INVESTIGATING PRE-FINANCIAL CLOSE RISKS ASSOCIATED WITH COMMUNAL LAND OWNERSHIP RIGHTS IN ONSHORE WIND ENERGY DEVELOPMENT IN SOUTH AFRICA

A thesis submitted to the Faculty of Engineering and the Built Environment in partial fulfilment for the award of the degree of Master of Philosophy in Energy and Development Studies

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Abbreviations and Acronyms

COD	Commercial Operation Date
CLRA	Communal Land Rights Act
CSIR	Council for Scientific and Industrial Research
CSP	Concentrated Solar Photovoltaic
DEA	Department of Environmental Affairs
DME	Department of Minerals and Energy
DoE	Department of Energy
DRDLR	Department of Rural Development and Land Reform
EIA	Environmental Impact Assessment
EPC	Engineering Procurement and Construction
FIT	Feed-in-Tariff
GCCA	Grid Connection Capacity Assessment
GW	Gigawatt
IPP	Independent Power Producer
IRG	International Risk Governance Council
IRP	Integrated Resource Plan
MW	Megawatt
MTS	Main Transmission Station
PMBOK	Project Management Book of Knowledge
PPA	Power Purchase Agreement
O&M	Operations and Maintenance
RDP	Reconstruction and Development Programme
RE	Renewable Energy
REDZ	Renewable Energy Development Zones
REFIT	Renewable Energy Feed-In-Tariff
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RFQ	Request for Qualification
RFP	Request for Proposal
SCADA	Supervisory Control and Data Acquisition
TCA	Thematic Content Analysis
TDP	Transmission Development Plan
UNFCCC	United Nations Framework Convention on Climate Change

Abstract

There are challenges to be addressed if South Africa is to reach its full potential in exploiting wind energy resources. One of such challenges is communal land ownership, which is used for the development of wind energy in rural areas. Often, communal lands have no formal land structures, ownership or title deeds to support the individuals and communities that claim possession thereof. This challenge of communal land ownership and the associated risks impact upon investments by independent power producers in wind energy infrastructure. Land in South Africa remains a highly sensitive issue given the historical injustice of land dispossession which became the source of poverty and inequality. Moreover, transitioning to renewable energy sources would add more pressure on land scarcity.

Commercial wind energy projects are capital intensive, with high annual turnovers. Achieving financial close is a risk mitigation strategy that confirms that early-stage contractual agreements have been reached in the development stage of a wind project lifecycle. Therefore, risk identification and allocation are fundamental to ensuring that the structuring and contractual obligations of non-recourse project financing are met. Wind energy plants require significant stretches of land, and this is progressing at an industrial scale and often, onshore wind energy projects are located in rural areas, thereby impacting local communities. Land ownership rights are a key element for communities, in which renewable energy development takes place. Households living on communal land, of which the right to use land is vested in individual households, are situated on such lands. This study uses the theory of risk management to investigate pre-financial close risks in developing wind energy associated with communal land ownership rights and the extent to which those risks inhibit wind energy projects from reaching financial close in South Africa.

An exploratory research design was applied, while a questionnaire survey was used to collect data from wind developers. The study identified the pre-financial close risks associated with communal land to be technical, legal, economic, social and political risks. Indeed, there is a lack of clear, long-term policy framework to support investments in clean energy infrastructure. This causes significant delays to wind energy project development and it negatively affects financial close. In addition, there are competing interests among multiple stakeholders, leading to the burdensome processes involved in securing leasehold agreements on communal land. As a result, projects which were initially proposed on communal land, have not always reach financial close as planned while others were stopped. The results show that risk mitigation tools could include effective and continuous stakeholder management which is critical to reaching financial close. Furthermore, the Department of Rural Development and Land Reform has not established a streamlined process that developers can follow to secure communal land leasehold rights, given that the process is time-consuming.

Keywords: Communal land; Wind energy; Financial close; Risk management; South Africa.

1 Chapter One: Introduction

1.1 General

This chapter commences with an introduction to the study. It highlights the background, the rationale for the research, the research questions and the scope of the research. The chapter seeks to examine the impact of renewable energy investments in the form of wind energy farms built within the communal lands of South Africa. Moreover, this chapter explores the linkage of communal land ownership and the potential risks to the development of wind technology. The chapter then concludes with the layout of the subsequent chapters.

1.2 Background

In recent years, wind energy has emerged as an important renewable energy source, and it is considered to be one of the most competitive renewable energy resources globally. Wind energy plays a pivotal role in reducing carbon emissions and thereby lessening the impact of global warming (Wüstenhagen & Menichetti, 2012; Vargas et al., 2019). The overall wind power capacity worldwide reached 540 GW in 2018, with 53.9 GW of capacity added in 2018 (BNEF, 2019). This reflects the advancing generation capacity of wind energy across the globe. The significant growth and investment in renewable energy is supported by favourable policy frameworks which are linked to subsidies (Wüstenhagen & Menichetti, 2012; Jones, 2015). As a result, this has attracted investments in this sector, given that renewable energy technologies are capital intensive. The offshore wind market has attracted USD 25.7 billion and onshore wind USD 100.8 billion of investments, both up by 14% and 2% respectively, from the previous year of 2017 (IRENA, 2018). In 2018, although Japan, India, and Germany, invested the most in billion-dollar terms into the clean energy sector, they were down between 16-32% from the previous years. On the other hand, emerging markets, including South Africa, were among the countries that increased their clean energy investment and were up by 40-fold. Out of the USD 4.2 billion invested in the country, an estimated USD1.4 billion is as a result of Enel Green Power, who under the REIPPPP bid window four that would add 706MW to South Africa’s renewable energy generation facilities (BNEF, 2019).

Energy is an essential gateway to the socio-economic development of any nation. Given the recent waves of renewable energy, onshore wind energy has emerged as a major alternative renewable energy source (Diógenes, et al., 2020). The economic growth of a country is closely related to energy contribution per capital (Baloch et al., 2016). More than 80% of South Africa's land area is endowed with wind resources that can be converted to wind energy with an over 30% annual load factor and the potential of 6700GW of total installed capacity, that is if wind energy farms were to be installed across the country (CSIR, 2016). As of 2019, 22 wind energy farms owned by various companies are already in operation while several others are at various stages. As shown in Table 1.1, the projects are initiated by different developers as part of South Africa's national utility-scale renewable energy auction. Wind energy has the highest potential in the coastal Cape provinces which include: Northern Cape, Western Cape, and Eastern Cape.

The need to diversify South Africa's energy mix has necessitated the development and deployment of renewable energy. This is also supported by the implementation of firm renewable energy policies and legislative measures that have resulted in the uptake of wind energy. Among key policy documents and policies are (a) the White Paper on Energy Policy, as it provides an overview of the South African energy sector, and its contribution to the economy, its importance to the success of reaching the country's sustainable national growth and development strategy (DME, 1998) In 2009 the Department of Minerals and Energy separated into the Department of Energy (DoE) and Department of Mineral Resources (DMR) but in 2019 it merged back to form the Department of Mineral Resources and Energy (DMRE); (b) the Renewable Energy White Paper positions renewable energy within the country's energy mix, and it ensures equitable investments in the technologies (DME, 2003); (c) the Energy Act of 2008 sets the objective to establish an institution responsible for promoting efficient energy generation and consumption (RSA Government, 2008); (d) the National Climate Change Response White Paper presents government's vision for an effective climate change response and the long-term just transition to a climate-resilient and lower carbon economy (DEA, 2018) and (e) the National Development Plan aims to alleviate poverty and reduce inequality by 2030 (DoE, 2015). Moreover, the Integrated Energy Plan outlines the scope of the country's entire energy sector, as well as the Integrated Resource Plan (IRP) 2010 (DoE, 2011) that focuses on the country's electricity generation, and the Environmental Impact Assessment guidelines for renewable energy projects of 2015 (DEA, 2015).

Table 1.1: South African operational REIPPPP bid windows 1 to 3 wind energy farms awarded by the DoE. Source: Independent Power Producers Office (2018)

Project Developer	Country of Developer	Project Name	Bid Window	Capacity (MW)
Mainstream	Ireland	Khobab Wind	3	137
Mainstream	Ireland	Loeriesfontein 2	3	138,23
Mainstream	Ireland	Noupoort	3	70,05
Longyuan Power/Mulilo	China/South Africa	Longyuan Mulilo Green Energy De Aar 2 North Wind Energy Facility	3	138,96
Longyuan Power/Mulilo	China/South Africa	Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility	3	96,48
Cennergi	India/South Africa	Tsitsikamma Community Wind Farm	2	93,68
Cennergi	India/South Africa	Amakhala Wind Project	2	131,05
Enel Green Power	Italy	Nojoli Wind Farm	3	86,6
Enel Green Power	Italy	Red Cap Gibson Bay	3	108,25
ACED	South Africa	Cookhouse Wind Farm	1	135,8
Globeleq/ Mainstream	UK/Ireland	Jeffery's Bay	1	135,11
Acciona	Spain	Gouda Wind Project	2	135,5
EDF RE	France	Grassridge Onshore Wind	2	59,8
EDF RE	France	Waainek Wind Power	2	23,28
EDF RE	France	Chaba Wind Power	2	21
Rainmaker Energy	South Africa	Dorper Wind Farm	1	97,53
GDF Suez	France	Wind Farm West	2	90,82
Red Cap	South Africa	Kouga Red Cap Wind Farm Oyster Bay	1	77,7
Gestamp	Spain	Nobelsfontein Phase 1	1	73,8
Umoya Energy	South Africa	Hopefield Wind Farm	1	65,4
Biotherm Energy Ltd	South Africa	Dassieklip Wind Energy Facility	1	27
Metro Wind	South Africa	Metrowind Van Stadens Wind Farm	1	27

1.3 Wind energy in South Africa

The South African Department of Energy under the Independent Power Producers Procurement Programme (IPPPP) set to procure renewable and non-renewable power from IPPs. Electrical generation capacity from IPPs is procured according to the Ministerial Determinations as part of procurement targets mandate in Section 34 of the Electricity Regulation Act of 2006 (ERA, 2006). The Minister of Energy promulgates the plan through the Integrated Resource Plan (IRP) which is the long-term national plan for allocating energy technologies, timing, and electrical generation capacity (DoE, 2011). The total ministerial determination from the previous IRP 2010 for wind was equivalent to 6,360 MW, of which 3,357 MW has been procured to date (Eberhard & Naude, 2017). The recently promulgated IRP 2019 allocates 14 400MW of new wind capacity to be procured until 2030, making wind capacity contribution almost half of the planned additional capacity for the country (DMRE, 2019).

A key barrier that faced the implementation of additional wind IPP projects was the delay in signing the PPAs for the 12 wind projects with a total capacity of 1,372.8 MW, and procured in bid window 4 of the REIPPPP through the national electricity utility, Eskom (SAWEA, 2019). In 2018, 4 years after announcing successful Bidders, the PPAs were eventually signed, so as to put an end to the moratorium that IPPs faced with Eskom and the DoE (Lawrence, 2020). Despite the impasse, a total of 618 MW of new wind power capacity was added to the grid in 2017, bringing the cumulative capacity to 2,085 MW (NERSA, 2018), and the South African renewable industry has begun the move towards recovery.

The additional renewable energy capacity is procured through an auction bid, the REIPPPP which was designed as a series of single steps in competitive bid auctions that are initiated by issuing a combined Request for Qualification (RFQ) and Request for Proposal (RFP) (Eberhard et al., 2014). After three months from the commencement of RFP, the bids close and the screening for compliant tenders that meet the qualification criteria begins. The preferred bidder status is awarded to the most competitive bidders (Bassett, 2005). Generally, within nine to twelve months, the signing of Power Purchase Agreement (PPA) contracts and financial close is reached. Subsequently, the Commercial Operation Dates (COD) occurs within 30 months of financial close (as shown in

Table 1.*1*).

South Africa has some of the best wind resources globally, and the wind energy industry in the country has developed rapidly over a short period, placing the country among the leading new wind markets globally. Up-scaling renewable energy development in the country has become a necessity, as renewable energy is the only source of new power that can be deployed fast enough to help ease South Africa's critical electricity shortages.

To determine suitable development areas for wind energy in South Africa the following technical criteria for site selection (adapted from CSIR, 2019) are generally considered by developers:

- Regions with power density above 250 W/m² and located within a 50km radius of the projects selected in round 1 to round 4b of the REIPPPP
- Regions with power density above 250 W/m² and located within a 50km radius of the projects with a Department of Environmental Affairs (DEA) approved environmental assessment (EA).
- Regions with power density above 250 W/m² and within the power corridors identified for the expansion of the strategic grid infrastructure areas with power density above 250 W/m² and within a 35km radius of Main Transmission Station (MTS) substations identified in the Transmission Development Plan (TDP) and the Grid Connection Capacity Assessment (GCCA) 2017 datasets.

Wind energy is lauded the best amongst other renewable energy technologies and has been given a lion's share in the latest IRP power generation resources allocation (DMRE, 2019). The South African energy regulator (NERSA) indicated that wind power contributed the most in the 6-month period from January to June 2018. The energy produced totalled a monthly production of 2 900 GWh, this contributed to reducing load during peak hours (NERSA, 2018). Figure 1.1 shows the hourly contribution of wind energy to South Africa's energy load (SAWEA, 2019). In addition to CSP, during the peak load demand from 18:00 to 21:00, wind energy was able to contribute to the peak demand saving. Evidently, wind energy can contribute to the country's seasonal energy variation with a 33% load factor (SAWEA, 2019).

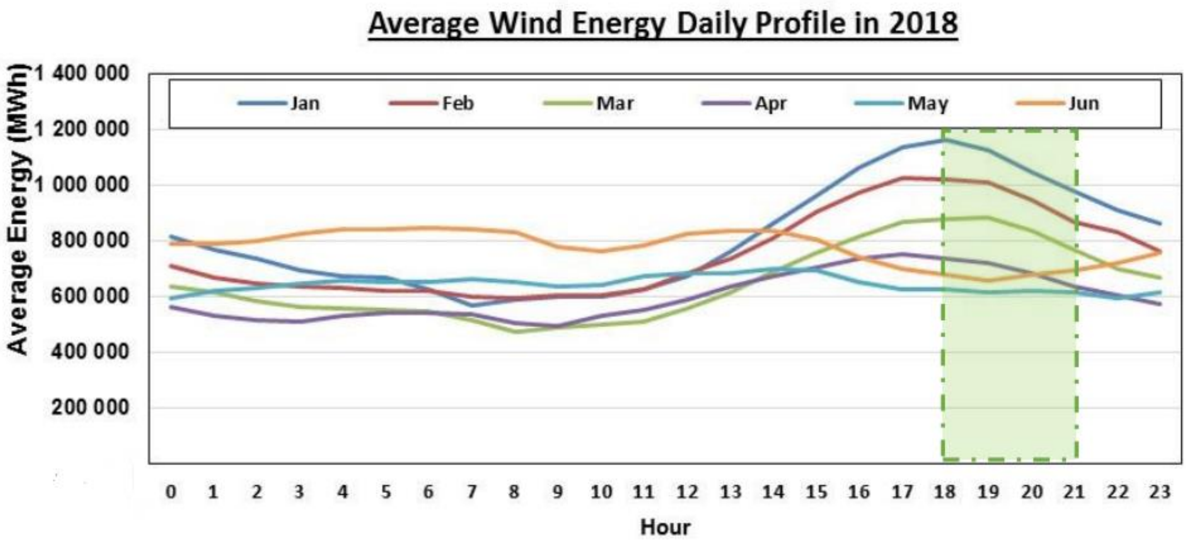

Figure 1.1: Hourly energy profile of wind January - June 2018

Source: Nersa (2018)

Equally, wind energy farms in South Africa that extend beyond the DoE procurement programme have a capacity of approximately 113 MW (NERSA, 2018). These are NERSA-licensed generation facilities and are operating under a bilateral wheeling agreement (NERSA, 2018). Mainly because the wind power plants were procured outside the REIPPP programme and were designed to feed industrial processes. The power plants were only feed to the grid when there is excess energy beyond self-consumption. Overall, wind energy promises to be a significant addition to the country's renewable energy sector.

