Gordon Institute of Business Science
University of Pretoria

TRANSITIONING TO A LOW-CARBON ECONOMY: THE ROLE OF SOUTH AFRICA'S BANKING SECTOR IN THE RENEWABLE ENERGY TRANSITION

Ntuweleni Ernest Mulibana
13294114

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ABSTRACT

An important goal of South Africa's National Development Plan (NDP) is to achieve a low-carbon economy through the process of a just transition. This goal will require the participation and cooperation from all stakeholders including academia, government, the energy sector, civil society and the financial sector. The role of banks and investment agencies will be particularly important due to the capital-intensity of low-carbon technologies and the large scale of energy grids.

Using the framework of Technological Innovation Systems (TIS), this study has explored the role of South African banks in mobilising the necessary financial resources for the country's energy transition, and particularly the two important questions of whether there are presently sufficient funds, and whether the banks are presently promoting or delaying technological innovation in the renewable energy sector.

Thirteen semi-structured interviews with representatives of South African banks and REI4P projects were conducted to collect data that was analysed using a content analysis approach. The study found that the banking sector has been investing in renewable energy producers through the provision of long-term loans and other forms of debt financing. However, it was noted that the banks are unwilling to provide funding for smaller deals (anything less than R100 million) or unproven renewable energy technologies such as small hydro, marine and geothermal.

In summary, it was concluded that the financial sector in South Africa is not playing a visible leadership or advocacy role in respect of the country's transition to a low-carbon economy. Investment proposals from renewable energy firms are assessed in the same way as proposals from other firms and sectors. This response is somewhat surprising given the threat of climate change to the future of the sector. A more proactive role will be important if the NDP goal of a just transition is to be realised.

KEYWORDS

Sustainability transition; Renewable energy; Low-carbon economy; Green finance; Banking sector

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

N.E Mulibana
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CHAPTER ONE: INTRODUCTION TO RESEARCH PROBLEM

1.1. Introduction

Addressing the catastrophic effects of climate change is no longer an option. Governments, non-governmental organisations, businesses, civil society, academia and other sectors have no choice but to actively participate in bolstering efforts aimed at curbing the effects of climate change. According to Tsitsiragos (2016), addressing climate change requires immediate action to reduce global carbon emissions. Such action includes the provision of financial resources to fund climate mitigation and adaptation measures (Hall, Foxon, & Bolton, 2017). Furthermore, Tsitsiragos (2016) noted that a study by the United Nations showed that developing nations, including South Africa, would need at least $28bn annually by 2030, to finance their climate mitigation and adaptation initiatives. Such initiatives include but are certainly not limited to renewable energy generation, low-carbon transportation, agriculture, forestry and, land-use management amongst others (Buchner, et al., 2019).

It is for this reason that this research was undertaken to understand the role of the banking sector in facilitating the transition to a low-carbon economy in South Africa, with a focus in the energy sector. This chapter provides the research problem statement, research objectives, context and, a business case of the study. It concludes with the structure of the research report.

1.2. Problem Statement

Countries of the world have become vulnerable to the devastating effects of climate change on the natural environment and human life (Busch, Bauer, & Orlitzky, 2016). Climate change was described by the late South African Minister of Environmental Affairs Edna Molewa (2018), as “the single biggest threat to development.” South Africa is and will be adversely affected by climate change (Rogerson, 2016). It is for this reason that, as envisioned in the National Development Plan (NDP), South Africa aspires to build an environmentally sustainable country through an equitable transition to a low-carbon economy. According to the South African Government (2012, p. 199), it is expected that “coordinated planning and investment in infrastructure and services that take account climate change and other environmental pressures, provide South Africans with access to

secure housing, clean water and, decent sanitation, and affordable and safe energy, making communities more resilient to the impacts of climate change and less socio-economically vulnerable." Attaining this noble yet highly ambitious vision will require the full support of different stakeholders, including non-governmental organisations, corporates, and civil society.

However, a recent news article in the Mail and Guardian (2019) newspaper reports that South Africa's banking sector is lagging behind with regards to facilitating a transition to a low-carbon economy. In a newspaper article, Davie (2019) writes that South African banks (Absa, Nedbank, Investec, FirstRand and, Standard Bank) may be using depositors' money to support industries that create global warming and the consequences of climate change. The article is based on the Full Disclosure 5 report by the Centre for Environmental Rights (2019) which highlights that with a combined asset value of over R6.8 billion, the five major South African banks, except for Nedbank, have not disclosed the extent of their assets in carbon-related sectors. This begs the question, as posed by Busch, Bauer and, Orlitzky, (2016, p. 304), "to what extent do financial markets foster and facilitate more sustainable business practices?"

In what appears to be an attempt to answer this question, Louche, Busch, Crifo, and Marcus (2019) and Naidoo (2019) undertook exploratory studies that sought to understand the role of financial markets or systems in transitioning to a low-carbon economy. In their studies, the authors argue that financial markets have a huge role to play in the transition to a low-carbon economy and that some progress has been made, specifically from a technological perspective. However, "a lot more needs to occur to make financial markets effective in promoting a low-carbon economy" (Louche et al., 2019, p. 6). It is on this basis that the research study undertaken sought to gain insight into the manner in which the South African banking sector is facilitating the journey to a low-carbon economy, particularly in the energy sector.

1.3. Purpose of the Study

The purpose of the research is to understand the role of the banking sector in facilitating transition to a low carbon economy in South Africa, with a specific focus in the energy sector. In order to achieve this objective, the research explored to gain insight by posing the pertinent research questions presented below:

Research Question 1: Is funding available for renewable energy projects, and if so, what is the nature of the funding?

Research Question 2: How has the way in which banks evaluate energy projects changed the profile of the energy portfolio over the period 2010 to 2020?

Research question 3: To what extent are the banks willing to invest in renewable energy projects?

1.4. Research Objectives

The objectives that this research sought to achieve are as follows:

- To determine the importance of financial resources and accessibility thereof, for building renewable energy projects;
- To determine how the banks, promote or impede technological innovation in the renewable energy sector and;
- To determine the impact of lobby groups on the banks decisions to finance renewable energy projects.

1.5. Context of the Study

Reliable energy supply is important for socio-economic development (Arndt, et al., 2016) in any country. In fact, according to Ndlovu and Inglesi-Lotz (2020), the energy industry is crucial in the functioning and performance of an economy, more especially with regards to job creation. However, in South Africa, the supply of electricity has been a challenge, which has led to scathing criticisms being levelled against the country's power utility, Eskom. The utility faces serious technical and financial constraints (Ateba, Prinsloo, & Gawlik, 2019) to an extent that it has not been able to ensure an uninterrupted supply of electricity in the country. As such, the country has had to endure a series of load shedding incidences that have unfortunately resulted in a decline in South Africa's economic performance (Ateba et al., 2019; Beker, 2017) for the past decade or so. Therefore, the importance of a reliable and sustainable energy supply cannot be overemphasised, particularly in an emerging economy like South Africa.

Notwithstanding its significance, the energy sector is considered to be the biggest contributor to greenhouse gas (GHG) emissions in South Africa. This, according to Winkler (2017, p. 27), is because of the country's "energy-intensive economy and high dependence on coal for primary energy." Approximately 92% of electricity is generated from coal, while about 20% of liquid fuels are also produced from coal in South Africa (Strambo, Burton, & Atteridge, 2019). Consequently, Eskom and Sasol, a South African energy and chemical company, together contribute at least 50% of GHG emissions in the country (Strambo et al., 2019). This has resulted in environment lobby groups such as Greenpeace and others staging protests at the headquarters of the Department of Environment, Forestry and Fisheries, and Eskom over high dependence on coal for energy generation. The groups have, and continue to advocate for the adoption of renewable energy, which could help alleviate the devastating effects of climate change.

Like many other countries, South Africa has ambitions to move towards clean energy. As such, the country has seen a significant increase in the number of clean energy projects, with others contributing electricity to the national grid. According to Beker (2017, p. 372), South Africa became "a leading destination for investment in renewable energy," following the adoption of the Renewable Energy Independent Power Producers' Procurement Programme (REI4P) in 2011. REI4P is a programme aimed at facilitating investment from the private sector through competitive bidding, for the generation of renewable energy (Eberhard & Naude, 2016). Since the adoption of REI4P, "nearly 6,327 MW of capacity and 92 projects have been approved" (Beker, 2017, p. 371) with an investment of approximately USD 20.5 billion (Eberhard & Naude, 2016).

In 2019, the Department of Energy released an improved version of the Integrated Resource Plan (IRP). According to the Department "IRP is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment" (Department of Energy, 2019, p. 4). The plan is premised on the NDP vision for the provision of reliable and efficient energy in the country. Quoting Professor David Walwyn from the University of Pretoria, Hancock (2020) referred to the IRP as "a positive step for the decarbonisation of South Africa's electricity generation and "clearly critical" to achieve the carbon-emission reduction goals, as well as mitigate other ongoing environmental and public health costs associated with burning coal for power." With initiatives such as the IRP and the REI4P in place, it is evident that South Africa is taking the need to transition to a low-carbon economy, and more

specifically in the energy sector, quite seriously. While the initiatives are certainly commendable, more can and must still be done.

In order to fast track the transition to a low-carbon economy, specifically through the reduction of GHG in the energy sector, investment in renewable and other clean energy projects is crucial. Fostering growth in renewable energy requires a great deal of investment in technology transfer, research, and development. Financial support from financial markets in general, and more specifically from the large banks, is a necessity for the energy transition.

1.6. Business Case for Climate Action

It is in every business's interest to adopt processes that facilitate a transition to a low-carbon economy. As Porter and Reinhardt (2007) acknowledge, climate change complexities on the environment, and human life will have a direct impact on business. A study by Coppola, Krick and Blohmke (2019) concludes that climate change impacts companies in a number of ways and creates complex business risks. It is therefore in the interest of every business to formulate and implement strategies that would help in mitigating climate risks, and "find competitive advantage in a warming, carbon-constrained world" (Porter & Reinhardt, 2007). According to Schwartz (2007), "companies can help in the mitigation of climate change by making proactive investments and supporting policy," which in turn reduce their own risks. In essence, companies in every sector of the economy must actively play a role in climate change mitigation. Such a role will not only help reduce company risks but also help protect various stakeholders from the devastating effects of climate change.

Addressing climate challenges should not be seen as a daunting task, but one that enables companies to innovate and create new business opportunities that will positively impact both current and future generations. According to Coppola et al. (2019), there are three immediate business opportunities that come with climate action. The first one has to do with improving resource productivity and efficiency, which will in turn help reduce operating costs. Secondly, climate action presents an opportunity to innovate, enabling companies to develop new products and services that are less carbon-intensive. The third opportunity is that "companies can enhance the resilience of their supply chains,…by reducing reliance on price-volatile fossil fuels by shifting towards renewable energy"

(Coppola et al., 2019, p. 3) There are clearly important business opportunities that come with climate action, particularly in the renewable energy sector. Therefore, it can be argued that businesses must actively participate in the imperative need to address climate change.

1.7. Division of Chapters

This research report is structured in the following manner:

Chapter One presents an introduction to the research problem, outlining the purpose, objectives, and business case of the research. It also provides the context under which the research was been undertaken.

Chapter Two provides a detailed and critical review of the literature. The chapter also provides definitions of key concepts that are central to the study. It then unpacks the theoretical foundation upon which the study is rooted, and delves into the various aspects of sustainability transition and the role of financial markets.

Chapter Three presents a list of research questions that the study sought to have answered. The questions are on the criteria for funding of renewable energy projects, change in technology, and the bank's willingness to provide funding for renewable energy.

Chapter Four focuses on the research design and methodology employed in the study. The profiles of the research participants are presented in this chapter.

Chapter Five presents the results of the study. The results are categorised according to thematic areas that emerged from the data analysis and respond to each of the research questions. Verbatim quotations of the participants are provided to support the findings of the study.

Chapter Six is an insightful discussion of the results. This chapter connects and compares the research findings with the literature reviewed. This process is known as the triangulation of the data, and is performed in order to ensure the reliability of the results.

Chapter Seven provides conclusions and recommendations for future studies. It also gives a reflection of the limitations of the study, and makes suggestions for future research areas.

CHAPTER TWO: THEORY AND LITERATURE REVIEW

2.1. Introduction

A literature review is an important step in an academic research process. It is a mandatory component that serves as the foundation of the research study (Turner, 2018) and enables the researcher to develop cogent arguments, while at the same time contextualising and justifying the research being undertaken (Saunders & Lewis, 2018). It is through a literature review that gaps and discrepancies in literature are highlighted while dissecting pertinent issues to generate a fresh perspective (Turner, 2018). Chapter Two provides a literature review on the subject of transition to a low-carbon economy. It starts by defining concepts of sustainability transition, low-carbon economy, and green finance. These concepts are core to the study and it is important to clarify them in order to ensure congruency of the review and arguments to be provided. The chapter also provides the theoretical foundation upon which the study is based and a critical review of the relevant literature (similar studies) that have been conducted in South Africa and other parts of the world.

2.2. Defining Key Concepts

In order to ensure consistency and a logical flow of the literature review and arguments made, the following key concepts are defined as follows:

2.2.1. Sustainability transition

In their highly acclaimed book on transition studies, Grin, Rotmans, and Schot (2010, p. 11) defined sustainability transition as “a radical transformation towards a sustainable society, as a response to a number of persistent problems confronting contemporary modern societies.” Sustainability transition is about moving away from processes that damage or have the potential to damage the integrity of the natural environment, thereby ensuring current and future generations are able to meet their needs. Sectors that are commonly considered to have a significant role in driving sustainable transition are agriculture, energy, manufacturing, transport, and mining (Geels, 2013; Musango, Brent, & Bassi, 2014; Edmondson, Kern, & Rogge, 2019), where their operations ought to be undertaken in a transformed and environmentally sound manner.

Interestingly, Geels (2013) observed that sustainability transitions were advancing from a pre-development phase that focused on conceptualisation, research and development, and experimentation, to what he referred to as “a take-off phase.” A take-off phase, he argued, emphasises “a real-world deployment and installation of green solutions” (Geels, 2013, p. 72). In this phase, sustainability-driven projects such as renewable energy and others, are being developed and implemented in reality. Nonetheless, research and development remains an important element of this process as it brings about new ideas that make the journey towards a low-carbon economy more seamless.

Sustainability transition, otherwise also known as a just transition (Heffron & McCauley, 2018) is a long term process that requires a great deal of resources (financial and human) and must be facilitated by technological innovations (Naidoo, 2020). As shall be seen in the subsequent section of this research study, technological innovation is considered to be the backbone of sustainability transition whose ultimate goal is a low-carbon economy.

2.2.2. Low-carbon economy

The term low-carbon economy was apparently coined by the United Kingdom’s Department of Trade and Industry almost two decades ago (Lyu, Ngai, & Wu, 2019) and has since been widely used in academic and business circles. Although there is no single internationally accepted definition, a low-carbon economy can be defined as “a development trend that aims to reduce energy consumption and pollutant emissions, improve energy utilisation rates and establish environmentally friendly economic development mechanisms to yield high economic outputs, and create a high standard of living as well as provide good quality of life” (Lyu et al., 2019, p. 359). In its essence, this concept refers to economic activities that consume low energy and produce less greenhouse gases (Chen & Wang, 2017).

The low-carbon economy is inherently linked to the energy sector. It is from this perspective that Anbumozhi, Kimura, and Kalirajan (2018) referred to low-carbon energy systems as systems at whose core are technologies and processes that produce clean energy. This is the kind of energy that is generated with significantly low emissions of greenhouse gases.

2.2.3. Climate finance

Achieving a low-carbon economy requires financial resources (Naidoo, 2020; Geels, 2013). Financial resources that are used to facilitate a transition to a low-carbon economy are generally referred to as climate finance, which Boissinot, Huber and Lame (2015, p. 3) defined as "financial flows expected to contribute to the reduction of emissions and to the adaptation to current climate variability as well as future climate change, encompassing private and public funds domestic and international flows." This definition is offered by the Intergovernmental Panel on Climate Change (IPCC), a body of experts who give scientific and evidence-based advice on climate change matters to the United Nations Framework Convention on Climate Change (UNFCCC).

Public and private financiers have developed multiple instruments or forms in which initiatives (innovations and infrastructure) aiming to advance sustainable development could be funded (Bürer & Wüstenhagen, 2008; Polzin, Sanders, & Taube, 2017). Boissinot et al. (2015) identified instruments such as green bonds, loans, equity, and government grants as being the most common forms of green finance. These and others will be discussed in detail later on.

2.3. Technological Innovation Systems

With the definitions of the concepts that are central to this study having been provided above, the attention turns to the theory upon which the research is grounded. As highlighted earlier, technology and innovation are fundamental enablers of sustainable development, serving as a catalyst for the transition to a low-carbon economy by curbing the use of fossil fuels as sources of energy (Edsand, 2016). South Africa's transition to a low-carbon economy could be facilitated by more investments in the renewable energy sector, amongst others. Taking into account that the energy sector is currently one of the biggest contributors to GHG emissions, the application of the Technological Innovation System (TIS) framework could serve as a catalyst for the much-needed transition to a low-carbon economy. According to Bergek, et al. (2015, p. 52) "a large part of the studies applying the TIS framework has focused on studying the emergence of clean-tech sectors and, by this, it has become a major building block of sustainability transitions research." It is for this reason that the TIS theory is considered to provide the most relevant and appropriate framework upon which the study was anchored.

The TIS is a processual and analytical framework that is widely used to map and understand low-carbon transitions. Defined as a "network of agents interacting in the economic/industrial area under a particular infrastructure and involved in the generation, diffusion and utilization of technology" (Edsand, 2016; Reichardt, Negro, Rogge, & Hekkert, 2016). The TIS is considered to be one of the salient conceptual approaches to managing sustainability transitions (Truffer, 2015). It is a functional framework made up of seven functions that can be applied in any context. These are: entrepreneurial activities; knowledge development; knowledge diffusion through networks; guidance of the search; market formation; resource mobilisation and creation of legitimacy / counteract resistance to change. The study focused largely on resource mobilisation and the creation of legitimacy functions of the framework. Table 1 below provides a description of each of the functions of the TIS:

Table 1: Definitions of the TIS functions.

No	Systems functions	Description
1	*Entrepreneurial activities*	Turning the potential of new technology into business opportunities.
2	*Knowledge development*	Generation of new knowledge and expansion of existing knowledge through research and development.
3	*Knowledge diffusion through networks*	The manner and extent to which latest technological insights (knowledge) are shared – conferences & workshops.
4	*Guidance of the search*	Expectations of the government and other stakeholders set through regulations and clear targets.
5	*Market formation*	Instruments aimed at facilitating smooth entry of new technology. This could be done through tax exemption, supply agreements and price controls.
6	*Resource mobilisation*	Financial and technical resources made available by the government, the industry or financier to enable development and the adoption of new technology.
7	L*egitimacy/counteract resistance to change*	Advocacy coalitions as a catalyst for the adoption of new technology.

Sources: Adapted from Hekker et al. (2007); Edsand (2016); and Dreher et al. (2016).

Although the TIS emerged in the 1980s, and there have been multitudes of literature about it. Edsand (2016) believes that the framework is still in its developmental stage and requires further improvements. Nonetheless, there has been substantial work by scholars such as Hekker, Suurs, Kuhlmann, and Smits, (2007); Jacobsson and Karltorp (2013); Bergek et al. (2015) and many others who have worked consistently on the development, advancement, and operationalisation of the framework. Unlike other innovation systems, the TIS not only covers technological advancements, but, according to Edsand (2017, p. 3), it also "captures the socio-technical processes which can influence the diffusion of technologies of socio-technical variation and their influence on the diffusion of technologies". Therefore, it can be universally applied.

According to Bergek et al. (2015, p. 51) the TIS framework "focuses on understanding how the innovation system around a particular technology functions". Such technology could be matured or brand new. It is a functional mission-oriented framework that facilitates transformation that, as Dreher, Kovač, and Schwäbe (2016, p. 47) stated, focuses on "analysing the emergence and functioning of socio-technical transitions to sustainability." Furthermore, the framework is rooted in the systems approach, given that, as Dreher et al. (2016, p. 47) suggested, "transitions typically depend on technological changes and also on socio-technical configurations, new actors or new institutional settings." As such, all elements that are necessary to facilitate transitions ought to work together in order to seamlessly achieve the intended goal of a low-carbon economy. Sustainability transition is facilitated by socio-technical systems which bring together different elements that are necessary to fulfil societal functions (Edmondson, Kern, & Rogge, 2019; Falcone, Morone, & Sica, 2018). In this regard, sustainability transition must result in changes in the technological, organisational, institutional, political, and socio-cultural environments (Edmondson et al., 2019).

