023). Not only does the increasing danger of the near collapse of the state-owned electricity utility, Eskom, pose a threat to the working class and society, but it is detrimental to the survival of the state as well. A solution presented to mitigate South Africa’s energy crisis specifically in the electricity sector is the implementation of strong green energy transition policies.

During the 2024 State of the Nation Address of the President of South Africa (SONA), President Cyril Ramaphosa focused on his plans to promote and implement a “just transition to a low-carbon economy”. The President acknowledged the role that energy and its security play to the nation as “energy security is the backbone of the economy, driving economic growth and transformation” (SONA 2024). On the 16th on November 2023, the Just Energy Transition Investment Plan (JET IP) was approved by the cabinet. The JET-IP was created to be a framework that highlights the plans as well as investment needed to help South Africa reach its energy transition commitments. This is South Africa’s five-year plan and the most used in terms of guidance when it comes to the green energy transition within South Africa. The JET-IP is described as a framework that “sets out the scale of need and the investments required to achieve the decarbonization commitments in the Nationally Determined Contribution (NDC)

that outlines the rate at which South Africa plans to reduce greenhouse gas emissions” (Government of South Africa, 2022:23). There are six portfolios in the short- and medium-term outcomes of the JET IP implementation plan, with four of the six plans addressing the electricity crisis in South Africa.

The first portfolio is the ‘Electricity Infrastructure’ which seeks to finance the “large scale grid expansion, and the retiring of coal power plants with decommissioning schedules that do not disrupt electricity supply” (SONA 2024:23). This portfolio will also look at the large-scale distribution of renewable energy generation as well as investment into the maintenance and upgrades of the current municipality and Eskom systems. To meet the decarbonization targets set by South Africa’s Nationally Determined Contribution (NDC), it is calculated that around 6 Gigawatt (GW) of renewable electricity capacity was to be added to the grid yearly between 2023-2027, the timeline of the JET IP. The investment will total ZAR498 billion for five years (SONA 2024:71). The South African Wind Energy Association (SAWEA) as well as the South African Photovoltaic Industry Association (SAPVIA) released a report with Eskom detailing the results of the renewable grid energy development and planning. They noted in the report that “66 000MW of renewable energy generation projects are at various stages of development, of which 18 000MW are at an advanced stage of project preparation” (Government of South Africa, 2023). Though optimistic as most projects in the preparations stage can be functional within three months, their operation is determined by the approval of a grid connection from either Eskom or the municipality which can add more months and in most cases years, to the execution.

There are several actions being taken by the South African government to create solutions to address their electricity and energy crisis such as the creation of various committees and approval of government policies. An example is the National Energy Crisis Committee (NECOM), established by President Ramaphosa, which oversees the implementation of the Presidential Energy Action (EAP⁷). The short-term objectives of NECOM are the reduction and eventual end of loadshedding in South Africa. This is to be achieved by NECOM focusing and promoting “improving the performance of Eskom’s existing power stations and adding as much new generation capacity to the grid as quickly as possible” (Government of South Africa 2022). One of

⁷ The Energy Action Plan is a fast-tracked plan to quickly address and end loadshedding and close the gap in electricity supply. This was announced by President Ramaphosa in July 2022.

the key successes of NECTOM in its first year was the leasing of land around several power stations in Mpumalanga to various developers. NECTOM has also ensured “a determination for more than 14,000MW of new generation capacity to be procured from wind, solar and battery storage” (Government of South Africa, 2023).

During the COP26 held in Glasgow, the South African delegation expressed the need for financial support in order to meet the target goals of the Paris Agreement and phase out the use of coal which the country is heavily reliant on. To assist the decarbonization of South Africa’s energy sector and economy, Müller and Claar (2021:2) state that “the United States of America, Britain, the European Union, France and Germany mobilized US\$8.5 billion (about ZAR131 billion) in concessional loans and grants to be channeled via multilateral development banks within the next three to five years”. Apart from maintaining and the construction of clean energy generating materials, the fund also goes to the creating of green jobs as the transition is said to be creating more than 59,000 jobs, though their wages struggle to compete with those in the coal industry. This is the result of overpaid workers within the non-renewable industry as a general worker in South Africa is set to make R14,735 per month, whereas a general worker at Eskom can make up to R18,485 per month (Roodt 2024:1). With the number of jobs, the energy transition is set to create, they cannot afford to pay the competitive price of the non-renewable industry jobs.

The mining industry is crucial to South Africa’s socioeconomic success as it has provided employment, investment as well as revenue into the country. The Minerals Council South Africa reported that “in 2023, the mining sector contributed ZAR425.6 billion to South Africa’s GDP and represented a total of 55% of total exports” (MCSA 2023). Over the past two decades, the revenue brought in from the mining sectors has been on a steady decline due to reasons surrounding policies and infrastructural constraints, however the energy transition could show promise potential in changing the graph for the better. The Harvard Growth Lab, after conducting a study on the economy of South Africa, concluded that the availability of critical minerals⁸ could boost the country’s economy. The study revealed that “South Africa could participate much more in the supply of critical minerals and provide the world with many of the

⁸ Critical Minerals (such as cobalt, lithium and copper) are minerals that are used to make green technologies possible, such as electric vehicles, solar panels and other green technologies (Carr-Wilson 2024).

enablers as promising future avenue for South Africa to leverage its capacities in this sector” (Hausmann *et al* 2023). Mining is key to the energy transition within South Africa as they are both a large importer as well as exporter of critical minerals due to the large number of multinational companies within South Africa. South Africa serves as a base location for many international partners and cooperations due to their processing capacity of minerals. In figure 2 (page 40), the percentage of the critical mineral export is calculated for the year 2021 with Tungsten being the highest exported mineral in South Africa

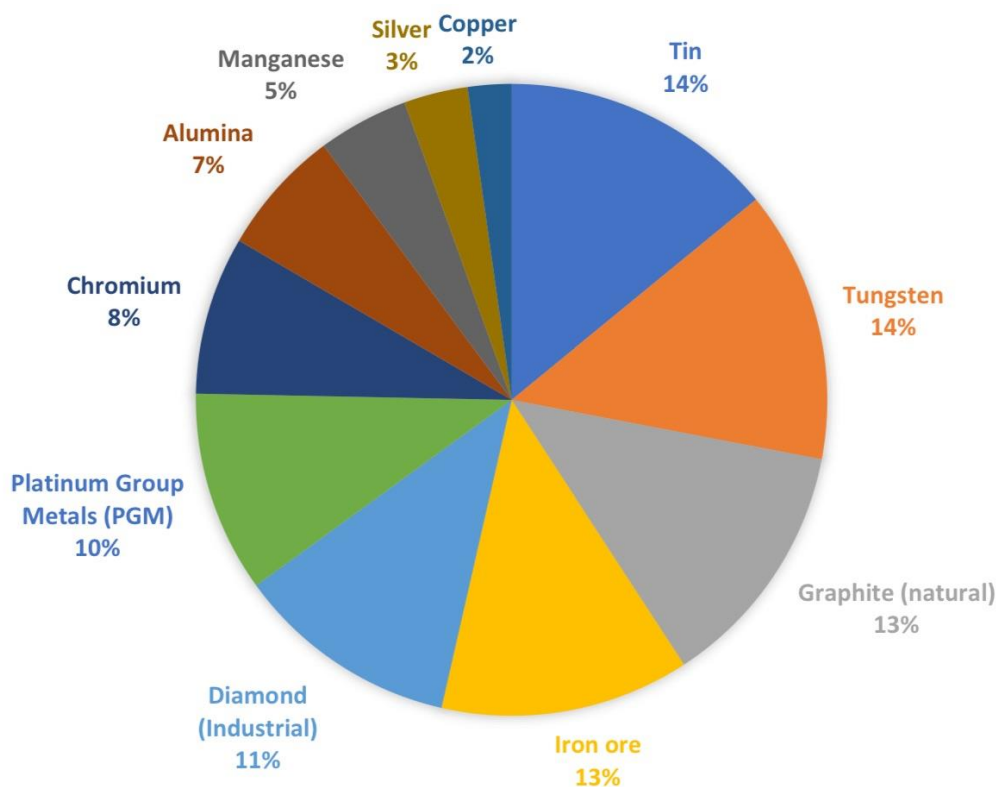


Figure 2: critical mineral export is calculated for the year 2021 in South Africa

South Africa has made large strides within Southern Africa as well as the African continent, to promote the green energy transition. However, in mitigating these effects of climate change, and on such a rapid timeline in the case of solving South Africa’s electricity crisis, not all avenues are truly considered to ensure that these changes would not later threaten the national security of the country. The following chapter will highlight how some of these energy transition policies and implementations could potentially create a new threat to South Africa. These include, to mention a few, the displacement and loss of jobs for citizens in large coal mining towns such as Mpumalanga; the risk of over mining further damaging the environment; the failure of

governance to create and implement change due to internal conflicts; as well as a collapse of economy due to the failed production capacity of renewable energy production. However, it is important to note while these potential threats do not seem as devastating as the pollution and results of coal mining, they play a big role in escalating larger threats to national security such as political instability due to job losses.