Although the renewable energy sector is supported by strong projects, policies and legislative guidelines, there are some challenges to be addressed if South Africa is to reach its full potential in exploring renewable energy resources. One of such challenges is land use for the development of wind energy. Rao & Sastri (1987) were amongst the earlier studies which recognized the scarcity of land use for energy and the pressure from other competing socio-economic developments, such as food, infrastructure, and shelter as the significant barriers to renewable energy advancement. Capellán-Péreza et al. (2017) agree that transitioning to renewable energy sources would add more pressure on the problem of land scarcity.

Amidst this reality, one is confronted with the question of why wind development on communal land in South Africa is relevant. Land in South Africa remains a highly sensitive issue given the historical injustice of land dispossession which became the source of poverty and inequality (Butler et al., 1978; Adams et al., 1999; Thornton, 2009; Boone, 2013; Stull et al., 2016). In recent years the government's rhetoric is to correct past injustices and expropriate land through a process of land reform. In addition, the government has indicated that Section 25 of the Constitution of South Africa on land reform will be amended in order to implement this process (National Assembly Parliament, 2018).

In the energy industry, it is common that commercial wind energy projects are large, capital and technology-intensive with high annual turnovers. Wind energy farms are often located in rural areas where there are no formal land structures, ownership or title deeds. Given this background, the rural communities are often very suspicious of any projects that might encroach on their land.

1.4 Research problem

Renewable energy in South Africa was first explored in 2009 in the form of the Renewable Energy Feed-In-Tariff (REFIT) policy as a response to government's voluntary carbon emission reduction pledge (Eberhard et al., 2014). Thereafter, the REFIT programme was repackaged as a competitive auction process in 2011 and was renamed as the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP). This decision by the government was meant to support its strategy to fully develop renewable energy resources, particularly utility-scale wind and solar energy generation, through the venture of public-private partnerships to increase energy access and for the country to meet its low carbon energy transition (DoE, 2014; Eberhard et al., 2014; McEwan, 2017).

As of 2019, 6 422 MW of electricity has been procured under the REIPPP programme, that includes onshore wind, solar PV, concentrated solar power (CSP), small hydro, biomass, biogas, landfill gas and cogeneration (DMRE, 2019). By March 2019, 3776 MW was connected to the national grid, of which 2078 MW accounts to wind energy (SAWEA, 2019). Due to its valuable contribution to the South African energy peak demand, wind has taken a larger share of the planned renewable energy investment, and it now supplies 55% of South Africa's renewable energy generation (CSIR, 2017; SAWEA, 2018). It is the most rapidly growing technology for renewable power generation, and it is taking an important role as an accepted utility generation technology. As with other clean energy technologies, wind energy plants require significant stretches of land, and it is progressing at an industrial scale (Huber, 2015). Often, renewable energy projects are located in rural areas, impacting local communities (SAWEA, 2019). However, a study conducted by the CSIR and the Department of Environmental Affairs argued that the overall percentage of land that the structure of a wind energy farm occupies is minimal, ranging between 0.17 and 0.81% of a plot (CSIR, 2017). The National Renewable Energy Laboratory (NREL) in support of this finding stated that a 2 MW wind turbine requires 0,6 hectares of land (NREL, 2009). Although the physical land usage is minimal, it is still land of the communities and it is essential to consider the associated risks with onshore wind energy development in the South African context. Equally, the communities should be empowered to have a voice and guide the development process of community-owned land.

Land ownership rights are a key element for communities where renewable energy development take place. Households living on communal land, of which the right to use land is vested in individual households situated upon such lands (Hoffman, 2013). In the case of agriculture and grazing land, the community has rights to the land. Therefore, the challenges of land ownership impact on governance structures and investments in infrastructure.

Numerous studies are dedicated to land conflict (Rao & Sastri, 1987; Feder & Feeny, 1991; Peters, 2004; Ntsebeza & Hall, 2007), displacement of communities for the extraction of natural resources (Ntsebeza & Hall, 2007; Dell'angelo et al., 2017). However, a few are dedicated to the structure of communal land ownership rights that can be integrated to renewable energy investment process in a consistent and scalable manner (Painuly, 2001; Christensen & Hain, 2017). This study is further encouraged by Kerr et al., (2017) as the authors suggest that there are power dynamics between wind energy developers and communities. Jones (2015) agrees with the importance of understanding the barriers faced by developers and investors in advancing wind energy infrastructure investments that are subject to land ownership rights. It is therefore important to gain more understanding about risks associated with communal land ownership rights in the wind energy projects in South Africa.

1.5 Research Questions

1.5.1 Main Research question

To meet the increasing interests of independent power producers to invest in renewable energy infrastructure, coupled with the significant demand by independent power producers for land on which onshore wind energy projects can be developed, the question that arises is, what are the pre-financial close risks associated with communal land that developers are exposed to in developing wind energy projects? Considering that the locus of this study is South Africa focused, the subsidiary questions in Section 1.4.2 are relevant.

1.5.2 Subsidiary Questions

i. How does the approach to developing wind energy projects on communal land differ from privately owned land?
ii. What are the risk mitigation strategies available to project developers of wind projects on communal land?

1.6 Scope and limitation of the research

This study looks at some of the risks associated with communal land; how they have been handled so far; and what can be done to mitigate these risks. The researchers understand that pre-financial close risks affect all parties that have a vested interest in the drive towards a cleaner energy future. However, this study limits itself to the viewpoint of wind energy developers, even though other renewable energy developers also face similar risks. The choice of wind energy developers is mainly due to time and financial constraints. The study also incorporates data from the Independent Power Producer (IPP) office, a subsidiary of the South African Department of Energy (DoE) in order to enrich the study. The study does not include the viewpoint of Community Property Association (CPA), that is recognised by the law as a juristic person in order to acquire and manage property on behalf of community members. Even though, the CPA at times also takes on the role of a developer. Nor does the study include the viewpoint of community members upon which wind energy farms are situated. This was due to a lack of financial resources as well as limitation of time.

1.7 Structure of the thesis

The next chapters are structured as follows: Chapter 2 presents the review of literature, with a focus on the theoretical foundation of the study, wind energy development and communal land. Chapter 3 unpacks the methodology followed in the study and the process of developing the questionnaire. Chapter 4 presents and discusses the findings of the study; and lastly, Chapter 5 draws conclusions from the findings and provides recommendations for further research.

2 Chapter Two: Literature Review

2.1 Introduction

The sustainability and viability of wind energy depends on the balanced mix of social, economic, and environmental attributes which are peculiar to the local context of the project. The local context also includes land related issues which may affect the viability of the wind energy projects, both in the long and the short term. The focus of this chapter is to review previous research and identify communal land-related risks which affect reaching financial close in wind energy development projects. Therefore, this study is based on risk identification in the context of the risk management framework related to wind energy projects. In addition, the phases of wind energy project are discussed, leading to the stage of financial close in the project lifecycle. In order to successfully apply the risk identification theory for this study, firstly, an analysis of the theory is required. It is essential to note that there is no generally accepted method for managing the risks associated with renewable energy development programs, national and regional approaches are often needed to find practical solutions. The knowledge gaps associated with the reaching of financial close in South Africa context are identified.

2.2 Theoretical foundation of the study

It is a common practice for large-scale energy projects to be financed through project finance or non-recourse financial structures. Non-recourse project finance refers to the financial and contractual arrangement that is limited to the project as a legal entity (Eberhard et al., 2017). The revenue of the project provides the source of the loan repayment and debt obligation where the project's assets constitute collateral for debt security. Therefore, project finance is designed to allocate and mitigate risks through project structuring (Yescombe, 2002a, Geroe, 2019). As a result, it limits and isolates the sponsor or developer from the risk due to the failure of large-scale capital intensive wind energy projects. In this way, the project financing structure is pivotal in the feasibility of large-scale projects which would otherwise be difficult to finance.

Wind projects can source funding from two primary sources, namely, equity and debt. This funding is known as the capital structure of an infrastructure project. Equity financing refers to the ownership share of the project, and debt financing refers to the debt providers for the project loan that is to be paid back (Eberhard et al., 2017). The funding of the project is structured such that it is financed to limit specific stages of development. Generally, funds are allocated to a project to complete the initial stages of development, and as the project progresses, the developer or lead sponsor reaches out to debt financiers to advance the project to the construction phase. The creditworthiness of the developer and the terms of a bankable power purchase agreement (PPA) under which the electricity will be sold to the buyer or off-taker are vital in obtaining financing and reaching financial close (Pieters et al., 2014; IFC, 2015; NREL, 2017). As such, financial close refers to the point at the end of the procurement phase where all the project contracts, including the PPA, engineering, procurement and construction (EPC) agreements, operations and maintenance (O&M) agreements, and financing agreements have been executed. Additionally, all the conditions precedent to financing have been fulfilled or waived (Clark and Luwaya, 2017).

The inability to reach financial close has resulted in numerous renewable energy projects being abandoned (Eberhard & Naude, 2017; Geroe, 2019). Others are under development but have missed their scheduled commercial operation date (Kruger et al., 2019; Geroe, 2019) or eventually reach commercial operation outside the planned timeframe (Kruger et al., 2019). The requirements to be fulfilled to reach financial close usually consist of a list of documents and an extensive context of a project financial agreement (Geroe, 2019). The project documents and financial agreements are signed to allow funds to flow into the development of the projects. Table 2.1 illustrates the South African REIPPPP submission process, where financial close is reached after the project has successfully passed the development stages. That entails site selection, environmental impact assessments (EIA), bid documents preparation, submission of a bid bond and the awarding of the project to preferred bidders. Once a preferred bidder has been selected and awarded, financial close has to be reached within three months. The table further illustrates the onerous steps that are to be met, duration, and the development costs prior to reaching financial close.

Geroe (2019) asserted that reaching financial close is a risk mitigation strategy. It confirms that early-stage contractual agreements have been reached including the financing obligations of the phases of an energy project life-cycle that succeed the development stage. Therefore, risk identification and allocation are fundamental to ensuring that structural and contractual obligations of non-recourse project financing are met (Yescombe, 2002b).

Risk management in the project finance setting is important to the success of infrastructure and large-scale energy projects. The success of project financing is based on careful analysis of all the risks the project will encounter during its project life-cycle (Gatti, 2018). These risks can occur when the project is not yet able to generate revenues, for example, during construction phase. Risk is thus a crucial factor in a project's life-cycle and it is responsible for unexpected changes in the abilty of the project to reach financial close.

Table 2.1: Steps in bid submission.

Source: DoE (cited by Walwyn & Brent, 2015)

Step	Activity	Duration (years)	Description	Developer cost (ZAR)	Comments
One	Site selection	1–3 years	Site selection	R0.5–R1 million	This includes identifying appropriate sites, collecting site-specific climate information, and final site selection. Wind power projects require two years of meteorological data.
			Agreement with landowner	R50,000 to R0.25 million	Some landlords require payment for initial options.
Two	Environmental Impact Assessment	1 year	Completion of required EIA	R0.5 to R1 million	Each site requires an EIA study
Three	Preparation of bid documents	6 months	Securing of black business and financial partners	R2.5 million	Extensive legal contracts are required at this stage, requiring input from the lender's legal advisor, the lender's technical advisor, the accounting advisor, insurance agents, and the "Equator Principle" audit team.
Four	Bid Bond	2 months	Submission of the first bid bond	R100,000 per MW	Bid deposit is a refundable deposit that is paid when you submit your bid documents.
Five	Award as Preferential Bidder	6 months to 1 year	Adjudication of the bids by the Department of Energy and National Treasury	No additional funding	If any of your development costs are covered by an interest-bearing loan, a time delay may generate additional interest.
Six	**Financial Close**	3 months	Submission of second bid bond	R100,000 per MW	In step four, a bid bond is required to reach financial close and returned to the developer after signing the PPA documents with the DoE. This happens at the end of the financial close. These fees are never charged because they are only charged (not paid) at financial close.
			Preparation of financial close and power purchase agreements	R6 million	Estimate the cost of compiling documents of a lender's legal adviser, lender's technical advisor, and developer's legal adviser for financial close.
Seven	Signature of the EPC contract	3 months	The EPC contract usually stipulates an initial payment of 10–15% of the total cost	15% of total contract	The Engineering Procurement and Construction contractor is required to file performance fees to the DoE to the value of 15% of the total contract amount.
Eight	Construction and commissioning	1–2 years	Construction and commissioning of the generation plant	85% of EPC contract	The project may be delayed if there are problems with international contracting or if there is no clarity on the scope of services / links to the national electrical grid.
Nine	Operations	20 years	Generation and sale of power to Eskom as per the supply agreements	Revenue as per the supply agreement	Revenues are guaranteed over the PPA period (usually 20 years) and escalate based on CPI, or depending on the supply agreement. The rate of return is contract-specific, but according to the energy regulator's "fair rate of return" guidelines, it is generally around 18%.

2.2.1 Defining the concept of risk

The definition of the term "risk" is highly contested and has multiple meanings, therefore it can be concluded to be a composite concept. Risk is the product of the probability that an event will take place, usually an adverse event and the effect it will have on its cost, scope or quality if it does take place (SRA, 2015; Jensen & Aven, 2018). Risk has a variety of emphases and nuances that are both positive and negative. People view risk differently and subjectively, and some risks are overstated, while others may be understated (PMBOK, 2017). Risk can exist at two levels of a project: individual risks that affect the achievement of project objectives and consequences of uncertainty of the project as a whole. Although there is no standardized classification of risk, Gatzert & Kosub, (2015) categorized renewable energy risks, as shown in
Table *2.2*.

Table 2.2: Risks associated with wind energy projects.
Source: Gatzert & Kosub (2016)

Risk		**Subcategory**
i.	Strategic/ business risks	• Financing risks/ insufficient expertise/ insufficient public acceptance/ complex approval processes/ insufficient management know-how
ii.	Transport/ construction/ completion	• Reduction in revenue due to late start / damage or theft during transportation or construction
iii.	Operation/ maintenance	• General operational and maintenance risks / damage / technology and innovation risks • Loss of income due to business interruption • Damage due to natural risks (bad weather) • Damage due to series losses
iv.	Liability/ legal risk	• Liabilities to third parties / legal costs / procurement risk
v.	Market/ sales risks	• Variability of revenue due to climate / resource risk • Variability of revenue due to network availability / risk of compression • Variability of revenue due to price volatility
vi.	Counterparty risk	• O&M contractor • Offtaker or Supplier risk
vii.	Policy/ regulatory risks	• Policy support/ Feed-in-Tariff changes; regulation uncertainty

Transport, O&M, market and counterparty risks can be attributed to the life-cycle phase of a wind energy farm, whereas, technical complexity in risks is country-specific.

Renewable energy project stoppages, withdrawals, and legal disputes over land increase financial and business risk that the developer may face. Also, in another study conducted by Finlay-Jones (2007), broad categories of local wind project development risks were identified as shown in Table 2.3. Specifically, land security risk associated with land lease and wind monitoring were prominently identified among the local project risks.