The TIS is an important tool for shaping policy decisions on technological innovation and diffusion thereof. Transition to a low-carbon economy requires making informed policy decisions that would guide the process of decarbonisation. The TIS is a necessary framework upon which policy decisions on sustainability transitions can be based (Bening, Blum, & Schmidt, 2015). As such, taking into account budgetary constraints within which policymakers operate, Bening et al. (2015) recommended that future application and analysis of the TIS should be logical, and must be based on the needs and goals of the

country. Such consideration requires the full participation of not only the scholars of the TIS, but also policy and decision-makers alike. In addition, active participation in policy consultation processes by the TIS scholars, as suggested by Bening et al. (2015), will not only generate new insights on the application of the framework but also serve as a basis for future policy recommendations. It is through the application of the functions approach to the TIS that policymakers can be able to cleverly identify and eliminate possible bottlenecks and other problems in their technological innovation journey. The framework is useful for analysing obstacles in the transition process which, according to Bergek et al. (2015), contribute to the elimination of possible impediments to the formulation of policy and execution of strategies.

2.3.1. Resource mobilisation

The resource mobilisation function of the TIS focuses on the human and financial capital required to facilitate sustainability transitions (Hekker et al., 2007). While all the seven functions of the TIS are important and certainly applicable to the intended study, resource mobilisation is the central focus. This is on the premise that resources, especially financial resources, are crucial in the transition to a low-carbon economy. However, resources, more especially financial resources, are always scarce (Hekker et al., 2007). As such, multiple role-players need to come to the party and not only make the much-needed resources available but also ensure that they are efficiently utilised. According to Hekker et al. (2007) the resource mobilisation function can be facilitated by the government, the industry, or even the financial markets. In concurrence with this, Edsand (2017) moved to identify government coffers and international funding as at least two major sources of financial resources that could be used in facilitating the decarbonisation process. In the ensuing sections, the literature on the role of banks as a source of financial resources to facilitate the transition to a low-carbon economy is reviewed in detail.

2.3.2. Limitations of the Technological Innovation Systems framework

As with many other theoretical frameworks, the functionality of the TIS has been reviewed by many scholars with an aim of not only being critical but also advancing its applicability. In their article on the application of the functional approach to the TIS, Bening et al. (2015) argued that many papers on this framework do not provide an adequate reflection on its foundation, and fail to clearly indicate possible gains of the framework. Edsand (2019)

identified two major limitations of the TIS, firstly saying that the framework cannot be universally applied as it was constructed from a developed country's perspective. Therefore, its application in developing countries has been limited and would depend on the characteristics of that particular country. Secondly, the framework has been criticised for being "inward-looking and not sufficiently incorporating the contextual factors that may influence the success or failure of RETs [renewable energy technologies] diffusion" (Edsand, 2019, p. 1). In this regard, Markard and Truffer (2008) and Edsand (2016), found the framework to be "myopic" as it gives less consideration to external environments which may have implications for its application. In essence, the framework does not adequately consider other external factors that could have a bearing on the technological innovation system. Such factors include but are certainly not limited to developments in the wider political, economic, and social fronts. As a result, the comprehensiveness of the framework may be reduced. The framework has further been criticised for being largely focused on the "emergence of new technologies that address sustainability problems," (Dreher et al., 2016, p. 65), and therefore falls short of being a full systems approach.

Notwithstanding these criticisms and possibly other shortcomings, the TIS approach is considered the most applicable framework for energy transitions (Sawulski, Gałczyński, & Zajdler, 2019). As alluded above, the TIS ought to provide some guidance on policy decision making. Therefore, it would be important that the framework takes into account the possible impacts of the external environments. However, the scholars of the framework have been criticised for disregarding other scholarly work that could help advance the applicability of the TIS. It is with this in mind that Bening et al. (2015, p. 74) suggested that in order to "improve the workability of policy recommendations," scholars of the TIS must be amenable to complementary literature. This would result in comprehensive policy recommendations that would have taken into account other facets such as political, economic, and social considerations. Bergek, et al., (2015) shared a similar sentiment, and argued that interaction between the TIS and other fields of studies is an undisputable necessity.

2.4. Transitioning to a Low-carbon Economy

There has been extensive research on the idea of transitioning to a low-carbon economy future, befittingly resulting in voluminous literature. According to Loorbach, Frantzeskaki, and Avelino (2017), transitioning to a low-carbon economy is about societal changes that

can solve societal problems. It is centred on shifting away from unsustainable operations and towards sustainability to a new (green) growth path (Geels, 2013; Naidoo, 2020). Loorbach et al. (2017) provided a number of attributes that make up sustainable transitions, which can be succinctly summarised as "non-linear and disruptive processes targeted at achieving a new sustainable state; typified by multi-level and contested interactions; resulting in the co-evolution and emergence of new systems; and displaying variation and selection in achieving the new sustainable state" (Naidoo, 2020, p. 5). Together, these characteristics ultimately bring about necessary changes that are required to solve problems in society.

As a multifaceted and complex process (Geels, 2013), transitioning to a low-carbon economy happens over a long period of time and requires the involvement of multiple actors (Naidoo, 2020). According to Edmondson et al. (2019, p. 8), the complexity of sustainability transitions "means that no single approach, technology, intervention, or policy instrument is capable of achieving transformative change." The complexity is largely brought about by the wide variety of interests, expectations, capabilities and beliefs of multiple actors (companies, consumers, policymakers, social movements, and researchers amongst others) who are involved in the process (Geels, Berkhout, & van Vuuren, 2016). The involvement of multiple actors make the transition processes inherently political and inevitably result in winners and losers (Köhler et al., 2019). Consequently, a large number of policy instruments or programmes are developed and sometimes implemented with the intention of achieving a transition to a low-carbon economy. Most importantly, for sustainability transitions to become a reality, all changes, particularly from a technological, societal and institutional perspective, "need to occur simultaneously," pointing in the same direction (Falcone et al., 2018, p. 25). This, therefore, requires a deliberate set of actions by different role-players as identified above. It can also be argued that without deliberate actions, sustainability transitions will remain nothing but a mere desire.

Furthermore, and as stated in the previous chapter, the ultimate goal of transitioning to a low-carbon economy is to eliminate the challenges of climate change, thereby positively impacting the natural environment and the society at large. Eliminating the challenges of climate change requires the world not to exceed the 2°C growth in the global temperature by the end of the current century (Porfiriev, 2019). Achieving this goal requires cooperation and deliberate participation of all stakeholders at global and national levels, to play specific

roles that will eventually result in the attainment of this noble idea. Researchers such as Grin, Rotmans, and Schot (2010) have worked on how countries of the world could achieve sustainability transitions, recognising that governments, businesses, and civil society, aided by technological innovations, must be at the forefront of this journey. It is for this reason that this literature review focuses on these drivers of the transition to a low-carbon economy.

2.4.1. Public policy intervention

The starting point of a journey to a low-carbon economy is the development and execution of a relevant and sound public policy. Potts and Walwyn (2020) identified policy coordination and the development of a comprehensive policy mix as fundamental conditions for sustainability transitions to take place. According to (Edmondson et al., 2019, p. 2) "policy is widely considered as an integral constituent of transitions towards sustainability," and provides the ground upon which the entire process takes course. It goes without saying that the public sector (governments) will always play a leading role (Louche et al., 2019; Corfee-Morlot, et al., 2012), through the development and execution of appropriate policies, in the journey to a low-carbon economy. In a demonstration of the importance of public policy in curbing the effects of climate change, Porfiriev (2019, p. 114) argued that "the first question to be answered is not how to reduce greenhouse gas emissions, but how the government policy can contribute to meeting the …basic goals of development, reducing emissions and forming an economy more stable to climate change." Accordingly, Kim (2018) argued that governments are custodians of public policy, and should make law and create a regulatory environment that is conducive for a transition to a low-carbon economy.

The policy ought to lay the foundation upon which sustainability transitions take place, and provide guidance thereon. Worrall, Roberts, and Whitley (2018) recognised policies as the backbone of the transition to a low-carbon economy. They have identified three broad categories of policies in this regard, arguing that "macroeconomic and sectoral policies are required to guide economies and sectors to decarbonise…,employment policies are needed to guide firms and skills development in the labour market…social policies are required to ensure health and safety in the workplace, as well as social protection where jobs or pensions are lost" (Worrall et al., 2018, p. 5). Coherence in these policies is required to ensure that there is no contradiction, but certainty and mutual support. It is in

the public policy that the varying interests of multiple actors, particularly the finance industry, civil society, government, and consumers are harmonised (Geels, 2013), thereby promoting innovations that will eventually replace or reconfigure unsustainable ways of operating.

A practical demonstration of the importance of public policy in transitions, particularly energy transitions, is the Integrated Resource Plan (IRP) initially adopted by South Africa in 2010. The plan aimed to facilitate the country's course to produce sufficient energy while transitioning to a low-carbon economy. The Department of Energy (2019, p. 6) refers to IRP as "the coordinated schedule for generation expansion and demand-side intervention programmes, taking into consideration multiple criteria to meet electricity demand." This plan serves as a public policy that provides guidance on the country's future energy initiatives and is updated on a regular basis to accommodate developments that may have implications for the energy sector. The first plan (referred to as IRP 2010) provided policy clarity and certainty for South Africa's renewable energy space (Montmasson-Clair & Ryan, 2014) and assured investors that the country seriously considered renewable energy as an important part of its energy mix. The latest plan was gazetted in October 2019 and is known as IRP 2019.

IRP 2019 is more than just a guiding document, but a public policy framework that binds both the government and roleplayers in the sector to facilitate the development of infrastructure that will eventually result in the reduced cost of electricity supply and carbon emissions (Felekis & van der Poel, 2019). It is in the execution of the IRP that the Renewable Energy Independent Power Producers Procurement Programme (REI4P) was born (Montmasson-Clair & Ryan, 2014) and is being implemented. The REI4P is being implemented as "a means of stimulating the adoption of renewable energy technologies" and expanding the country's energy sector (Potts & Walwyn, 2020, p. 3). The programme has been lauded for setting a global standard for renewable energy procurement (Montmasson-Clair & Ryan, 2014).

Furthermore, given that tackling climate change is a global action, public policy interventions must take a cue from the international accords. International agreements such as the Montreal Protocol and the Kyoto Protocol, for example, have provided the foundation upon which countries, particularly member states to UNFCCC, base their policies on climate change (Barret & Stavins, 2003). In 2015, the UNFCCC adopted the

Paris Agreement, a piece of document that the United Nations Climate Change (n.d.) describes as “a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future.” It is expected that all countries will adapt their policies to embrace clauses contained in the Paris Agreement as a way to frame their public policies to support the transition to low-carbon economies. In this regard, Feldman and Hart (2018) correctly argued that scientists and policymakers ought to work together in developing solution-driven policies that will eventually help in reducing GHG emissions and mitigate climate change. Important areas of collaboration for scientists and policymakers include the promotion of renewable energy, regulation of emissions from various sectors, particularly power stations, transport, and the manufacturing sectors (Feldman & Hart, 2018).

It is arguably inline with this perspective that the South African government has developed and adopted the NDP as the master policy, containing recommendations as to what different sectors must do to bring about a sustainable and just transition to a low-carbon climate resilient economy. The NDP is supported by the National Climate Change Adaptation Bill, which is currently being finalised at the National Economic Development and Labour Council (NEDLAC). Once finalised and adopted, the Bill will be enacted and become a legal policy framework that will guide the manner in which both public and private sectors conduct their businesses in relation to climate change mitigation.

2.4.2. Business intervention

Sustainability transitions can be achieved through the participation of multiple actors which include the business community. Köhler et al., (2019) concluded that businesses play critical roles in sustainability transitions, particularly through innovations that result in the development of new products, services, and technologies. Debates on the role of business in the sustainability transitions have been raging for decades and have inevitably resulted in ample literature. In the earlier years, Elkington (1998) wrote extensively about the role of business in society, with a focus on social, economic, and environmental performance (triple bottom line). In this regard, it can be argued that the corporate world has embraced sustainability transitions as one of the key elements of strategic planning and a driver of competitiveness (Elkington, 1998; Porter & Kramer, 2011).

The role of business in sustainability transition has been linked to the concept of corporate social responsibility (CSR) (Elkington, 1998; Porter & Kramer, 2011; Loorbach & Wijsman, 2013), thereby creating value for different stakeholders that are affected or may affect the business. CSR is not a new concept. According to Wang (2015, p. 7) CSR can be traced as far back as 1917, while Carroll and Shabana (2010) contend that it extends before World War II. Although the definition of CSR is constantly reviewed and updated, it is simply defined as corporate action towards fulfiling the social and economic needs of stakeholders while protecting the integrity of the environment in which the business operates (Ditlev-Simonsen & Gottschalk, 2011).

As shall be seen in the subsequent sections, businesses have and continue to play a significant role in sustainability transitions, particularly from an energy transition perspective. The role of business in this regard is of great importance given that, as Loorbach and Wijsman (2013) argued, transitions in various sectors, particularly energy, food production, and manufacturing have a fundamental impact on business. Other than providing financial resources required particularly in the initial phase of energy transitions, the business community is expected to facilitate the transitions through its actions. Kim (2018) argued that businesses must deliberately develop products and services that are environmentally friendly. In this manner, businesses participate and contribute to sustainability transitions.

2.5. Mobilising Financial Resources for Low-carbon Transitions

In their study on the greening of the financial system, Falcone et al. (2018, p. 31) rightly concluded that “achieving a sustainable economy relies heavily on the amount of investment obtained to fuel a long-lasting transition.” In concurrence with this view, Naidoo (2020) emphasised that for sustainability transitions to occur at a meaningful scale, financial resources are a basic necessity. While Naidoo (2020) also highlighted that there is no scarcity of money to support sustainability transitions, Polzin (2017) contended in a study on mobilising private funding for low-carbon transitions, that lack of finance is a barrier to low-carbon innovation. It could be for this reason that financing of initiatives aimed at reducing GHG emissions has been widely debated at many of the Conferences of the Parties (COP) to the UNFCCC meetings, including the twenty-first session that took place in 2015 in France. The meeting in France culminated in the adoption of the Paris Agreement. In terms of Article II of the Agreement, country parties undertake to “making

finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development" (United Nations Climate Change, 2015). Mobilisation of financial resources towards climate change mitigation and adaptation is generally known as green finance or climate finance.

Green finance is defined as "financial flows expected to contribute to the reduction of emissions and the adaptation to current climate variability as well as future climate change, encompassing private and public funds domestic and international flows" (Boissinot et al., 2015, p. 3). This definition is offered by the Intergovernmental Panel on Climate Change (IPCC), a body of experts who give scientific and evidence-based advice on matters relating to climate change to the United Nations. On the same vein, Busch et al. (2016, p. 305) talked about sustainable investments, which they define "as a generic term for investments that seek to contribute toward sustainable development by integrating long-term ESG [environmental, social, and governance] criteria into investment decisions." While these definitions may not necessarily be the same, their central theme is on the provision of financial resources that facilitate sustainable development. These definitions are also consistent with the resource mobilisation function of the TIS framework explained above.

Ultimately, "transition financing will require discipline, transparency, and accurate measurement of environmental outcomes related to greenhouse gas emissions, levels of pollution and deforestation, soil and water degradation, and carbon sequestration" (Badre & Sire, 2019). The Global Landscape of Climate Finance 2019 has acknowledged that while green finance has significantly grown to record levels, more financial resources are required to facilitate the 1.5 ˚C scenario of the Paris Agreement (Buchner, et al., 2019). The report estimated that at least USD 1.6 trillion per annum is required to fund a renewable energy transition between 2016 and 2050, globally.

Mobilising financial resources is crucial for the transition to a low-carbon economy to take place. According to Geels (2013), the deployment of green initiatives requires a great deal of financial investment, particularly at the initiation stages. Edmondson et al. (2019) also emphasise the importance of resources (financial) for sustainability transitions, saying that the manner in which resources are allocated has a significant bearing on the rate and direction of the desired transitions. It is arguably with this in mind that Louche, Busch, Crifo, and Marcus, (2019) called for an urgent action to increase and fast-track

investments in initiatives aimed at transitioning to a low-carbon economy. They referred to this as low-carbon investments, which they defined as “financial institution and investor practices that support and facilitate the transition toward a low-carbon economy through low-carbon and renewable technologies as well as energy efficiency measures” (Louche et al., 2019, p. 4). Interestingly, the emphasis here is not only on the need for financial resources but also on the practices of financial institutions and investors. Practices here are understood to mean the manner in which financial institutions conduct their businesses, particularly with regards to decisions on funding of initiatives that could either enhance or hinder the transition to a low-carbon economy. Similarly, the investors – owners of the funds, are equally responsible for what their deposits are used for. This suggests that investors have the capacity to influence the manner in which their deposits are used.

There certainly are multiple role players in the mobilisation of financial resources to advance the course of sustainability transition. Governments, through the central bank’s monetary policy (Campiglio, 2016), provision of grants and other interventions, surely play a significant role by setting aside funds for sustainable development initiatives. However, Geels (2013) correctly argued that government funding, which is usually used in the research and development phase of sustainability transition is not sufficient to finance the up-scaling of the initiatives. This sentiment is shared by Louche et al. (2019) who concluded that the scale of investment required for sustainability transition is much bigger than what government coffers can be able to handle alone. Therefore, other role players, particularly the financial markets, need to come to the party and contribute to this noble course of action. Naidoo (2020) shared the same sentiment, arguing that the need for financial resources place the financial system (markets) at the forefront of supporting sustainability transitions.

Building on the earlier work of Grubb (2004), scholars such as Bürer and Wüstenhagen (2008); Wüstenhagen and Menichetti (2012); and Polzin et al. (2017) could not overemphasise the importance of sound public policy as the foundation upon which investments in sustainability transitions, specifically energy transitions, ought to be built. In his widely cited innovation and investment chain model (figure 1.), Grubb (2004) highlighted that intentional public policies are prerequisites to foster technologies right across the innovation chain. The model was designed to showcase the different funding instruments for the deployment of renewable energy technologies over different stages,

placing government policy at the forefront of technological innovation and investment therein. In terms of the innovation and funding chain model, the government, in consultation with the private sector, is expected to facilitate the basic development and application of new technologies through public research institutions and universities (Polzin, 2017). This phase of the technological innovation phase, also referred to as the 'valley of death,' can also be funded by private companies in a form of grants, crowdfunding, or other arrangements.

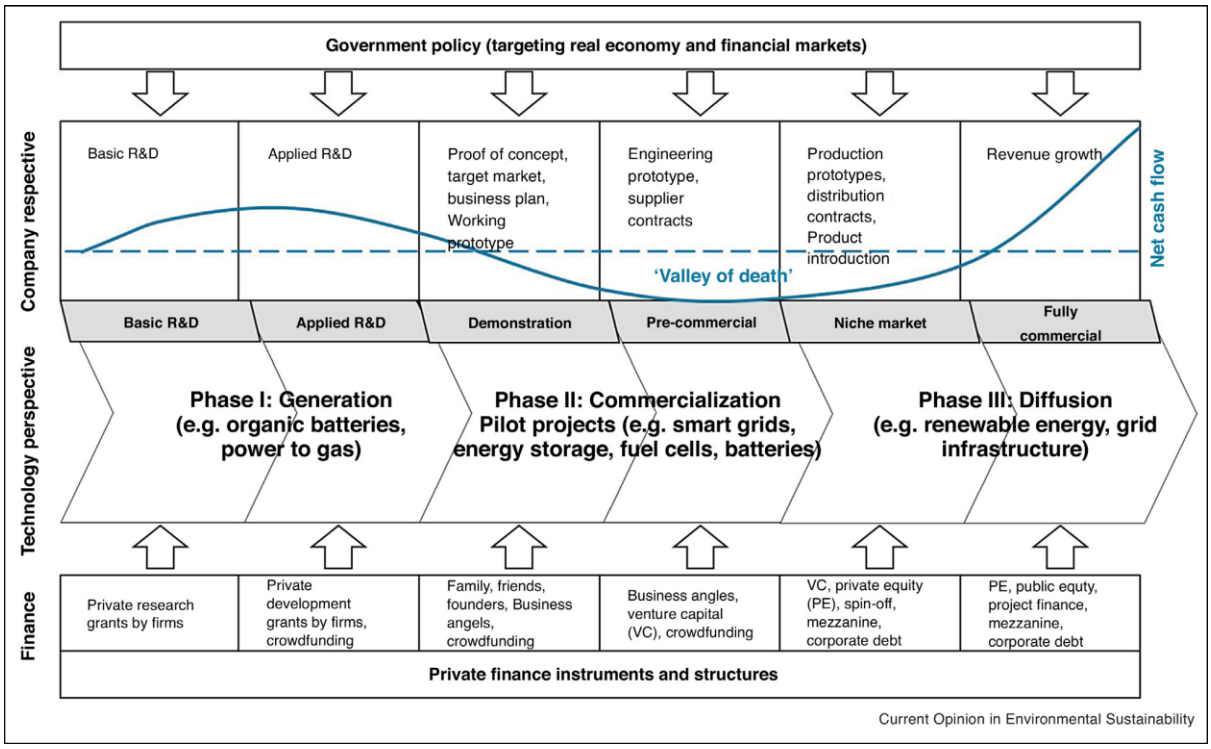

Figure 1: Innovation and investment chain.
Source: Polzin, Sanders, & Taube (2017, p. 28).