4.2.2. The Negative Impacts of the Green Energy Transition to South Africa

South Africa is recorded to be amongst the top 25 greenhouse emitting countries globally as their electricity supply is largely coal based, with coal making up 90% of the country's electricity supply (Igamba 2023:11). The heavy reliance on coal brings light to South Africa's electricity crisis that dates to 1948. Due to industrialization and an increase in population, the need for electricity also increased as the domestic consumption of electricity grew. Throughout the years, the country faced several blackouts because of poor infrastructure, as various power stations throughout the country were not operating at maximum capacities due to maintenance and finance related issues. To keep up with this increasing demand for electricity, South Africa makes use of coal fired power stations as coal is the 3rd largest produced mineral in South Africa, therefore easily accessible. In an effort to adhere to the globally accepted laws of carbon emission and to promote a more sustainable future, President Cyril Ramaphosa along with his cabinet approved the JET-IP to help South Africa in achieving their energy transition commitments (Government of South Africa 2022:21).

The JET-IP is a framework that details and organizes the need and investments required to achieve the South Africa's goals to reduce greenhouse gas emissions as well as the goals set out in the Nationally Determined Contribution document. The JET-IP suggests six short- and medium-term outcomes to address the energy crisis in South Africa with four of them addressing electricity related issues. Eskom, the South African electricity public utility aims to lead a large-scale grid expansion as well as the retiring of coal powered plants (SONA 2024:23). Through the JET-IP the government also hopes to look into the investment for the maintenance and upgrade of current systems adding new generation capacity to the grid. Apart from the JET-IP, South Africa has also seen successes in their various committees such as NECT, the National Energy Crisis Committee, which managed to lease the land around the power stations in Mpumalanga to different developers (Eskom 2022:1). South Africa is

undertaking various projects to promote the green energy transition; however, it can be argued that these initiatives could potentially threaten the national security of the country.

One of the largest debates surrounding the hopes of decommissioning coal powered plants is the creating of ghost towns, specifically in the Mpumalanga region. Coal production in Mpumalanga accounts for up to 80% of the country's total coal production as most of Eskom's coal powered plants are located in this region (Molelekwa 2023: 1). The transition from coal to renewable energy will resolve in significant economic and socio-economic losses with job losses at the forefront. The coal industry accounts for the employment of over 100 000 people in South Africa most of who live in the Mpumalanga region. Though reports claim that the transition will create more jobs than the current coal industry, there are still several variables to be taken into consideration. The first consideration being the turnover time between the current coal centered job, and the green centered work. Many of the new jobs being created will require qualifications and skills that many who are currently in the region do not have and very little funding has been put into the education of the green transition in these areas, and as a result very little 'green training' as well. According to the CSIR, on the current policy paths South Africa is following, there is an estimated 47,700 job losses expected between 2018-2030. These figures are most likely to increase as well due to the low turnover time of reemployment in the shift to renewable energy. This highlights another consideration as the reabsorption of displaced workers by the renewable sector is a necessity. South Africa is currently facing a national unemployment rate of 30%, meaning not all workers will be able to retain their jobs, which for most in the region is their livelihood (Magome 2023:1). This could lead several families into poverty as the coal industry is the backbone of the economy in Mpumalanga and in South Africa as a whole. This is a direct threat to the national security of South Africa as Martin (2022:1) states that "high levels of unemployment and poverty are a high national security risk to South Africa". Both unemployment and poverty are the main drivers of crime and instability which feeds into national unrest for example, the July 2021 riots that saw the looting and destruction of several businesses. It is estimated that because of the July unrest, the country lost R50 Billion and approximately 353 lives were lost (SAHRC 2024: 14). Domestic instability can be caused by job insecurity as the state would have failed to provide safety and security

as well as employment to the population, as in the example above. By the beginning of June 2021, about a month before the unrest, South Africa had recorded their highest unemployment rate figures which had increased from 29% to 34.4% in the space of a year (SAHRC 2024: 10).

Another challenge and potential threat of the green energy transition in South Africa is the lack of accountability, or rather, failed governance. Corruption is a term frequently used in relation to the South African government, specifically financial corruption. Teresa Pinto (2023) writes that “corruption and economic mismanagement have eroded public confidence driving political instability and riots”. The disconnect between the social contract between the state and the citizens creates political instability as the citizens no longer have faith in their elected officials. Due to the lack of accountability, there have been several instances and reports of misuse of funds from government officials. The misuse of funds has resulted in poor infrastructural development as several plans and projects are approved, however many do not see completion due to a lack of funds. An example of the consequence of the misuse of funds are the out of commission power stations in South Africa that have led to several blackouts throughout the country over the last ten years (Martin 2024). These power stations lack financial investment for any major electricity generating changes or repairs. This could easily be the case with the investment expected for the energy transition initiatives creating mistrust between the citizens and the government officials.

The most recent riots termed the “July unrest” or the “Free Zuma⁹” protests, though being centered around the arrest of the former South African President Jacob Zuma, this violent unrest highlighted key underlying political, social, and economic issues. Throughout the riots, there was significant damage that was experienced by businesses, medical and pharmaceutical establishments as well as the telecommunication facilities. As like many cases in history, apart from the imprisonment of Former President Zuma, there were several underlying issues that were considered the root cause of the unrests, such as the division and issues within the government itself. John (2021:3) writes that “Divisions in the A.N.C. party have led

⁹ Between the 9th of July to the 17th of July 2021, South Africa saw violent protests and political unrest which was characterized by the looting of shops and the destruction of property and public services. “The socio-political unrest and violence were largely sparked by initial low-intensity and sporadic protests in parts of KZN against the arrest and imprisonment of former President Jacob Zuma” (Accord 2022:2).

to slow action in resolving a slew of formidable challenges: staggering unemployment, a vicious third wave of coronavirus infections, vast inequality and the shoddy delivery of basic services like water and electricity”. This division in the ruling party has led to a great distrust on the government for the provision of basis services leading citizens to take matters into their hands, usually in ways that harm the economy. It is also important to note that in 2023, the former Group Chief Executive Officer of Eskom, Mr Andre De Ruyter was accused on “allegations of corruption, theft, maladministration, sabotage, lack of consequence management, cartel and other financial irregularities at Eskom” (The Government of South Africa 2023:3). During the interviews, Mr De Ruyter mentioned that this is not the first occurrence of corruption within Eskom as he claimed corruption has been present before he came in to power. This shows that not only is the issue of corruption crippling the already fragile system in South Africa, but the poor policy choices that have also led to an inability to control corruption in the country.

The mining sector of South Africa is important towards the green energy transitions as South Africa is home to several critical minerals that are exported by several international partners and cooperations. It is important to note that, though the acquisition of critical materials is important, more than often the negative impacts of mining to an environment and community are ignored. There is a need for stricter policies surrounding the sustainable mining of minerals as many companies are focused more on the quicker extraction of minerals. Mining activities are also known to have impacts such as “disturbance to landscape and topography; poor management of waste such as ore stockpiles, spoils, tailing, and dumps; loss of topsoil and greenery due to topsoil removal and acid water” (Tiwany & Dhar 2010). These all result in a displacement of people, as the destruction of an area can affect the livelihood of the community being mined if not mitigated well. This displacement also leads to a disgruntlement of the citizens threatening national security.

Though there are various other examples, in the case of South Africa, the green energy transition can easily threaten the national security of South Africa both economically, politically, and socially if not safely and thoughtfully navigated.

4.2.3. Mozambique

At the COP28 UN climate conference, former UK Prime Minister, Tony Blair acknowledged that “the only way to solve the problem of climate change is to link clean energy and economic development, if clean energy doesn’t help people, it will never work” (Blair 2023). This statement was in agreement with the proposed \$80 billion dollars energy transition strategy introduced by Mozambican President Filipe Nyusi. In his speech, President Nyusi expressed the importance of prioritizing growth as well as meeting the needs of the population while still promoting the transition to a decarbonized future (Chahed 2023). During the COP28 summit in Dubai, President Nyusi laid the groundwork for the energy transition strategy which was eventually published by Mozambique’s Ministry of Mineral Resources and Energy (MIREME) in March 2024, following the summit in December 2023. The Just Energy Transformation Strategy is guided by four pillars: the adoption of clean energy transport, universal access to modern energy, modern energy systems based on renewable energy sources and, green industrialization. In line with the Just Energy Transformation Strategy (JETS), between the years 2024 and 2030, the government on Mozambique intends to have an addition of 3.5GW of new hydroelectric capacity through “the modernization of existing power stations and the completion of the Mphanda Nkuwa hydroelectric project” (Aler 2024). To show the importance of this addition of 3.5GW in capacity, a single gigawatt is the equivalent of 1000 megawatts which is enough to power a medium sized city such as East London with a population of 478 676 inhabitants (WPR 2024). There are three objectives of the JETS: National Development, Regional Energy Hub and Global Energy Transition.

Under National Development plan, a planning and budgeting guide for the country’s development over the next 20 years, the government intends to “promote and accelerate universal, affordable, and reliable access to clean energy sources to improve the well-being of all citizens and make the country a middle-income economy” (Machiana and Coelho 2024:1). This will require both the expansion and improvement of the national electricity grid as well as improving and accelerating national access to renewable off grid energy. By focusing on the objective of a regional energy hub, the government of Mozambique will “position Mozambique as a regional energy hub providing low carbon energy to the Southern African Development Community (SADC) countries” (Machiana and Coelho 2024:1). Through the transition, Mozambique will be

able to exploit their country's vast energy resources to ensure the development of biofuels supply chain as well as the development of hydropower allowing the country to provide clean and reliable energy to the country. The last objective, global energy transition, the Mozambican government aims to "contribute to the global energy transition by exporting the country's abundant natural gas resources and provide the world with an important and necessary clean fuel" (Machiana and Coelho 2024:2). The government is working towards making Mozambique a key player in Africa when it comes to energy transition in the hopes of attracting investors in the sector. According to the Minister of Mineral Resources and Energy, Carlos Zacarias, "we estimate that more than US\$80 billion in public and private investment is needed by 2050...short-term investments to be financed amount to US\$3 billion in 2024 alone" (Chahed 2023:4). To further ensure the attraction of private investment, the government has prepared to enact new regulations to their Electricity Law No. 12/2022 of July 2022, which will facilitate the participation of the private sector in the development of renewable energy systems as more importantly minimize red tape through the simplification of processes.