Table 2.3 General classification of risks associated with wind energy projects. Source: Finlay-Jones (2007)

Risk factor	**Subcategory**	**Risk stakeholder**
Prospecting	Land assessment	Developer
Land security	Wind monitoring agreement	Landholders/ developer/ legal advisors
	Land lease	Landholders/ developer/ legal advisors
Wind resource	Monitoring/ modelling	Developer/ contractors
Feasibility studies	Economic modelling	Developer/ contractors
Development application	Environmental impact assessment	Developer/ contractors
Licensing/ permitting	Approvals and reporting	Developer/ state agencies/ local government
Grid connection	Study/ agreement	Developer/ contractor/ network service provider
Power purchase	Power purchase agreement	Developer/ utility/ legal advisors
Finance	Debt	Developer/ institution/ legal advisors
	Equity	Developer/ shareholder/ institution/ legal advisors
Construction	Construction agreement	Developer/ EPC/ turbine manufacturer/ shareholders/ legal advisors
Operation& maintenance	O&M agreement	Turbine manufacturers/ subcontractors/ property entity
Decommissioning	Decommission agreement	Project entity/ subcontractor

It worth noting that land security issues could pose a serious threat to the completion of projects. For instance, four communities brought a land claim against a sugar farmer in South Africa to stop the development of a R1.1 billion biomass energy facility in KwaZulu-Natal. The planned biomass project was selected under the South African national renewable energy programme bid window 3 (IPP, 2018). The communities surrounding the farm alleged that the land rightfully belongs to them (Potelwa, 2015). It is such incidents that reveal the disconnect between government, corporate organizations, and communities. As the government will often sign-off on development deals without consulting the local communities and even the corporate organizations, in most cases, do not engage continuously with local communities through all development phases. That exposes corporations to the risk of financial loss, reputation damage and risk to development.

Over the years, risk management has been pivotal to the success of large-scale projects. Therefore, risk management can enhance the viability of a wind energy project that would otherwise not be able to obtain financing. Yang & Haugen (2015) and Yang, et al. (2018) categorize risk management based on how severe the risk could be, the process of risk analysis is used to comprehend the nature of risk and determine the level of risk. This study applies the risk management framework to wind energy development. It places emphasis on risk identification since it is the most relevant stage of project management to this study.

2.2.2 Risk management

Risk management is a critical component of the project management process. According to the Association of Project Management, risk management is defined as: *"A process that allows individual risk events and overall risk to be understood and managed proactively, optimizing success by minimizing threats and maximizing opportunities"* (APMBOK, 2019).

With the above definition in mind, the study examines the risk management cycle, as documented in the Project Management Body of Knowledge (PMBOK). The risk management process activity takes into consideration the costs, benefits, and opportunities while specifying the resources required in the process.

2.2.2.1 Risk management cycle

The risk management cycle commences with risk management planning, that is the process that defines how risk management activities will be conducted within a project (APMBOK, 2019). The flow diagram presented in
Figure 2.*1* shows the interacting components of risk management, it also identifies the reiterative nature of risk management, from risk management planning, to risk identification, risk analysis and finally risk control. Ralik (2017) suggests that as the project gets closer to commissioning, the likelihood of risk occurrence is reduced. Therefore, planning for risk management should begin at the conceptual stage of the project and be completed early in a project.

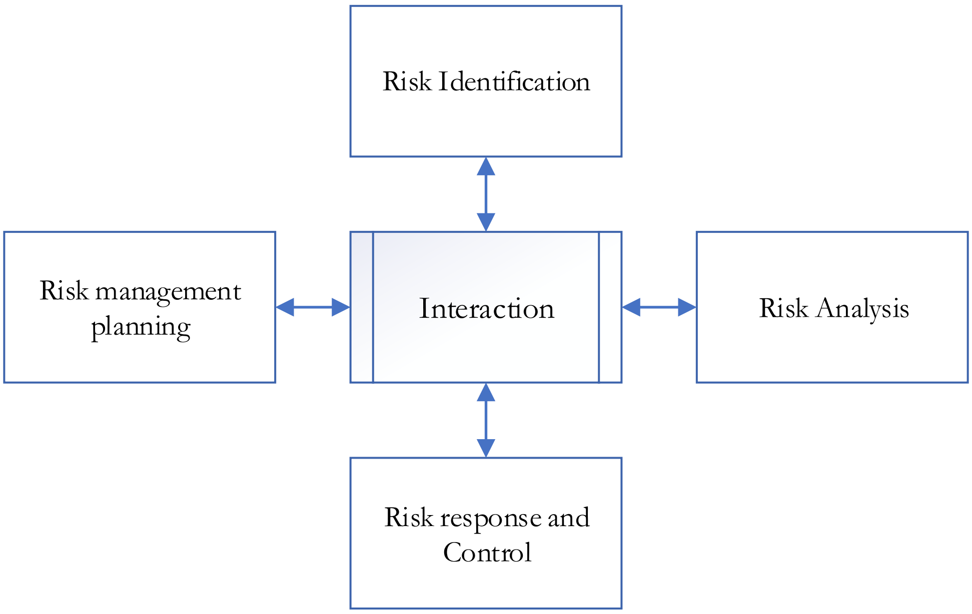

Figure 2.1: Risk management process. Source: PMBOK (2017)

2.2.2.2 Risk identification

Risk identification involves the systematic process of detecting the potential project risks, their sources, and documenting their characteristics by keeping a risk register (PMBOK, 2017), so as to forestall unexpected consequences. It is vital that all risks are identified so that the project team can respond appropriately to the risks. The risk identification process and its activities are reiterative and presented i
Figure 2.2.

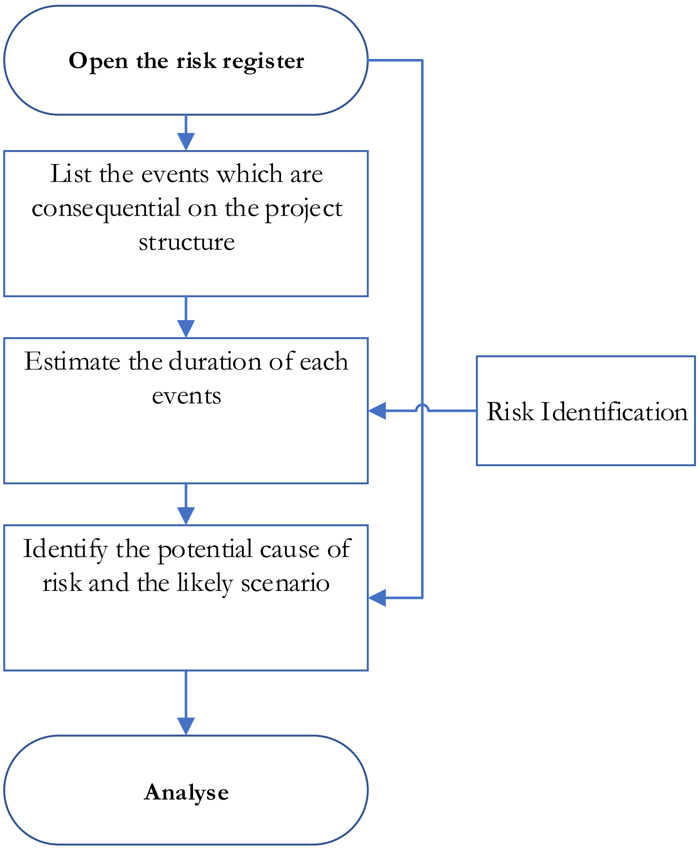

Figure 2.2: Risk identification process. Source: Authors' analysis

2.2.2.3 Risk identification: tools and techniques

The PMBOK (2017) handbook suggests that expertise from individuals and groups with specialized knowledge relevant to the project should be sort after. Firstly, the process would be to identify such experts who can contribute in order to identify the project risk and sources of risk that may impact the project based on their experience in the business. However, at this stage of the process, experts' bias should be taken into account. Data gathering techniques that can be used for this process as described by PMBOK (2017) include brainstorming, checklists, interviews, root cause analysis, assumption, constraint analysis, SWOT analysis and document analysis.

2.2.2.4 Risk identification process

The details of the identified individual project risks are stored in the risk register, hence the need to open a register which ensures proper documentation of the risk factors. A complete list of events that can affect every element of the project's structure after repeated risk identification through the risk analysis process, planning risk responses, implementing risk responses and monitoring risks (PMBOK, 2017). The contents of the risk register may include a classification of identified risks, possible risk owners, and a list of possible risk response. In addition, the possible scenarios which may be the consequences of the identified risk should be detailed. In turn, this would result in severity of a risk factor placement.

2.2.2.5 Risk analysis

Risk is typically expressed in terms of a combination of the consequence of the likelihood of an event and the concomitant likelihood of its occurrence (Hsu et al., 2016; PMBOK, 2017). While risk analysis considers the source of risk, the process is designed to separate minor acceptable risks from significant crippling risks and provide data on the evaluation and treatment of the risks. The key benefit of risk analysis is that it brings high-priority risks into focus. The risk matrix in Figure 2.3 links the probability of a risk occurring and the consequence of the risk. Likewise, the risk matrix is used to analyse the risk factors that affect wind energy projects and map the consequence the risk may have on the overall project, particularly, the project achieving financial close.

The types of risk analytical method depend on the risk information and the available data. The analysis may be qualitative, semi-qualitative or quantitative or a combination depending on the circumstances (Finlay-Jones, 2007; PMBOK, 2017). The PMBOK (2017) argues that while risk analysis concerns the link of probability, risk evaluation involves comparing the level of risk observed in the analysis process.

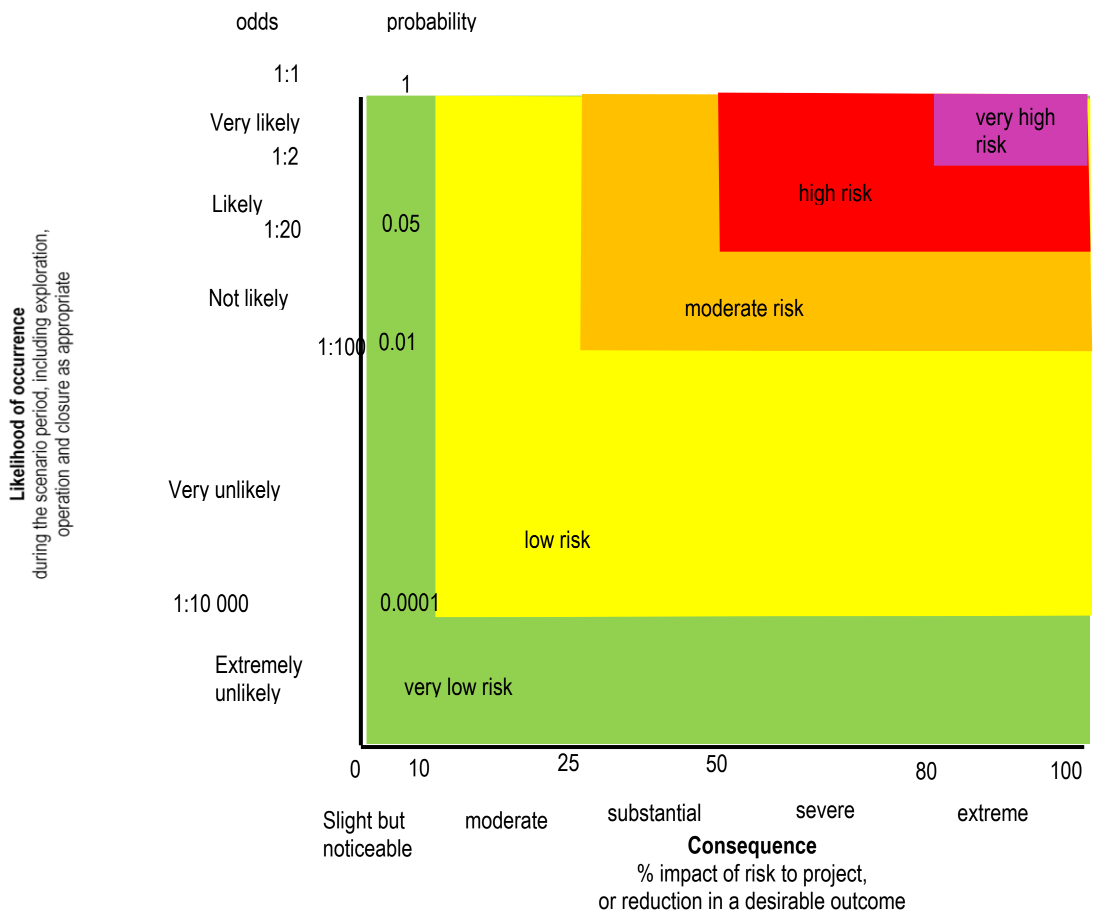

Figure 2.3: Risk matrix. Source: Hsu, et al. (2016)

2.2.2.6 Risk treatment and control

The use of risk management for wind energy projects include the process of identifying, analyzing, and responding to project-related risks in order to reduce the probability of negative risks and the impact of negative events arising throughout the project scope (PMBOK, 2017). The main objective of the risk management cycle is the preparation for the likely occurrence of risks; however, to be able to plan for risks, it is necessary to identify them. Where developers overlook the likelihood of risk occurrence, the resulting consequences may include stoppages, legal disputes, project withdrawals, bad publicity, slowdowns, and shareholding impact.

Risk treatment involves identifying options for treating risks, assessing the options, preparing a risk treatment plan, and implementing it. Some of the options that PMBOK (2017) highlighted as risk treatment include; risk avoidance, reduction of the consequence or transfer of the risk (PMBOK, 2017). The treatment and control of risk lend itself to risk monitoring which is of importance for the effectiveness of risk treatment plan and strategies to manage risk. It also ensures that changing circumstances do not alter risk priorities. The different approaches for risk treatment are briefly explained below:

- Risk avoidance – it is a decision taken not to proceed with the activity that is likely to generate risk or reduce the likelihood of the risk occurring. Having a set of alternatives to select from is important. When presented with a set of alternatives, the developer would select a lower risk choice. Although, Proag & Proag (2014) suggest that selecting a lower risk option may not always be the 'best' option, for instance in a case where that lower-risk option can jeopardise the project design or limit future options.

- Risk control - this process involves handling and monitoring of risk parameters identified as critical to a project, while correcting the approach as required.
- Risk assumption - this approach involves making an informed decision to accept the risk that includes a higher upside benefit.
- Risk transfer – it involves the purchase of an insurance policy, sharing or transferring the risk to several stakeholders in a way that is beneficial to all parties.

The above stated risk treatments are a form of risk mitigation. As such, risk mitigation is concerned with minimizing various risk components, with the balance of effort being determined by cost-effectiveness. Formerly risks may have been accepted as inevitable, but risk management is the action or inaction taken to address the risk issues identified through critical evaluation and analysis with a view to curtailing the risk (APMBOK, 2019).

2.2.3 Wind energy project lifecycle

Wind energy development is made of multiple stages which constitute the lifecycle of the project. The development phase activities are central to the feasibility and success of a wind project. As such, the key steps for developing wind energy projects are well established. However, there is no definitive detailed "road map" a developer can follow (IWEA, 2019). A wind project lifecycle can be broken down into a number of phases that typically apply to most wind energy projects.
Figure 2.4 identifies the phases in a wind project life cycle. The life cycle involves: feasibility and development, planning & permitting, pre-construction, construction, commissioning, operations, and decommissioning. These components of the wind lifecycle are reviewed below.

2.2.3.1 Feasibility and development

The first step in the process is to assess the site that has the potential to become a commercially viable wind farm. The feasibility of a site's potential is assessed based on multiple measures such as average wind speed; land area and land ownership; distance from community and houses; proximity to protected sites; existing and future grid infrastructure; land-use of the proposed site; community acceptance; construction access; and nearby existing wind farms (NREL, 2017). The developer will evaluate the suitability of the site virtually, through a desktop-based study to determine wind estimates based on local characteristics (IWEA, 2019).