As technologies begin to mature and become widely adopted, other forms of investments begin to emerge. In this stage, venture capital is specifically identified as one of the main sources of funding for maturing the techonolgical innovations (Grubb, 2004; Bürer & Wüstenhagen, 2008). Venture capital and private equity investments are considered important sources of funding for clean energy technologies in particular (Bürer & Wüstenhagen, 2008; Wüstenhagen & Menichetti, 2012). For this form of investment to take shape, specific public policies are required to assure investors some degree of certainty and potential growth of the sector (Wüstenhagen & Menichetti, 2012). In this stage, innovators get to prototype and embark on pilot projects with their technologies,

thereby preparing to establish niche markets and progress to a full commercialisation phase.

The final phase of the technology innovation chain happens when innovators advance to a full diffusion of their technologies. It is in this phase that there is a diversity of investors who can fund the large-scale deployment of renewable energy technologies (Wüstenhagen & Menichetti, 2012). Amongst the diverse investors are the financial markets, particularly commercial banks that provide funding in a form of project finance (Polzin et al., 2017). According to Pieters, Lotz, and Brent (2014, p. 59) "project finance is based on the principle that lenders provide a loan for the development of a project, taking into consideration the project's risks and the cash flow projections." Mozzane and senior corporate debts are the common financing instruments used in this regard (Polzin, 2017).

2.6. Cost and Financing Renewable Energy Generation

There is no doubt that financial resources are a basic necessity for renewable energy projects (Steffen, 2018). For Lam and Law (2018), funding for renewable energy projects is required from the conceptualisation stage, including technological innovation all the way to infrastructure development. Financial investment in renewable energy generation has reportedly been on a steady increase for the past decade or so. Geels (2013) recorded that the world has seen a "healthy growth in global investments from $39 billion in 2004 to $257 billion in 2011." This figure marginally grew to $333.5 billion in 2015 (Naidoo, 2020), and the United Nations Environment Programme's (2020) Global Trends in Renewable Energy Investment 2020, showed that over a period of 10 years (2010 to 2019), investment in renewable energy capacity grew to a whopping $2.8 trillion. This figure is a clear indication that investors are taking a keen interest in renewable energy, and perhaps realise the socio-economic value of energy transitions (Steffen, 2018).

As can be seen in Figure 2 below, global investment in renewable energy increased to $301.7 billion in 2019, reflecting a 2% jump from $296 billion in the previous year. Campiglio (2016) and Busch et al., (2016) positively note that investments in green initiatives, specifically renewable energy projects, have been growing fast throughout the world. While such an upward trajectory in renewable energy investments is widely accepted, Louche et al. (2019) rightly believe that more is yet to be done.

Figure 2: Global new investment in renewable energy by asset class, 2004-2019, $BN.
Source: United Nations Environment Programme (2020, p. 7).

However, the more that needs to be done has to be guided by cogent and consistent public policies that enjoy wider public support and legitimacy (Geels, 2013). In their attempt to emphasise the importance of public policy, Wustenhagen and Menichetti (2012) developed a basic and simple model (figure 3) that shows policy on energy as the starting point for investment in renewable energy. Their model is based on an understanding that every investor (individuals and financial institutions) rationally weighs the risks and returns of the investment opportunities.

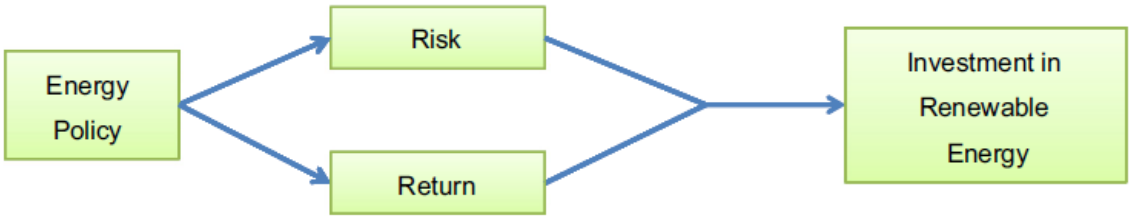

Figure 3: A model of renewable energy policy and investment.
Source: Wüstenhagen and Menichetti (2012, p. 3).

After all, “investment decisions are made by human beings who act under bounded rationality” (Wüstenhagen & Menichetti, 2012, p. 4). However, given the uncertainties related to renewable energy, investments in this sector tend to be limited when compared

to conventional sources of energy (Wüstenhagen & Menichetti, 2012). It is for this reason that the development and execution of an energy policy is imperative and a starting point to promote investment in the sector, and it is both the public and private sectors' responsibility to ensure that a coherent and sound energy policy is adopted.

The cost of renewable energy generation, particularly solar and offshore wind energy, has been on a steady decline (figure 4) (Potts & Walwyn, 2020). According to Walwyn and Brent (2015), although renewable energy generation requires intensive capital investment, the cost of electricity generation from renewables has fallen and is expected to continue to decline in the near future. Notwithstanding the decline in the cost of renewable energy generation, almost all the literature reviewed for this study considers the availability of financial resources as an enabler of projects that would bring about a transition to clean or renewable energy, while the lack of financial resources would impede such projects.

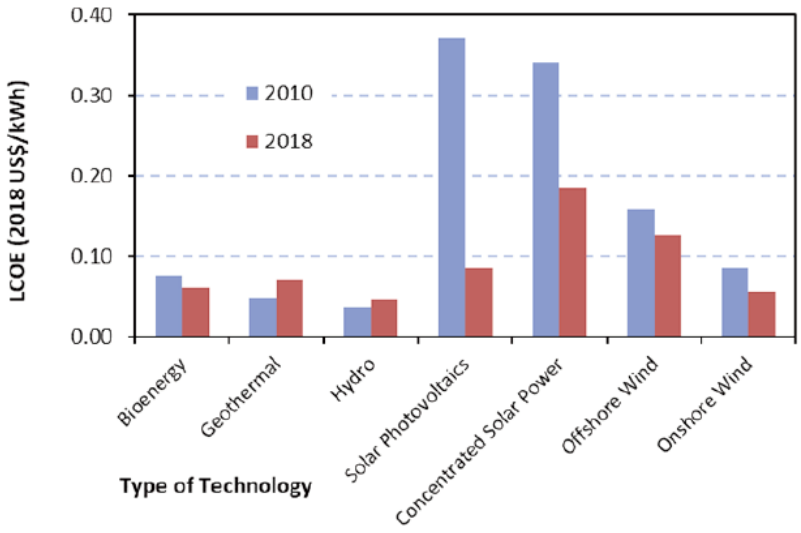

Figure 4: Cost of renewable energy generation
Source: Potts and Walwyn (2020, p. 11).

2.7. Financial Markets and Sustainability Transitions

Financial markets, specifically banks, can be major drivers of change that would bring about the much-needed reduction in GHG emissions. The financial sector, as Falcone et al. (2018) noted, can foster economic development which would eventually result in the creation of job opportunities, environmental protection, and social inclusion. According to Louche et al. (2019, p. 4) "financial markets can play a key role in fostering sustainable

development… and have the capacity to create significant change—also in the climate context." On the same wavelength, Polzin et al. (2017) argued that financial systems provide direction for development by mobilising and transforming savings into productive investments. It is through robust and consistent investments into innovative initiatives, particularly renewable energy sources, that sustainability transitions would become a reality. In this regard, the sector is expected to play a leading role in sustainability transition initiatives by, amongst others, de-risking projects for investors, and optimising funding costs (Badre & Sire, 2019). However, one wonders whether banks, specifically in South Africa, are living up to this expectation.

As indicated in Chapter One of this study, some of the South African banks have been accused of doing the opposite, with Davie (2019) suggesting that the depositors' cash "may be being used to support industries that create global warming and the consequences of climate change." In essence, the financial sector, more specifically banks, are considered to be pursuing short term profits by funding projects that possibly contribute to climate change. Polzin et al. (2017) also concluded that financial markets are still favouring the status quo by "not responding to the financial requirements of an innovation-led energy transition." This could be as a result of a "depressed macroeconomic environment" following the 2007 global financial crisis and "unattractive risk/return profile" (Campiglio, 2016) of green projects. Financial markets have been criticised for sticking to their "rational investment" approach (Naidoo, 2020), with Hall, Faxon, and Bolton (2017) saying that they are behaviourally and structurally constrained. This suggests that financial markets would only make investments in initiatives that present the right risk and return ratios. It further gives an impression that financial markets will only invest in projects, programmes or initiatives that present strong profit opportunites, with no real consideration of the environmental consequences.

While this could paint a bleak picture of the banks' role in sustainable transitions, it is certainly not all doom and gloom. Literature on the role of financial markets in fostering sustainable development has by far and large acknowledged that, notwithstanding some challenges, the sector plays a significant role (Louche et al., 2019; Campiglio, 2016; Boissinot et al., 2015). The banks, irrespective of whether they are retail or corporate and investment focused, have a significant function of directing or even redirecting investments into projects that are climate-conscious. One instrument that the banks can use in this regard is green bonds. According to Boissinot et al., (2015, p. 7), green bonds

are instruments “aimed at raising money on the bond market for activities with a demonstrated positive impact on the environment and climate.” Green bonds work in the same way as any other bonds, despite that they solely focus on initiatives that promote environmental sustainability (Flaherty, Gevorkyan, Radpour, & Semmler, 2017). Other instruments that could be employed to finance the transition to a low-carbon economy debt, equity, grants, and/or subsidies (Lam & Law, 2018) to list but a few.

However, investing in renewable energy initiatives is considered to be a risky exercise. Polzin, (2017, p. 530) believes that “clean technologies exhibit higher uncertainty, regulatory dependency and capital intensity, which makes them unattractive for private financiers as these possess limited abilities to screen potential targets.” This sentiment is shared by Safarzyńska and van den Bergh (2017) who suggest that increased investment in renewable energy could be burdensome on the financial system. Their justification for this is that “investments in renewable energy increase the price of electricity, and hence profits and ability to re-pay debts of incumbent power plants” (Safarzyńska & van den Bergh, 2017, p. 13). On the contrary, Louche et al., (2019) are of the view that the success of financial markets is highly dependent, at least in the long run, on the “intact and functioning ecological systems,” thereby suggesting that it is in the interest of the sector to play an active role in sustainable transitions. Currently, the financial markets are considered to be insufficient in their support for the long-term sustainability transitions (Naidoo, 2020). This consideration is based on an understanding that the financial markets ought to do more than just providing financial resources for sustainability transitions, but have to transform the entire system and “align itself with sustainability, climate change and transition goals through multi-dimensional and non-linear processes” (Naidoo, 2020, p. 3) amongst other things.

Nonetheless, the literature suggests that research on the role of the banking sector in facilitating sustainable transitions, particularly in the energy sector is still at an early stage (Steffen, 2018). For Hall et al. (2017) the role of finance and capital markets have been largely in the energy projects that promise short-term returns, while investments innovation, infrastructure, and transformation of the energy projects, have been insignificant. According to Polzin (2017, p. 525) “investment in Research and Development (R&D), commercialization and diffusion of clean technologies still remains below the required level to limit warming to 2 °C despite central banks providing large amounts of liquidity through quantitative easing.” Taking this into consideration, it is clear

that there is a need to undertake a study that seeks to further understand the role of the financial sector in facilitating the transition to a low-carbon economy in a South African context, with a specific focus on the energy sector.

2.8. Literature Gap

All the literature reviewed provided adequate details about the importance of transitioning to a low-carbon economy and that renewable energy plays a significant role in this regard. Lam and Law (2018) are correct in their assertion that funding for renewable energy projects is required right from the conceptualisation stage. Walwyn and Brent (2015) write at length about South Africa's REI4P and acknowledge that renewable energy projects are capital intensive. The two academics and renewable energy experts also provide an estimated cost of renewable energy generation, highlighting that such costs have been falling and are expected to continue to decline until at least 2030 (Walwyn & Brent, 2015). Nonetheless, as Steffen (2018) opined, the provision of capital is important for renewables to become a success.

Furthermore, the role of financial markets (particularly banks) in providing the much needed financial resources to facilitate the transition to a low-carbon economy is well documented. Boissinot, Huber, & Lame, (2015); Busch, Bauer, and Orlitzky (2016); Campiglio, (2016); Polzin (2017); Kim (2018); Tian (2018); and Louche et al. (2019) clearly articulate the role of the private sector, specifically the financial markets, in providing funding for low-carbon innovation in the renewable energy space. However, none of them are clear with regards to the requirements that must be satisfied in order to secure funding for renewable energy projects. This is essentially about the accessibility of the financial resources required for building and maintaining a functional renewable energy project in a South African context.

2.9. Conclusion

Transition to a low-carbon economy requires deliberate collaboration and cooperation between multiple stakeholders. Governments have the responsibility to set out the law and regulatory frameworks that will guide the journey and create a conducive environment for private sector investments. With adequate financial resources and technological innovation, the transition to a low-carbon economy seems to be an attainable goal. The

private sector, particularly the financial markets are particularly important in providing financial resources for renewable energy projects. However, the research is yet to determine the accessibility of such resources from a South African perspective.

CHAPTER THREE: RESEARCH QUESTIONS

3.1. Introduction

Chapter Three provides a list of research questions that the study sought to have answered in a quest for gaining insight on the role of the banking sector in the transition to a low-carbon economy in South Africa. This is on the basis that, as Busch et al. (2016) and Louche et al. (2019) postulated, the financial sector has an important role to play in promoting sustainability transitions, and that more is yet to be done. The research questions focused specifically on the funding of renewable energy projects.

3.2. Research Questions

The questions emanated from the literature reviewed, and are as follows:

3.2.1 Research question one

Is funding available for renewable energy projects, and if so, what is the nature of the funding?

This question sought to understand the availability and nature of financial resources for renewable energy, as well as unpacking the banking sector's evaluation criteria prospective clients to access the funding. Question one is aligned to the assertions by Geels (2013), Falcone et al. (2018) and Naidoo (2020) that renewable energy transition is capital intensive.

3.2.2 Research question two

Has the way in which banks evaluate energy projects changed the profile of their energy portfolios over the period 2010 to 2020?

The second research question sought to understand how the bank's evaluation criteria changed the energy portfolio in terms of technology and other aspects, and the reasons for the change, if any. As the renewable energy technologies advanced, the costs technology and energy generation have reportedly declined (Walwyn & Brent, 2015). As such, investment in renewable energy is expected to also rise (Steffen, 2018).

3.2.3 Research question three

To what extent are the banks willing to invest in renewable energy projects?

Research question three sought to determine whether banks fund renewable energy projects out of their own will, or they are influenced by external pressure from cash depositors and lobby groups. This question is linked to the legitimacy function of the TIS framework (Edsand, 2016).

CHAPTER FOUR: RESEARCH DESIGN AND METHODOLOGY

4.1. Introduction

The preceding chapters outlined the research problem, purpose of the study, research objectives, theoretical foundation upon which the study is based, and a detailed literature review on sustainability transitions. In order to fulfil the purpose and achieve the research objectives, the study employed a qualitative research methodology, which guided data collection and analysis processes. The qualitative research design was the preferred methodology for it allows for the presentation of the findings in a rich, thick description (Merriam, 2002). This chapter provides a detailed account of the research design, data collection, and analysis techniques used in the study. It concludes with a presentation of the limitations of the study.

4.2. Research Design

As a qualitative research, the study is rooted in the interpretivism philosophy. Interpretivism is “a philosophy which advocates the necessity to understand differences between humans and their role as social actors” (Saunders & Lewis, 2018, p. 109). At the core of this philosophy is an idea that the subject matter of social sciences (people and their institutions) is fundamentally different from that of natural sciences (Bryman & Bell, 2014). The study sought to interpret the actions of individuals with positions of responsibility and consequences of such actions. In line with the interpretivism research philosophy, the researcher identified research questions that informed the approach through which data is collected and analysed (Creswell, Hanson, & Clark, 2007). The research questions, as presented in Chapter Three, emanated from a thorough literature review process.

The study took an inductive approach, as it is aligned with the nature of qualitative research. The inductive approach involves the building of theory from the explanations, analysis, and interpretations of the data collected (Saunders & Lewis, 2018). It enabled the researcher to “draw conclusion that explains the facts, and the facts that support the conclusion” (Cooper & Schindler, 2014, p. 114). The study did not intend to prove a particular theory, but to generate some ideas that could be implemented based on the evidence collected. It is for this reason that an inductive approach was found to be the

most suited for the study. The researcher was able to make conclusions based on the evidence gathered through the data collection methods outlined below. As a cross-sectional study, the research entailed the collection of qualitative data through semi-structured interviews from a variety of participants over a short period of time (Bryman & Bell, 2014) and thematic content analysis was conducted.

4.3. Sampling and Data Collection

Broadly defined, sampling in qualitative research is "the selection of specific data sources from which data are collected to address the research objectives" (Gentles, Charles, Ploeg, & McKibbon, 2015, p. 1775). While there are multiple sampling methods that could be applied in qualitative research, a purposive non-probability sampling method was used to select specific data sources for the study. The population from which the sample was drawn and the profile of the unit of analysis are explained below.

4.3.1. Population

A population is defined as the total collection of elements about which the researcher wishes to make some inferences (Cooper & Schindler, 2008). In line with this definition, the population for the study undertaken was therefore all the banks (commercial and development finance institutions) operating with valid banking licences in South Africa, and all the Renewable Energy Independent Power Producer Procurement Programme (REI4P) projects awarded by the South African government. According to the South African Reserve Bank (SARB, 2019) South Africa has a matured banking sector, with at least 12 locally controlled banks, four mutual banks, six foreign controlled banks, 15 branches of foreign banks, and 31 foreign banks representatives operating in the country. Furthermore, the Department of Mineral Resources and Energy (2020) has listed on its website a total of 115 projects that are participating in the REI4P. All these banks and the REI4P projects form the total population, also known as the universe of the study. However, given the limitations of the study as outlined below, the target population was the unit of analysis identified in the ensuing section.

4.3.2. Sampling method and sample size

Given that qualitative researchers' ultimate goal is to generate a detailed description of the phenomenon of interest, the qualitative research sampling focuses on participants with rich experiences in the phenomenon of concern (Blumberg, Cooper, & Schindler, 2008). It is for this reason that non-probability methods of sampling, which are considered most suitable to correctly sample participants for a qualitative research were employed. Non-probability sampling, as defined by Bless, Higson-Smith, and Sithole (2013, p. 88) "is when the probability of including each element of the population in a sample is unknown." Taking into consideration that the research undertaken is in a form of a qualitative exploratory study, a sampling method that would enable the researcher to achieve the research objectives as set out in Chapter One is purposive sampling.

Purposive sampling is one of the non-probability sampling methods that allowed the researcher to use his or her judgement on the selection of participants who would best answer the research questions in order to meet the research objectives (Saunders & Lewis, 2018). It is in this regard that a total of 15 participants from the banks operating in South Africa and REI4P projects that were awarded during the fourth window of bidding and are fully functional, were purposively sampled to participate in the study. The researcher approached each of the purposively sampled participants immediately after ethical clearance was granted (see Annexure 1) by the Masters Ethics Committee of the university, to secure their participation in the study.