Mozambique is a signatory to many climate change agreements including the United Nations Development Program, the Paris Agreement, the Kyoto Protocol, and more recently, the bilateral Supporting Climate Policy and Energy Transition in Mozambique (PCTE) program launched in October 2023. The main objective of the PCTE program is the enhancement of capacities in the "sectoral ministries for energy and climate for the development of an evidence-based climate policy" (GIZ 2023:1). The objectives of the PCTE program contribute indirectly to the objectives of both the existing NDC 2021-2025 as well as the objectives of the 2030 Agenda. The main objectives of the program are to focus on the enhancement of the capabilities in the energy and climate ministries through strengthening institution and coordination capabilities and establishing solid interregional cooperation. The program was commissioned by the German Federal Ministry of Economic Cooperation and Development (BMZ) in order to promote Mozambique's commitment to its climate targets and energy transition for long term climate resilience. The program presents a 'whole-of-society' approach exploring the intersection of politics, science, civil society and business to promote the development of evidence-based climate policies. This has seen the adaptation of local plans, the enhancement of capabilities of climate data collection, enhanced

transparency frameworks, and NDC road mapping and facilitation to ensure strengthened accountability across the board (GIZ 2023:2).

4.2.4. The Negative Impacts of the Green Energy Transition to Mozambique

As echoed above, Mozambique's current electricity situation is more to do with lack of accessibility as more than half the country is not connected to the national grid. Despite having one of the largest hydroelectric plants in southern Africa, "less than 50% of the population has access to electricity" (ITA 2024). Mozambique is one of the largest exporters of electricity on the African continent with the highest power generation potential with abundant renewable sources, though this is not translated into the current electricity situation. Similar to South Africa, Mozambique's energy climate is largely shaped by its political history dating back to the post-colonial rule of 1975. Political instability has been one of the main causes of the country's energy crisis as after the independence of Mozambique from the Portuguese, the country fell into a period of instability. The civil war in Mozambique began in 1977 till 1992 between the Mozambique Liberation Front (Frelimo) and the Mozambique National Resistance (Renamo). This resulted in an economic decline and a further disruption in the infrastructure as telecommunication lines and transmission grids were often the targets of these groups. A significant disruption in the generation of electricity was the damaging of HVDC transmission lines of the Cahora Bassa dam, which was intended to provide power to Zimbabwe, South Africa as well as Mozambique itself. After the end of the civil war, the new government of Mozambique began tackling the electrification crisis in the country as about 20 million inhabitants experienced a lack of reliable electricity supply causing them to resort to environment harming sources of energy (IRENA 2024).

Through the efforts of the government, electrification rates increased from 6% in 2001 to 44% in 2022 according to the World Bank (2023). The Mozambican President Nyusi expressed how important the prioritization of growth within the country is as well as ensuring to meet the needs of the citizens as well. He believed this began with promoting sustainable and renewable decarbonized future for Mozambique, leading to the creation of the Just Energy Transition Strategy. The JETS is guided on the four pillars of the adoption of clean energy transport, universal access to modern energy, modern energy systems based on renewable energy sources and, green industrialization. Through the guidance of the JETS, the government hopes to

modernize the existing power stations, the completion of several projects including the Mphanda Nkuwa hydroelectric project in hopes to increase hydroelectric capacity adding 3.5GW to the national grid. To ensure their green transition initiatives are met, the government of Mozambique has made changes on various policies and laws.

One of these changes included the changing to the Electricity Law No. 12/2022 of July 2022, which is intended to facilitate private sector participation in the renewable energy systems development. More importantly, this law is meant to minimize red tape through the simplification of processes. This could cause a potential threat to the country's national security, as the simplification of processes and reduction of red tape opens the door to corruption as well as exploitation of the country's resources. Mozambique is a strategic ally for many countries as well as international cooperations not only for its minerals but for its ports which make exportation simple. In 2021, Mozambique "shipped metals and minerals worth US\$1.8 Billion Dollars mainly through the exportation of aluminum, titanium and gold" (Nhede 2024). Mozambique is known to have reports of insurrections such as the 2024 Cabo Delgado, which saw the militants motivated by socio-economic exclusion amid key mineral and hydrocarbon discoveries. Opening and increasing the rate of mining as well as the loosening of regulations could see the increase of more insurrections as private investments do not always follow the rules. The minimization of red tape opens the door for threats to national security such as violent uprisings, destruction of infrastructure, increased crime due to the relaxation of the laws to accommodate the green energy transition in Mozambique.

This also highlights the role of corruption and poor governance as funds provided by donors does not always make it for the intended use. In 2016, the Mozambican economy was hit with unfavorable fluctuations in exchange rates, inflation, and an increasing debt burden (Wolf 2016:2). It was later discovered that several senior government officials, were misusing the funds meant to relieve the economic crisis for their own personal gain. The lack of accountability within government was further highlighted after the accused officials had filed paperwork alluding to the funds having been used to purchase "a range of maritime goods including military equipment for state security services" (Wolf 2016: 4). In addition to the political instability in the country, corruption is considered as the cause of Mozambique's troubles as between

2002 and 2014, it is estimated that due to corruption alone, the country lost nearly US\$5 million (Wolf 2016:2).

Another threat to the national security of Mozambique is the availability and affordability of renewable sources of energy. For the green energy transition to work, it requires more than policy creation, but action and implementation. This has been one of the struggles in the implementation of the green energy transition, as a lack of adequate financing and infrastructural development have led to the current electricity crisis in the country. Since the promotion of the transition, fossil fuels such as gas and coal have increased in both accessibility and usage as there is a limited production and consumption of renewable sources such as solar power. The poor infrastructure has also meant that the construction of renewable sourced power plants has decreased the amount of time and money that gas powered plants consume. The green energy transition has made the fossil fuel market in Mozambique a cheaper and quickly accessible form of electricity generation, further adding onto the problem the green energy transition was meant to tackle.

The above examples of the negative impacts of the green energy transition to South Africa and Mozambique, though not exhaustive, gives an insight into the importance of adequate research and policy planning at government level. The green energy transition is intended to reduce the impacts of climate change brought about by the use of fossil fuels for energy production. However, if not introduced and implemented well, could threaten the national security of the country and in the example of Mozambique, further accelerate climate change rather than decelerate.

4.3. Conclusion

Climate change has devastated many countries due to extreme weather patterns, and in the case of countries like Mozambique, flooding and cyclones have become a regular occurrence. To try and mitigate some of the effects of global warming, countries have come together to remove the dependence of fossil fuels by promoting the renewable energy transition. These measures are intended to reduce the amount of greenhouse gases in the atmosphere. However, there are many considerations to be accounted for when implementing the green transition. As mentioned in the chapter above, in the examples of South Africa and Mozambique, there are internal challenges that affect the proposed transition strategies such as corruption, societal

considerations as well as infrastructural issues. Based on the above findings, the following chapter suggests recommendations for both researchers and policymakers to consider with solutions such as ensuring the green energy transitions are applicable to the current domestic environment of the country and ensuring that climate adaptation rather than mitigation is at the core of the transition strategies.

Chapter 5: Recommendations to the Implementation of the Green Energy Transition and Conclusion

The transition from carbon-based economies to more sustainable economies is a global initiative that is well and truly underway. The energy transition or green energy transition emphasizes the global need to reduce the emissions of greenhouse gases to the environment as over the last decade, the world has experienced the consequences of tampering with the environment. This has led to various climate change effects such as extreme weather patterns, floods, droughts and even wildfires due to high temperatures. These effects of climate change can also be felt through changes in everyday society, such as destroyed infrastructure due to weather patterns like floodings and cyclones, resulting in poor public service delivery such as disruptions in the supply of energy, more specifically electricity.

As analyzed above, the green energy transition can do as much good to a country as it can equally cause harm. Through exploring various threats of the green energy transition to Mozambique and South Africa, it is possible to outline key areas of weakness that should be taken into consideration in the implementation of the energy transition at national security level. The first major and overlooked key area of weakness is the importance of the consideration of 'justice' or in the above cases 'injustice' and its potential to influence national security. Secondly, after analyzing the potential threats, there are six possible recommendations to take into consideration at the policy making level to ensure that these potential threats to national security are addressed. The six recommendations to be discussed include:

1. African Solutions for African Problems
2. Climate Adaptation over Climate Mitigation
3. Accountability
4. Policy Restructuring
5. Ensuring a Bottom-Up Approach
6. Job Redirection

These recommendations are not isolated to Mozambique and South Africa, as there are recommendations that apply to mostly African states and can also be taken into consideration by other countries as well.

5.1. Justice within the Green Energy Transition

Yergin (2020) states, energy transitions were previously driven by factors such as technology advancements, “economics, environmental considerations, convenience, and ease”, whereas the current energy transition is centered around politics, policy and activism. However, it is important to note that this new age of policy, politics and activism more frequently ventures away from the welfare of citizens and focuses on profit making. This draws attention to the importance of justice within green energy transitions. Though there has been an increase in the research centered around energy justice, most of the literature focuses on energy justice specifically for the Global North.