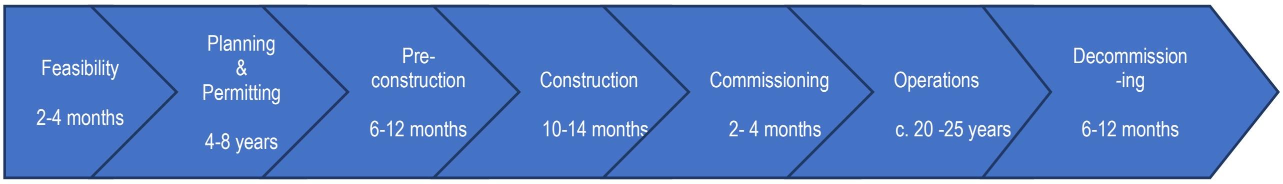

Figure 2.4: Steps to wind energy project life cycle.
Source: NREL (2017)

2.2.3.2 Planning and permitting

At this stage, the wind project requires investment in resources and financing to bring the projects from feasibility to pre-construction. This includes land lease options for the site, continuous community engagement, environmental surveys and studies, grid connection application and on-site wind speed monitoring (NREL, 2017). Once the site is deemed suitable, the developer will prepare an economic assessment for converting the potential wind resources on the wind farm into commercially viable electricity. At the end of the development stage, the project moves to construction stage, pending the finalization of project financing and financial close. In addition, at this stage, the developer applies for permission for grid connection before progressing to the construction stage.

2.2.3.3 Pre-construction

Once the project has secured the land options, it would need to successfully achieve the planned grid connection and acquire an economical commercial offer to sell renewable electricity from the planned wind energy farm, it can then proceed to construction. At this stage, the likelihood of the project reaching completion will increase, and a utility or commercial power purchase agreement will be pursued. Often, larger developers will continue to fund the development of the project off their balance sheet, whereas smaller developers often seek additional external funding sources or sell the development rights to the projects.

2.2.3.4 Construction

Typically, at the construction stage, a wind energy farm has secured the necessary funding for the project to proceed. Development risks have now shifted to construction-oriented risks. Moreover, because of the large number of wind energy projects that have been completed successfully, construction contractors, insurance providers, and equipment vendors are now better placed to understand the associated risks (NREL, 2017). When the construction is completed, typically within an average of 10 -14 months, the project can then proceed to the commissioning stage.

2.2.3.5 Commissioning

At this stage, specialized commissioning engineers and technicians test and adjust the equipment to operate safely and reliably. In addition, grid code compliance testing is conducted with the utility grid system operator to ensure continuous flow and secure operation of the electrical transmission and distribution system (NREL, 2017). Once the grid connections and the wind farm substation have been energized and commissioned successfully, each wind turbine can be commissioned within a week, even though wind turbines are often commissioned simultaneously (IWEA, 2019). At the end of commissioning, a ‘reliability run’, where wind turbines undergo extensive testing is conducted.

2.2.3.6 Operations

Once the wind farm has been completed, and each turbine commissioned and certified, the project begins operations and electricity is then delivered to the grid. The operations of a wind farm can be up to 20 years, depending on the technical specifications, manufacturer of the wind turbines and developer of the farm (Gonzakezm, et al., 2017). The wind farm is managed daily by a number of dedicated on-site staff; it is continually monitored remotely via a system that gathers and analyses real-time data, such as supervisory control and data acquisition (SCADA) computer system. It undergoes routine maintenance at least two to four times a year; and continuously undergoes further grid code compliance tests for periods required by the system operator (NREL, 2017). During operations, electricity is sold to the customer, and the income derived from the sale of electricity is used to pay back the loan obtained towards the construction of the wind farm. The income from electricity sales is also used to pay contractors, operators, land leases, local authority rates, and insurances.

2.2.3.7 End of life - decommissioning

When a wind farm approaches its estimated end of useful life, the equipment may be refurnished, decommissioned, or repowered. These options will depend on the PPA, the economies of the decision, and the land lease provision (IWEA, 2019). Typically, the activities of a wind farm contract are linked to a financial mechanism which requires a posting of performance bond or setting aside of a reserve fund (NREL, 2017).

In considering the steps briefly described above, it is evident that reaching financial close is essential in the project wind development lifecycle as it signals that the preceding onerous conditions to the proposed development of a renewable energy project and the financial agreements have been met.

2.3 Wind energy development

Wind technology has achieved substantial cost reduction in the past five years, the global weighted average cost of wind power declined by 13% in 2018 from 2017 (IRENA, 2019), and there remains a number of barriers that inhibit the exponential growth that is expected from wind technology. The identified barriers are starting points to investigating the potential risks to wind energy development. Barriers are a set of issues that influence funding and decision-makers not to invest or otherwise. On the other hand, risks are a set of issues that are measurable and can be managed or hedged.

2.3.1 Barriers to wind energy development

Wind energy plays a pivotal role in a nation's energy mix due to its higher energy production efficiency originating from lower electricity generation costs (IRENA, 2017). Besides the growth of global wind energy in recent years, the wind energy industry faces a number of barriers that inhibit a fully integrated electricity industry. Capellán-Péreza et al. (2017) stated that geopolitical and economic barriers are restricting investments in industrial-scale infrastructure, since renewable energy infrastructure investment assumes large capital projects and most of the investment is required up-front, as such, this poses a huge risk for developers. Jones (2015) echoed a similar view about locking capital upfront, which is a high risk from the developer's perspective. In view of the capital risk linked to wind energy development, global challenges or barriers to wind energy development are briefly outline.

2.3.1.1 Wind energy is intermittent

Scholars (Musgrove, 2010; Zhao et al., 2016) acknowledged that due to wind energy intermittency, and the absence of utility-scale energy storage, which is generally considered expensive, wind energy would not be suitable as a 'base-load' energy source.

2.3.1.2 Fossil fuel subsidies

IISD (2014); Ouyang & Lin, (2014), and Whitley & van der Burg (2015) recognized that current subsidies for fossil fuels and the inability to absorb the negative external effects of fossil fuels can prevent wind energy development, as it affects the competitiveness of renewable energy sources, which tend to have significantly lower external costs (Taylor, 2020). For example, the IEA (2017) estimated that in 2016 the fossil fuel sector received USD 260 billion in subsidies, compared to only USD 140 billion for the renewable energy sector, this creates an uneven economic playing field. One would have expected that more subsidies are given to renewable energy since this is the direction that the global community is driving.

2.3.1.3 Energy literacy

When key stakeholders lack knowledge about energy sources and there is widespread misinformation about wind energy technologies, this can hinder their development. Moore et al. (2013); DeWaters & Powers (2011), and Bittl et al. (2009) found that inadequate 'energy literacy' is an impediment to the development of sustainable sources of energy. Moore et al. (2013) stated that "an informed or literate public is critical for the long-term conservation, management, pricing and use of increasingly scarce energy resources". Furthermore, implementing wind energy in developed and developing countries is linked with localization and knowledge transfer (CSIR, 2017).

2.3.1.4 "Not in my backyard"

The phenomena of "not in my backyard" (NIMBY) literature has been well documented by Wizelius (2007); and Wolsink (2011). NIMBY merely is local opposition to an energy project when built in proximity of property owners.

It should be noted that policies in support of clean and renewable energy have lowered barriers towards sourcing and developing renewable energy. This has led to accelerated growth in clean energy development in recent years (Chaurasiya, et al., 2019). National governments have further provided subsides as an impetus towards renewable energy developments. Jones (2015) lists the subsidy regimes that have been implemented as:

- Feed-in-Tariff (FiT)
- Power Purchase Agreements
- Tradable Renewable Certificates
- Auctions
- Tax credit
- Low carbon vehicle subsidies
- Differential tax regimes on the carbon content
- Accelerated depreciation of renewable energy assets

The World Economic Forum agreed that renewable energy infrastructure size and corresponding risk pertaining to it are inhibiting factors to investments in the renewable energy sector (WEF, 2016). As such, at a greenfield stage, the first key risks are indicated to be related to land purchase and site usage permission. Therefore, it is important to discuss the land ownership structure since it may significantly affect wind energy projects.

2.4 Types of land tenure and acquisition

2.4.1 Land tenure

Land is an important factor of production, irrespective of what is produced. Land tenure can be defined as the rules and arrangements related to land ownership (Feder & Feeny,1991; Cousins, 2009). Land tenure systems determine the condition of land and associated resource ownership. The system has a significant effect on the social, political, and economic structure of society related to wind energy projects. Land tenure system may also affect the timeline for the achievement of financial close of a wind energy project. It is a multifaceted web which includes several interrelated interests which may be overriding, overlapping, competing or complementary. Broadly speaking, land tenure can be classified into private ownership, communal ownership, open access, state ownership (King, 2019; Kalabamu, 2019). In practice, several forms of ownership can be observed in the society. Take for instance, in each region, there may be common grazing land, private residential, agricultural holdings and state-owned forest. The classes of land ownership are briefly discussed:

i. Private land ownership: This is the ownership structure where the right of assignment belongs to an individual or corporate organization (Grain SA, 2015). In each community, an individual may have exclusive rights to residential parcel, agricultural land or certain trees, while another member of the same community is not allowed to use such resources except by express permission of the individual who owns the right.

ii. Communal land ownership: Communal land ownership structure is present in many developing countries, in particular, Sub-Saharan Africa (Claassens, 2008: Gottlieb and Grobovšek, 2019: Kalabamu, 2019). In this ownership structure, each member of a community has the right to use the land independently. For instance, a community may have access to graze on a common pasture. For a wind energy developer to use this kind of land, several stakeholders could be involved before a decision can be reached. This may influence reaching financial close in a wind energy project. In a case study which investigated the local community perception to the implementation of a wind power project in Portugal, the authors reported that the acceptance of the wind project on communal land was motivated by the positive impact of a "community fund" (Kalabamu, 2019).

    Communal land ownership is broadly defined as the collective ownership of property in possession of a community in which the members of that community have the right of access and use of the land (Clark & Luwaya, 2017). However, land remains a sensitive topic in many countries, the implementation of land tenure reform is a move away from permits that were instituted in the past and towards ownership rights (du Plessis, 2011). Therefore, the value of land can be measured by how readily it can be accessed, acquired, and used for economic activities (Jabareen, 2006). Land reform and redistribution programmes were instituted to strengthen property rights of communities in possession of land, rebalance and restore the state of land through land restitution which empowered communities to have a part in decision making and have an economic identity.

iii. Open access: Open access is somehow close to communal ownership, but the main difference lies in the fact that in communal ownership, non-members of the community do not have the right to use the land, whereas in open access ownership, no one can be excluded from using the land.

iv. State ownership: In this case, the right to land belongs to constituted authorities in the public sector. This may be state government, central government, the provincial government, or municipalities. State ownership of land is a subject of hot debate in Africa. For instance, in South Africa, opinions are divided between the advocate of state land ownership and private land ownership, therefore, the question around land ownership structure which can ensure access to land for all is still a subject of intense discussion (Kepe and Hall, 2018, Adger, 2019, Clark, 2019, Ferreira et al., 2019, Moyo et al., 2019).

A number of legislative reforms were introduced to correct past injustice and reform land displacements. One of such legislation was the Reconstruction and Development Programme (RDP), an integrated socio-economic policy framework, which recognized that land represents the most basic need for South Africans (Butler et al., 1978; Adams et al., 1999). Clearly, understanding South African's communal land environment is deeper than the rhetoric of land reform, communal land security and tenure. Clark & Luwaya, (2017) stressed that one should first understand the relationship between the law, land and the rights including the obligations that arise from the relationships between people. In addition, Avelino et al., (2017) argues that there is no clarity in the multi-level perspective of actors within the community. The authors agree that we need to keep open space for a range of distinct actors to play roles across levels, stages, and spaces. Strong community structures are required to support wind energy projects on community-owned land.

Land continues to be a key resource for renewable energy technologies from which value can be derived, especially for socio-economic development of communities. Unfortunately, land disputes are at the centre of many development challenges (Worldbank, 2016). In rural Africa, land tenure is primarily based on customary law whereby land is allocated under non-written, non-formal customary rules and procedures. Traditional authorities rule over the allocation, access, and inheritance of land (LARC, 2016:53). Even though land governance intends to reduce conflict and social tension, the land issue is complex and raises the question of how it should be accessed and used.

2.4.2 Means of land acquisition

Land acquisition can be defined as a process through which an entity be it private or government acquires land for a predetermined purpose (Clark, 2019). If the government acquires private land for public use, compensation is meant to be paid to the landowner. Generally, there are three main routes for acquisition of land, these are:

i. Expropriation: Land expropriation is the act of government taking privately owned land with the plan to use it for the overall benefit of the public. It often comes with much resistance, as private owners are not willing to let go of their land. The land issue in most Sub-Saharan Africa has been aggravated because of historical privately-owned land expropriated by the colonial governments from the early settlers (Berry, 2018). As noted by Faustin (2019), expropriation of land can create acute land shortages and lead to land conflict. Clark (2019) opined that land expropriation would signal the genesis of economic downturn in South Africa, although this has not been confirmed. Given this conflicting context, land expropriation is often not advised in wind power projects land acquisition. Apart from the aforementioned, a developer often avoids this type of land acquisition process for the following reasons (Clark, 2019):

    - The developers may not have any other interest apart for energy generation, thus will instead settle for other acquisition means.
    - It may be risky to allow local residents to continue their normal activities without any form of restriction.
    - The legal process which may ensue may be too burdensome for a wind energy developer while the negotiation over the compensation may be protracted.
    - In most cases, a wind energy developer may not have the constitutional authority or experience required to consummate the land expropriation process.

ii. Outright land purchase: In this instance, a wind energy developer may propose to buy the land needed for the project from willing sellers. This process may include identification and negotiation with multiple owners depending on the prevailing ownership structure. Depending on the terms and conditions, the developer after acquiring the land, may limit other activities which can be practised in between the wind turbine. The direct land purchase may also be applied to acquire the right of way (ROW) for the transmission lines.

iii. Lease or rental: This is the most acceptable option in wind energy project implementation. It is beneficial to both the landowner and the project developer. The landowner retains the legal ownership of the land while deriving a direct benefit from its use, and the developer can reduce the required upfront investment while only securing the land for a given period, within which the wind resources can be exploited. However, the term of the lease contract must be carefully detailed to include expected activities on the land. Most of the land which are currently used for wind energy in South Africa are acquired through lease agreement (Ledec et al., 2011, Eberhard et al., 2017).

iv. Easement: An easement can be defined as no possessory right to use land which belongs to another entity. It allows the use of the land for a specific limited purpose. The rights of way for the transmission lines are often acquired through an easement agreement. Even when easement is imposed on land, compensation payments to the owner is made through an established administrative process.