4.3.3. Unit of analysis

The unit of analysis is considered to be an important building block of a research design, given that it describes the level at which the research is performed and the objects being researched (Cooper & Schindler, 2008). Accordingly, the unit of analysis for the study undertaken were the four major banks which have provided funding for infrastructure development and the fully functional renewable energy projects whose bids were awarded in the fourth window of the REI4P as listed on the Department of Mineral Resources and Energy's website. Representatives of the banks were the individuals entrusted with the responsibility to assess and decide on the applications of funding for infrastructure projects, particularly renewable energy. Furthermore, representatives of the REI4P projects were individuals whose role had to do with securing the funding for their project

development and operations. Ultimately, the profile of the unit of analysis (participants/interviewees) from the sample is reflected in table 2 below.

In order to ensure confidentiality, the following identifiers (pseudonyms) are used instead of the real identities of the participants:

Banks: CB = commercial bank; DFI = development finance institution.
REI4P: REP = renewable energy project

Table 2: List of unit of analysis (participants / interviewees)

Banks			
No.	**Identifier**	**Nature of the bank**	**Role**
1.	CB1	Commercial Bank	Team lead: Renewable Energy
2.	CB2	Commercial Bank	Head: Transformation and sustainability
3.	CB3	Commercial Bank	Deal maker
4.	CB4	Commercial Bank	Head of Natural Resources
5.	CB5	Commercial banks	A group of facilities managers
6.	DFI1	Development Finance Institution	Technical Advisor, Independent Power Producer office
7.	DFI2	Development Finance Institution	Technical Advisor: Renewable Energy
REI4P			
No.	**Identifier**	**Scale of the project**	**Role**
8.	REP1	Utility scale	Engineer
9.	REP2	Utility scale	Economist
10.	REP3	Utility scale	Project manager
11.	REP4	Utility scale	Credit analyst
12.	REP5	Utility scale	Finance consultant
13.	REP6	Utility scale	Engineer

14.	REP7	Utility scale	Chief executive officer
15.	REP8	Not yet operational	Country lead

Source: Researcher's own work

4.3.4. Semi-structured interviews and interview procedure

The literature suggests that an interview is the most prominent tool for data collection in qualitative studies. According to Punch (2014, p. 144), an interview is "a very good way of accessing people's perceptions, meanings, definitions of situations and construction of reality." The study employed a semi-structured interview technique for the collection of primary data. Semi-structured interview, as Saunders and Lewis (2018) postulate, is a method of data collection that allows the researcher to ask predetermined questions in a flexible manner.

A series of semi-structured interviews with purposively sampled participants were conducted in the collection of data for the study. The semi-structured interviews, also considered as a measurement instrument for the research study, were conducted by the researcher. In preparation of the interviews, the researcher developed a list of open-ended questions that served as a guide for the discussion with the participants. The questions were relevant to the research topic and were linked to the literature review that had been undertaken and the interest of the researcher. A list of the guiding interview questions is contained in Annexure 3. However, the order of the questions in the prepared list was not strictly followed, as it only served as a guide (Bryman & Bell, 2014). Therefore, the researcher had the flexibility to pose any question at any given moment, provided it was relevant to do so. During the interviews, the researcher posed the questions to the participants and allowed them to provide as much details as possible. Follow-up questions were also posed as and when necessary.

A total of 15 semi-structured interviews were conducted on a one-on-one basis through online platforms (MS Teams and Zoom) and telephonically in cases where the participant was not able to connect to an online platform. Two (2) of the interviews (CB5 and REP8) were deemed unusable given that the participants had no experience in facilitating funding (either from the applicant or a funder's perspective) for infrastructure development, let alone renewable energy. CB5 is a commercial banks whose representatives had no knowledge of project funding but focused on how the banks was reducing its carbon

footprint. REP8 is an international company that is undertaking feasibility studies to determine whether or not it will participate in South Africa's renewable energy programme in the future. As such, data collected from these interviews is deemed unusable for the study. Therefore, usable data was collected from 13 participants as reflected in table 3 below. The interviews took an average of 43 minutes each, generating an average of a little over 4800 words per interview.

Before the interviews commenced, the researcher officially introduced himself and asked that the participants consent to participate in the study. Thereafter, participants were assured that the contents of the interview will be treated with the highest level of confidentiality and that their identity would not be revealed. As contained in the interview guide (Annexure 3), the researcher asked for permission to have the interview recorded for ease of reference and to ensure the accuracy of the data provided. All the participants gave consent for the interviews and agreed that the interviews could be recorded on audio and/or video.

As a way to break the ice, the researcher began the interviews by asking the participants to explain their roles and responsibilities in their respective organisations. Below is a typical icebreaking statement and question that the researcher posed:

Thank you for making time to engage with me on my research topic which focuses on the transition to a low-carbon economy in South Africa with a specific focus on the funding of renewable energy projects. As a way to start, would you kindly just indicate to me what sort of responsibilities you are charged with in your company?

On the substantive issues, a broad question that sought to contextualise the discussion, specifically for the banks, was as follows:

South Africa aims to transition to a low-carbon economy as envisioned in the NDP, but this vision requires a great deal of investment in projects that emit less carbon, and of course that includes renewable energy. What would you say is the role of a financial service institution like yours in this regard?

For the REI4P projects operators, the typical question was:

Where did the funding for the development and operation of the project come from?
These and many other questions allowed for the collection of adequate data.

Table 3: List and duration of the interviews

No.	Identifier	Duration	Word count
1.	DF1	00:37:50	3759
2.	CB1	00:48:37	6268
3.	CB2	00:37:14	4072
4.	CB3	00:38:24	4160
5.	CB4	00:44:19	5234
6.	DFI2	00:55:57	4845
7.	REP1	00:31:12	3124
8.	REP2	00:51:14	5915
9.	REP3	00:34:23	3048
10.	REP4	00:29:27	2773
11.	REP5	00:49:19	5866
12.	REP6	00:50:14	5847
13.	REP7	00:59:03	8123
Total		09:27:13	63 034
Averages		00:43:38	4849

Source: Researcher's own work

4.3.5. Transcripts

The recordings of the interviews were transcribed by a competent transcriber who entered into a nondisclosure agreement (annexure 5) with the researcher in order to ensure the integrity and confidentiality of the data were not compromised. As a way to ensure confidentiality, the names of the participants were not included in the transcripts. Transcribing the interviews enabled the researcher to conduct a proper analysis of the collected data. A total of 13 interviews were transcribed and used for data analysis.

4.4. Data Analysis Approach

The study employed the conventional content analysis approach to analyse the data that was collected. According to Hsieh and Shannon (2005), conventional content analysis enables researchers to immerse themselves in the data to generate new insight. In terms of this approach, the researcher read through the transcribed data to achieve immersion and a sense of whole (Hsieh & Shannon, 2005). The data analysis process was undertaken in terms of the steps provided by Creswell (2014). In line with the prescribed steps for data analysis and interpretation, the process began with the transcription of the interviews as alluded to above. Upon receipt of the transcripts from the transcriber, the researcher read through each one of them, thereby gaining some sense of the information and meanings therein (Creswell, 2014).

Having read through the transcripts, the researcher made note of the key phrases that appeared to capture the concepts relevant to the study. Thereafter, all data was coded using ATLAS.ti software, a Computer Aided Qualitative Data Analysis Solution (CAQDAS). Coding is a process whereby data is broken down into components which are given names (Bryman & Bell, 2014). It involves segmenting sentences or paragraphs into categories (Creswell, 2014). Coding was done line-by-line and short phrases were assigned to key sections of the text. This is in accordance with Saldaña's (2016) highly acclaimed coding manual for qualitative researchers. A total of 271 codes were recorded during the first round of coding. Saldaña (2016, p. 3) defines a code as a "word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data." Codes were assessed and duplication was eliminated, resulting in 158 codes as per the list in Annexure 5.

The number of new codes began to decline from participant number 8. At this point, 11 new codes were recorded. However, no new codes were recorded from interview participants 12 and 13, thereby showing saturation. This is a point when emerging concepts have been fully explored and no new theoretical insights are being generated (Bryman & Bell, 2014).

As a way to streamline the process, codes were sorted into categories aligned to the research questions. This enabled the researcher, using the CAQDAS, to systematically

analyse the data and determine major themes. The themes are presented as the findings and are discussed in Chapters Five and Six respectively.

4.5. Validity and Reliability

A number of quality control measures were adopted in order to ensure the validity and reliability of the study. This began by strictly following the sampling criteria, as detailed above, in the selection of research participants. As a result, data was collected from the relevant sample. The second measure was the recording of all the interviews, thereby ensuring the correct representation of the participants' responses. Furthermore, the interviews were transcribed and the transcripts were shared with each participant so they may verify the accuracy of the recorded data. The thesis was proof-read by a language expert to ensure the correct use of academic vocabulary.

Creswell (2014) provides a number of strategies that could be employed to enhance the accuracy of the research findings. The researcher also used some of the approaches as recommended in ensuring the validity and reliability of the study. These are:

Triangulation: this is the most common approach to ensuring the validity and reliability of qualitative research studies. According to Creswell (2014), triangulation involves using different sources of data. It is an approach that enables the researcher to build comprehensive themes from the data collected. As indicated in the sampling approach, data for this study was collected from three sources. These were the commercial banks, development finance institutions, and the REI4P projects. Perspectives from these data sources were useful in the building of themes, thereby contributing to the validity and reliability of the study.

Member checking: Chapter Five of this report was shared with the research participants to determine the accuracy of the results. This allowed the participants to preview the key themes and make inputs where necessary.

Clarify bias: the researcher is a middle manager at a national government department entrusted with the responsibility to develop and implement policies and legislation that give effect to section 24 of the Constitution of the Republic of South Africa. Section 24 of the Constitution grants everyone a right to an environment that is not harmful to their

health and wellbeing. In effecting this constitutional right, the department, for which the researcher works, is at the forefront of driving the transition to a low-carbon climate resilient economy in South Africa. As such, the researcher had to be careful not to cloud his judgement, particularly in instances where participants were critical of government work.

Supervisor review: although this is not necessarily one of the strategies that research methodology experts like Creswell (2014) have specifically recommended, it is a standard practice that the research supervisor reviews the draft reports before final submission. In this regard, the research supervisor reviewed and made crucial inputs that also helped advance the quality, validity and reliability of the report.

4.6. Limitations of the Study

A major limitation of qualitative research studies is that they are hard to generalise, given that their findings cannot be extended to wider populations (Queirós, Faria, & Almeida, 2017). In addition this, the following limitations are acknowledged:

Sample size: although the 13 research participants provided thick and rich data, the size of the sample remains a limitation to the study. The focus of the study was limited to the commercial banks and REI4P participants, thereby limiting the transferability of the research to the broader financial services sector and other independent power producers.

Participant bias is also a concern, particularly from the representatives of the REI4P. Some of the participants appeared not to be keen on providing certain details. However, the researcher conducted the interviews thoughtfully, taking into consideration that some participants may be uncomfortable to share certain information about their institutions.

Researcher bias is another possible limitation of the study. The findings of the research are dependent on the interpretation of the researcher and may therefore be highly subjective.

CHAPTER FIVE: PRESENTATION OF RESULTS

5.1. Introduction

Chapter Five presents the results of the study. The results were derived from the data collected through one-on-one semi-structured interviews, whose contents were rigorously analysed using the methods described in the previous chapter. Themes that emanated from the data analysis are presented in accordance with the research questions that were outlined in Chapter Three. Verbatim quotes of statements made by participants will be used to support the themes. The chapter begins with a brief description of the participants and the interview process undertaken.

5.2. Description of participants and interview process

As indicated in the previous chapter, a total of 15 one-on-one semi-structured interviews were conducted. However, two of these interviews yielded data that was not usable and were therefore discarded. As such, data from 13 interviews was used. In addition to the sampling methodology presented in the previous chapter, data was collected from a set of two groups. The first set included individuals working in the banking sector in South Africa, and are responsible for infrastructure finance, amongst other things. The second set was comprised of individuals who are running projects that are participating in the government's Renewable Energy Independent Power Producers Procurement Programme (REI4P).

The interviews took place over a period of less than four weeks, between 14 September 2020 and 09 October 2020. The majority of the interviews were conducted via online platforms (Microsoft Teams and Zoom) and only one was conducted telephonically. Having obtained the participants' consent, all interviews were recorded as audio and transcribed for ease of analysis. A copy of the consent form that each participant had to sign is attached as Annexure 2.

In terms of demographic representation, there were only two (2) females and 11 males. The two (2) females were from the banking sector while the REI4P was represented by males only. This demographic representation was not by design. The researcher wished to have a balanced representation of respondents, particularly in terms of gender.

However, some of the females approached to participate in the study were not available. Nonetheless, neither gender nor any other demographic element had a bearing on the quality of the data collected and did not have any impact on the results presented in this chapter.

All the participants had a postgraduate university qualification and were employed in senior management or specialist roles, with more than five (5) years of working experience in their respective fields. Their roles included engineering, economics, credit analysis, and charted accountancy. Therefore, they can all be considered as experts in the fields of finance or renewable energy. Table 4 below provides a summary of the participants' profiles.

Table 4: Profiles of the research participants / interviewees

Banks				
Participant	**Gender**	**No. of years in banking**	**Period in current bank**	**Level of responsibility**
P1 / CB1	Male	7	5 months	Team lead
P2 / CB2	Male	13	4 years	Divisional lead
P3 / CB3	Male	22	10 years	Deal maker
P4 / CB4	Male	18	11 years	Divisional head
P5 / DF1	Female	6	3 years	Engineer
P6 / DF2	Male	8	2 years	Project finance advisor
REI4P projects				
Participant	**Gender**	**Years in RE**	**No. of years in the project**	**Level of responsibility**
P7 / REP1	Male	23	11	Engineer
P8 / REP2	Male	14	7	Economist
P8 / REP3	Male	16	9	Project manager
P10 / REP4	Female	12	4	Credit analyst
P11 / REP5	Male	13	3	Energy finance specialist
P12 / REP6	Male	11	6	Charted Accountant

P13 / REP7	Male	23	11	Chief Operations Officer

Source: Researcher's own work

5.3. Data coding

Interview transcripts were coded using the ATLAS.ti software and a total of 271 codes were generated but were revised down to 158. The graph below presents the number of codes generated from each interview transcript and the point of saturation. A definition of saturation was provided in Chapter Four.

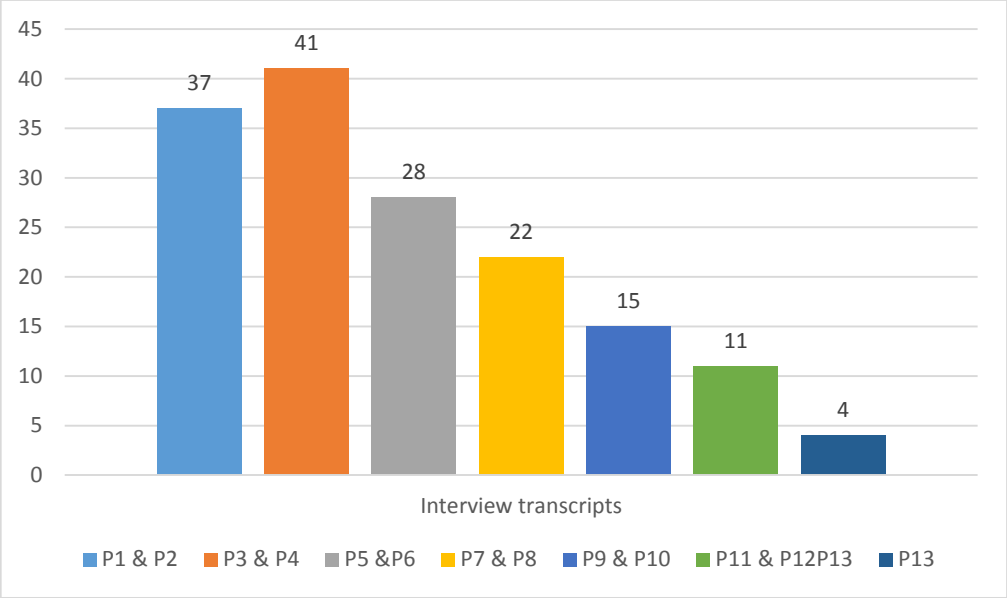

Figure 5: Number of codes generated from data through ATLAS.ti

Source: Researcher's own work

Once the saturation point was reached, codes were sorted into three categories aligned with the research questions. These categories are: Category 1: funding of renewable energy in South Africa; category 2: renewable energy technology and; category 3: importance of energy portfolio to the banks' future business. Categorisation of similar codes is in line with Saldaña's (2016) codes-to-theory model for qualitative inquiry (figure 6). It is through this model that comparison of the different catagories led to the consolidation and emergence of key themes that are presented in the following section.

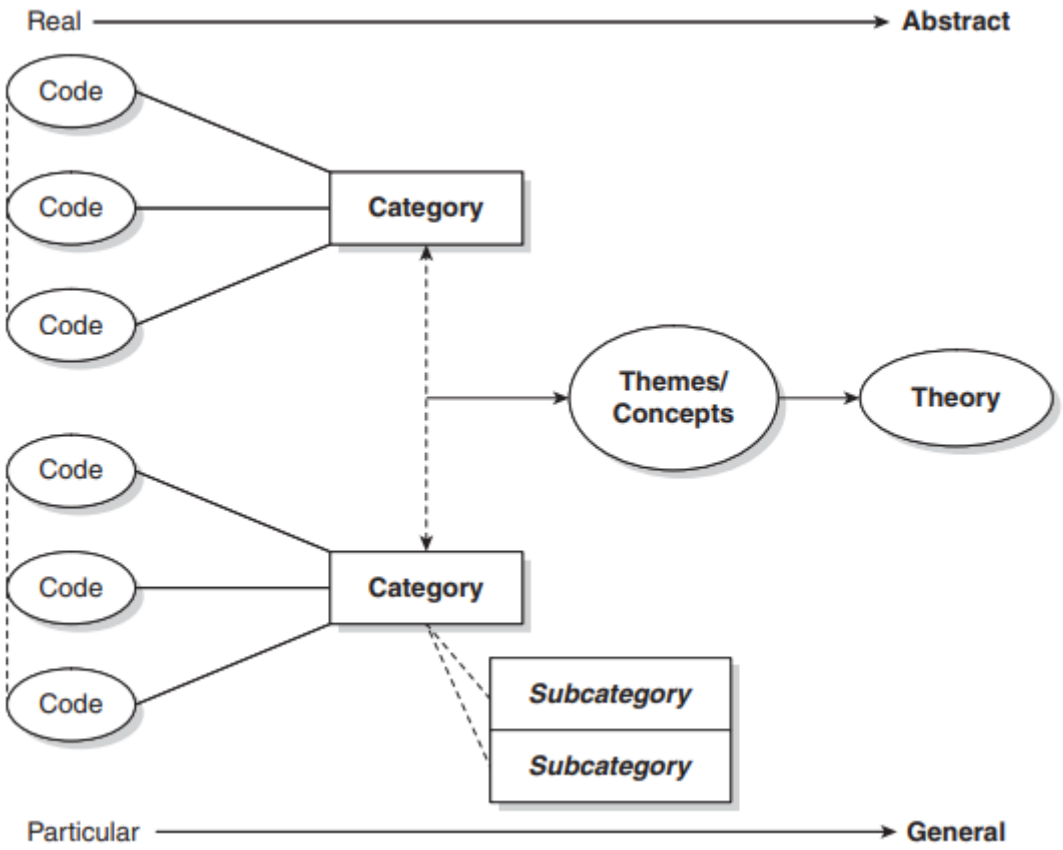

Figure 6: A streamlined codes-to-theory model for qualitative inquiry.
Source: Saldaña (2016, p. 67).

5.4. Emergent themes

A total of 11 themes emerged from the data analysis process. These themes are linked to each of the research questions that the study sought to answer, and are presented as follows:

Table 5: Emergent themes for research question 1

Research question	**Themes**
Question 1	Availability of funding for renewable energy transition
	Nature of renewable energy funding
	Evaluation criteria to determine funding
	Technological innovation

Table 6: emergent themes for research question 2

Research question	Themes
Question 2	A renewable energy technology
	Reliance on renewable energy
	A just energy transition

Table 7: Emergent themes for research question 3

Research question	Themes
Question 3	Renewable energy is central to the future of banking sector
	Return on investment
	Stakeholder activism
	Regulatory framework

Having thoroughly undertaken the data collection and analysis processes, the results of the study are hereby presented.