Energy justice is defined by Talus and Aalto (2021) as a research agenda which aims to “apply justice principles to energy policy, energy production and systems, energy consumption, energy activism, energy security and climate change”. Justice within the green energy transition is important as it assures that no communities are left vulnerable during the implementation of the energy transitions. Heffron (2022:156) defines energy justice as focusing on the “application of human rights across the energy life cycle- meaning from extraction to production to operation and supply to consumption to waste management”. Energy justice is important as it ensures that energy access remains affordable, secure and safe for all communities. Previously guided by the ‘triumvirate of tents’ of justice, specifically; distributive, procedural and recognition justice, today energy justice is guided by five principles, with the addition of restorative and cosmopolitan justice (Heffron 2023: 227). Looking at the principle of distributive justice, it examines the major changes in the energy transition analyzing what needs to change to support workers and communities. Under the principle of distributive justice falls the concept of ‘just transition’

5.1.1 Just-Transition

Recognizing that shifting to a low-carbon economy needed to consider the protection of workers rights, address the socio-economic inequalities and support affected communities, the concept of a just transition was introduced. According to Abe and Azubike (2024:281), in energy transition, a just approach “seeks to ensure that the benefits of renewable energy deployment are equitably distributed, and the burdens are minimized, particularly for marginalized groups”. The transition is intended to

ensure that sustainable development is achieved while tackling climate change through methods such as the prioritization of individual welfare, the advocacy for the use of sustainable energy sources as well making sure energy is accessible and affordable. In summary, the just energy transition provides workers and communities, largely reliant on non-renewable fuel industries, support during green transitions through methods such as retraining opportunities, new market job creation as well as the mitigation of economic disruptions (Heffron, 2023).

The aspect of justice within the green energy transition is becoming increasingly of importance as components such as the just transition consider the social and economic implications of the green energy transition which could potentially threaten national security.

5.1.2. National Security and The Just Transition

To understand the influence that justice has on national security, it is important to delve into the four dimensions of energy security, specifically the first dimension which states that energy security must consider “physical disruption of supplies resulting from infrastructure breakdown, natural disasters, social unrest, political action or acts of terrorism” (Abe and Azubike 2024: 283). Examining both case studies of South Africa and Mozambique, each country has experienced a national security threat through the avenue of social unrest both within the energy sector and out.

In South Africa, July 2021 was characterized by civil unrest which led to the disruption of public services such as looting of supermarkets, destruction of private and state infrastructures (Naidoo *et al*, 2023). Amongst the multidimensional complexities presented to analyse the events, poverty, corruption and unemployment are no new topics in both case studies. Prior to this, South Africa’s economy has been affected by descaling within the mining sector in the past, specifically in the southwest of Mpumalanga. South Africa’s energy sector is also associated with negative community impacts, stemming from the socio-economic and cultural conflicts due to an influx of foreign workers (Naidoo *et al*, 2023). This tends to lead to social resistance from communities, and in most cases in South Africa, to violence that impacts the region as a result of the harm of foreigners.

Since 2017, Mozambique’s Cabo Delgado has seen deadly insurrection as a result of socio-economic exclusion following the discovery of minerals within the region. This

has led to several acts of violence including bodily harm, looting and increased regional and ethnic divides (Pinto 2023:1). The economic disruptions of social unrest can threaten both the state, its neighboring countries and the region as a whole, threatening not only national security but global security as a whole. In Mozambique, the energy supply is often cut due to damage of infrastructure, especially during times of unrest.

The just transition, which focuses on the rights of workers, the socio-inequalities and affected communities could assist in lowering the potential threat to national security, that justice can pose. South Africa is considered a leading country with a history in just transition planning dating back to 2010, when trade unions brought about the notion of just transition to national climate policy discussions (Strambo et al 2024:1). Since then, South Africa has made strides in just transition planning as in 2021, they initiated the Just Energy Transition Partnership (JETP) with leading countries in the Global North aimed at assisting South Africa in the transition to renewable energy. In 2022, the government released a Just Transition Framework to guide policymaking and resource allocation, and this led to both the publication of a Just Energy Transition Investment Plan for 2023-2027 and lastly a JET implementation Plan in December 2023 (Strambo et al 2024:2). Though South Africa has the right policies and conversations in place, it can be argued that they have the wrong actors. The purpose of the just transition as stated earlier is to ensure the welfare of both communities and individuals undergoing the green energy transition. The individuals at the core of the policy decisions should be the citizens, however as described by Montmasson-Clair (2021), “the concept of just transition has become mainstream in South Africa, serving as an anchor point for fostering a wide range of economic and political visions”. This is as a result of some actors advancing their decarbonization without willing to adhere to socio-economic practices.

In South Africa there is a large disparity between the actors defined as being driven by lower ambitions such as government entities, foreign investors and Eskom, whereas the communities and individuals majorly and directly affected by these transition activities are not acknowledged. This has led to misalignment of goals of the just energy transition resulting in a lowered level of support for renewable energy transitions.

Mozambique on the other hand, in their attempt at the just energy transition presented their strategy at COP28. Their strategy is focused on four main pillars which include “modern energy systems based on renewable energy sources, green industrialization, adoption of clean energy transport, and Universal access to modern energy” (GET 2024). Similar to the case of South Africa, Mozambique implements an Inter-Institutional Group on Climate Change, which consists of members and representatives from the public and private spheres as well as the civil society (Natural Justice 2024). This group was created to ensure everyone was brought to the table to allow affected groups to report and inform any issues that they encounter as a result of the green energy transition. However, when it came to the formation of the long-term integrated Master Plan 2018-2043, the people most affected by these policies were not invited to the decision making.

Both South Africa, and Mozambique have in place, just energy transition systems to allow them to promote the green energy transition with justice at the forefront of the decisions, however both countries have failed to maintain the mandate they were created under. Justice is an important aspect with energy transition as it seeks to promote social equity, community engagement as well as economic development while transitioning to a low carbon economy (Patel and Maimele 2024). The aim of the justice in energy is to ensure there is minimal threat towards national security. National security as mentioned in earlier chapters (Chapter 2), can be threatened by economic and social issues leading to instability within a country which is why it is imperative for governments to carefully consider the aspect of justice in their policymaking.

5.2. Recommendations for the Green Energy Transition Implementations

5.2.1. African Solutions for African Problems

One of the biggest debates within the field of International Relations, is the topic of inclusivity when it comes to African states on the global stage. Often, African states have been considered as marginal when it comes to the decision making. After the colonization of African countries, due to the wars and struggles for independence left a large toll on the continent as the infrastructures that were developed were destroyed and governance, that was not taught, was left in the hands of the civilians. This has led to a very different stark contrast between governance and the economy in African states compared to the governance and economy of other states. This indicates one

key issue in the green energy transition, a ‘one size fits all’ solution to contrasting situations. Though climate change is considered a result of a global greenhouse gas emissions, the Carbon Disclosure Project (CDP) report states that “Africa accounts for the smallest share of global greenhouse gas emissions, at just 3.8%, in contrast to 23% in China, 19% in the US, and 13% in the Europeans Union” (CDP 2020:3). The difference in greenhouse gas emissions also highlights the difference in economic structure as the regions with higher GDP’s are also known to have working infrastructures and are largely industrialized. Given these reports and numbers, it is clear to see that a solution for climate change that works for one region may not work in another resulting in the collapse of the initiative as a whole.

A solution is a focus on African energy transition policies tailored to African environments. This will require the investment and collaboration between the African states on a continental and on a regional level. Due to the lower level of gas emission on the continent compared to reports on individual countries, it is important to create policy and energy transition initiatives that will analyse where states can reduce the carbon emissions and transition at a pace that promotes the energy transition. This allows states to meet the global required levels gradually but effectively in line with their economic and infrastructural capabilities (Ola-Busari and Kraus, 2022). This also allows for job creation as the research into sustainable policies can be shifted to cooperations such as the CDP, a non-profit charity that helps cities, states, regions and even companies manage their environmental impacts. An African example is EnviroAfrica, an environmental management and impact assessment firm focused on promoting sustainable protection management and development of South Africa’s natural environment. These companies can work in collaboration with the governments to ensure the agreed upon climate policies work to protect the national security of states from potential threats. However, though continental collaboration is important, a more regionally centered approach may yield the best results as solutions and efforts are more targeted to the regional environment, such as collaborations under SADC.

5.2.2. Climate Adaptation over Climate Mitigation

There is a global focus on climate change mitigation compared to climate change adaptation. Mitigating climate change requires the decrease in the emission of greenhouse gases into the atmosphere. Whereas climate change adaptation refers to

the “altering of our behavior, systems, and in some cases, ways of life to protect our environment” (WWF 2023:1). Due to the urgency of lowering the rate of greenhouse gas emissions, there is evidence of more short term rather than long term planning, specifically in Southern Africa. This urgency has resulted to energy transition initiatives that are not carried out, or partially carried out. Climate adaptation and climate mitigation need to be present when focusing on the energy transition, as climate change is an ongoing issue that needs long terms solutions as it requires planning not just for tomorrow, but for the future. For example, efforts are being made through risk pooling. The Southern African Power Pool (SAPP) for example, is Africa’s first formal international power pool, aimed at providing reliable economical electricity supply to SAPP members and ensure sustainable energy development (SAPP 2024:1).