2.4.3 Socio-economic impact of wind energy projects

It is well established that wind energy plays a vital role in the transition toward a carbon-free society. Wind energy projects, when used efficiently, can contribute tremendously to sustainable development. While so much emphasis has been laid on environmental benefits of wind energy, the socio-economic impact should also be positioned in the bigger picture. As a matter of fact, wind energy farms have a lasting impact on the economy and social life of the people where the project is sited. These impacts may be long term, medium-term or short term and may be positive or negative. It may be in the form of direct benefits or indirect benefit which may arise from increase in revenue to the government (Mail & Guardian, 2015), which should eventually benefit the host community. In line with the social aspect of wind energy projects, there are several social indicators associated to wind energy projects, these include; population migration, improved level of education, health, and education (Eberhard and Naude, 2017). Several authors have discussed these impacts (Carrera and Mack, 2010, Huesca-Perez et al., 2016, Jenkins et al., 2016, Okkonen and Lehtonen, 2016, Carbajo and Cabeza, 2019, Copena et al., 2019). Overall, the host community must understand how the proposed project will affect their immediate lives and livelihood before buying into such a project. These impacts are briefly discussed;

2.4.3.1 Positive Impacts

i. Wealth creation and employment generation

Wind turbine installations involves both simple and complex operations which require both medium and highly skilled professionals. The installation requires significant human resources. During installation and construction, there is a demand for labour force, which may be a source of employment opportunity for people at different skill levels. Wind energy projects can improve the host community economy through the creation of long term and short-term jobs. The short-term jobs are created during the preliminary assessment and construction phase of the project, while the long-term jobs are created during the operation and maintenance phase of the project.

ii. Improved income generation and diversification

The land leased from private owners or a community may provide additional income to the owners, while the normal agricultural activities remain undisturbed (Scheidel & Sorman, 2012). In addition, regular income stream is assured to the owners for leasing the land. The lease amount paid to the landowner may be fixed or can be in the form of royalties based on the expected gross revenue from the wind energy project (Ledec et al., 2011). As such, lease income can drastically improve household income.

iii. Revenue generation to the government

The government can make an income in the form of tax and rates from wind energy projects. This will increase the available funds for infrastructural development of the local community or region.

iv. Healthier populace

Construction and operation of wind energy projects bring substantial socio-economic benefits to humans by contributing to the low carbon economy. Likewise, like other renewable energy projects, investment in a wind energy project reduces pre-mortality rate, and healthcare costs (Machol and Rizk, 2013). In addition, wind energy eliminates water pollution, which is a hallmark of generating electricity from coal and natural gas. All the consequential health problems associated with fossil fuels are mitigated in the wind power projects. In general, a healthy populace means that the resources accrued to the government can be spent on other beneficial causes otherwise the government would have to spend much more on unhealthy citizens.

2.4.3.2 Negative Impacts

i. Visual impact and noise pollution

As with other renewable energy infrastructures, wind energy farms have a visual impact which may significantly affect the perception of people towards the project (Cîrstea, 2015). In some countries, the visual impact is a source of contention (López-Uriarte et al., 2019), especially when the wind infrastructure is in close proximity to urban settlements or proposed in an area with potentially high tourism. In the rural communities, wind energy projects are often viewed in a positive light with much admiration, as the dwellers are not worried about the visual impairment (Ledec et al., 2011). However, because the communities are often not involved in the decision-making process during site selection and other related stages, there is resentment toward the project (Ledec et al., 2011). These often reinforce the "not-in-my-backyard" phenomenon (Devine - Wright, 2005) associated with wind energy projects. Sullivan et al. (2012) proposed a distance for an impact threshold of wind energy facilities to address the visual impact and also reduce the negative perception related to the visibility of wind turbines.

In addition, depending on the size and the design of the turbine, noise emanating from the wind farm may be a nuisance. The noise produced is largely due to the wind turbine. An expert panel has established the nexus between the wind turbine noise and annoyance (Guidotti et al., 2015). It was revealed that the wind turbine noise caused annoyance and sleep disturbance in some cases in the rural landscape (Pedersen and Waye, 2007). As presented in
Figure 2.5, more people are highly annoyed with wind turbine noise at the same sound pressure level (SPL) compared to other sources of noise in the community (Pedersen and Waye, 2007).

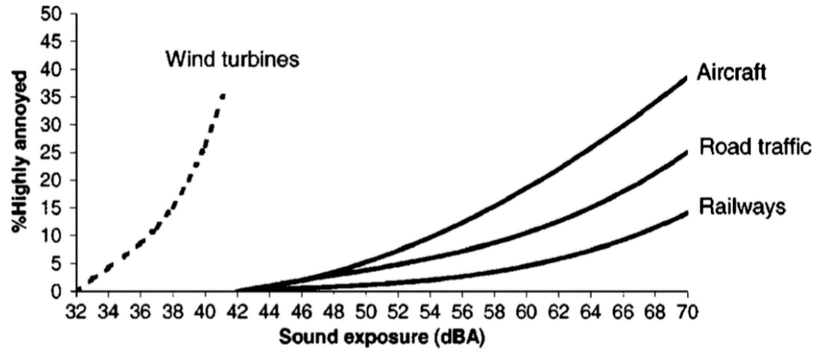

Figure 2.5: Comparative study of the dose response relationship between the turbine noise and transportation noise. Source: Pedersen and Waye, (2004).

There are two major sources of noise which are associated with wind farms. These are aerodynamic noise which emanates from the air motion around the turbine blades and mechanical noise which is caused by the movement of the mechanical and electrical components of the turbine, such as gearbox, generator, cooling fan and other related parts (Deshmukh et al., 2019). Proper shielding of the nacelle, which houses the main mechanical parts of a turbine, has drastically reduced the mechanical noise (Wagner et al., 2012) while the redesign of aerodynamic parts has proven to be a viable solution towards noise reduction (Deshmukh et al., 2019).

ii. Aviation safety and Telecom Interference

Wind turbine operation may interfere with the signals received from telecommunication systems including aviation radar especially if the wind turbine is within the line of sight (Permien and Enevoldsen, 2019). Also, aerial spraying of the pesticide may be difficult in a landscape with wind turbines (Permien and Enevoldsen, 2019).

2.4.4 Sustainable development and communal land

The importance of accelerating sustainable development and eradicating poverty while also tackling the global issue on climate change is deeply intertwined. A common denominator to the success of both is infrastructure development, which is an essential component for growth, development, environmental sustainability, and poverty reduction. Jabareen (2006) argued that the tension between principal goals of economic development and environmental protection tend to favour goals of economic growth. This emphasizes Yenneti & Day (2016) suggestion of land power politics within renewable energy. Even though development should involve a progressive transformation of the economy and society, researchers agree that sustainability can be achieved through the effective balancing of social, economic and environmental objectives (Jabareen, 2006; del Río et al., 2011; Scheidel & Sorman, 2012).

Many definitions of sustainable development exist, in 1987, the World Commission on Environment and Development (WECD) under the Brundtland Commission defined it as the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs or economic development that is conducted without depletion of natural resources", (WECD, 1987). This definition is supported by Victor (1991), who stated that sustainable development requires that the stock of capital from a generation is passed on to the next and it should be maintained or enhanced. Therefore, by deduction, the concept of sustainable development consists of three interconnected pillars; economic, environmental, and social. The economic pillar aims to sustain opportunity, usually in the form of capital. The environmental pillar proposes to sustain the environment and ecosystem, rather than focusing on opportunity or capital as the key unit of sustainability. The social pillar proposes to sustain the social systems that focus on human dignity. Although the concept of sustainable development aims to balance different and often competing needs, in practice, the concept is usually fragmented whereby all three pillars tend not to integrate to meet economic, environmental and social objectives across all sectors, territories and generations (McEwan, 2017). It is clear that the key principle of sustainable development is the long-term stability of the economy, society and the environment and it is achievable through integrating and the acknowledgement of economic, environmental and social concerns into all aspects of the decision-making process (Daly, 1990). This means that infrastructure is an important input in human development. Large-scale land deals can bring benefits such as jobs, infrastructure, and access to markets (Bhattacharya et al., 2015). Although when poorly managed, they can dispossess people in rural communities and spark conflict.

The concept of equity is interchangeable with "justice" or "fairness" and can be summed as, all people have similar rights, opportunities and access to all forms of community capital (Hart, 1998). Equity represents the social aspect of sustainable development, which encompasses environmental, social, and economic justice, equal rights to development, social equity, quality of life, equal economic distribution, democracy, public participation, and empowerment (Jabareen, 2006). These rights need to be protected as social justice concerns may be overlooked in the drive towards renewable energy in the developing world

Investigating the risks associated with land ownership rights is important because the developers' perspectives are an integral component of investing for a sustainable future and understanding information needs of developers is crucial in formulating meaningful renewable energy policies (Christensen & Hain, 2017). An understanding of project risks can be integrated to project development process and be better managed by developers. The risks associated with the investment can be quantified and can be balanced against returns on that investment, in order to determine if the investment is profitable or not (Jones, 2015). In addition, delays in energy projects would provide a good indication of financial loss. Therefore, work stoppages and legal interventions during a project's lifecycle highlight the significance of land dispute related risks.

2.5 International experience in wind energy development on communal land

There is a need to review international experiences associated with development on communal land, in support of the study. The study reviews two international case studies, the United Kingdom and Kenya to inform wind energy development case on South African communal land.

2.5.1 United Kingdom

It is widely accepted within the sovereign state of the United Kingdom (UK) that all land in the UK ultimately belongs to the crown. Land tenure in the UK, is distinguished legally as being either freehold, that is, it allows for complete ownership of land or leasehold, with the use of the land for a specified period (Eberhard and Naude, 2016). The UK defines communal or common land in general terms, that is land owned by one or more people who are entitled to use the land or its resources. The rights to common land is held under the Countryside and Rights of Way Act 2000 (CRoW), which is related to natural produce including 'the right to take coal and minerals (UK National Archives, n.d.). However, it does not stipulate the rights of commercial exploitation of land because these rights were subject to domestic usage and limits. Home (2009) argues that there is no comprehensive geographical data available for the types of land ownership, since not all land has been statutorily registered with the Land Registry. Furthermore, OSS (2011) argued that there is insufficient recognition in national policy documents regarding the importance of communal land. Furthermore, the Open Spaces Society (OSS) added that there appeared to be no policy in place for wind turbines on common land and other areas open for access (OSS, 2011). It also appears that common land does not even feature in the renewable energy policies, even though according to the UK Renewable Energy Roadmap, the government has set out a target to source 15% of its energy from renewable sources by 2020. Konadu et al. (2015) added that land shortages hinder development in renewable energy. This illustrates a mismatch between energy policy and physical limits of natural resource appropriation. It also highlights the unequal distribution of land ownership, with very little political pressure to change land ownership structures, leading to increasing conflicts over land use allocation (Home, 2009; Konadu, et al., 2015). To encourage development on communal land, departments within government have championed the change in policy to increase development in renewable energy on communal land. This policy change removed the requirement of the Secretary of State for Environment, Food and Rural Affairs to provide consent on the development of renewable energy on communal land. In addition, this change was effected on the new Planning Policy Statement to remove the consent clause and as a result encouraged further developments. Even though, the new directive was not accepted by all communal land protective rights-based factions.

2.5.2 Kenya

Alternative resource use in Kenya is the basis of most land-use conflicts in rural lands, which are predominately communally owned in the country**.** The search for sustainable land tenure, which address the land issues, resulted in a Community Land Trust (CLT) model (Pueyo, 2018). It was adapted from the American CLT model which splits ownership of property and defined the land which can be legally owned by the community. This model was adopted to provide tenure security of investment in renewable energy on community land. It also helps fuel the drive for increasing electrification rate and expand renewable energy generation within the East African country. Under the CLT model, the community members are leaseholders with a leasehold tenure ownership. This type of tenure allows the lessee to own the property on the land and pay an affordable rent to the Trust as compensation for use of the land. The CLT model also allows lessees to have a more active role and voice to collectively decide on land use, financial matters and are also entitled to vote on CLT matters and run for leadership positions. The Trust is then the legal entity that holds a legal title to the land. The Trust or communal land is a territory in possession of a community, instead of an individual or company.

Furthermore, the CLT model provides a social safety net to assist the indigent in communities to maintain their land access (Midheme & Moulaert, 2013). The model provides a recommendation to understand and incorporate customary institution in order to enhance tenure security. The implementation of CLT on land provided strong provision for community participation and encouraged the banning of absentee owners. CLT further assisted in the prevention of land sales for temporary profit gain by community members and with the aim to deter a total buy out which could lead to gentrification. The CLT model became a mechanism for community members to retain their land ownership through difficult periods (Pueyo, 2018). Thus, the rigorous requirements in the model make provisions for first refusal on sale for property by community members and vetting candidates who are interested in leasing within the community land. With all these structures in place, there was a lack of supportive government policy dedicated to communal land (Hoickaa C and MacArthur J, 2018), coupled with divisive issues of land allocation within the settlements.

There have been some land related issues regarding renewable energy exploration in Kenya. As an example, the development activity in the Olkaria area of the Olkaria Geothermal project raised two pertinent issues in the land question (Mariita, 2002). Firstly, the issue of land ownership and the rights thereto, and secondly, the question of the national energy needs as well as the impact on the environment. This situation is similar to the 60MW Kinangop Wind Park Project where no proper channel for community engagement, compensation, and relocation of people were not undertaken (Kazimierczuk, 2019). As fears of forced displacement, environmental and health concerns led to local protests. A lawsuit was filed by the local community to stop the project. The protests and lawsuit made construction impossible, and the developers depleted their funds by 2015 and the development halted. Ultimately, in 2016, the project was cancelled following unsuccessful medication by project company, local farmers and landowners (Kazimierczuk, 2019).

In another instance, a village in Kenya was disposed of its land by the Kenyan government as a result of the multimillion-euro Lake Turkana Wind Power (LTWP) Project. LTWP is Kenya’s largest private investment to increase the country’s energy supply by 13% (Kazimierczuk, 2019). The project is estimated to provide electricity to 2.5 million Kenyans households. Since 2006, LTWP leased 150,000 acres of land and resettled a small community in order to build a road and set up 365 wind turbines alongside the windy shores of Lake Turkana. The project was constructed by Danish company Vestas (Kazimierczuk, 2019). What is confusing is the involvement of both private sector and the state engagement in community land acquisition without sufficient buy in from the community. As Hashi (2016:6) proclaimed, *"We are all moving towards green energy, and we know of course, that means the large-scale acquisition of land. The communities just want to know how their land was given away to an international consortium without them being consulted."* There was a legal battle which ensued on LTWP as a result of disregard to the community engagement. The complaints that were phrased in the court documents as infringements against indigenous identity and land rights were some of the community grievances against LTWP. As cited by Cormack & Kurewa (2018): *"The land is owned by indigenous pastoralists i.e. Rendille, El-Molo, Samburu and Turkana as an ancestral grazing land and cultural heritage since 1920. In 2008, 150,000 acres of our community land was privatized and leased to LTWP for a period of 33 years. This was done without our knowledge and with no compensation in total disregard to the Kenyan Constitution and other laws."*

It is incidents such as these that cast a dim light on renewable energy projects in developing countries with less strong communal land policy. Hence a conclusion by Benjaminsen et al. (2009), that land reform programmes are failures which institute increased conflict, greater inequality and corruption by the elite to better benefit themselves. Although, this may not be taken as the absolute truth nor generalized considering the subjectivity of the authors opinion.

2.6 South Africa in context

South Africa is no different to land disputes that arise from the land topic given the historical injustice of land dispossession and the formation of the former homelands. The importance of land discussions in South Africa and distinct lack of information on the effect of communal land ownership structure sets a tone to for the discussion on ownership, land use and policy.

2.6.1 Land law changing hands

Land remains a highly sensitive component in South African history and lies within the country's political ranks (Freud, 2010). Land ownership has taken various forms as property laws that govern the ownership of land changed from Dutch to British, therefore, it has become heavily influenced by English property law (Stull et al., 2016). Friction of land intrusions led to the formal adoption of the *Land Ac*t of 1913, which displaced many families and communities (Stull et al., 2016). In 1991, the *Abolition of Racially Based Land Measures Act* was instituted in order to bring an end to the *Land Ac*t (Stull et al., 2016).