5.5. Results for research question 1

Research question: Is funding available for renewable energy projects, and if so, what is the nature of the funding?

This research question sought to unpack the banking sector's evaluation criteria for funding of renewable energy projects and how easy or hard it was to meet such requirements by those in need of funding.

5.5.1. Availability of funding for a renewable energy transition

Research question one sought to understand the different instruments that the banks have put in place in the funding of renewable energy transition. It emerged from data that banks indeed have in place multiple and sometimes special products through which they provide financial resources needed. This is evident in the assertions of the research participants, who collectively believe that there are sufficient financial resources to facilitate South

Africa's renewable transition. In this regard, data shows a clear consensus between the banks and REI4P participants that there are sufficient financial resources.

> *"I think that there is so much money for any of those (renewable energy) projects. You should be able to find a pocket of capital for renewable energy if you've got a decent project," (CB3).*

> *"There's more than enough money going around in the great capital markets, in the equities market there is more than enough. That (availability of financial resources) has never been an issue. What we battle with is getting a project that has been prepared and is ready for funding," (DFI1).*

> *"I believe they (banks) offer sufficient finances and if you just look at how [name of a bank] is structured. We have three divisions that work on this, and those divisions start actual individuals and small businesses and they've set funds aside for it... I'm just often concerned about, are there enough or adequate and sufficiently qualified installers to manage this flood that's coming our way?" (CB2).*

> *"Every project that is viable will get funding. There's not a shortage of money, there's a shortage of opportunities to invest the money," (REP3).*

The research has found that there is an abundance of financial resources that funders would like to deploy to finance renewable energy generation. However, there are fewer viable projects in which such funds could be invested.

5.5.2. Nature of funding

Research evidence reveals that financial resources are available in different forms. The most common forms are equity, loans, and grants. Banks provide loans while grants are provided by development finance institutions. Equity is provided by partners who are usually shareholders on the company that owns renewable energy projects. The evidence presented here indicates how renewable energy projects are funded.

> *"So, most of our projects or most of the large projects in South Africa maybe all of them, currently have been funded through the government's renewable energy*

programs… the REIPPP program, and those projects are funded typically with a mixture of debt and equity and you would know that. The equity has in the beginning significantly come from overseas investors either large independent power producers or international utilities. Almost all of the debt has been sourced locally from South African commercial banks…," (REP1).

"…there are many ways that projects are funded both from the private sector as well as foreign investment and then by accessing funds that banks have allocated for these projects. So, we have budgets obviously aligned to the sustainable development goals that we avail for projects such as renewable energy," (CB1).

"The funding is provided as you will know from the equity participants. Usually they provide something between 10 to 30 percent of the required funding and then the balance is being provided by the banks and equity participants are the owners and the banks are the lenders," (REP3).

"…wherever there is viable proposal from a financial perspective, you find blended funding to be available. I mean if you look at a renewable energy independent power producer program, most of those projects have been funded by commercial banks. And then of course there's always equity available, provided there is a reasonable return to the equity providers and I think the projects proved overtime that they had the capability to attract sufficient blended funding through debt and through equity," (CB4).

Data suggests that not all banks offer equity, but provide funding in a form of a loan. In most cases, loans are provided by commercial banks.

"At this stage we don't do equity. Most banks are very wary of equity and that type of thing and historically banks don't take investments in clients and it's maybe something we need to look at, but that's a whole different debate. We then moved to term loans. So, we've got medium term loans, up to 10 years that we provide, and then we would also have a look at a rental option where you can rent the equipment from us and we own the asset in that case," (CB2).

"It's not development funding, it's not venture capital, it's not seed capital, it's called senior debt. It's money that comes in at the end when you're ready to build your project, not in the beginning when you still got the ideas," (CB3).

"Yeah, so any project always requires a balance between equity and maybe some sort of mezzanine finance sometimes, and then often more senior debt. And as a commercial bank we tend to focus more on the provision of the senior debt but then it's done in, shall I call it a partnership you know, between other players like providers of equity, private equity firms," (CB4).

On the other hand, banks whose mandates have to do with the developmental agenda of the country are able to offer both equity and loan funding.

"At [name of the bank], we do fund equity but how we do that we do a lot of funding for say BEE parties in renewable energy deals. We give them preference shares to invest their equity in the project. So, it does assist parties who don't have access to as much capital as they as they need," (CB3).

"We are able to offer debt funding as well as equity funding… and when I say equity it's not just any equity, we provide BEE equity. It has to be BEE equity. Same as [name of institution], they also provide BEE equity as well. , Otherwise, if you are just a normal equity player who does not fulfil the BEE requirements, then you would go to an equity provider such as your [names of companies]…" (DFI1).

"…we can finance public projects and private sector projects, meaning a private entity can come to us and say, they want to do a solar plant or the wind plant and then I have CS providing equity or debt, or we can support the government in terms of guarantee," (DFI2)

Other commercial banks have gone to an extent of developing special products that they believe to provide cheaper finance.

"All these projects that we can disperse and these are linked to products that are designed to allow cheaper funding, to allow beneficial interest rates, to basically you know refund against those assets meaning that there's no security enquired

and then in those tenures in terms of the amount of years that we can finance," (CB1).

"It's been a very steep learning curve. We started at the beginning of 2013 with the first product that we launched and since then we've developed on five different funding methodologies as the technology is changed, as we've become more comfortable with the data that we've taken it further," CB2).

"…we can make cheaper funding available. We do have funding from the development finance institutions that is ear-marked for renewable energy and so on and water as well," (CB3).

It also emerged that there are foreign funding institutions that are eager to provide financial resources for the South African renewable energy sector. In most cases, such institutions form partnerships with local commercial banks or development finance institutions to make disbursement of funding much easier.

"…there are a number of them and that has been enabled to some extent by European players coming in and in bid windows one and two and then the slow but steady diffusion of knowledge and equity and value into the South African economy," (REP1).

"We see the best success in the market that local companies partner with international utilities and then get bank funding. And it's evident in the fact that most of the power plants are not financed by grant funding institutions but by commercial banks," (REP3).

"For instance you know the [name of a foreign agency], we've got the United Kingdom that has funding line to the country and so forth. We did make this accessible to our clients in terms of cheaper funding and I mean obviously with the help of our [name of government department] and local funding as well you know it assists," (CB1)

Debt, equity and grants are found to be the most used forms of funding for renewable energy. Banks are providing long term loans in a form of senior debt and sometimes

mezzanine debt, while development finance institutions provide grants. Foreign development finance institutions are also providing funding, but it's often facilitated by local commercial banks.

5.5.3. Funding evaluation criteria

In order to access the financial resources that are so abundantly available, applicants need to fulfil a set of project evaluation criteria determined by the banks. It is important to note that each bank had their own evaluation criteria in this regard. Therefore, the data shows that while applications for funding have to undergo a rigorous evaluation process, the criteria was not universal, but similar. By and large, applicants need to have a good track record in developing and operating renewable energy projects, using a proven technology and must have an offtake guarantee. Most importantly, the envisaged project must be bankable or financially viable, and demonstrate an ability to repay the loan.

> *"Well, lenders are very conservative as you will know. That means they will have a long list of conditions that must be met before they provide money. So, the first one is they want technology certainty. So, they want to know that the technology that will be used is tried and tested in the market. So, we have not especially in South Africa, seen a technology that has received lending from the bank that does not have a technical and commercial track record…," (REP3).*

> *"The banks are highly risk averse. They will check that the project is fully compliant with all of the bid requirements, they'll check the track record, and they'll check that the technology is tier 1 and so forth. I mean they wouldn't put funding by a company that didn't have a balance sheet, that wasn't able to provide guarantees and then the compliance that are required by the bid conditions," (REP1).*

> *"So, they [funding applicants] would know what they need to do. They will they need to have done EIAs [environmental impact assessments], they need to have some funding of their own, need to have an off taker for the power, they need to have you know construction lined up, they need to know the technology. It can't be new technology it's not something that hasn't been proven and then they know they need to have a real deal," (CB3).*

"…if we cannot demonstrate in terms of repaying ability and when you do the simulation in terms what this asset can generate and offset from the working capital and the cashflow for the plant, then it will not be successful," (CB1).

While other banks require applicants to be their primary clients, others are not so much concerned about who their prospective applicants bank with.

"…so it would be first of all they'd have to be a client of [name of the bank] … if the client is not willing to join [name of the bank] we don't do standalone deals," (CB2).

"So, we can finance customers that permanently bank with the other financial institutes, however there's certain criteria that they must follow as well" (CB1).

With regards to the offtake certainty requirement, participants highlighted that guarantees provided by the government in the form of power purchasing agreements are sufficient.

"The power purchase agreement and the risk sharing agreement is such that if you're a project developer you're responsible for two things; building the plant, operating the plant. Anything else is a zero risk because it's all taken care of by the PPA (power purchasing agreement) and it's all underpinned by government. If there's no transmission and you can't transmit treasury [National Treasury] will pay or Eskom will pay," (REP2).

"This is why in South Africa; the power purchase agreements are not just signed by Eskom but as well signed by treasury [National Treasury] because they want to make sure that if Eskom goes bust somebody will still be buying the power," (REP3).

Data also highlight strong participation of international companies from countries such as France, Spain and Canada, in South Africa's renewable energy market. It is clear from the data that international companies find it easy to secure funding for renewable energy because of their level of knowledge and expertise. The strong participation of international companies in the local renewable energy space is considered to make the sector highly competitive. However, it is also seen as a barrier to entry for local companies who often do not have the intensity of capital and expertise as the international counterparts.

"Now, mind you again these are international players with teams of hundreds of people, they hire the world's best consultant as well. This is why they are able to package things that you wouldn't easily reject," (DFI1).

"…most of the big renewable energy power plants built in South Africa are being owned by international utilities such as [names of companies], because to them it's fairly easy to fulfil all those requirements but for local companies it's very hard…," (REP3).

"I think this technology, believe it or not started in Europe and those places you wouldn't think so without climate and it's developed there. So we importing these panels and things from China from Europe from Canada. I see a lot of Canadian products coming in," (CB2).

Applicant's track record, proven technology, compliance with REI4P bidding requirements, and healthy financials were listed as some of the most impact aspects that banks look for in their evaluation criteria for renewable energy funding.

5.5.4. Technological innovation

Interestingly, some participants believe that the requirement for proven technology hampers innovation, while others were of the view that proven technology gives banks some certainty of the return on investment or effort. Therefore, banks are wary to fund the development of renewable energy new technologies.

"So, at this stage, we very wary of funding those kinds of things. So, we actively encourage innovation but we also, for our clients' benefit and for our protection, we are certainly not going to fund something worth millions of rands only to find it doesn't work or it's worthless," (CB2).

"I think innovation is not a commercial bank's job and we don't know commercial banks that really funds innovation. That's where angel investors come in or something like [name of institution], development finance institutions. Banks don't invest in stuff that they don't know, that they can't see clear loan of repayment,

that's the nature of a bank. So, I think there are lots of entrepreneurial pools of capital that developers can tap for that kind of thing, but innovation is not where a commercial bank normally sits," (CB3).

"So, at the end of the day we can say that the way the banks allocate their lending is hampering local participation and is hampering technological innovation. But anyway that's the way it is, we all need the bank's money so we play by the rules," (REP3).

REI4P participants recognise the importance of technological innovation and believe that financial resources are key in driving innovation in the renewable energy transition. However, banks are only keen on proven technologies with a credible track record.

5.6. Results for research question 2

Research question 2: Has the way in which banks evaluate energy projects changed the profile of their energy portfolios over the period 2010 to 2020?

Research question two sought to understand how the bank's evaluation criteria changed the energy portfolio in terms of technology and other aspects, and the reasons for the change, if any.

5.6.1. Advances in renewable energy technology

Research data shows that over the last ten years, South African banks provided substantial financial resources meant to fund the development or expansion of the country's renewable energy sector. Although most of the renewable energy projects operating in South Africa are either owned or funded by foreign entities. The South African banking sector has also been playing an important role in advancing the country's agenda for energy mix. Research participants attributed the bank's increased participation in renewable energy funding to advances in renewable energy technologies, which led to a significant decrease in renewable energy generation.

However, such an increased uptake in funding renewable energy projects seems to have been entirely influenced by improvements in renewable energy technology, and not

necessarily by the manner in which the banks evaluate applications of renewable energy funding.

A REI4P participant is of the view that the banks are increasing their renewable energy portfolio because it is a cheaper source of electricity.

> *"Well, 10 years ago the renewable energy technologies were part of the portfolio, but they were subsidised elements of the portfolio. 10 years ago, people were talking about wind and solar energy as part of the energy mix in order to reduce the carbon footprint for example, now this has changed. Renewable energy is cheaper to generate so now the portfolio has changed in a sense that we're not talking that much about environmental benefits but rather about what is the cheapest way of getting electricity to the grid," (REP3).*

From the banking sector's perspective, the advances in renewable energy technology has led to a decrease in the prices of the different technologies, thereby making it easier for the banks to provide finance.

> *"What we are finding is that as technology improves in the industry, we are finding that the panels are becoming cheaper and the installations are becoming cheaper. There's more competition so we're finding that it's becoming easier to finance these things as well. There's a track record now if you want to call it that… and initially the book was entirely PV and we have subsequently seen it evolve into wind into water turbines and those kinds of things," (CB2).*

> *"So, as you know and over those ten years there's other components that came. For instance, the cost of these installations compared to what it is now. And we've seen a massive drop in the cost in terms of solar technology or renewables. So a lot more people are taking solar technology and we are also financing a lot of them. We are expanding our renewable energy portfolio. Ten years ago you were getting panels of about 80 to 100 watt and now we're getting almost five to six times that amount in a single panel that can produce. So, pricing has reduced, technology has been matured, there's a greater awareness out there, there's even these accreditations that are out there in terms of installers. It's been quite a drastic*

change if you look at the landscape and you know so those are some of the things that have encouraged the uptake," (CB1).

"As far as energy is concerned I think there are however drivers that impacted risk, which made it easier to extend debt. Those trends relate to, for example the cost of technology. So, the technology overtime became cheaper and better. If you look at efficiency on solar panels for example it has improved, if you look at the cost of energy production as a result of the cost of technology it's come down significantly," (CB4).

The advances in renewable energy technologies have also made banks to be more flexible in their funding methodologies. As such, the banks have moved to provide funding for projects that they, ordinarily, would not fund in the earlier years.

"We definitely looked broader and we're doing projects that we wouldn't have done before. And the [name of the fund] has funded a project that turns chicken waste into clean water and energy and that's something that we might have turned down before, because it's quite technically challenging and difficult to get to do you know all the due diligence and so on," CB3).

Furthermore, flexibility in the banks is also evident in that they are also providing funding for small projects developed and operated by Small, Medium and Micro Enterprises (SMMEs).

"…we are looking at a project which does energy efficiency in the mines. It's a piece of technology that you put in high energy units in the mines and then it's a demand. So, that's something we probably wouldn't have done before. So, that facility for small renewable systems definitely broaden our range of projects that we do. Traditionally as a department in [name of the bank] we would focus on billion Rand deals, not R100 million deals," (CB3).

While most of the participants acknowledge the change in renewable energy technologies from a historical perspective, one of the REIP4 project representatives took a more futuristic view, saying that:

"I think in the future there's going to be more wind than there have been in the past. I think the IRP [integrated resource plan] sets out like a certain allocation, and it's predominantly solar wind. There is potential for other technologies like landfill gas project, one biogas project. So there's been a couple hydro projects," (REP5).

It is found that banks have provided substantial funding for renewable energy in South Africa over the last decade. However, this was not because of the manner in which applications for funding were evaluated, but was a result of advances in renewable energy technologies.

5.6.2. Reliance on renewable energy

Notwithstanding the advances in renewable energy technologies and the encouraging update of the consumers and funders, South Africa remains heavily reliant on coal for energy generation. Based on the experiences and views of the research participants, South Africa will continue to rely on coal energy for a foreseeable future. Participants made it clear that reliance on renewable energy to power the entire South Africa remains only a vision, but one that is not farfetched.

"I definitely believe it's possible and doable and I think that's more of a question of timeframe. I think it's going to happen but on what timeframe is more of a question. Like I really believe in humanity's ability to solve problems and move forward," (REP6).

"The reality is, if we want to achieve a net zero carbon economy by 2050, coal does not have a space," (REP2).

"I think it's always important to have a balanced energy mix. There definitely needs to be a transition to cleaner sources and you going to shift towards the renewable energy but you also going to need to make sure you have sufficient load-based power," (REP4).

With regards to South Africa's transition to renewable energy, a highly optimistic and visibly passionate independent power producer had this to say:

> *"We can't switch off coal in the next ten years, it's going to take longer. But what I can see is we can start a phase migration, and we can start by educating youngsters, we can start by reskilling coal workers. So, I think that…that would be the three hot buttons, hot buttons for me," (REP7).*

The banks also share the same sentiment that South Africa has great potential to have renewables as the main source of electricity, but must always have a base load from coal power.

> *"South Africa is absolutely perfect for renewable energy. We've got wind, we've got sun, we don't have much hydro potential but you know enough sun and wind to-to do all our renewables and there's a lot of biomass potential. So, the country is well poised for it, but you need government to run the program that does it," (CB3).*

> *"So, if you look at solar PV for example you need the sun to shine to harvest that source and to generate energy. So, at night if you don't have battery backup, where then are you going to get your energy from? So, the base load supply piece to smooth out the intermittency of alternative energy sources is always going to be important and then something like coal fire plants does play a role," (CB4).*

Another participant from the banking sector expressed a similar sentiment, highlighting the abundance of coal in South Africa and the importance of energy to the country's economy.

> *"South Africa does have an abundance of coal, we need electricity, we need base load power to fuel industry and to lead into GDP growth. So, I think just saying we want to do all renewables is a nice statement, but it's not necessarily practical. While coal is still in the ground, I think that the human race is going to want to get it out," (CB3).*

Interestingly, a REI4P project participant took a more cautious approach, warning that reliance on renewable energy could be catastrophic for the economy.

> *"So, we will have a low-carbon economy but it will be a failed economy or economy that is significantly smaller than it could have been because of the collateral*

damage to the economy, because of lack of access to energy will cause massive damage. The truth is renewable energies cannot currently supply 100% of the energy and so there has to be some transition period with maybe with gas or-or in a gas and batteries for a while. So, one needs to be intelligent about phasing out of those technologies," (REP1).

Despite having great potential for renewable energy, evidence suggest that South Africa will still rely on coal for energy generation for many decades to come. Furthermore, participants strongly emphasised that transitioning to renewable energy has to be done in a just manner.

5.6.3. A just energy transition

With the advances in renewable energy technologies, research participants expressed confidence that South Africa has the capacity and capability to facilitate energy transition. However, participants also emphasized that such a transition has to accommodate all sectors and individuals who are currently playing a role in the coal energy generation space. In other words, energy transition must be facilitated in a manner that will not jeopardise the livelihoods of communities that benefit from the current energy generation regime. In this regard, all participants particularly emphasized the importance of job security for the workers employed in the coal power stations, and those who work for the coal mining companies. This process is known as a just transition and was clearly defined in Chapter Two of this report.

Transition to renewable energy has to be an inclusive process:

"It must be done in a just and inclusive way, meaning that we have to make sure that the communities and the workers and small businesses and all the other valuable stakeholders, the youth remain abled. Actually, they should be better off through this transition process. We have a significant amount of stakeholders and people who are at stake of losing out because of the transition," (REP2).

For one participant, South Africa must start converting the space wherein coal power stations are built into a solar farms.

> *"Let's start building utility scale, solar farms, cut the mines because they are ate a lot of ground, let's start building them there all of the reticulation of the cables comes in the anyway. So, let's start doing that. Let's start using the people that are there and say "Right, you're going to move into the REIPPPP or the renewable sector over time. We going to train you to make that migration," (REP7).*

On the contrary, another participant believes the process must be handled with care.

> *"It's something that needs to be handled with care because we are a very coal dependent economy. So, you need to ensure that you upskill then you reskill a number of workers that are dependent on the coal industry so that you transition them. You can't just sort of shut off a coal power plant, because there are a lot of communities and individuals that are dependent on that source of income. So, that's why there's a focus on just transition," (REP4).*

While some participants advocated that coal power plants can be easily converted into renewable energy facilities, others reiterated that workers must be reskilled so that they do not lose their jobs through the transition to renewable energy.