5.2.3. Accountability

An issue not uncommon to Southern African states is the issue of accountability. Due to high levels of corruption within African governments, funding or resources intended to aid the country’s infrastructure, resulting in a failure of systems, and as seen in both cases of Mozambique and South Africa, limited electricity provision for citizens. Dan Kuwali writes that “it is no longer news that governance dysfunctions at national and international levels are the major culprits responsible for conflict, instability, and poor socio-economic development in Africa” (2022:1). In South Africa, one of the largest challenges to accountability is the failure in the government structure. There are various departments in South Africa that deal with the realm of energy, which leads to multiple stops when it comes to policy creation and when involving execution, too many players involved with no direct reporting lines. There is the ministry of energy and electricity, ministry of mineral resources and energy, the department of environmental affairs, the department of forestry, fisheries, and the department of environment. The lack of one clear body and the creation of various departments and special tasks forces increases the lack of accountability as there is no ‘one stop shop’ so to say. In Mozambique, one of their administrative issues is the lack of transparency and accountability as in the first six months of 2024, “the Mozambican authorities seized assets valued at USD6.3 million resulting from acts of corruption” (Club of Mozambique 2024:2). Accountability holds the government to their promises and provides transparency allowing accurate progress to be tracked and realistic goals and times to be set due to realistic reports. However, this accountability requires

changes at a government level to tackle corruption, as well as a restructuring of laws and policies to allow less loopholes.

5.2.4. Policy Restructuring

Related to accountability, it is also of importance for governments to reassess their policies to ensure they are both feasible and to the benefit of the state. For example, in South Africa, the department of mineral resources and energy was exposed for various conflicts of interest as the department remained committed to the continued mining of fossil fuels such as coal despite the government's efforts to promote and create policies promoting sustainable mining. These conflicts of interest were mainly caused by the influence of other institutions involved, or for personal gain mostly leading to corruption as ministers were receiving private tenders from companies to evade sustainability policies (PMG 2022:1). There is a need for stricter laws and policies, though Mozambique has removed some red tape from their environment laws to allow easier processing for companies advocating for the energy transition. Relaxed laws and policies allow for loopholes to be created harming either in the long term or short term, the effects towards the energy transition. Policy restructuring will also assist in combating the issue of corruption as it stems from a lack of clear and concise policy as well as lack of policy enforcement itself.

5.2.5. Ensuring a Bottom-Up Approach

Climate change is more commonly discussed at a global level, with high level advisors and government officials agreeing on terms that affect the public back home. For these agreed upon goals to be successful, there is a need to approach climate change using a bottom-up approach, as climate change needs to be a collective effort not only amongst states but together with the civilians who make up the state (Van der Bank and Karsten, 2020). There needs to be a greater initiative to educate individual on what climate change is and what renewable and sustainable options are available that appeal to their price point as well to ensure this transition is long term. In a study conducted in South Africa where 13 government officials took part in a data collection process with semi structured interviews, several issues were highlighted. These include, lack of finances, lack of human capacity at both a provincial and local government level, and most important, the study highlighted a gap in the knowledge surrounding climate change in communities (Sibiya *et al*, 2023: 146). This education

is more urgent in the rural areas as they make use of fuels for daily household consumption and are often, relying on harmful methods such as using coal, firewood or both for cooking and heating. Climate change needs to begin at a ground level to help people understand the dangers and true harm of carbon dioxide and allow policy makers to also hear the concerns of the individuals in relation to the transition (Sibiya et al, 2022). For example, one common hinderance to the transition is the cost of alternatives such as solar powered options. Through a bottom-up approach governments also get to assess the future requirements to account for adequate electricity generation and storage to ensure available access to households and companies is secure. This allows them to create realistic approaches as well, as indicated in the research, governments might need to rely on a more combined approach.

5.2.6. Job Redirection

Through a bottom-up approach, as suggested above, governments can also focus on one of the major disruptions of the green energy transition, the loss of jobs. Though the green energy transition is meant to create new job opportunities, many of these job opportunities require skills that many of the current workers in the coal production and supply do not possess. One of the greatest causes of instability in a country, is the loss of jobs for citizens. Job loss leads to many frustrations including increased crime rates, looting, riots, and other threats to national stability. Governments need to establish a reabsorption program, to allow workers with the ability to receive training in the green energy sector and assure re-employment. This will require investment into training and workshop as well as education materials. It is also important that the government focuses of the redirection of jobs as well. Many of the employees working within the current energy environment will not be reabsorbed as easily into the new green energy sphere, which will require government to ensure that these individuals can find other work to ensure their livelihoods are not disrupted as most African countries already experience high levels of unemployment.

5.3. Conclusion

The provision of energy is important to ensuring the national security of a state as energy is critical to the survival and security of a state. Using Phillip Cornell's three model framework, he concludes that national security and energy work parallelly to

ensure the prioritization of primary-level security services, followed by the facilitation of critical domestic services at the secondary level, which is essential for promoting economic well-being and prosperity at the tertiary level. (Cornell 2009:63). Applying his framework to the realm of electricity as a form of energy, the protection and continued provision of electricity is something that is key to national security, encouraging governments to ensure its security. This has resulted in the growing urgency to transition economies to low carbon emitting. This is the case for both South Africa and Mozambique, as the examples used to explore the relationship between national security, green energy transition and electricity and how the three interlink. Through examining South Africa's national security policy which focuses on ensuring the survival of the state and promotion of sustainability, the government managed to create policies and push forward initiatives that tie in line with both the country's national security policy as well as their various global initiatives such as the goals of the COP28. To emphasize the importance of the research, Mozambique was also explored as a contrast to the South African example with Mozambique seeing more than half of their population with no access to the national grid.

Through the energy transition, countries hope to see an increase in electricity production and storage, while reducing the emissions of carbon dioxide, promoting a green and sustainable future. By analyzing and researching the importance of the green transition as well as the various government proposals to guide the transition, it is clear to see the double-edged sword presented by it. The research has identified potential threats to the national security of both South Africa and Mozambique by their promoting of the transition. These threats include, political instability, loss of jobs, failed governance, and further harm to the environment through critical mineral mining. A threat, which is discussed in the paper, is the role of injustice as it has the potential to threaten national security. These are just some of the consequences or outcomes of the green energy transition that threaten the national security of these states.

Though this research has proved that without clear policy guidelines, and considerations of potential threats, the green energy transition could do more harm than good to states, it does not cancel out the need for sustainable energy development within states. The research has pointed out the current electricity environments of both countries, highlighting the need for a renewable and environmentally friendly energy transition to also ensure the survival of states and limit

the impacts of climate change. However, it also highlights the importance of ensuring all avenues have been explored when considering the transition. The research does this by providing key considerations for both countries, that are also applicable to other states as these threats are not isolated to just South Africa and Mozambique. These are to ensure that the green energy transition is carried out safely, without threatening the national security or states, or further adding to the current climate change problems the transition is meant to address. In conclusion, it is clear to see that while the green energy transition, as a global initiative, can ensure the further survival of states as well as the environment we live in, without clear research into potential negative outcomes, the green energy transition could pose a potential short-term threat to national security.

Looking towards the future, as indicated in the research, the literature available on the green energy transition is either focused on a macro approach which highlights generic transition guidelines, or continent specific approaches. While the pan-African approach is a first step to more realistic results, there is still a need for an even more robust differentiated approach, potentially at a regional level to allow for collaboration between states with similar geopolitical environments. This allows for more transparency and an easier chain of accountability. It is also important for policy advisors to consider the importance of justice in promoting the green energy transition and not underestimating its potential to either threaten or strengthen the national security of the state.

6. Bibliography

- Abe, O., & Azubike, V. (2024). (Re)examining the intersection between energy justice and energy transition in Africa. *Journal of Energy & Natural Resources Law*, 42(3), 279–299. <https://doi.org/10.1080/02646811.2024.2356988>
- Azubike, V., & Gatiesh, M. M. (2024). The intricate goal of energy security and energy transition: Considerations for Libya. *Energy Policy*, 187, [114005]. <https://doi.org/10.1016/j.enpol.2024.114005>
- Accord (2021). The July 2021 Protests and Socio-political Unrest in South Africa. [online] ACCORD. Available at: <https://www.accord.org.za/conflict-trends/the-july-2021-protests-and-socio-political-unrest-in-south-africa/>.
- Adhikari, A.S. (2024). The Concept of International Security. *Hasanuddin Journal of International Affairs*.
- African Development Bank (2021). Mozambique Energy for ALL (MEFA) - Project Appraisal Report. <https://www.afdb.org/en/documents/mozambique-mozambique-energy-all-mefa-project-appraisal-report>
- AFDB (2021). African Development Bank’s Africa Disaster Risk Financing Program receives \$2.5 million pledge from United States. [online] African Development Bank Group. Available at: <https://www.afdb.org/en/news-and-events/press-releases/african-development-banks-africa-disaster-risk-financing-program-receives-25-million-pledge-united-states-46718> [Accessed 4 Aug. 2024].
- African Energy Chamber (2023). South Africa’s Ambitious, and Expensive, Energy Transition - African Energy Chamber. [online] African Energy Chamber - Leading chamber of successful networks, transactions and partnerships. Available at: <https://energychamber.org/south-africas-ambitious-and-expensive-energy-transition/> [Accessed 4 July. 2024].
- African Union. 2023. Agenda 2063: Our Aspirations for the Africa We Want.
- Akinbami, O.M., Oke, S.R. and Bodunrin, M.O. (2021). The state of renewable energy development in South Africa: An overview. *Alexandria Engineering Journal*, [online] 60(6), pp.5077–5093. doi:<https://doi.org/10.1016/j.aej.2021.03.065>.