In South Africa, communal land are the former 'homeland' areas that were developed during the period of 1948 to 1960, under a governmental policy known as 'apartheid'. This policy was used to segregate race, into 'White' (British and Afrikaners), 'Black Africans' (the many tribes of Bantu people), 'Coloured' (Koi-khoi, San and descendants of slaves from the Cape Colony whom also have some European parentage), and 'Indians' (small percentage migrants from South Asia) (Stull et al., 2016). As part of a strategy to keep the Blacks away from urban South Africa, the former homelands were designated for Blacks and were divided by ethnicity into:

Transkei Ciskei, KwaZulu, Lebowa, Venda, Gazankulu, Boputhatswana, Basotho Qwa Qwa, Swazi and South Ndebele (Butler et al., 1978) (see Table 2.4). In addition, Figure 2.6 shows the areas and boundaries of the former homelands that were located in the rural periphery.

Table 2.4: Ethnic Composition Size, and Stages of Self-Government of the former homelands.
Source: Horell (1972) as cited in Butler et al. (1978)

Homeland	**People**	**Land Area (sq. miles)**
Transkei	Xhosa	14,178
Ciskei	Xhosa	3,547
KwaZulu	Zulu	12,141
Lebowa	Pedi/N. Ndebele	8,549
Venda	Venda	2,333
Gazankulu	Shangaan/Tsonga	2,576
Bophuthatswana	Tswana	14,494
Basotho Qwa Qwa	S. Sotho	144
Swazi	Swazi	818
S. Ndebele	S. Ndebele	unknown
		58,813

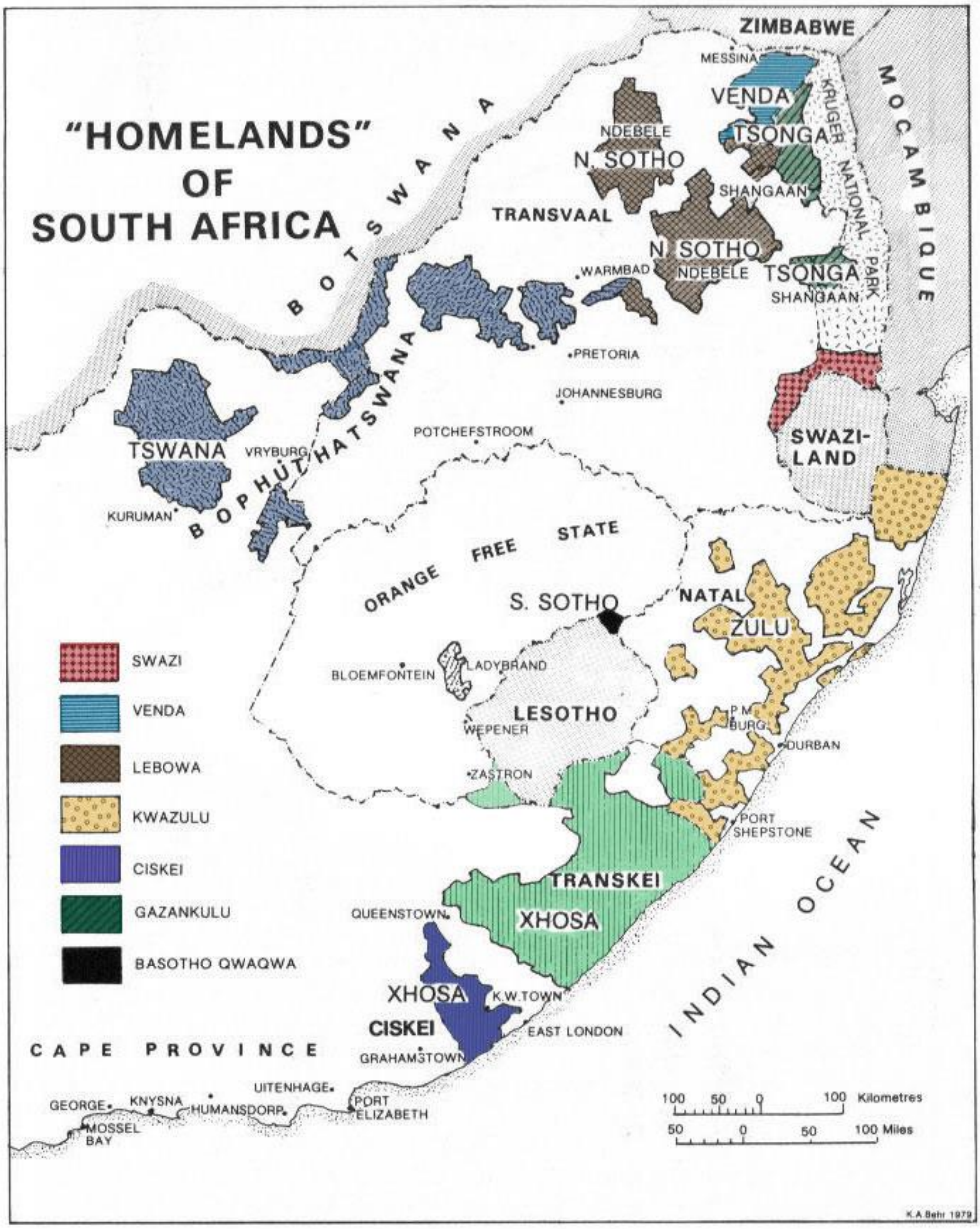

Figure 2.6: Map of former homelands (Bantustans) of South Africa between 1960 - 1983. Source: Stull et al. (2016)

In post-1994, South Africa has nine provinces with a total population of 58 million and a land area of 1.22 million km^2 was established (see Table 2.5). Additionally, six provincial house traditional leaders which are: Limpopo, KwaZulu Natal, Eastern Cape, Free State, Mpumalanga, and North West were established. In all these provinces, the South African government recognizes 774 traditional leaders of the communities. Traditional authorities act as custodians of the land on behalf of rural residents, however, it is believed that they have not been accountable to the communities, but rather are accountable to the State (Ncapayi, 2018). Furthermore, Table 2.6 shows the various land users and coverage recorded by the Department of Rural Development and Land Reform (DRDLR, 2017). The land users spread across the government departments, municipalities, organizations and so on which is used by organizations in the provinces across the country.

Table 2.5: Demography of South Africa

Source: Statistics SA (2018), LARC (2016)

Population	58 million
GDP	2018: USD 366 billion
Provinces	9
Land area	1,22 million km^2
Types of land ownership	Land tenure, communal land, commonage land, private land
Land acquisition	The process where the States takes possession of land for public purpose for its own use for private entity by paying a compensation to the owner. The land acquisition process occurs under Section 10 (a) of Land Acquisition Act, thereafter it is registered in the name of the State prior to the identification and selection of beneficiaries. Land acquisition happens in three (3) forms: expropriation, auctions, and land market (2005)

Table 2.6: Land use per province

Source: DRDLR (2017)

Land user	GP	KZN	LMP	NW	NC	WC	MP	FS	EC
	Hectares								
Government department	46 850	178 079	2 923 146	358 256	752 638	331 936	390 812	554 216	232 044
Municipality	61 400	54 217	507 827	675 578	1 337 719	790 445	48 249	323 661	103 328
Organization	6 898	39 129	195 505	55 031	96 373	766	52 897	27 483	57 402
Private person	21 086	19 906	309 158	242 701	122 787	531	91 471	39 939	78 451
Public entity	2 335	14 321	32 244	44 162	57 888	1 257	62 802	34 987	205 412
Traditional authority	7 033	544 213	3 483 784	927 200	16 511	148	108 655	63 413	72 480
Unknown	90 162	74 361	620 652	1 036 711	394 313	46 923	298 219	270 639	800 231

The social embedded nature of communal land rights has complicated the establishment of western-legal form of individual property rights (Cousins, 2007). The controversial Communal Land Rights Act (CLRA), was intended as a mechanism to facilitate the process of transferring communal land from the state to a community (Cousins, 2007). The CLRA intention is to transfer the decision-making powers from the state to a rural community through the traditional authority entrusted as the 'land administration committee' (Cousins, 2007).

The legal insecurity of land tenure is a critical challenge facing those living in communal land regions. This sentiment was echoed by Prince Ncamashe at the Eastern House of Traditional Leaders in 2016. It was expressed thus: "there is no agreement among traditional authorities regarding land ownership in communal areas" (Ncapayi, 2018). Land tenure security refers to the legal and practical ability to defend one's ownership, occupation, use of and access to land from interference by others (Boone, 2013; Clark & Luwaya, 2017; Nersa, 2018). A key component of tenure security is the legal right not to be illegally or arbitrarily evicted from a dwelling. Without secure tenure, people cannot exercise their rights over land and face the risk of complete loss of their rights altogether. Some scholars (Adams et al., 1999; Benjaminsen et al., 2009) assert that tenure security has social aspects: the relationship between people in relation to the land on which they live, and the legal dimensions. Equally, tenure security and property rights are some of the market-supporting fundamentals missing in communal areas. They are equally the missing components of the infrastructure that cripple economic development and limits private sector investment opportunities, (Stull et al., 2016). Section 25 of the South African Constitution secures the rights for many families that live in areas that they have occupied and used undisturbed for generations. It further recognizes the right to security of land tenure for those that may find that they have weak legal claims to the land they inhabit (Adams et al., 1999; Clark & Luwaya, 2017).

Land use is thus controlled through regulations, planning policies and enforcement which is governed by the Spatial Planning and Land Use Management Act of 2013. A broad view of the country's land use and land user are shown in Table 2.6 and Table 2.7. Here the definition of communal area is broad and scanty, as such, the registered areas as communal land in South Africa takes up a significant portion in the KwaZulu, Limpopo, North West and the Eastern Cape (DRDLR, 2017).

According to a collaborated study by the DoE, CSIR, and SANEDI, which resulted in the Wind Atlas of South Africa, the best wind resources in South Africa, as seen in Table 2.7, are in the coastal provinces, namely the Western and the Eastern Cape and in Northern Cape (CSIR, 2017, 2018). The Eastern Cape is endowed with the best resources of the three provinces and it is evident in 50% of the operational wind energy farms were built in the region, as seen on Table 1.1. The Eastern Cape is home to former homelands of Ciskei and Transkei as shown in Figure 2.6. Butler et al. (1978) reported that the Ciskei was 14 366 square kilometres (5 547sq. miles) of land area and the Transkei had 36 720 square kilometres (4 178sq. miles) of land parcel as shown on Table 2.4. Indeed, both these former homelands cover a large part of the Eastern Cape. To understand the land coverage of potential wind resources in the Eastern Cape, the formula of the area of a circle was used for the marked circles on the map in Figure 2.8.

Table 2.7: South African Land by Use

Source: DRDLR (2017)

Land use	GP	KZN	LMP	NW	NC	WC	MP	FS	EC	Total
	Hectares									
In-land waters	3 228	69 413	5 748	17 175	10 340	23 530	6 011	73 611	36 996	246 052
Transformed areas	445 721	414 020	572 637	266 399	219 354	200 632	368 615	215 136	436 776	3 139 290
Protected areas	36 279	489 058	1 235 705	142 663	1 402 742	617 574	1 211 002	154 627	320 850	5 610 500
Forests	21 119	615 050	73 211	4 599	808	58 654	606 655	12 266	140 039	1 532 401
Cultivation	363 954	975 687	1 266 846	2 238 552	261 565	1 985 466	1 409 448	3 771 112	1 619 331	13 891 961
Rangeland	947 525	6 759 701	9 419 489	7 816 924	35 385 178	10 049 597	4 044 697	8 753 396	14 328 170	97 504 677
Total agricultural land	1 332 598	8 350 438	10 759 546	10 060 075	35 647 551	12 093 717	6 060 800	12 536 774	16 087 540	112 929 039
Total land	1 817 826	9 322 929	12 573 636	10 486 312	37 279 987	12 935 453	7 646 428	12 980 148	16 882 162	121 924 881
Communal areas	36 260	3 181 374	3 361 198	2 674 867	1 024 335	0	875 087	236 619	4 936 807	16 326 547

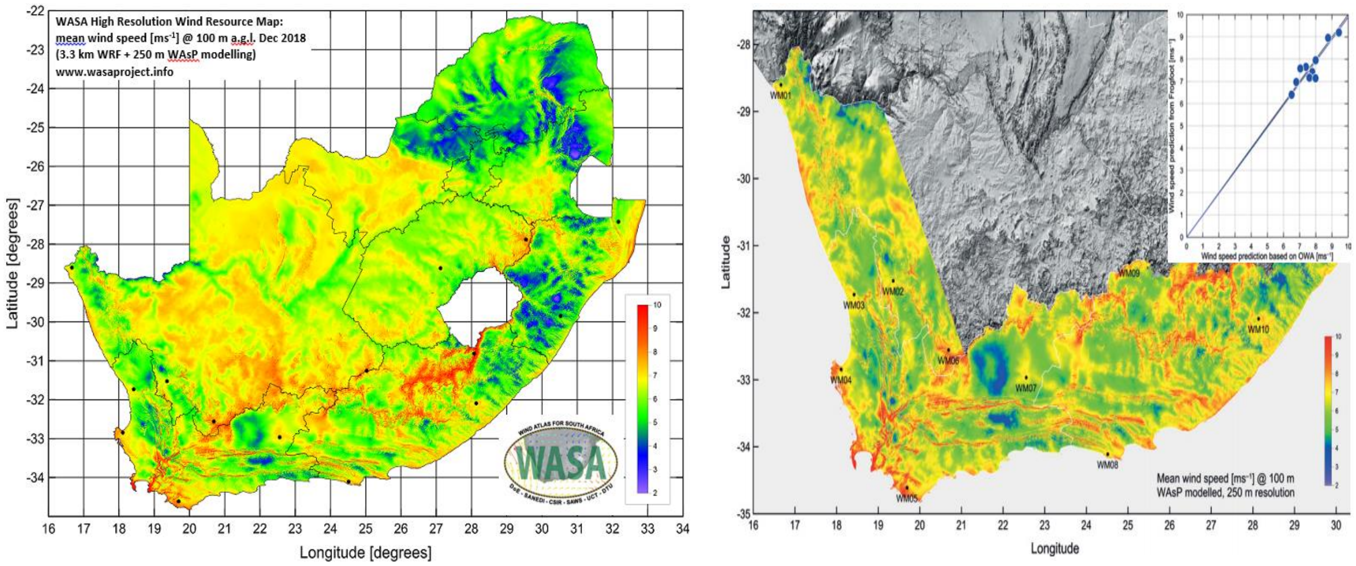

Figure 2.7: Wind resource map (WASA). Source: CSIR (2017)