5.7. Results for research question 3

Research question 3: To what extent are the banks willing to invest in renewable energy projects?

As alluded to in Chapter Three, research question 3 sought to determine whether banks fund renewable energy projects out of their own will, or they are influenced by external pressure from cash depositors and lobby groups. The role of the financial sector in general was also discussed during the data collection interviews. A total of four themes relating to this question emerged from the data analysis process, as presented below.

5.7.1. Renewable energy is central to the future of banking sector

Data shows that South African banks consider renewable energy to be central to their future business. Over and above recognising the importance of energy in power operation, banks believe that they have a crucial role to play in advancing the renewable energy sector. Some of the banks consider their participation in the renewable energy space as

part of their DNA and a broader vision for sustainable development, while others consider it part of their corporate social responsibility initiatives.

It became clear through the data that banks are certainly willing to provide funding for renewable energy because it amounts to investment in infrastructure development. A REI4P project participant believes that banks are interested in infrastructure funding because of security of their investment.

> *"They have a strong interest because it is an infrastructure investment and lenders love infrastructure investments. So it is clearly crucial and the amount of attention the renewable energy or the energy sector in general gets from the banks is proving that the banks see this as being absolutely crucial for their portfolio," (REP3).*

The banks share the same sentiment, alluding that energy is a basic necessity for the economy to thrive. Therefore, the banks consider energy in general and renewable energy in particular, to be a thrust of their current and future business.

> *"We believe it is part of the strategic thrust of the bank. It's the way we've got to be going. You are aware of the issues with Eskom and the continuity of business issues and all those kinds of things and just to protect our client it's something that we have to do. We see it as a risk mitigant not only of planet warming or global warming and those kinds of things, but also of our financial fitness and that of our clients. Not only do we want to be part of a new industry, but we also want to ensure that our clients are sustainable financially as well as with electricity and those kinds of things. And it just makes no sense not to be involved in this," (CB2).*

> *"It's vital, I mean it's the main thrust of what we do. When government talks about infrastructure and all this post Covid infrastructure spin and so on I mean you got to trust that they actually are going to do that. But the main sort, the main driver behind industrial growth is going to be energy you know," (CB3).*

> *"We feel that we have a big role to play in this translation by making it accessible to everyone but also we're governed by you know the UN [United Nations] sustainability development votes. So, we have to follow those trends, we have to*

be responsible in what we do, for the greater benefit of the world itself, for it to be in existence for the years to come," (CB1).

It is clear that banks consider the energy to be important to their future for different reasons. A participant eloquently indicated that the bank's participation in the energy sector is dependent on the needs of their clients.

"If our clients want to make a direct investment into that space, it's upon us to work with them and to find a suitable solution to enable them to do what they want to do and achieve what they want to achieve in time to come," (CB4).

Furthermore, it also emerged that senior leaders of certain banks are actively advocating for sustainability transitions, and investment in renewable energy.

"And so as a bank, as an infrastructure division which is an important division within the bank, the chairman of the bank has gone out speaking about how important infrastructure is. So, is the CEO of [name of the bank] and energy for me is the number one infrastructure driver that we need. It is without a doubt we see a bright future in it," (CB3).

"Previous CEO [name], and our currently [name], are visionaries in that sense and it is always been a passion to take it further," (CB2).

For a development finance institution's perspective, energy is central to its portfolio given that it helps attract funding and enables the institution to comply with the funders' requirements.

"We are self-funded, and we go to the capital markets to attract funding there. And obviously they will look at what is our portfolio mix, they will look at what our funding patterns are and you will be penalized based on what it looks like. If they feel like you are not transforming," (DFI1).

"So, 15% of our investment is in energy and non-renewable energy it's a large part of it and then in Africa region is going I think even above 25%. So, meaning that

25% of the lending that we're doing with governments is on energy first less majority of this is clean energy," (DFI2).

It is evident that banks are keen on participating in renewable energy space, particularly if it benefits them in terms of return on investment.

5.7.2. Stakeholder activism

Stakeholder activism emerged as one of the factors that influenced the banks in making decisions on renewable energy funding. It is interesting to note that participants expressed fear of reputational damages or negative perceptions about their banks as a serious consideration when it comes to making decision on funding energy projects. As such, banks would be keen on renewable energy than fossil fuel deals. Some participants went to an extent of making reference to an incident of shareholders protesting against one of the commercial banks on its stance on funding fossil fuel deals.

"I think there were threats in the past and maybe that is part of the persuasiveness that we needed to go into this route. So, we are very aware of those things and you'll be aware of the shareholders becoming quite activist in [name of the bank], where they demanded that they stop funding coal or find an alternative," (CB2).

"You know there were two coal deals that were about to happen and then all of a sudden the bank pulled out. And it is entirely due to public perception and I mean it's not to say the bankers don't care, but definitely without lobby groups a lot wouldn't be done. CEO of [name of the bank] is highly-highly attuned to public perception and so on and there's no way they would risk doing projects that are going to get them in the newspapers," (CB3).

Stakeholder activists exert pressure not only on commercial banks, but development finance institutions too. However, these institutions often have to execute the mandate of their government and must be cognisant of the competing needs that the country has to attend to.

"We are not immune to that as well. We do have lobby groups that have come to the bank and protest outside not happy with the projects that we are investing in or

that we are looking to invest in, and we've invited them for talks and deliberations and one thing that is made very clear to them is that this is not about trend setting. This is about development. We do try to be forward-looking as best- as we can, but you also understand that we live South Africa and not an ideal first world nation. I'm not trying to downplay the importance of greenhouse gas emissions and global warming. However, we've got problems with education in the country, we've got problems with healthcare, with poverty, with unemployment, youth unemployment more especially. We've got problems with not having enough electricity, we are still working on industrializing our economy," (DFI1).

In response to pressure from stakeholder activists, some of the banks have moved to develop and adopt new policies that essentially guide their investment decision making process. In addition, partnerships with lobby groups have also been established as a way to not only quell future protests, but also to get the stakeholders' buy-in for future deals.

"We have a partnership with WWF, a very strong one, once we realized that we done about as much as we could do for ourselves. I mean we sorted out our water, we sorted out our electricity see all those kinds of things," (CB2).

Partnerships with multiple stakeholders appeared to be central in dealing with lobby groups who may stage protests against certain stances of the banks.

5.7.3 Return on investment

The research also found that, irrespective of whether stakeholders are exerting pressure regarding the kind of deals to work with, banks would finance any deal that is financially viable. In essence, the banks are driven by profit and not necessarily environmental considerations and possible climate change risks associated to certain deals.

"Although they paying lip service to sustainable development, but they would ultimately invest in anything. If you come with a nuclear power plant and its promise…it ticks all the boxes for lending money to, they will invest in it. If you come with some weapon system, if you come with a toll road. If you come with anything then banks will give you money if you tick the boxes and equity investors are mostly very similar," (REP 3).

This is echoed by the commercial banks; whose main goal is to derive return on investment. It became clear from the data that individuals entrusted with responsibilities to invest the bank's money must make sure they do all it takes to earn some returns.

> *"If you work at a commercial bank, if you lose money for the bank you're going to lose your job. So, you know that's what the difference between a development finance institution and commercial bank is. We do want to get our money back," (CB3).*

Furthermore, the magnitude of the project was also identified as an important factor that would influence the bank's willingness or unwillingness to fund a renewable energy project. The understanding here is that small projects often do not yield enough returns and therefore are not worth pursuing.

> *"No bank really wants to do small deals. A deal of a R100 million is not worth doing a project finance type deal, because the lawyers cost so much money, there's so much work to be done that you'll kill the project with costs and you won't make enough money. There's not enough return on effort," (CB3).*

Participants made it clear that, even though banks may have noble ideas about the country's future and are willing to participate, they will do so only if it yields returns.

5.7.4. Regulatory reform

The role of government in energy transition, specifically from a regulatory perspective, emerged as a key theme. Even though there was no specific question regarding the role of government, all participants had reflections on the progress of the country's journey to energy transition and the role of government. While some participants acknowledged and applauded the government for implementing the REI4P programme, others were not impressed with the regulations governing renewable energy generation, the pace of REI4P implementation and the relationship between the government and independent power producers.

Participants felt that government legislation hindered opportunities for SMMEs to participate in the renewable energy programme. The legislation favours large companies to participate in the programme.

> *"So, the barrier to the generation of energy irrespective of who that is for in South Africa, is in tidy regulations. I mean government just needs to lift the energy generation licenses from one to ten megawatts and they will create a multi-billion rand industry that anybody can in principle participate in… even with relatively limited resources," (REP3).*

In addition to high barriers of entry into the renewable energy sector, particularly for SMMEs, participants were less impressed with the government's pace on the REI4P bidding process.

> *"Most scale prices are harder because the kind of requirements to get the regulatory policy and legal hurdles to get a small-scale project going are basically the same as a large scale project. So, it's significantly harder to jump above those hurdles because it does cost quite a little bit of money and time and effort so if your products cost much more than it may make, it makes it less viable for you to go ahead," (REP2).*

> *"What's happening now is that instead of the government and Eskom embracing renewable energy on a rational path towards a lower carbon footprint that government would be part of, is that the slow regulatory reforms by government are leading to hostile defection from the grid. We've been waiting for four and a half to five years since the last bid window from the government. It's still impossible for industry to generate electricity for their own usage. Eskom continues to obfuscate and slow down projects," (REP1).*

Had it not been for the unfavourable government regulations, banks would be lining up to offer financial resources for renewable energy projects.

> *"Banks are queuing up and extremely hungry to fund as much renewables as possible," (CB3).*

However, poor political leadership and lack of trust between the government and private sector were identified as some of the major challenges hindering progress in renewable energy.

> *"My parting shot is absolutely not lack of funding that's stopping renewable energy. It's the government's roll out and distrust of renewable energy, distrust of the private sector and the need to keep funding Eskom. Those are the impediments," (CB3).*

Nonetheless, the government was acknowledged for developing a progressive integrated resource plan and its embracing of renewable energy, although it is being implemented at a slow pace.

5.8. Conclusion

The main findings from the data collected are that South Africa does not lack financial resources to finance a renewable energy transition. Instead, participants highlighted that there are not enough projects that are fundable. It emerged from the data that banks are willing to make financial resources available, provided the projects are viable and yield some return on investment. It was also found that renewable energy technologies are rapidly advancing, thereby increasing generation capacity. However, South Africa's transition has to take place in a just manner. Furthermore, the study also found that there is an increase in the bank's uptake to fund renewable energy. Conversely, this is not as a result of the banks' own proactive initiation, but is due to advances in renewable energy technologies. The findings of the study are thoroughly discussed in the next chapter.

CHAPTER SIX: DISCUSSION OF RESULTS

6.1. Introduction

Chapter Six provides an interpretation of the results of the study that were presented in chapter Five. The interpretation is guided by the insights drawn from the results of the study and the literature reviewed. The research was conducted with an objective of gaining insight into the role of the banking sector in facilitating the transition to a low-carbon economy in South Africa, particularly in the energy sector. The study was rooted in the TIS framework, particularly the question as to whether the development of technological innovation system (renewable energy) is constrained by resource mobilisation. Based on the TIS framework, resource mobilisation is a key condition for the progression of the innovation system (Hekker et al., 2007; Markard & Truffer, 2008; Edsand, 2019). Unless concerted efforts to mobilise resources are made, the innovation system does not move forward.

The literature review on sustainability transition and the role of the financial markets / systems was undertaken and was presented in Chapter Two. Therefore, this chapter compares, connects and contrasts the research results from multiple data sources and the literature review, a process known as triangulation (Creswell, 2014). As was done with the presentation of the research findings in Chapter Five, the discussion of results is grouped according to the research questions and begins with a brief summary of the findings for each of the research questions.

6.2. Discussion of the results for research question 1

Research question one: Is funding available for renewable energy projects, and if so, what is the nature of the funding?

As presented in the previous chapter, the research found that renewable energy projects in South Africa are funded through what some of the research participants referred to as blended finance. This is understood to mean a mix of various financing facilities, particularly debt, grants and equity. Interestingly, the study also found that there are international institutions which are providing funding for renewable energy projects. Some international institutions, holding very considerable assets, partner with local commercial

banks to facilitate the disbursement of funds. In this respect, it was concluded that there are probably sufficient financial resources to fund renewable energy transitions.

However, it was also found that each bank and development finance institution has a set of requirements that applicants must satisfy in order to have access to the funding. While each bank indicated that they had their own funding evaluation criteria, they all sought to satisfy themselves with the applicants' track record, financial viability of the project, use of proven technology and compliance with prevailing regulatory requirements of the government. Each of the bank's funding evaluation criteria is based on the premise that there has to be some degree of certainty on the return on investment. These findings are discussed at length in accordance with the themes that emerged from analysis of the data for research question one.

6.2.1. Availability of funding for renewable energy transition

The research found that there is an abundance of financial resources available to facilitate a renewable energy transition in South Africa. This is consistent with the assertions by Geels (2013) and Naidoo (2020) that there is no scarcity of money to support sustainability transitions. Even though the research participants were not able to provide the exact figure on the funding provided to support sustainability transitions, it is understood that at least R193 billion of private sector money has been made available in South Africa (Hashem, 2016). At a global level, funding for sustainability transitions, particularly renewable energy is reported to have significantly increased since 2012, and is expected to remain on an upward trajectory for the foreseeable future (United Nations Environment Programme, 2020).

Congruent to Steffen's (2018) view, it is apparent that South African banks are keen to invest in the renewable energy transition. One of the reasons provided by the research participants in this regard is that banks have a keen interest in the financing of infrastructure projects. Furthermore, it is important to note that funding for a renewable energy transition is not only provided by the commercial banks. The resource mobilisation function of the TIS framework is unequivocal in that financial resources ought to come from multiple sources (Hekker, Suurs, Kuhlmann, & Smits, 2007; Dreher, Kovač, & Schwäbe, 2016; Edsand, 2016). It is evident in the findings of the study that not only commercial banks but also the government and some international institutions are playing

a significant role in providing the much needed financial resources for renewable energy in South Africa. Therefore, in the same manner that Geels (2013) and Naidoo (2020) do, this research study also found that there is sufficient financial resources to faciliate renewable energy transition in South Africa.

6.2.2. Nature of renewable energy funding

The literature referred to the financial resources aimed at facilitating the reduction of greenhouse gas emission as green finance (Boissinot et al., 2015). The concept of green finance is in line with what Busch et al. (2016) call sustainable investments. These, as the authors postulate, are investments that will bring about sustainable development over a long term (Busch et al., 2016). Green finance or sustainable development investments are made in different ways. The research has found that financial resources for renewable energy are provided in the form of bank loans (debt), equity and grants. Lam and Law (2018) identified these forms of funding as the most common types and sources of funding for renewable energy projects. All research participants were consistent in listing debt, grants and equity, as the main sources of funding through which the South African renewable energy sector is funded.

While the focus of the the study was primarily on the role of the banks in faciliating the renewable energy transition, it was deemed important to gain insight on the different forms of funding that could be provided by the banks or other institutions. Banks, which all the research participants were umabigious in identifying them as lenders, provide long term loans that must be repaid with interest. The literature (Kim, 2018; Lam & Law, 2018; Campiglio, 2016) has also been clear in that commercial banks offer loans that renewable energy developers use for the running of renewable energy projects. It became clear during the semi-structured interviews that banks were certainly keen on providing long term loans, and sometimes go to an extent of developing special green funding products. Therefore, it can be argued, as did Louche et al. (2019) that South African commercial banks are playing an important role in fostering sustainable development. However, they do so with a single objective of deriving maximum return on investment. This is discussed further in the relevant section under the discussion of findings for research question three.

It is also important to highlight that the role of government funding emerged as a prominent contributor to the renewable energy transition. The TIS framework also identifies

government as an important source of resources required for sustainability transitions (Edsand, Technological innovation system and the wider context: a framework for developing countries, 2019). Development finance institutions (DFIs), as Lam and Law (2018) alluded to, are key players in renewable energy funding as they offer loans at a rate that is substantially lower than that of commercial lenders. The Development Bank of Southern Africa (DBSA) and the Industrial Development Corporation (IDC) were identified as the most prominent investors. These DFIs have provided billions of Rands as both equity and concession loans for renewable energy in the country. However, research participants felt that these institutions could do more, particularly with the empowerment of SMMEs and in ensuring transformation in the renewable energy sector.

Interestingly but certainly not surprising, the research found that international funds are also used to finance energy transition in South Africa. It is interesting because, as some of the research participants highlighted, South Africa is a predominantly sunny country and has great potential for renewable energy. This is consistent with Potts' and Walwyn's (2020) writing that South Africa receives a substantial amount of direct normal irradiation (DNI) per year, with the Northern Cape province accounting for an average of 2 816 kWh/m^2/year. Therefore, local companies ought to have been attaching greater priority to funding for renewable energy, especially within the context of the present electricity crisis that has had so negatively impacted on the country's economy. However, as a developing country, South Africa has other competing needs for investment and a relatively small capital market.

It is therefore not surprising that many international companies are providing funding for renewable energy, and also participating in the sector as IPPs. The TIS framework (Edsand, 2017; Hekker et al., 2007; Dreher, Kovač, & Schwäbe, 2016) and other literature on sustainability transitions (Polzin, Sanders, & Taube, 2017; Wüstenhagen & Menichetti, 2012) also recognise international funding as a crucial source of funding for renewable energy projects. In this regard, all the countries from which funding is obtained, as listed by the research participants, are developed nations. These include but are certainly not limited to Germany, Canada, Spain and the USA. With the amount of DNI that Potts and Walwyn (2020) refer to, international players are bound to consider South Africa as a suitable market for renewable energy, particularly solar energy.

Funding from developed countries is important, particularly when one considers that developing nations, including South Africa have a plethora of other competing needs for finance, as already stated. Hence the UNFCCC (2015) resolved in its Paris Agreement, that developed nations must be at the forefront in providing financial resources for climate change mitigation and adaptation. At least two of the research participants representing commercial banks indicated that they have partnered with international DFIs and pension fund providers to disburse funding for renewable energy. The study found that such funds are considered cheap finance and the owners do not necessarily expect a market-related return on investment.

6.2.3. Key considerations for investment in renewable energy

The research found that each of the commercial banks has a set of criteria to evaluate applications for renewable energy funding. It certainly makes sense that some evaluation criteria would be in place in order to ensure consistency, and that finances are provided to companies that will optimally use them. The researcher was mostly interested in gaining insights on how easy or difficult it was for applicants to access the funding. In general, the study found that it is easy for large international companies, while it is difficult for local and mostly small enterprises to secure funding for renewable energy funding from commercial banks. Campiglio (2016) expressed concerns that banks are substaintially autonomous and are loosely regulated when it comes to the provision of finances. While in many cases, the role of the central banks has been around determining the interest rate, the banks have been left to make their own determinations with regards to the provision of finances (Campiglio, 2016).

It can be argued that the commercial banks' evaluation criteria are based on an understanding that financing decisions have to be economically rational. The evaluation criteria that most of the research participants listed closely related to the assertion that "investment decisions are made by human beings who act under bounded rationality" (Wüstenhagen & Menichetti, 2012, p. 4). In essence, each bank's evaluation criteria is arguably designed to protect the lender against uncertainties of the renewable energy sector. Polzin (2017) found that uncertainties related to, amongst others, regulatory frameworks, technologies and capital intensity of renewable energy projects cause investors or lenders in this case, to set stringent requirements that applicants must satisfy before accessing the financial resources. Safarzyńska and van den Bergh (2017) shared

the same sentiment, highlighting that financial markets consider investment in renewable energy burdansome, hence the stringent screening processes.

Connecting the literature and the findings of the study gives an impression that banks perform due dilligence with an objective of ensuring that no money is lost, but some return on investment is made. Like any other business, banks are not charity organisations, as they seek to make profits out of their deals. However, given the expectations that not only commercial banks but the entire financial services sector must play a proactive role in facilitating renewable energy (Louche et al., 2019; Naidoo, 2020), there seems to be a need to empower small enterprises in order to improve their capacity and capabilities. In this way, the banks will not appear to be entirely seeking a return on investment but playing an important role of growing the renewable energy sector. This will certainly improve the country's electricty generation capacity, and arguably help expand the banks' contribution to climate change mitigation efforts.