ALER. (2024). ALER - Lusophone Renewable Energy Association - Communication - News - Energy Transition Strategy points the way to renewable energies. [online] Available at: <https://www.aler-renovaveis.org/en/communication/news/mozambique-aims-to-decarbonise-transport-sector-by-2030/> [Accessed 23 June 2024].

Amansure, D.R. (2023a) The role of civil society in the just energy transition in South Africa, IJR. Available at: <https://www.ijr.org.za/2023/10/the-role-of-civil-society-in-the-just-energy-transition-in-south-africa/> (Accessed: 21 May 2024).

Azzuni, A. and Breyer, C. (2018) Definitions and Dimensions of Energy Security: A Literature Review. WIREs Energy and Environment, 7, e268. <https://doi.org/10.1002/wene.268>

Bajracharya, T.R., Shakya, S.R. and Sharma, A., 2022. 2 Energy Transitions. *Handbook of Energy Transitions*, p.21.

Baldwin, D.A. (1997). The concept of security. *Review of International Studies*, 23, 5 - 26.

Barnett, J., 2001. *The meaning of environmental security: Ecological politics and policy in the new security era*. Zed Books.

Blair, T. (2023). Tony Blair Statement on COP28 Presidency. [online] Institute.global. Available at: <https://institute.global/insights/climate-and-energy/tony-blair-statement-cop28-presidency> [Accessed 4 Jun. 2024].

Bradshaw, M.J., 2009. The geopolitics of global energy security. *Geography Compass*, 3(5), pp.1920-1937.

Brown, L. R. (1986) 'Redefining National Security', *Challenge*, 29(3), pp. 25–32. doi: 10.1080/05775132.1986.11471086.

Buzan, B. (1991). *People, states, and fear: an agenda for international security studies in the post-cold war era* (2nd ed). L. Rienner.

CDP (2020). Africa Report - CDP. [online] www.cdp.net. Available at: <https://www.cdp.net/en/research/global-reports/africa-report>.

Chahed, C. (2023). COP28: Mozambique's \$80 billion energy transition will leverage its vast renewable resources, says President. [online] African Development Bank Group. Available at: <https://www.afdb.org/en/news-and-events/press-releases/cop28-mozambiques-80-billion-energy-transition-will-leverage-its-vast-renewable-resources-says-president-66710> [Accessed 13 Jun. 2024].

Chandra, S., & Bhonsle, R. (2015). National Security: Concept, Measurement and Management. *Strategic Analysis*, 39(4), 337–359. <https://doi.org/10.1080/09700161.2015.1047217>

Cherp, A. and Jewell, J., 2011. The three perspectives on energy security: intellectual history, disciplinary roots and the potential for integration. *Current opinion in environmental sustainability*, 3(4), pp.202-212.

Chevallier, R and Marais, D., 2022. Ensuring that COP27 is Truly an 'African Cop': African Diplomacy and Governance. SAIIA Policy Insights No 139.

Climate Change Laws (2013). 2013-2025 National Strategy for Climate Change (ENMC) - Climate Change Laws of the World. [online] Climate-laws.org. Available at: https://climate-laws.org/documents/2013-2025-national-strategy-for-climate-change-enmc_5297?id=2013-2025-national-strategy-for-climate-change-enmc_fe72.

Club of Mozambique (2024). Mozambique: Government approves 2025-2044 National Development Strategy (ENDE). [online] Mozambique. Available at: <https://clubofmozambique.com/news/mozambique-government-approves-2025-2044-national-development-strategy-ende-259653/> [Accessed 31 May 2024].

Cornell, P.E., 2009. Energy and the three levels of national security: Differentiating energy concerns within a national security context. *Connections*, 8(4), pp.63-80.

Cristóvão, L., Chichango, F., Massinga, P.H., & Macanguisse, J. 2021. The Potential of Renewable Energy in Mozambique: An Overview. *Journal of Energy Technologies and Policy*.

CSIR. 2022. From coal to renewables in Mpumalanga: Employment effects, opportunities for local value creation, skills requirements, and gender-inclusiveness. Assessing the co-benefits of decarbonising South Africa's power sector. COBENEFITS Executive Report. Pretoria

Cunguara, B. and Hanlon, J. (2012), Whose Wealth Is It Anyway? Mozambique's Outstanding Economic Growth with Worsening Rural Poverty. *Development and Change*, 43: 623-647. <https://doi.org/10.1111/j.1467-7660.2012.01779.x>

de Joode, J., Van der Welle, A. and Jansen, J., 2010. Distributed generation and the regulation of distribution networks. In *Distributed Generation*. IntechOpen.

Denchak, M. (2023) Greenhouse effect 101, Be a Force for the Future. Available at: <https://www.nrdc.org/stories/greenhouse-effect-101#whatis> (Accessed: 29 July 2024).

Dimitrijević, V. (1973). The concept of security in international relations. Belgrade: Association of Lawyers Yugoslavia

Dingley, C. E. (1990). Electricity for all in South Africa: The need and the means University of Cape Town, Faculty of Engineering & the Built Environment ,Department of Electrical Engineering. Retrieved from <http://hdl.handle.net/11427/23894>.

Eligon, J. (2021). After Ex-President's Arrest, South Africa's Governing A.N.C. Is More Fractured. *New York Times*. [online] 9 Jul. Available at: <https://www.nytimes.com/2021/07/09/world/africa/south-africa-anc.html> [Accessed 11 Aug. 2021].

Enel (2023) The Digitalization of Energy, The digitalization of energy | Enel Green Power. Available at: <https://www.enelgreenpower.com/learning-hub/energy-transition/energy-digitalization> (Accessed: 13 June 2024).

Energy Institute (2023) Statistical Review of World Energy, Statistical review of world energy. Available at: <https://www.energyinst.org/statistical-review> (Accessed: 11 June 2024).

Eskom (2022). Eskom signs land lease agreements with independent clean power generators - Eskom. [online] Eskom. Available at: <https://www.eskom.co.za/eskom-signs-land-lease-agreements-with-independent-clean-power-generators/> [Accessed 5 Aug. 2024].

ETG (2023) Sustainability Report 2022, Sustainability model aligned to the UN Sustainable Development Goals 2030. Available at: <https://www.etgworld.com/sustainability.html> (Accessed: 12 May 2024).

Fjäder, C. (2014) 'The nation-state, national security and resilience in the age of globalisation', *Resilience*, 2(2), pp. 114–129. doi: 10.1080/21693293.2014.914771.

Friedman, S. (2020). How corruption in South Africa is deeply rooted in the country's past and why that matters. [online] The Conversation. Available at: <https://theconversation.com/how-corruption-in-south-africa-is-deeply-rooted-in-the-countrys-past-and-why-that-matters-144973>.

GIZ (2024). Transforming Mozambique's climate and energy pathways. [online] [Www.giz.de](https://www.giz.de). Available at: <https://www.giz.de/en/worldwide/152892.html> [Accessed 29 Jun. 2024].

Goldman, E.O. (Ed.). (2004). *National Security in the Information Age* (1st ed.). Routledge. <https://doi.org/10.4324/9780203005859>

Government of South Africa. 2015. Ministry of Defence. South African Defence Review.

Government of South Africa. 2022. Cabinet approves Just Energy Transition Implementation Plan

Government of South Africa. 2023. South African Renewable Energy Masterplan.

Grizold, A. (1994). THE CONCEPT OF NATIONAL SECURITY IN THE CONTEMPORARY WORLD. *International Journal on World Peace*, 11(3), 37–53. <http://www.jstor.org/stable/20751984>

Hausmann, R., O'Brien, T., Fortunato, A., Lochmann, A., Shah, K., Venturi, L., Enciso-Valdivia, S., Vashkinskaya, E., Ahuja, K., Klinger, B., Sturzenegger, F. and Tokman, M. (2023). Growth Through Inclusion in South Africa. [online] growthlab.hks.harvard.edu. Available at: <http://www.tinyurl.com/ylvjzp2d>.

Heffron, R, J. 2022. Applying energy justice into the energy transition, *Renewable and Sustainable Energy Reviews*, Elsevier, vol. 156(C).

Heffron, R. J. (2023). Energy justice – the triumvirate of tenets revisited and revised. *Journal of Energy & Natural Resources Law*, 42(2), 227–233. <https://doi.org/10.1080/02646811.2023.2256593>

Hiebert, K. (2024) *In 2024, national security requires a whole-of-society approach*, *Centre for International Governance Innovation*. Available at:

<https://www.cigionline.org/articles/in-2024-national-security-requires-a-whole-of-society-approach/> (Accessed: 27 May 2024).

Hughes, L., & Lipsey, P. (2013) 'The Politics of Energy', *Annual Review of Political Science* 16, pp 449-69

IEA (2023). World Energy Outlook 2023, IEA, Paris. Available at : <https://www.iea.org/reports/world-energy-outlook-2023>. Licence: CC BY 4.0 (report); CC BY NC SA 4.0 (Annex A)

IEA (2024). Mozambique - Countries & Regions - IEA. [online] IEA. Available at: <https://www.iea.org/countries/mozambique/emissions> [Accessed 31 May 2024].