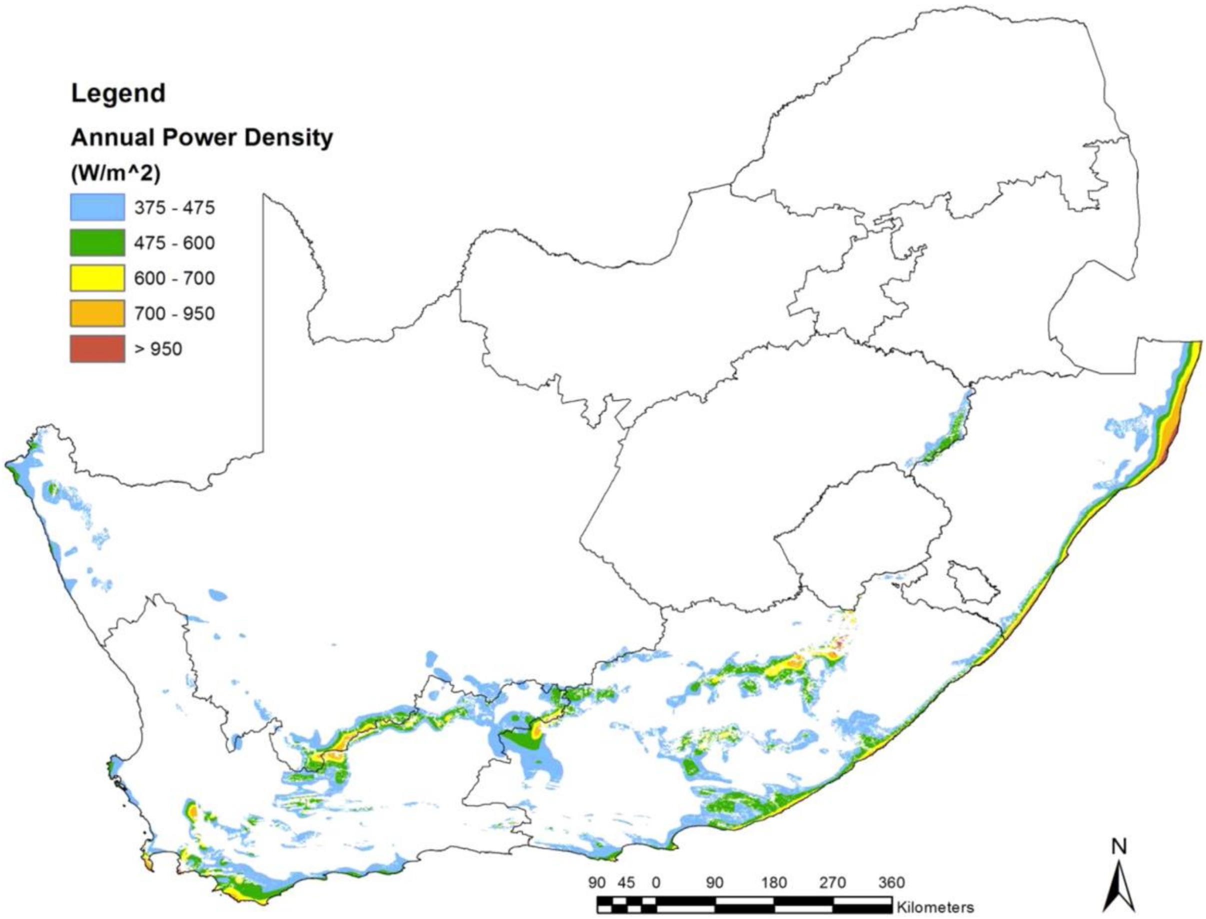

Figure 2.8: Best wind resource quality areas in South Africa. Source: Walwyn & Brent (2015)

2.6.2 Private land or communal land leasehold

Wind energy developers that participate in the national renewable energy auctions cannot bid in the auction unless a leasehold agreement is secured with the landowners (Eberhard & Naude, 2017). Obtaining communal land leasehold agreements is lengthy, and it could take three to four years to secure a lease agreement, and this leads to time delays on the bidding process which add to the cost of preparing the land for the bid. In an interview, a developer stated that "*If you are dealing with a farmer, Eskom, who is going to buy the electricity, the lawyers who register the servitude or a lien over a title deed – you have a relatively neat and certainly understandable deal. You do the same deal with a community, it's a different scenario altogether*" (Mail & Guardian, 2015). Another developer in the REIPPPP was quoted as saying *"On the provincial level it goes through a series of machinations and eventually it works its way through to Pretoria. Because of the stages, the process is lengthy in and of itself, but it is compounded by delays in the department"* (NERSA, 2018). Adding to the onerous process of securing a lease agreement on communal land, is the fact that not all land in South Africa is registered; land parcels are not always clearly described and other variations may exist between title deed and actuality (Thornton, 2009 ,Stull et al., 2016).

The laws that govern tenure security in South Africa are still under debate, such as the Communal Land Tenure Bill that intends to transfer custodianship power to traditional leaders; the Interim Protection of Informal Land Rights, an interim legislation that compels developers to have the members of the community consent to development on the land, therefore a communal leasehold cannot be entered into unless there is security of tenure (Cousins, 2007).

2.6.3 Policy implication

Policy on green energy investment is increasingly focused on scaling up investments in clean energy infrastructure (del Río et al., 2011; UNEP, 2011), however, to obtain energy security in the future, a trade-off of land for energy needs to take place. This will ensure that energy demands from renewable energy are met (Capellán-Péreza et al., 2017: 772).

Over the years, the importance of situating renewable energy within politics of energy, land ownership and value have been downplayed as it lies outside the sphere of formal politics (Boon, 2013; McEwan, 2017). Behr et al. (2015) argued that land reform is not only an economic issue but also affects the power dynamics within states. Therefore, development efforts are severely constrained by lack of clarity on land rights and subsequently builds tension among stakeholders. Furthermore, Cousins (2002) inferred that land tenure results in conflicting claims to land and bitter disputes over authority and little has been done to clarify the roles of social actors in land ownership and governance.

Changes in regulatory framework of a country cause investors to be cautious about renewable energy infrastructure investments. The *Draft Regulation of Agricultural Land Holdings Bill* published in 2017 restricts foreigners, including corporations that are foreign controlled from owning agricultural land in South Africa. The Bill not only has an effect on mining and the agricultural sector, but also on renewable energy, since the majority of IPPs are formed by foreign entities. In addition, the Bill highlights the need for renewable energy project developers to include potential local land risks as part of their project risk profile.

Government has further initiated a Renewable Energy Development Zones (REDZ) which is aimed at identifying suitable geographical zones for wind and solar energy projects while also expediting the process for developers in REIPPPP bidding application (DEA, 2016). However, REDZ has done little to assure investors of a stable regulatory environment. The government's aim for REDZ is to eliminate areas of potential environmental concern and technical constraints. McEwan (2017) argued that land takeover is a viable threat that may occur within REDZ. The current political structure does not produce change or social outcomes, so people and investors struggle over the political arrangements and outcomes (Boone, 2013). This further echoes Jones (2015), that there is a lack of clear, long-term policy framework to support investments in clean energy infrastructure.

2.7 Summary

This chapter reviewed previous research to give a broad overview of specific areas of the literature pertaining to the development of wind energy projects on communal land. As it is common practice for large-scale energy projects to be financed through non-recourse project finance, project finance is designed to allocate and mitigate risks through project financing and isolate the developer from the project risks. As such, reaching financial close is a risk mitigation strategy that confirms that site selection leasehold contractual agreement has been met.

Risk management has been pivotal to the success of large-scale projects. Therefore, this study applied the risk management framework to wind energy development and placed emphasis on risk identification given that it is the most crucial stage of project management related to this topic. Wind energy has emerged as on of the best and most competitive renewable energy resource. However, it has faced several barriers that brought a hiatus in accelerating the technology. Such criticism is related to the fact that it is an intermittent technology that cannot be used as a baseload energy resource, as well as the issues of community acceptance.

Arguably, land tenure in the UK is no different to other countries, where common land, in general, belongs to the crown. A decade ago, there were no wind energy policies on communal land. This has changed with pressure from departments within the government, encouraging change in policy to increase the development of renewable energy. In Kenya, the Community Land Trust (CLT) model was adopted to provide tenure security in investing in renewable energy on communal land while also fuelling the drive for increasing the electrification rate. The CLT model became a mechanism for community members to retain their land ownership, as it allows the community members to have an active role in collective decisions on land use, financial matters, and leadership roles.

South Africa is no different to emotions that arise from the land topic given the historical injustice of land dispossession, which became the source of poverty and inequality. The apparent importance of land discussions in South Africa and distinct lack of information on the effect of communal land ownership structure to reach financial close of wind energy projects became evident in the course of the literature review.

Adding to the onerous process of securing lease agreements on communal land, it is fact that not all land in South Africa is registered. Equally, land parcels are not always clearly described, and other variations exist between title deed and actuality. With most onshore wind energy being developed in rural areas, what are the associated risks in developing in these communal lands, and how does developing on communal land differ to developing on privately-owned land. The remainder of the thesis will see to address these questions.

3 Chapter Three: Research Methodology

3.1 Introduction

This chapter focuses on the research methodology which was applied to answer the research questions in this study. The procedure which was employed is presented in Figure 3.1. Generally, the research is made of triangulated information sources (Zhou & Nunes, 2015) which are captured as follow:

- A literature review related to communal land and the identification and assessment of risk regarding wind energy projects
- A review of industry-specific secondary data source, such as government regulation and policy documents, best practice guidelines, case studies, and community stakeholder engagement.
- Questionnaire and interview with industry wind energy developers

In this study, a hybrid exploratory approach which combines deductive and inductive techniques was applied. Whereas, a deductive approach progresses from the theory to a general conclusion. A deductive, technique attempts to deduce a conclusion from some propositions or based on some premises (Morse, 2003, Zirker, 2005, Williams-Wynn, 2015). It allows for the generalization of findings to a reasonable extent. Furthermore, it is possible to explain the nexus between the concepts and associated variables. When there is abundant information within ample time to conduct a study, the most relevant method is the deductive approach (Bhattacherjee, 2012; Bell et al., 2018; Skillman et al., 2019; Vreys et al., 2019). The stages of deductive research techniques follow the following sequence; deduction of hypothesis for theory, hypothesis formulation, hypothesis testing, outcome examination, modification of theory (Walliman, 2017, Pandey, 2019, Pearse, 2019). Inductive research is probably the most renowned and the most familiar research approach (Johnson & Christensen, 2019). It is premised on the fact that a theory can be formulated if there is none that previously exist, based on empirical analysis (Wilson, 2014; Görög, 2019). In addition, the inductive technique considers the circumstances of the event under investigation and identifies the similarities and differences across the cases before generalizing (Kathleen, 1989; Saunders et al., 2007; Saunders, 2011; Ketokivi and Choi, 2014; Sleep et al., 2019). Mantere and Ketokivi (2013) support that all case research applies the same reasoning method to varying extent towards different ends.

As mentioned above, this study follows a hybrid exploratory research based on the reasoning that deductive approach is used to test an existing theory, while the inductive approach is used to develop new theory contingent on the data observation and available information. The deductive approach is applied in the formulation of a theory and subsequent testing in the course of the research while inductive study is not based on an existing hypothesis. The interpretation and perspectives from the literature were integrated to project how communal land ownership affect achieving financial close and how to evolve the strategies to mitigate the associated risks. While no theory was formulated in this study, some proposal which may ultimately lead to the formulation of theories when the discussion around financial close in wind energy has matured were suggested. This research was carried out based on the existing literatures.

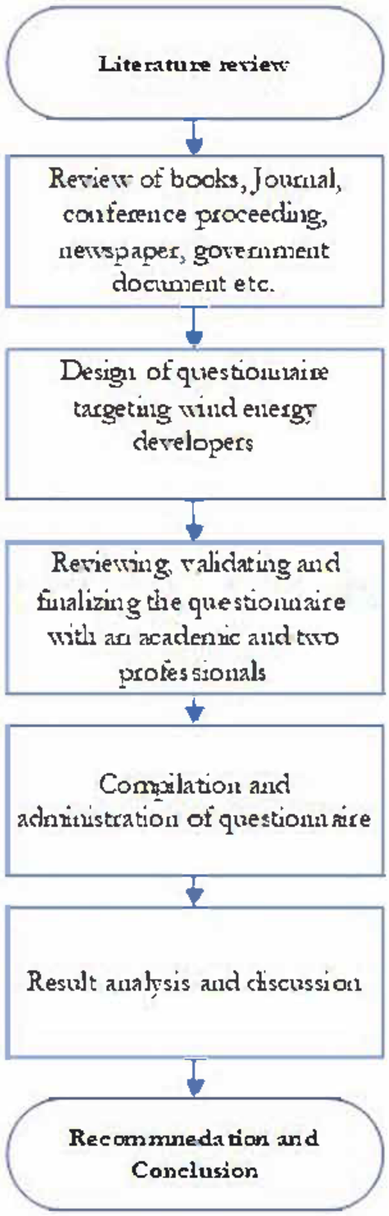

Figure 3.1: Map of research plan undertaken by authors. (Source based on PMBOK, 2017)

3.2 Research Design

It was important to receive responses from the developers within the wind energy sector in South Africa. This was critical in shaping the research findings and reaching a conclusion of the study. The key focus of the study was to identify the risks proposed by developers and other experts in developing wind energy projects on communal land. Thus, it is important to define research design to understand what it is and how it fits into the whole research process from framing our research question, analyzing and reporting findings.

The research must be properly designed in order to appropriately answer the research questions. It is needed because it engenders smooth flow of various research operations, thereby optimizing the research output while yielding maximum result at low cost in term of effort, money and time. It should be noted that research design has a significant impact on the research outcome (Weisburd et al., 2001). According to Kerlinger (1986) “Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variances”. Further to this, Green & Tull (1970) defined research design as the specification of methods and procedures for obtaining necessary information. This goes further to say that research design involves a holistic operational dimension or framework of a project which stipulates the nature and the source of information required including the procedures.

The elements of effective research design include: the research output, the input data and the methods of analysis of framework. The research design must clearly answer the questions pertaining to: the focus of the study, the aim of the study, the location of the study, the nature of the data, the data sourcing, the timeframe of the study, the sample design, data collection techniques, analysis method and reportage procedure (Miller & Salkind, 2002; Creswell & Creswell, 2017; Stapenhurst, 2020). Research design maximizes efficiency and reliability, while also providing an overview to other experts in a related research focus. Furthermore, research design must take cognizance of the nature of the study whether it is exploratory, comparative or interpretive and considers the research approach either inductive, deductive or hybrid. Whichever the choice of research approach is contingent on the research questions which encompass the reasoning or rationality behind the research.

3.2.1 Types of research design

There are several types of research designs which include: Action research design, Case Study design, Casual design, Cohort design, Cross-sectional design, Descriptive design, Experimental design, Historical design, Longitudinal design, Exploratory design, Metal analysis, Mixed method design. These are briefly described in *Table 3.1*.

Table 3.1: Types of research design

Type of research design		Definition	Purpose	Advantage and disadvantages
1	Action research design (Stringer, 2008; Efron & Ravid, 2019; Gray, 2019)	It is an iterative or cyclic process that involves the collection of information regarding the research problem, analyzing such information and developing an improved plan followed by subsequent implementation of the plan and iteration based on feedback.	It is intended to engender in-depth understanding of a particular problem from conceptualization and particularization to interventions and evaluations. It is often used to advocate for change.	**Advantages** • It can be used in community-based research problem. • It is solution driven rather than testing theories. • It provides a learning cycle. • No hidden controls or preemptive direction by the researcher. **Disadvantages** • It is more difficult since the researcher takes on the responsibility of advocating and researching • The result may be biased due to the personal over-involvement of the researcher. • It is time consuming and complex. • It requires buy in from the participants.
2	Causal design (Beach, et al., 2016; Gemici, 2018; Markus & Rowe, 2020)	It focuses on the analysis of a specific problem in order to describe the pattern of interaction between the variables. The determination of causality is based on the empirical association, appropriate time order and non-spuriousness of a relationship between variables.	It is mostly used in social science studies and measures the impact of specific change on the existing norms and assumptions	**Advantages** • It allows replication. • There is greater confidence in the internal validity due to the systematic subject selection and equity of groups being compared. **Disadvantages** • It does not account for non- causal relationships. • A causal relationship can only be inferred not proven. • It is difficult to determine the actual causal variable.