6.2.4. Technological innovation

One of the seven functions of the TIS framework is mobilisation of financial resources (Edsand, 2016; Reichardt et al., 2016). This function is thought to mean that financial resources are a basic necessity for innovation to occur, suggesting that unless concerted efforts for resource mobilisation are made, innovation will not move forward. The study has found that while banks accept that financial resources are crucial for cultivating innovation, they do not consider it their responsibility to fund technological innovation in the renewable energy space. Instead, the financial resources that banks provide are usually geared towards financing the operations (in cases of medium sized IPPs) and sometimes the expansion of renewable energy projects (large utility IPPs). Therefore, the banks' funds are not meant to promote generation, diffusion and utilisation of new technology. This contradicts the understanding that, as TIS advocates, the industry (being largely companies), must contribute to the financing of the R&D phase of technological innovation particularly in a developing country like South Africa (Edsand, Technological innovation system and the wider context: a framework for developing countries, 2019). In addition, such a requirement

The bank's insistence on only funding the use of proven technology for renewable energy, as was found in the study, is hindering technological innovation in the sector. However,

such a requirement is clearly not new. Grubb's (2004) work on financing sustainability transitions made it clear that there are different sources of financial resources for the technological generation, diffussion and utilisation stages. In this regard, Bürer and Wüstenhagen (2008), Wüstenhagen and Menichetti (2012) and Polzin et al. (2017) all concur with Grubb (2004) that the basic stage of technological innovation (usually research and development) ought to be funded through private research grants or public institutions. Commercial banks are expected to provide funding for technologies that are on diffusion and utilisation phases through senior or mozzanine debt. Therefore, the views expressed by the participants from the banks are consistent with the literature, suggesting that commercial banks are not responsible for financing technological innovation but its diffusion. However, this is problematic, particularly in the context of a developing country, where innovators need all the support they can get to not only pilot their technologies, but also take such technologies to the market. In addition, the banks' insistance on proven technologies does not promote the enterpreneral activities function of the TIS (Edsand, 2019).

6.2.5. Summary of discussion for research question 1

There are sufficient financial resources to fund the transition to renewable energy. These are largely available in a form of equity and loans. However, applicants need to meet a set of requirements in order to access the funding. Such requirements include the use of proven technology. The requirement for proven technolgies, amongst others, is based on the banks' quest for certainty on the return on investment or effort. However, representatives of the REI4P projects were adament that such a requirement impedes the adoption of renewable energy technology. Having considered the literature and the findings of the study, it is can be argued that the banks are neither impeding nor accelerating renewable energy. They instead treat the sector like any other.

6.3. Discussion of results for research question 2

Research question two: Has the way in which banks evaluate energy projects changed the profile of their energy portfolios over the period 2010 to 2020?

Findings for research question two (2) show that South African banks have provided a substantial amount of money to finance the country's renewable energy sector. The uptake in financing renewable energy projects has been attributed to advances in

technology, and not necessarily the way in which the banks evaluate applications for the funding of projects. It has also been found that despite the advances in renewable energy technologies and increased financing, South Africa will not be ready for a complete transition to renewable energy anytime soon. As such, coal will remain the main source of electricity for the foreseeable future. Nonetheless, research participants are confident that South Africa has the capacity and capabilities to facilitate the renewable energy transition. However, such a transition must be done in a just manner.

With the summary of findings for research question two presented above, the insightful discussion of these findings ensues. The discussion is also presented in accordance with the themes that emerged from the data collected.

6.3.1. Advances in renewable energy technology

The study found that renewable energy technologies have matured and become better. Consistent with Grubb's (2004) innovation and investment chain, South African banks are putting financial resources in renewable energy projects as a result of advances in techologies. These are technologies that would be in the third phase of the innovation and investment chain, that are either serving a niche market or are fully commercial (Polzin, Sanders, & Taube, 2017). As technologies mature and become widely adopted, more funders become on baord (Grubb, 2004; Bürer & Wüstenhagen, 2008). It can therefore be argued that the banks' evaluation criteria for funding of renewable energy projects has not changed the profile of their energy portfolios over the last decade. Instead, the advances in renewable energy technologies must have resulted in their full diffusion and commercialisation, thereby increasing the demand. With the high demand for renewable energy, banks have an opportunity to provide funding in the form of loans, thereby expanding the profile of their energy portfolio.

The substantial increase in renewable energy investment globally, may have also been as a result of technological advances. Global investment in renewable energy began to increase susbtantially almost two decades ago, with a mere $39 billion in 2004 increasing to a good $333.5 billion in 2015 (Geels, 2013; Naidoo, 2020). Over the last decade, the world recorded a signifcant $2.8 trillion in renewable energy investment (United Nations Environment Programme, 2020). This is a clear indication that as the technology matures, investments also increase. However, the substantial increase in global investment may

not only be attributed to advances in technologies, but also the investor's keenness to participate in sustainability transitons (Steffen, 2018).

Furthemore, there has been evidence of a steady decline in the cost of renewable energy generation (Potts & Walwyn, 2020; Walwyn & Brent, 2015). It can be argued that as the technology advances, the cost of renewable energy declines. In this regard, research participants unambiguously highlighted that the declining cost increases the demand, hence the spike in the consumption of renewable energy technologies at business and residential scales. For the large utility projects, the reduced costs make for a strong business case in a sense that the producer would generate sustainable cashflows and a high net income. Ultimately, investments in renewable energy seem to be about generating a return on investment over and above the socio-economic benefits.

6.3.2. Reliance on renewable energy

The importance of renewable energy is signified in the advances in technologies, rising investment, and declining costs of generation. According to Ritchie and Roser (2020), renewable energy technologies produced at least 11% of the world's primary energy which amounts to just over 7,000 TWh in 2019. Solar, wind and hydopower have been cited as the most prominent sources renewable energy, and this has been the case since the beginning of the 21st century (Sawulski et al., 2019). These figures are a clear indication that renewables are an important source of energy and the sector is wide open for further exploration.

With a highly acclaimed IRP 2019 and the REI4P initiative (Department of Energy, 2019; Montmasson-Clair & Ryan, 2014), only 5% of South Africa's energy came from renewables in 2019 (Ritchie & Roser, 2020). Since its inception in 2011, the REI4P has produced about 6,327 MW of capacity through 92 projects participating in the programme (Beker, 2017), with an investment of approximately $20.5 billion (Eberhard & Naude, 2016). Given that South Africa is considered a special place due to its geographical location and amount of DNI it receives (Potts & Walwyn, 2020), the figures above paint an encouraging picture that the country is on course to meet the target of 20 000 MWh of renewable energy by 2030 as per the NDP (South African Government, 2012). Hence the banks see renewable energy as great investment opportunity.

Notwithstanding the country's great potential for renewable energy and the 6 327 MW capacity produced through the REI4P (Beker, 2017), the research found that South Africa will still rely on coal for energy generation for many decades to come. Two main reasons that research participants cited in this regard are the abandant coal reserves and the socio-economic benefits of the coal mining sector in South Africa. This finding does not in anyway downplay the country's ambitions and efforts for a renewable energy transition, but suggests that the process must be undertaken in a just manner, which in the literature is referred to as a just transition (Heffron & McCauley, 2018).

A just transition requires that the process must strive to cater for the needs of all stakeholders who may impact or be impacted. Protection of current jobs in the coal supply value chain and skills developed are two main issues found to be of great concern. Steyn (2020) reported in a news article that the coal mining value chain employs more than 120 000 people. These people are mostly semi-skilled and breadwinners, and do not enjoy the flexibility of changing jobs. Therefore, as the study has found, transitioning to renewable energy will require the reskilling of the current cohort in order to protect their livehlihoods. It is therefore important that modalities of the renewable energy transition be developed, and guided by emperical insights and cogent policy framework to ensure that no one is left behind in the process.

6.3.3. Summary of discussion for research question 2

Advances in renewable energy technologies was found to be the catalyst of increased investment in the sector. Bank's have provided substantial finances for renewable energy in South Africa due to the maturity and commercialisation of the technologies. This has resulted in the expansion of the banks' energy portfolios over the last decade. The increase in renewable energy finance is evident not only in South Africa but the entire world. The advances in renewable energy technologies and subsequent increase in the financing of the sector have also resulted in a higher generation capacity. Nothwithstanding the improved generation capacity, South Africa will still rely on coal as a source of energy for a few decades to come. This is also clear reflected in the IRP 2019.

6.4. Discussion of result for research question 3

Research question three: To what extent are the banks willing to invest in renewable energy projects?

Findings for research question 3 show that South African banks are generally willing to provide finances for renewabe energy. As such, it became evident that banks consider renewable energy central to their future business, hence the increased investment in the sector. However, it is the researcher's impression that while the banks consider renewable energy central to their future business, they will not take the lead. As such, it can be argued that their involvement in the sector is of opportunistic rather than value-, reputation- or resilience-based. In some cases, stakeholder activists have had to exert some pressure on the banks to desist from investing in fossil fuels, but rather channel funds to renewable energy. Fearing possible reputational damages, the banks have in some cases bowed to stakeholder pressures. Although, the banks presented varied reasons for their willingness to participate in the renewable energy transition, the study found a return on investment be the main driver. In essence, the banks are driven by profits and not necessarily environmental considerations and possible climate change risks associated with certain deals.

Furthermore, government regulatory framework also emerged as an important factor in the renewable energy transition. It was found that although South Africa has made good progress in the renewable energy transition, the rate of transition has slowed in recent years. Research partcipants collectively thought that government regulations prohibited the expansion of renewable energy generation capacity and hindered opportunities for SMMEs to participate in the sector. In order to address this challenge, research participants called for an urgent reform of the existing regulations.

6.4.1. Renewable energy is central to the future of banking sector

The importance of energy in any economy cannot be overemphasised. As alluded to in the first chapter of the report, Arndt et al. (2016) correctly opined that reliable energy supply is crucial for economic development, with Ndlovu and Inglesi-Lotz (2020) emphasising that every country's economic functionality is dependent on the supply of energy. From the findings of the study, it is clear that banks recongise the importance of a reliable energy supply. With all research participants expressing concerns about the state of affairs at the state utility company Eskom, it became apparent that South Africa needs to increase its energy generation capacity.

Increasing South Africa's energy generation capacity requires investment in infrastructure development. It is for this reason that the Department of Energy (2019) has adopted the IRP 2019, an electricity infrastructure development plan. The banks expressed great interest in funding infrastracture development. As Lam and Law (2018) postulate, funding for renewable energy generation is required from the conceptualisation, infrastructure development and distribution phases. Considering Grubb's (2004) innovation and investment chain, it can be argued that the banks' interest in infrastructure investment is justified. The banks see investment opportunities in renewable energy infrastructure development, which they consider crucial in ensuring the sustainability of the country's electricity grid. It is on this basis that the banks consider renewable energy central to their future business. However, if the banks consider renewable energy central to their future business, as found in the study, why would they not be keen on funding new technologies? It is clear that the banks' interest is in making maximum return on investment, and not necessarily in the promotion of sustainability transition. As such, banks treat the renewable energy sector like any other. .

Nonetheless, investment in renewable energy generation infrastracture can be increased when favourable conditions are in place. It has already been mentioned that South Africa has great potential for renewable energy, particularly from solar technology given the large amounts of DNI it recieves (Potts & Walwyn, 2020). Therefore, an important element that would enable the country to reap maximum benefits in this regard is public policy. As Edmondson et al. (2019) correctly found, public policy is arguably the most important constituent of sustainability transitions. Investment decisions, as Wüstenhagen and Menichetti (2012) postulate, are highly influenced by the prevailing policy imperatives, particularly with regards to renewable energy. This is consistent with the TIS framework, which considers the role of public policies central to achieving sustainability targets (Markard & Truffer, 2008).

While all participants expressed confidence in the IRP 2019, they also showed frustrations with regulations governing renewable energy generation. The requirements to participate in the REI4P are found to be prohibiting participation of many local companies and most SMMEs in the sector. From the perspective of the banks, the renewable energy sector is littered with political meddling, which creates unfavourable conditions for future investments. As indicated in Chapter Five, poor political leadership and the lack of trust between the government and private sector were identified as some of the major

challenges hindering progress in renewable energy. This, therefore, calls for urgent regulatory reforms that would enable increased renewable energy generation.

6.4.2. Summary of discussion for research question 3

In summary, banks are generally willing to provide funding for renewable energy projects. However, stakeholder activists have also played an important role in influencing the banks' investment decisions. The banks' willingness to provide financial resources for renewable energy is linked to their desire for investment in infrastructure development, with a view of making some return on investment over a long term. Renewable infrastructure development, as found in the research, would increase South Africa's energy generation capacity. However, current regulations governing the renewable energy sector are considered to be hindering the growth of the sector, as they create high barriers of entry for SMMEs in particular.

6.5. Moving Forward

As evident in the findings of the study, there is a disconnect between what the proposals for renewable energy funding and what the banks are looking for. Not so much has the way in which the banks evaluate applications for renewable energy projects changed, but some of the funding proposals fall short of meeting the banks' basic requirements. Therefore, it is important to determine how both the banking and renewable energy sectors can move forward. One of the ways through which the sectors could move forward is if government is clearer about its legislative framework. This and other forward-looking ways are elucidated provided as recommendations in Chapter Seven below.

6.6. Conclusion

Chapter Six provided an insightful discussion that connected and compared the literature on sustainability transitions with the findings of the research study. The findings were consistent not only with the theoratical foundation of the study (TIS), but also the literature. Both the literature and the research findings are consistent regarding the availability of financial resources to faciliate the renewable energy transition, concuring that they are sufficiently available. Financial resources are largely available in the form of bank loans, grants and equity. However, the banks are only willing to provide finances for viable

projects that are employing proven technology with a sound track record. This is contrary to the TIS framework, which expects the industry to allocate resources towards R&D for the technology.

Nonetheless, drawing inference from the findings of the study, it is clear that renewable energy is not constrained by mobilisation of financial resources, as the evidence shows that the issue is more around the lack of projects and no the lack of finance. Consistent with literature, banks are expected to provide loans for technologies that are ready for commercialisation or diffusion. This is aligned to the banks' quest for a return on investment. Therefore, it is concluded that banks are neither impeding nor accelerating renewable energy. They instead treat the renewable energy sector like any other.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1. Introduction

Chapters Five and Six respectively presented the results and then discussed the findings based on the study's theoretical framework, existing information in the literature, and following the structure of the research questions. This chapter presents the conclusions of the study and recommendations that, if implemented, could help advance the country's transition to a low-carbon economy. It begins by providing a recap of the main findings of the study. The chapter further presents the limitations of the study and makes suggestions for future research areas.

7.2. Principal findings

The devastating impacts of climate change on human life and the natural environment need urgent attention (Busch et al., 2016). The research study has sought to understand the role of South African banks in mobilising financial resources required for the transition to a low-carbon economy, with a particular focus on renewable energy funding. The financial sector has recently been criticised for its inadequate contribution to the sustainability transition (Naidoo, 2020; Hall et al., 2017). This study has sought to further understand the sector's response and the basis for this criticism.

The study has found that the South African banking sector has been making some inroads in providing much-needed financial resources for the sustainability transition, through the funding of the renewable energy projects. The financial resources, provided in the form of long-term loans, have contributed to the growth of the country's renewable energy sector, and subsequent provision of electricity to the national grid.

However, this contribution appears to be driven by self-interest and the standard requirement in the sector for an acceptable return on investment. As evident in the results of the study, the banks have provided loans for financially viable renewable projects developed and operated by companies with a proven track record. The banks are not keen on providing financial assistance to companies whose deals are less than R100 million, claiming that there would be no return on efforts for such small deals. In addition, banks would support any other projects based entirely on their financial viability, with no

environment sustainability considerations. From the analysis of the data, it is evident that the banks treat the renewable energy sector like any other. Therefore, it is concluded that the banking sector is neither impeding nor accelerating the country's transition to a low-carbon economy. In other words, the sector is essentially neutral to the imperative for measures to address climate change. Further details on how this overall conclusion has been derived, based on the structure of the research questions, are provided in the subsequent sections.

7.3. Availability and Nature of Funding

Research question one sought to determine the availability and the nature of funding that banks provide for renewable energy projects. It was also aimed at understanding the criteria used to evaluate applications for renewable energy funding. The study found that in general, renewable energy projects are largely funded through loans provided by the commercial banks, grants provided by the development finance institutions, and equity provided by shareholders. In line with Geels (2013) and Naidoo (2020), it was found that there are sufficient financial resources to fund renewable energy. Nonetheless, the funding evaluation criteria favors large utility independent power producers (IPPs), and disadvantages the smaller players. Large IPPs generally have extensive experience and expertise in renewable energy generation, and can easily secure funding for their projects from the banks. As for the smaller players, they find it difficult to access the finances that all participants representing the banks confidently indicated are sufficiently available.

The main stumbling block for the smaller players appeared to be linked with the requirements for participation in the REI4P, which include thorough environmental impact studies, availability and ownership of the land on which the renewable energy plant would be built, legal issues, and so forth. Of course, the projects have to be of high quality with financial, legal, and technical capabilities (Eberhard & Naude, 2016). However, building such capabilities requires strong financial support. The banks are not keen on providing financial assistance for companies that are still building their capabilities in renewable energy project development and implementation. They will only fund companies that are already well developed, most of which are from foreign countries such as Spain, Canada, China, and the United States of America.

It is therefore recommended that in order to continue making a positive contribution to the country's renewable energy transition and move its acceleration, South African banks must proactively develop special funding products that would cater to smaller IPPs. This recommendation is in line with the view that addressing climate change presents an opportunity for companies to be innovative and develop products and services that are less carbon-intensive (Coppola et al., 2019). In this instance, banks ought to develop special funding products for both larger and smaller players in the renewable energy space. In addition, the banks must endeavour to provide any possible assistance to IPPs to meet the funding requirements of the REI4P. This will increase the competitiveness of the programme and the number of participants therein.

7.4. Evaluation of Renewable Energy Projects

The objective of research question two was to understand whether the way in which banks evaluated applications for renewable energy projects has changed the profile of their energy portfolios in terms of technology and other aspects, and the reasons for the change, if any, over the last decade. The research found that the energy portfolios of South African banks has changed significantly, with a greater proportion of the portfolios now directed at renewable energy projects. The sector has provided substantial financial resources to fund the development or expansion of the country's renewable energy sector, reflecting an increased uptake in the funding of renewable energy projects.

However, this change seems to have been entirely influenced by improvements in renewable energy technologies, and not necessarily by the manner in which the banks evaluate applications for renewable energy funding. As renewable energy technologies advanced and became commercialised, banks' provision of funding has also increased.

The advances in renewable energy technologies have not only resulted in reduced costs of renewable energy generation (Walwyn & Brent, 2015), but also decreased the costs of technologies themselves, thereby making it easier for the banks to provide finance. It is normal for any business to tailor their offering according to changes in their business environment. However, as Louche et al. (2019) postulated, the financial markets, and banks in particular, have a much more important role to play in the transition to a low-carbon economy. Based on the findings of the study, it is clear that the banks are aware of their role and the responsibility regarding transitioning to a low-carbon economy. They

also understand the importance of the renewable energy sector and its contribution to GHG emission reduction. However, they will not take lead in the mobilisation of the much-needed financial resources for the renewable energy transition. Therefore, it is clear that banks do not consider that their present business models are under threat from climate change. Otherwise, they would be more proactive.

7.5 Barriers and Incentives for Investment

It was clearly established from research question one that banks are providing financial resources for renewable resources. In research question three, it was established that banks are providing such funds on the basis that the projects are financially viable. Furthermore, it was found that banks are willing to provide funding for renewable energy given that it is considered an investment in infrastructure development. Banks are interested in infrastructure development because it provides some degree of certainty that there would be a return on their investment. From this perspective, it is concluded that banks consider renewable energy important for their future business.

Notwithstanding an impression that the increased uptake in renewable energy funding demonstrates the banks' willingness to fund the projects, stakeholders have had to exert some pressure on the sector to desist from funding fossil fuels and turn to projects that emit less carbon, including renewable energy. Out of fear of potential reputational damages, some banks have acceded to the demands of lobby groups, who have demanded they desist from funding fossil fuel projects. In this regard, some of the banks have moved to develop and adopt new investment policies that will guide future investment decisions with specific reference to the energy sector. This is in line with Polzin et al. (2017) and Buchner et al. (2019) that financial markets ought to develop and implemment investment policies that aim to fast track climate finance. It is therefore concluded that lobby groups have a great influence on the banks' funding of the energy sector.