Igamba, J. 2023. Climate Change In South Africa: 21 Stunning Facts About South Africa's Climate Breakdown. <https://www.greenpeace.org/africa/en/blogs/54171/climate-change-in-south-africa-21-stunning-facts-about-south-africasclimate-breakdown/>

IPCC (2023). Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647.

IRENA (2018). Global Energy Transformation: A roadmap to 2050, International Renewable Energy Agency, Abu Dhabi.

IRENA. (2020). Green Hydrogen Cost Reduction: Scaling up Electrolysers to Meet the 1.5°C Climate Goal, International Renewable Energy Agency, Abu Dhabi. Retrieved: May 07, 2024. From: <https://www.irena.org/publications/2020/Dec/Green-hydrogen-cost-reduction>.

IRENA (2021). Bracing for climate impact: Renewables as a climate change adaptation strategy, International Renewable Energy Agency, Abu Dhabi.

Instituto Nacional de Estatística (2014). Mozambique in Figures. http://www.ine.gov.mz/estatisticas/publicacoes/mocambique-em-numeros/mocambique-em-numeros_final_net.pdf/view

International Institute for Sustainable Development (IISD). (2023). South Africa Needs Grid Storage Plans to Tackle the Power Crisis—New Report. [online] Available at:

<https://www.iisd.org/articles/press-release/south-africa-needs-grid-storage-plans-tackle-power-crisis-new-report>.

International Trade Administration (ITA) (2024). Mozambique - Power Generation, Transmission & Distribution. [online] www.trade.gov. Available at: <https://www.trade.gov/country-commercial-guides/mozambique-power-generation-transmission-distribution>.

Josephine Ofosu-Mensah Ababio, Yiadom, E.B., John K.M. Mawutor, Tuffour, J.K. and Attah-Botchwey, E. (2023). Sustainable energy for all: the link between financial inclusion, renewable energy and environmental sustainability in developing economies. *International journal of energy sector management*, 18(3). doi:<https://doi.org/10.1108/ijesm-07-2023-0012>.

Johnson, C. and Boersma, T., 2015. The politics of energy security: contrasts between the United States and the European Union. *Wiley Interdisciplinary Reviews: Energy and Environment*, 4(2), pp.171-177.

Jones, D., Ryan, C.M. and Fisher, J. (2016). Charcoal as a diversification strategy: The flexible role of charcoal production in the livelihoods of smallholders in central Mozambique. *Energy for Sustainable Development*, 32, pp.14–21. doi:<https://doi.org/10.1016/j.esd.2016.02.009>.

Kamanzi, B. (2021). *The Crisis in South Africa's Energy Sector: Towards a Just Transition centring job creation and social ownership*. Institute for Social Research Johannesburg.

Kim, J., Panton, A. J., & Schwerhoff, G. (2024). Energy Security and The Green Transition. *IMF Working Papers*, 2024(006). Retrieved Oct 29, 2024, from <https://doi.org/10.5089/9798400263743.001>.

Kitzing, L., Siddique, M. B., Nygaard, I., & Kruger, W. (2022). Worth the wait: How South Africa's renewable energy auctions perform compared to Europe's leading countries. *Energy Policy*, 166, Article 112999. <https://doi.org/10.1016/j.enpol.2022.112999>

Kuwali., D. (2022). Is Accountable Governance a Solution to African Problems? [online] The Raoul Wallenberg Institute of Human Rights and Humanitarian Law. Available at: <https://rwi.lu.se/blog/is-accountable-governance-a-solution-to-african-problems/>.

Friedman, S. (2020). How corruption in South Africa is deeply rooted in the country's past and why that matters. [online] The Conversation. Available at: <https://theconversation.com/how-corruption-in-south-africa-is-deeply-rooted-in-the-countrys-past-and-why-that-matters-144973>.

Machiana , H. and Coelho, S.P. (2024). Mozambique Approves Ambitious 'Just Energy Transition' Strategy - Petroleum Africa. [online] Petroleum Africa. Available at: <https://www.petroleumafrika.com/mozambique-approves-ambitious-just-energy-transition-strategy/> [Accessed 25 May 2024].

Magome, M. (2023). South Africa's unemployment is a 'ticking time bomb.' Anger rises with millions jobless. [online] AP News. Available at: <https://apnews.com/article/south-africa-unemployment-jobs-economy-un-ab41fc68f3641819cd0d5557e63b17a6>.

Mahalik, M. K., & Mallick, H. (2014). ENERGY CONSUMPTION, ECONOMIC GROWTH AND FINANCIAL DEVELOPMENT: EXPLORING THE EMPIRICAL LINKAGES FOR INDIA. *The Journal of Developing Areas*, 48(4), 139–159. <http://www.jstor.org/stable/24241254>

Martin, G. (2021). Unemployed youth are the biggest threat to South Africa's security - defenceWeb. [online] defenceWeb. Available at: <https://www.defenceweb.co.za/editorial/editor-column/unemployed-youth-are-the-biggest-threat-to-south-africas-security/>.

Matsui, T., Tanaka, K., Haga, C., and Hori, K. 2022. Renewable energy Nexus: interlinkages with biodiversity and social issues in Japan. *Energy Nexus*, 6, p.100069.

Minerals Council of South Africa (2023). Integrated Annual Review 2023. [online] MineralsCouncil.org.za. Available at: <https://www.mineralscouncil.org.za/reports/2023/> [Accessed May 2024].

Molelekwa, T. (2023). Coal-mining communities left in the dust for a greener future. [online] The Mail & Guardian. Available at: <https://mg.co.za/the-green-guardian/2023-01-25-coal-mining-communities-left-in-the-dust-for-a-greener-future/>.

Montmasson-Clair, G. (2021). *Policy primers for a South African Just Transition Framework*. Trade & Industrial Policy Strategies (TIPS). <https://www.tips.org.za/>

[images/Working Paper PCC Policy primers for a Just Transition framework 2021.pdf](#)

Müller, F. and Claar, S. (2021) 'Auctioning a 'just energy transition'? South Africa's renewable energy procurement programme and its implications for transition strategies', *Review of African Political Economy*, 48(169), pp. 333–351. doi: 10.1080/03056244.2021.1932790.

Mungabe, J. 2022. 'Concerns rising on South African risks, warns Riskonet'. Available at: <https://afahpublishing.com/concerns-rising-on-south-african-risks-warns-riskonet/>. Accessed May 15, 2024.

Naidoo, K., Lewis, S., Essop, H., Koch, G. G. V., Khoza, T. E., Phahlamohlaka, N. M., & Badriparsad, N. R. (2023). July 2021 civil unrest: South African diagnostic radiography students' experiences. *Health SA = SA Gesondheid*, 28, 2253. <https://doi.org/10.4102/hsag.v28i0.2253>

Naidoo, K. and Loots, C. (2024). Solar energy in sub-Saharan Africa. [online] Sun Connect News - Leading News Platform for Decentralized Solar Energy in Sub-Saharan Africa. Available at: https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/2021-01-29_UNDP-UNCDF-Mozambique-Energy-and-the-Poor.pdf [Accessed 2 June 2024].

Natural Justice. 2024. *Status of the Just Energy Transition in Seven Southern African States*. Natural Justice: Cape Town.

Nhede, N. (2024). Mozambique: Thermal Power Plant to Begin Operations in 2024. [online] Energy Capital & Power. Available at: <https://energycapitalpower.com/mozambique-thermal-power-plant-temane/>.

Nuechterlein, D.E. (1976) 'National interests and foreign policy: A conceptual framework for analysis and decision-making', *British Journal of International Studies*, 2(3), pp. 246–266. doi:10.1017/S0260210500116729.

NOAA Research (2023) Record carbon dioxide emissions impeding progress on meeting climate goal. Accessed March 4, 2024.

Novikau, A., 2022. Rethinking demand security: Between national interests and energy exports. *Energy Research & Social Science*, 87, p.102494.

- Nye, J. S. (1999). Redefining the National Interest. *Foreign Affairs*, 78(4), 22–35. <https://doi.org/10.2307/20049361>
- O'Hara, Conor (2023) "Energy Policy as National Security," Pepperdine Policy Review: Vol. 15, Issue 1. Available at: <https://digitalcommons.pepperdine.edu/ppr/vol15/iss1/4>
- Otto, L. and Green, C. (2022). Resource Abundance in Mozambique: Avoiding Conflict, Ensuring Prosperity. [online] SAIIA. Available at: <https://saiia.org.za/research/resource-abundance-in-mozambique-avoiding-conflict-ensuring-prosperity/> [Accessed 31 May 2024].
- Pablo-Romero, M.P., Sánchez-Braza, A. and Galyan, A., 2021. Renewable energy use for electricity generation in transition economies: Evolution, targets, and promotion policies. *Renewable and Sustainable Energy Reviews*, 138, p.110481.
- Parliamentary Monitoring Group (2022). Glencore Bribery Case & alleged misuse of Mining Rehabilitation Funds | PMG. [online] Pmg.org.za. Available at: <https://pmg.org.za/committee-meeting/35338/> [Accessed 1 Aug. 2024].
- Parliamentary Monitoring Group (2023). Eskom corruption and related matters: engagement with Minister of Public Enterprises (with Deputy Minister present) |
- Patel, M., & Maimela, S. (2024). *Green Hydrogen and the Just Transition: Understanding the dynamics at a project level*. Trade & Industrial Policy Strategies (TIPS).
- PMG. [online] pmg.org.za. Available at: <https://pmg.org.za/committee-meeting/36960/>.
- Peoples, C., & Vaughan-Williams, N. (2020). *Critical Security Studies: An Introduction* (3rd ed.). Routledge. <https://doi.org/10.4324/9780429274794>
- Pinto, T.N. (2023). The lost promise of South Africa. [online] GIS Reports. Available at: <https://www.gisreportsonline.com/r/south-africa-lost-promise/>.
- Pinto, T.N. (2025). *Political crisis in Mozambique rages on – GIS Reports*. [online] GIS Reports. Available at: <https://www.gisreportsonline.com/r/mozambique-election-crisis/>.
- Pueyo, A. and Maestre, M. (2019) 'Linking energy access, gender and poverty: A review of the literature on productive uses of energy', *Energy Research & Social Science* 53: 170-181

Ramaphosa, C. (2023). 2023 State of the Nation Address. [South African Government] Available at: <https://www.gov.za/news/speeches/president-cyril-ramaphosa-2023-state-nation-address-09-feb-2023> [Accessed May 2024].