Even though research question three was not about the progress that South Africa has made in relation to the transition to renewable energy, it was found that government regulations have slowed down the process. The REI4P is widely applauded to an extent of being benchmarked amongst the world's best renewable energy programmes (Montmasson-Clair & Ryan, 2014). However, its implementation has been slow because

the government takes long to open new bidding windows. As such, the renewable energy sector is not growing at a pace it should for the country to significantly reduce its GHG emissions from the energy sector in particular, and fast track the renewable energy transition. In this regard, it can be concluded that government processes are barriers for further investment and possible growth of the sector.

Therefore, it is recommended that in order to grow the sector, the government should have REI4P bidding windows on an annual basis or at most every 18 months. This will attract more investors and significantly increase the renewable energy generation capacity and improve the paceof transition. In addition, the government must encourage citizens to install renewable energy technologies, specifically solar photovoltaic (PV), at their homes. This will reduce the load from the national electricity grid, thereby improving the stability of the energy supply in the country.

7.6 Implications for Management

The main managerial implications of the study are that the banks need to embrace the importance of their role in the transition to a low-carbon economy. Their role in this regard is not limited to the funding of renewable energy, but also figuring out more areas through which they can expand their contribution to sustainability transitions. Unless managers seriously consider the environmental impacts of their products and services, sustainability transition will remain just an idea. In line with the enterpreneurial function of the TIS framework, mitigating against the effects of climate change provides an opportunity for innovation to bring about products and services that emit less carbon. Therefore, the banking sector must, amongst other things, work towards developing products that empower small independent power producers to expand their businesses so that they may subsequently participate in the REI4P initiative.

The finding that the current regulatory framework impedes the growth of the renewable energy sector is a call on policy makers to rethink the policies. In the interests of the economy and also the climate agreements, the government must implement cogent policy, to create a conducive environment for the sector to thrive. As a regulator, the government must endeavour to ensure policy clarity and certainty, and move with an appropriate pace in the implementation of the REI4P. This necessitates for frequent and

continuous engagements between the government and all stakeholders to ensure that the process is undertaken in a just manner.

7.7 Limitations of the study

The following limitations are acknowledged:

Generalisability of the study: qualitative studies have always been criticised that they are not generalisable given that they are often based on a small sample and the subjectivity of the researcher (Punch, 2014). The findings of this study are based on data collected through semi-structured interviews with 13 participants. This number is certainly not a complete representation of the banking sector and the independent power producers participating in the REI4P initiative. However, as shown in Figure 5, saturation was reached, thereby indicating that data collection stopped at an acceptable stage.

Sample selection: the unit of analysis was drawn from a matured banking sector with different kinds of banks that serve different needs of the clients and the economy. All banks that provide project funding were approached. However, only four commercial banks and two development finance institutions positively responded to the invitation to participate in the study. Reasonable efforts were made to secure as many participants from the banks as possible, but these did not materialise.

Researcher bias: the interpretation of qualitative data depends on the researcher's understanding or impressions about the participants' inputs, thereby making the process highly subjective (Creswell, Research design: qualitative, quantitative, and mixed methods approaches, 2014). Although the researcher endeavoured to reduce the bias by, amongst other things, posing follow up questions and seeking the participants to corrobate their inputs after interviews were transcribed, the researcher's bias cannot be completely ruled out. Therefore, it remains a limitation of the study.

7.8 Suggestions for future research

The study undertaken focused specifically on the role of the banking sector in facilitating the transition to a low-carbon economy, with a specific focus on the renewable energy

sector. As presented in Chapters Five and Six, banks are providing financial resources for the renewable energy sector, thereby contribute to the sustainability transition. However, it is important to understand how else the banking sector is contributing to the sustainability transition. A study that looks into how the banks are funding other climate change mitigation initiatives is suggested.

In addition, banks also have the responsibility to reduce their own carbon footprint. From this perspective, it will be interesting to understand the initiatives that banks have embarked on or plan to implement in order to reduce their own carbon footprint, and the potential benefits to be derived from implementing such green initiatives.

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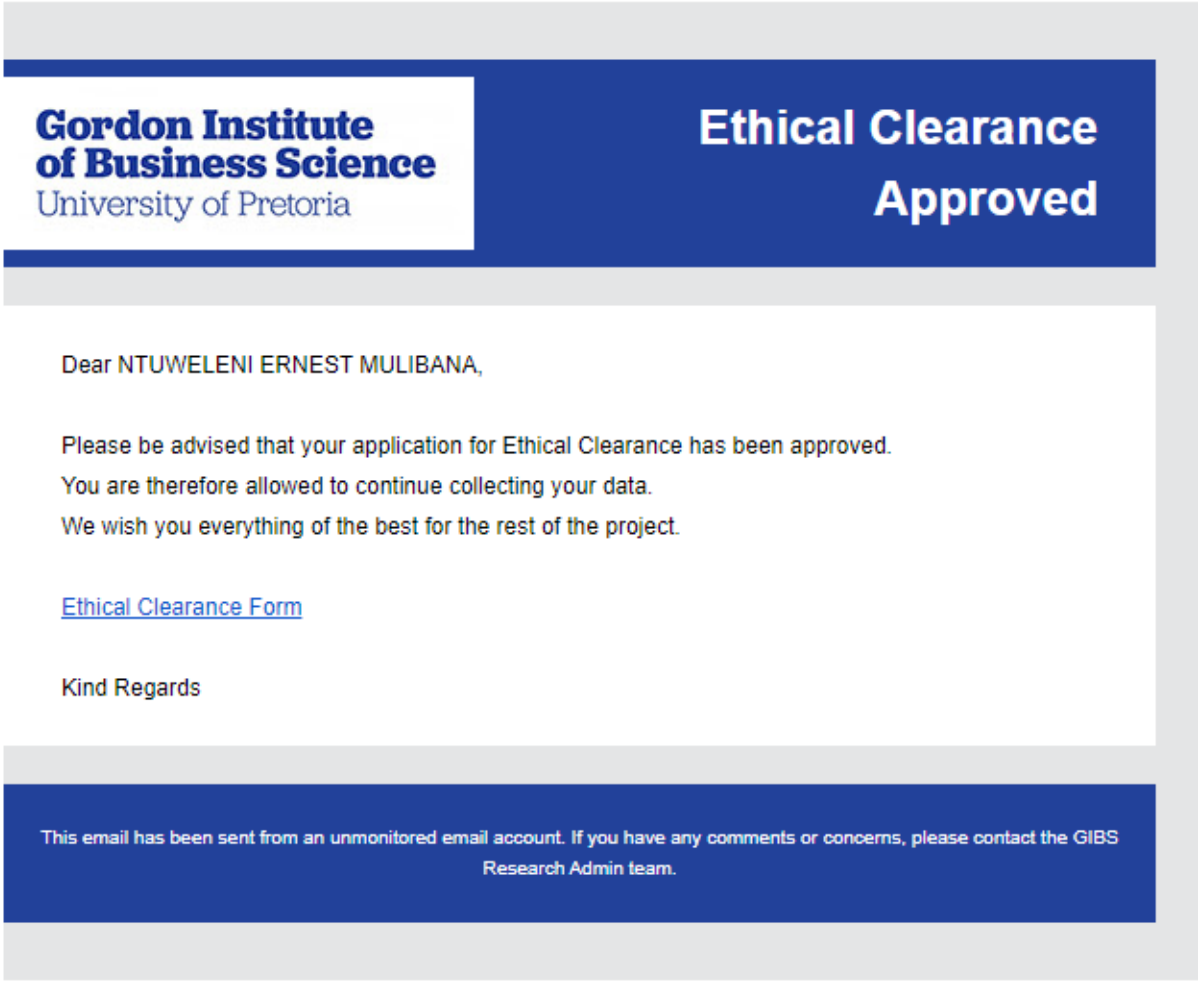
ANNEXURE 1: ETHICAL CLEARANCE



Gordon Institute of Business Science
University of Pretoria

Ethical Clearance Approved

Dear NTUWELENI ERNEST MULIBANA,

Please be advised that your application for Ethical Clearance has been approved.
You are therefore allowed to continue collecting your data.
We wish you everything of the best for the rest of the project.

Ethical Clearance Form

Kind Regards

This email has been sent from an unmonitored email account. If you have any comments or concerns, please contact the GIBS Research Admin team.

ANNEXURE 2: INTERVIEW PARTICIPANT CONSENT FORM

Gordon Institute of Business Science
University of Pretoria

Research conducted by:
Mr. N.E Mulibana (13294114)
Cell: 082 263 7372

Dear Participant

I am a student at the University of Pretoria's Gordon Institute of Business Science where I am undertaking a research towards a mini dissertation, a requirement in partial fulfilment of a Master of Business Administration (MBA).

My research is about funding of the transition of a low carbon economy, with a focus in the renewable energy sector in South Africa.

You are kindly requested to participate in this research as a key informant on the funding of renewable energy projects. Our interview is expected to take no more than 45 minutes.

The questions have been designed to assist me in understanding the sector, develop some insights into how funding or lack thereof contributes to the country's vision of a low carbon climate resilient economy.

Your participation is voluntary, and you can withdraw at any time without penalty. All data will be reported without identifiers. If you have any concerns, please contact my supervisor or me. Our details are provided below.

_____
Participant's signature
Date: _____

Researcher: Ernest Mulibana
Contact: 13294114@mygibs.co.za
Date: 28 August 2020

Supervisor: Prof David Walwyn
Contact: david.walwyn@up.ac.za
Date: 28 August 2020

ANNEXURE 3: INTERVIEW GUIDE

INTERVIEW GUIDE

Introduction and Interviews Questions

The researcher will introduce himself to the participant and briefly highlight the purpose of the interview. The participant will be reassured that the contents of the interview will be strictly treated with highest level of confidentiality and that the identity of the participant will not be revealed.

Furthermore, the research will request permission from the interviewee that the interview be recorded for ease of reference when conducting data analysis. The participant will be reassured that the transcript will be shared in order to verify or confirm the veracity of the information. It will also be noted that the participant may stop the interview at any point without any negative consequences, as per the terms of the prior informed consent document.

Thereafter, the broad set of the questions as listed below will be posed. Follow up questions may also be asked, depending on the responses of the participant and the context of the participant.

Research Question 1: Is funding available for renewable energy projects, and if so, what is the nature of the funding?

1. What sort of requirements did your renewable energy project have to meet in order to secure funding?
2. How easy or hard was it to meet such requirements?
3. How important are the financial resources in building and maintaining a renewable energy project?
4. On account of what reasons would a financial institution such as a bank reject an application for renewable energy project funding?
5. What sources of funding, other than the formal private sector banking organisations, are available?

Research Question 2: Has the way in which banks evaluate energy projects changed the profile of their energy portfolios over the period 2010 to 2020?

1. Over the last 10 years, how has the bank's evaluation criteria changed the energy portfolio in terms of technology and other aspects?
2. Notwithstanding whether there has been a change in the evaluation criteria or not, has the energy portfolio changed in terms of technology and other aspects?
3. If the portfolio has changed over the last 10 years, what are the reasons?

Research question 3: To what extent are the banks willing to invest in renewable energy projects?

1. How important is the energy portfolio to the bank's future business?
2. Why would a bank be willing or unwilling to invest in a renewable energy project?
3. To what degree could external pressure, particularly from lobby groups or depositors, influence the bank's willingness to fund a renewable energy project?

The interview will conclude with the researcher thanking the participant for their time and data provided.

ANNEXURE 4: CONSISTENCY MATRIX

TITLE: TRANSITIONING TO A LOW-CARBON ECONOMY: THE ROLE OF SOUTH AFRICA'S BANKING SECTOR IN THE RENEWABLE ENERGY TRANSITION

RESEARCH QUESTION	LITERATURE REVIEW	DATA COLLECTION	ANALYSIS
Research question 1: *Is funding available for renewable energy projects, and if so, what is the nature of the funding?*	Busch, Bauer and Orlitzky (2016) Falcone, Morone and Sica (2018) Geels (2013) Louche, Busch, Crifo, and Marcus (2019) Naidoo (2020)	Semi-structured interviews	Content analysis
Research question 2: *How has the banks evaluation changed the energy portfolio over the period 2010 to 2020 in terms of technology and other aspects?*	Polzin (2017) Safarzyńska and van den Bergh (2017) Steffen (2018) Walwyn and Brent (2015)	Semi-structured interviews	Content analysis
Research question 3: *To what extent are the banks willing to invest in renewable energy projects?*	Bergek et al. (2015) Dreher, Kovač and Schwäbe (2016) Edsand (2016) Hekker, Suurs, Kuhlmann and Smits, (2007)	Semi-structured interviews	Content analysis

ANNEXURE 5: NON-DISCLOSURE AGREEMENT

Gordon Institute of Business Science
University of Pretoria

CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT

CONFIDENTIAL INFORMATION

In this Agreement, "Confidential Information" shall mean all information disclosed by the Parties to this Agreement, directly or indirectly, in writing, orally, which by its nature or the circumstances of its disclosure should be reasonably construed as being confidential.

It is a condition of engagement that the Parties shall preserve and aid in preserving all Confidential Information, in particular any confidential company information, which may be revealed during the course of interactions of the Parties. Such Confidential Information relates to information that is not in the public domain.

1. The Parties shall at all times keep the contents of the interview recordings provided by the researcher, and this agreement, confidential and shall use its best endeavours to keep confidential any information which it has acquired or may acquire.

2. The Parties undertake in relation to the Confidential Information, as follows:

a. not to use any Confidential Information for any purpose (including any technical or commercial purpose) other than for the Permitted Use;

b. not to disclose any part of the Confidential Information to any third party; and

c. not to disclose any part of the Confidential Information to its employees or professional advisors, except to those employees or professional advisors who are required to receive the Confidential Information for purposes of the permitted use, it being understood that the Parties shall –

i. inform such employees or professional advisors of the confidential nature of such information; and

ii. instruct them to treat such information confidentially in accordance with the terms of this Agreement; and

iii. be responsible if its employees or professional advisors to whom it has disclosed the Confidential Information should fail to treat such information confidentially in accordance with the terms of this Agreement.

3. Neither Party shall use or disclose Confidential Information except with prior written consent or in accordance with an order of a court of competent jurisdiction or in order to comply with any law or governmental regulations by which any Party concerned is bound or as may be lawfully requested in writing by any governmental authority.

4. In the event that the receiving party should breach the provisions of this agreement and fail to remedy such breach within 7 (seven) days from date of a written notice to do so, then the disclosing party shall be entitled to invoke all remedies available to it in law including the institution of urgent interim proceedings and/or an action for damages.

5. The Parties undertake to permanently delete any electronic copies of Confidential Information received, and destroy any confidential printed documentation or similar material in their possession promptly once they are no longer required for the negotiation of a proposed services or on completion of the contracted services.

6. Upon termination of negotiations for a proposed service or on completion of the contracted service, the Parties are to confirm to each other that they are no longer in possession of any Confidential Information.

7. The confidentiality obligations as contained in this Agreement shall commence from the date of signature of this Agreement and shall remain in force indefinitely irrespective of the termination of the contracted services.

For the researcher:

Signed by at _____on this _____day of_____20___.

Name: _____ Signature: _____

Witness 1: _____ Witness 2: _____

For the transcriber/s:

Signed at _____on this _____day of_____20___.

Name: _____ Signature: _____

Witness 1: _____ Witness 2: _____

ANNEXURE 6: LIST OF CODES – ATLAS.ti

No.	CODE
1.	Ability to repay the debt
2.	Advocating for transition
3.	Availability of financial resources for renewable energy
4.	Bank leadership supports infrastructure development
5.	Bankable technology
6.	Banks are hungry to fund renewable energy projects
7.	Banks are risk averse
8.	Banks are wary of equity funding
9.	Banks see future in energy portfolio
10.	Banks will invest in anything
11.	Bidding requirements
12.	blended funding
13.	Board leadership
14.	Bridging the gap through renewable energy finance
15.	Broadening the funding scope
16.	Business sustainability
17.	Capital intensive
18.	Carbon intensive
19.	carbon intensive energy
20.	Carbon neutral bank
21.	Case for infrastructure investment
22.	Cautious of funding coal power
23.	CEO concerned about public perception
24.	Challenges experienced by project developers
25.	Change in renewable energy technology
26.	Cheap technology
27.	Cheaper funding
28.	Client willing to join the bank
29.	Climate change
30.	Climate change related goals
31.	Climate finance
32.	Coal power deals abandoned due to external pressure
33.	Coal power finance
34.	Compliance with legislation
35.	Complicated deals
36.	Concern for public perception
37.	Corporate responsibility
38.	Cost of coal power plant
39.	Cost of renewable energy generation
40.	Debt finance by local banks
41.	Delay in bidding rounds
42.	Delay in power purchasing agreements
43.	Development Bank of Southern Africa
44.	Development Finance
45.	Difficulty in raising the funds

46.	Embedded energy financing
47.	Enabling policy change
48.	Energy crisis
49.	Energy is crucial for the banks
50.	Energy is driver of industrial growth
51.	Energy mix
52.	Equity partners
53.	Equity provided by foreign funders
54.	Equity required for project development
55.	Equity sponsor
56.	Eskom
57.	Ethical decision making
58.	Financial investment
59.	Financial resources not impediments for renewable energy
60.	Financing project development phase
61.	Focus on small renewable projects
62.	Foreign funding
63.	Foreign players
64.	Fossil fuel technologies
65.	Funding energy efficiency in the mines
66.	Funding evaluation criteria
67.	Funding for small renewable energy projects
68.	Funding for viable project
69.	Funding from development finance institutions
70.	Funding of renewable projects
71.	Funding requirements for REI4P
72.	Funding through loan
73.	Future of coal power
74.	Future of energy portfolio in the bank
75.	Government distrust renewable energy
76.	Government considers private sector to be greedy
77.	Government distrust private sector
78.	Hampering technological innovation
79.	High barriers of entry
80.	High demand for electricity
81.	Highly competitive space
82.	Importance of infrastructure to the bank
83.	Independent power producers
84.	Influence of lobby groups
85.	Infrastructure finance
86.	Innovation funding
87.	Integrated resource plan
88.	Just transition
89.	Legislation is a bottleneck
90.	Lenders are conservative
91.	Lending policy
92.	Loans only granted when equity is available
93.	Long term loan
94.	Mezzanine finance
95.	National Development Plan

96.	National treasury
97.	Nature of funding
98.	Need for acceleration
99.	Net zero carbon economy
100.	No bank wants to do small deals
101.	No funding for innovation
102.	No lack of funding
103.	No shortage of money, but opportunities to invest
104.	Opportunities are available for big players
105.	Pace of transition in South Africa
106.	Paris Agreement
107.	Partnership with international funders
108.	Play by the bank's rules
109.	Policy uncertainty
110.	Poor political leadership
111.	Power purchase agreement
112.	Project bankability
113.	Promote competition
114.	Protest against coal funding
115.	Proven technology
116.	Reduced carbon footprint
117.	Regulatory framework
118.	REI4P bidding round
119.	REI4P financial requirements
120.	Relationship between debt and equity providers
121.	Reliance on coal for power generation
122.	Renewable energy business opportunity
123.	Renewable energy is a long term game
124.	Renewable energy is relevant for the banks
125.	Renewable energy policy
126.	Renewable energy projects are capital intensive
127.	Renewable energy technology
128.	Renewable energy transition
129.	Repayment of bank loans
130.	Repurpose Eskom
131.	Return on effort
132.	Return on investment
133.	Role of government
134.	Role of IPP office
135.	Self-sustaining projects
136.	Shareholder activism
137.	Slow energy transition
138.	Social inclusion
139.	South Africa is perfect for renewable energy
140.	South African renewable energy programme
141.	Special funding product
142.	Sponsor certainty
143.	Stakeholder activism
144.	Strong drive for sustainability
145.	Subsidised renewable energy technologies

146.	Sustainability is a good business practice
147.	Sustainable development
148.	Sustainable Development Goals
149.	Sustainable investments
150.	Technological advances
151.	Technology certainty
152.	Track record
153.	Transition to green economy
154.	Understanding of renewable energy space
155.	Value based asset finance
156.	Willing to fund projects that make financial sense
157.	Willing to switch to the funding bank
158.	Wind and solar energy
159.	Ability to repay the debt