Repsol (2024) *Repsol strategic plan 2024-2027*, REPSOL. Available at: <https://www.repsol.com/en/about-us/strategic-plan/index.cshtml> (Accessed: 04 May 2024).

Rogers, P. (2019). The triple paradigm crisis: economy, environment, and security. *Journal of Global Faultlines* 6 (2):139-149.

Roodt, D. (2022). Striking Eskom workers are paid far too much — Economist. [online] MyBroadband. Available at: <https://mybroadband.co.za/news/energy/451128-striking-eskom-workers-are-paid-far-too-much-economist.html>.

SADC. 2022. Annual Report 2021/2022. Gaborone, Botswana

SANews. 2023. SARS leads efforts to 'break the back' of coal syndicates. DefenseWeb. Available at: <https://www.defenceweb.co.za/security/national-security/sars-leads-efforts-to-break-the-back-of-coal-syndicates/>

Salite, D., Kirshner, J., Cotton, M., Howe, L., Cuamba, B., Feijó, J. and Zefanias Macome, A. (2021). Electricity access in Mozambique: A critical policy analysis of investment, service reliability and social sustainability. *Energy Research & Social Science*, 78, p.102123. doi:<https://doi.org/10.1016/j.erss.2021.102123>.

South African Police Service. 2020. Crime Statistics 2019/2020. Retrieved from <https://www.saps.gov.za/services/crimestats.php>

Serzedelo, L. and Delgado, C.L. (2019). The Plantation Forestry Sector in Mozambique: Community Involvement and Jobs. Working Paper (Numbered Series), [online] 1, pp.1–47. Available at: <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/269431559132547929/the-plantation-forestry-sector-in-mozambique-community-involvement-and-jobs> [Accessed 31 May 2024].

Sibiya, N.; Sithole, M.; Mudau, L.; Simatele, M.D. 2022. Empowering the Voiceless: Securing the Participation of Marginalised Groups in Climate Change Governance in South Africa. *Sustainability*, 14, 7111.

Siyobi, B., & Moosa, M. 2023. "SA's Energy Crisis Plan- Too Little over Too Long." *Good Governance Africa*. Available at: gga.org/sas-energy-crisis-plan-too-little-over-too-long/. Accessed 17 May 2024.

Sokulski, C.C.; Barros, M.V.; Salvador, R.; Broday, E.E.; de Francisco, A.C. 2022. Trends in Renewable Electricity Generation in the G20 Countries: An Analysis of the 1990–2020 Period. *Sustainability*, 14, 2084. <https://doi.org/10.3390/su14042084>.

SONA. 2024. 2024 State of the Nation Address. [South African Government] Available at: <https://www.gov.za/news/speeches/president-cyril-ramaphosa-2024-state-nation-address-08-feb-2024> [Accessed May 2024].

South Africa. Department of International Relations and Cooperation. 2022. Framework Document on South Africa's National Interest and its advancement in a Global Environment. Internet: http://www.dirco.gov.za/docs/2022/sa_national_interest.pdf. Access 18 May 2024

SAHistory (2019). A Short History of ESKOM, Part 1 (2001-2019) | South African History Online. [online] Sahistory.org.za. Available at: <https://www.sahistory.org.za/article/short-history-eskom-part-1-2001-2022> (Accessed 18 May 2024).

SAHRC (2024). July Unrest Report: The National Investigative Hearing Report into the July 2021 Unrest in Gauteng and Kwazulu-Natal. [online] South African Human Rights Commission. Available at: <https://www.sahrc.org.za/home/21/files/JULY%20UNREST%20REPORT%20FINAL%2029%20JAN%202024.pdf>.

South Africa. Presidential Climate Commission. 2023. The Presidential Climate Commission: Towards A Just Transition

South African Reserve Bank. 2024. Occasional Bulletin of Economic Notes combined. Johannesburg, South Africa.

Spalding-Fecher, Randall., Senatla, M., Yamba, F., Lukwesa, B., Himunzowa, G., Heaps, C., Chapman, A., Mahumane, G., Tembo, B. and Nyambe, I. (2017). Electricity supply and demand scenarios for the Southern African power pool. *Energy Policy*, 101, pp.403–414. [doi:https://doi.org/10.1016/j.enpol.2016.10.033](https://doi.org/10.1016/j.enpol.2016.10.033).

S&P Global (2024). The big picture on climate risk, S&P Global. Available at: <https://www.spglobal.com/en/research-insights/special-reports/the-big-picture-on-climate-risk> (Accessed: 11 June 2024).

Stripple, J. (2012). The Subject of Security in a Warming World. *The Brown Journal of World Affairs*, 18(2), 181–194. <http://www.jstor.org/stable/24590872>

Strambo, C., Patel, M., & Maimela, S. (2024). *Taking stock of the just transition from coal in South Africa* [Working paper]. Stockholm Environment Institute and Trade & Industrial Policy Strategies. <https://doi.org/10.51414/sei2024.034>

Talus, K., & Aalto, P. K. (2020). Energy Transitions and the Law. In T. Hunter, I. Herrera, P. Crossley, & G. Alvarez (Eds.), *Routledge Handbook of Energy Law* (pp. 549-560). Article 32 Routledge. <https://doi.org/10.4324/9780429450891>

Tiwary, R.K. and Dhar, B.B., 1994. Environmental pollution from coal mining activities in Damodar river basin, India. *Mine water and the environment*, 13(1), pp.1-10.

Uamusse, M., Tussupova, K., Persson, K. and Berndtsson, R. (2019). Mini-Grid Hydropower for Rural Electrification in Mozambique: Meeting Local Needs with Supply in a Nexus Approach. *Water*, 11(2), p.305. doi:<https://doi.org/10.3390/w11020305>.

Ullman, R. H. (1983). Redefining Security. *International Security*, 8(1), 129–153. <https://doi.org/10.2307/2538489>

US Department of Defense (2007) *Energy Independence and security act of 2007 - congress.gov*. Available at: <https://www.congress.gov/110/plaws/publ140/PLAW-110publ140.htm> (Accessed: 06 May 2024).

UN News (2020). In General Debate speech, Mozambique Foreign Minister highlights need for UN reform. [online] United Nations. Available at: <https://www.un.org/africarenewal/news/general-debate-speech-mozambique-foreign-minister-highlights-need-un-reform> [Accessed May 2024].

United Nations Framework Convention on Climate Change (UNFCCC). 2011. Compilation of economy-wide emissions reduction targets to be implemented by parties included in Annex I to the Convention, FCCC/SB/2011/INF.1/Rev.1.

United Nations General Assembly. 1948. The Universal Declaration of Human Rights (UDHR). New York: United Nations General Assembly.

World Tourism Organization (2024). Glasgow Declaration Implementation Report 2023 – Advancing Climate Action, UNWTO, Madrid, DOI: <https://doi.org/10.18111/9789284425242>

Van de Graaf, T. & Sovacool, B.K. 2020. *Global energy politics*. John Wiley & Sons.

Wolf, A., Klein, E. 2016. Mozambique: Overview of corruption and anti-corruption. U4 Expert Answer 2016: 18.

Wolfers, A. (1952). “National Security” as an Ambiguous Symbol. *Political Science Quarterly*, 67, 481-502. <https://doi.org/10.2307/2145138>

World Bank (2023). World Bank Open Data. [online] World Bank Open Data. Available at: <https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?locations=MZ>.

World Bank. 2023. Green Digital Transformation: How to Sustainably Close the Digital Divide and Harness Digital Tools for Climate Action. Climate Change and Development Series. Washington, DC: World Bank. <http://hdl.handle.net/10986/40653>

World Bank. 2023. Climate impacts on energy systems: key issues for energy sector adaptation (English). Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/580481468331850839/Climate-impacts-on-energy-systems-key-issues-for-energy-sector-adaptation>

WWF (2022). Climate adaptation and climate mitigation. [online] World Wildlife Fund. Available at: <https://www.worldwildlife.org/stories/what-s-the-difference-between-climate-change-mitigation-and-adaptation>.

Yergin, D. (2020). *The new map: energy, climate, and the clash of nations*. New York, Penguin Press.

Zakharov, A.N., 2017. The Global Energy Challenge: New Challenges and Threats, the Ways to Overcome Them. *MGIMO Review of International Relations*, (1 (52)), pp.187-200.

Zhang, D. and Kong, Q., 2022. Green energy transition and sustainable development of energy firms: An assessment of renewable energy policy. *Energy Economics*, 111, p.106060.