3	Case Study design (Keen and Packwood, 1995; Gerring, 2004; Russell et al., 2015; George,2019)	It is a deeper investigation of a particular research problem rather than across-the-board statistical survey or comprehensive comparative inquiry.	It tests the practicality of a specific theory or model in the real world. It is also useful when there is not much information about a problem or issue. Social scientist often use this method to examine the contemporary real-life issues	**Advantages:** • It fosters an in-depth understanding of a complex issue through detail contextual analysis. • Several methodologies and sources can be consulted in this investigation. • It can be used to reinforce the understanding of the previous research. • It can be used for a specific and rare research cases. **Disadvantages:** • Poor generalization capability. • Little understanding of cause and effect. • May be hard to interpret due to missing vital information.
4	Observational design (Denzin, 1994; Rosenbaum, 2010; Sheets & Nathan, 2020)	It is a technique whereby a conclusion is drawn based on the comparison of the subjects with the control group. The ongoing behaviour of the subjects are observed either directly or indirectly. In direct observations, the participants are aware that they are being observed while in indirect method, the individuals do not know they are being observe.	It rules out the ethical and practical huddles associated with setting up a large and cumbersome research project.	**Advantages** • It is flexible with a less rigid structure of hypothesis. • In-depth information about a particular behaviour is possible. • It lends itself to a real-life generalization. • It takes cognizance of the complexity of group behaviour within a group. **Disadvantages** • It is difficult to replicate. • It is susceptible to bias as the researcher may choose what to observe. • The sources may not have equal credibility thus impact on the result of the observation. • Data collected may be skewed to satisfy the interest of the researcher.
5	Historical design (Charles, 1998; Howel, 2001; Denny and Bouquet,2019 Kumpulainen et al., 2020)	It is a design method which studies the past events in an attempt to decipher the facts and explain the cause of events and their immediate consequence. It uses both secondary and primary sources.	It collects, verifies, and synthesize evidence from the past in order to establish or refute a hypothesis.	**Advantages** • It is unobtrusive and well suitable for trend analysis • It can be used to replicate previous study. • There is usually no possibility of researcher-subject interaction which

				could compromise the findings. **Disadvantages** • It is subject to the amount of available data. • It could be time consuming. • It is very weak regarding the demand of internal validity. • The entire historical data may not be sufficient to address the research question.
6	Longitudinal design (Farrington, 1991; Ployhart and Vandenberg, 2010; Taylor et al., 2019)	This research method uses the same sample and make repeated observation over time. It is a form of observatory study and it is also known as panel study.	It outlines patterns of change and over time, helps to establish the direction and breadth of causal relationships over time.	**Advantages** • It promotes the analysis of the duration of a particular event. • It facilitates the forecast of future outcome based on earlier factors. **Disadvantages** • The data collection is susceptible to change over time. • It is difficult to maintain the integrity of the samples over time. • It is time intensive. • It is based on an unlikely assumption that the present trend will continue.
7	Exploratory design (Durepos & Wiebe, 2010; McEvoy et al., 2020; Pinson et al., 2020)	It is a method applied to a problem that has not been studied or not clearly defined, with the aim of setting a precedent, develop working definitions and improve the final research design	It helps to establish understanding of the investigation process and effective methodology. Additionally, it is used to develop tentative theories and hypotheses.	**Advantages** • It is flexible and can address all kinds of research questions. • It provides an avenue to conceive new terms and clarify existing concepts. • It is used to develop formal hypotheses and develop more precise research problems. • It is useful in the establishment of research priorities and resources allocation. **Disadvantages** • It is typically not capable of generalized conclusion for the larger population. • Although they provide insight, there is no definitive conclusion.

				• The design lacks rigorous standards applicable in data gathering and analysis.
8	Meta-Analysis design	It is an analytical methodology which is designed to systematically assess and summarize the outcomes from a number of individual studies, thereby increasing the overall sample size which allows the researcher to zoom on the study effects of interest.	The purpose of this method is to develop a new understanding of a research problem through synoptic reasoning.	**Advantages** • It can be effectively used to determine the literature gaps. • It is useful towards the generation of new hypothesis. • It can be used to outline the research problems from future studies. • It provides a means for concentrated review of existing researchers which have been published. **Disadvantages** • The result may not be valid in some cases. • The process of reviewing and synthesis can be very long.

3.3 Population and sample

3.3.1 Sampling and Sample size

Sampling is a procedure used to select the sample size from a defined study population (Kelley et al., 2003). A sample size is a portion of the population which is selected for a survey and a population refers to the group of people or events on the basis of which an assumption is made. Sampling is important in research since it is impossible to survey or gather data from an entire population. It is suitable for research in terms of cost, convenience, and time. However, the sample size must reflect the overall behaviour of the population, otherwise there may be significant error which include sampling errors, sample frame errors and systematic errors (Assael, 1982; Smith, 2019).

Broadly speaking, there are two major sampling methods, namely, Probability sampling and Purposive sampling (Olatunji et al., 2019). The methods which may be used to take samples from large population depends on the kind of analysis being performed. Both sampling methods are briefly discussed below.

Probability sampling is a technique whereby the members of a larger population are selected based on probability theory using the random selection approach. This sampling technique, Probability sampling, leverages on the possibility of selecting or creating a sample which is a true representative of the population under study, though it is not suitable for qualitative research (Alvi, 2016; Rahi, 2017). There are various types of probability sampling which include: simple, systematic, stratified, cluster, multistage random sampling, as reported by Rahi (2017). Non-probability sampling is a technique which is solely based on the judgement of the researcher, as such, the odds of any member being selected for a sample cannot be calculated (Daniel, 2012; Rahi, 2017). Non-probability sampling method include: Quota, Purposive, self-selection, and snowball sampling (Rahi, 2017).

Based on systematic sampling technique, the study group used for this research focuses on wind energy developers was established. A questionnaire was developed with a focus on multinational wind energy players in South Africa which have been involved in previous bid rounds of REIPPPP. Questionnaires may be designed based on open, closed, or multiple-choice questions (Collis & Hussey, 2009). Open ended questions give the participant an opportunity to choose their words while closed ended questions constrain the participants to choose from a list of predetermined answers. The multiple-choice questions are similar to close-ended questions as they allow the participant to choose from a predetermined list of responses. The use of a questionnaire survey was done to support the secondary information which was obtained from literature. The questionnaire survey comprised a list of questions which were aimed at gathering information that could be deployed to a specific research focus (Denscombe, 2007).

It was important for these organization to take part in this study since the objective of this study was related to wind energy projects' financial close which might impact on their turn around time and break-even period. The sample size was made up of 5 out of 27 wind energy developers which were considered to have been involved in previous bid rounds of REIPPPP. The number of successful respondents are largely due to the nature of the competition in the industry since some players were not comfortable with disclosing information related to their organization. Additionally, wind energy is still at its developmental stage in South Africa; hence the organizations have not attained the expected level of trust among the players.

3.3.2 Data collection

The primary data gathering tool applied in this study was a questionnaire. The questionnaire was supplemented by telephone interviews in some instances. In addition, the questionnaire was developed with a focus on multinational wind energy players in South Africa which have been involved in previous bid rounds of REIPPPP. The survey comprised a list of questions which were aimed at gathering information that could be deployed to a specific research focus (Denscombe, 2007). Open ended questions give the participant an opportunity to choose their words while closed ended questions constrain the participants to choose from a list of predetermined answers. The multiple-choice questions are similar to close-ended questions as they allow the participant to choose from a predetermined list of responses. The use of a questionnaire survey was done to support the secondary information which was obtained from literature. In addition, two professionals who are industrial players and an academia in renewable energy project development were requested to review the questionnaire prior to disseminating it. With this approach, the reliability of the data was assured.

A desktop approach to research involves gathering and analyzing information based on existing literature. Subsidiary data was gathered from existing literature such as government gazette, government agencies and published reports. The data tables and maps to locate communal land and wind resources areas in South Africa were used to address the subsidiary questions: ‘How much land mass is communal land in South Africa’.

3.4 Analysis of primary data from questionnaires

Data analysis entails the decoding and decrypting of primary and secondary data which is collected from a survey. It is also a process of inspecting, cleansing, transforming and modelling data with a goal of discovering useful information for decision making (Braun & Clarke, 2006, Lambert, 2019). There are several data analysis methods which have been reported in the literature. The three major analysis techniques are: Thematic Content Analysis (Javadi, 2016), Cross-Cultural Analysis (Goldstein, 2019) and Grounded Theory (Lambert, 2019). Consequently, the Thematic Content Analysis (TCA) approach was used to analyze the data gathered in the course of this study. This approach was selected since the study does not seek to generate new theory as part of its immediate outcome. More so, it provides large amount of flexibilities which can be modified to suit the needs of many studies. It also provides a rich and comprehensive yet complex account of data (Braun & Clarke, 2006)

The following steps were adopted in implementing the Thematic Content Analysis for this study (Braun & Clarke, 2006; Neuendorf, 2019):

- Step 1: Data familiarization: This involves iterative reading of data in order to understand the pattern and overall idea that the data represents. The preliminary codes and detailed notes are taken at this stage.

- Step 2: Data reduction, categorization and compilation: As this stage, the data obtained is classified into different categories to achieve a more efficient analysis. There is an understanding of how the data answers the research questions and inferences are formulated from initial generated codes.

- Step 3: Searching for themes: The themes that accurately describe the data are gathered at this stage. Themes are broader than codes and related codes are combined into a theme. The meaning and scope of each theme is defined and themes that answer the purpose of the study are identified for further analysis.

- Step 4: Generation of thematic maps: The completeness of the analysis is reviewed at this stage. The theme is expected to make a complete thought and account for the entire dataset, if not the researcher has to go back to step 1.

- Step 5: Definition and naming of categories: At this stage, the clear definition and name of each theme are generated. This gives detailed knowledge of what each theme contributes to the understanding of the data.

- Step 6: Description of finding and final report production: The patterns discovered in the data are described at this stage. There is a need for verification of the accuracy of what the data represent.

3.5 Summary

This chapter describes the research methodology which was applied to answer the research questions in the study. The use of triangulated information sources which include literature review, industry specific secondary data and questionnaire survey were adopted. Based on a systematic sampling technique, the study group used for this research focuses on wind energy developers.

Different research design methods which include action research design, case study design, casual design, cohort design, cross-sectional design, descriptive design, experimental design, historical design, longitudinal design, exploratory design, metal analysis, and mixed method design were briefly discussed. The primary data gathering tool used was a questionnaire survey. Two professionals which are industrial players and an academia in renewable energy project financing were requested to review the questionnaire.

The steps that are involved in implementing content analysis for this study were briefly discussed. The perspective from various sources of information were integrated to understand how the land ownership affect the project development and the project reaching financial close. The information obtained from the developers which were interviewed forms the basis of further discussion in the subsequent chapters.

4 Chapter Four: Findings and Discussion

4.1 Introduction

The key focus of this study is to investigate the risks associated with wind energy development on communal land and the extent to which those risks inhibit infrastructure development of wind energy projects to reach financial close, by drawing analysis on government documents of general renewable energy policies and development of the wind energy market in South Africa. The study identifies the key strategies which can facilitate the rapid attainment of financial close in the development of wind energy projects on communal land. Among other things, this chapter seeks to answer the question about how land ownership structure affects financing of wind energy projects within the context of South Africa and evaluate the approach to mitigate the risks which are associated with communal land ownership. The general background of the developers who were surveyed in this study is discussed, as well as the various responses obtained from the participants are analyzed and discussed.

As previously stated in Section 3.1, the approach used in this study is a hybrid exploratory approach which combines the deductive and inductive research techniques. This is because there is limited information regarding how communal land ownership has affected reaching financial close in wind energy projects, especially in the South African context. Given the pace at which renewable energy is growing in South Africa, such information may be necessary to assist in the decision-making process by potential developers while also engendering holistic policy formulation from the onset. The risks associated with developing wind energy farms on communal land are discussed alongside their severity and consequences.

The overview of the scope and coverage of the organizations which responded shows that these organizations operate globally with multiple years of experience in the wind energy industry and have been involved in the REIPPPP. The sample size was made up of 5 out of 27 participants that were considered to have been involved in REIPPPP. To ascertain their involvement in wind energy development, they were asked if they are wind developers, 100% of the respondents confirmed that they are wind developers. This eliminates any form of assumptions concerning the jurisdiction of the respondents.

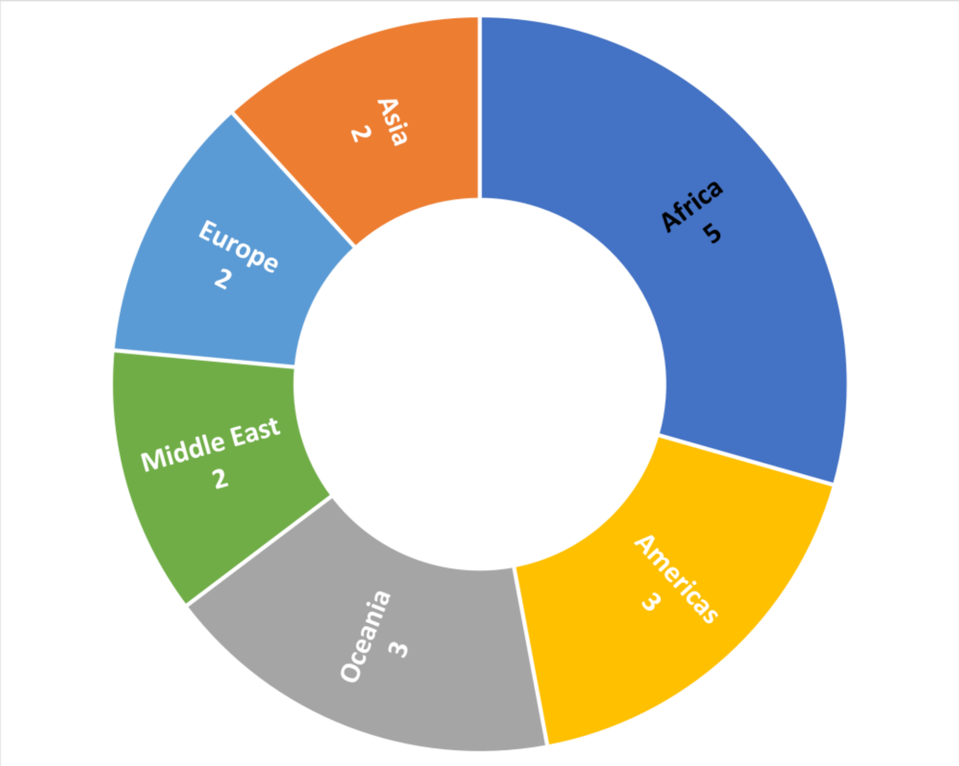

Figure 4.1: Respondents' countries of operation

To further ascertain their experience and spread in the industry, they were asked to state the countries of their operates. In Figure 4.1, all five respondents confirmed they operate in Africa, Asia (2), America (3), Europe (2), Middle East (2), and Oceanic (3) regions. This was to ascertain the developers' familiarity with the nuances of the South African renewable energy industry. Subsequently, the question was to gauge the developers' exposure and understanding of the wind development risks, and regulatory environment of the country.

Furthermore, the question was presented at the beginning of the questionnaire to set the tone for the follow-up questions on land ownership, and to ensure the developers understood the idiosyncratic nature of land ownership in South Africa. The responses confirmed that all respondents surveyed have been involved in projects within the country.

4.2 Available communal land in South Africa

The study reviewed previous literature to determine the amount of communal land in South Africa. The legal nature of communal land is complicated and the mechanism to facilitate ownership process is the controversial Communal Land Rights Act which seeks to devolve decision making powers. The implementation of the CLRA appoints traditional authorities and the government as the custodians and administrators of communal land. The study reviewed a book published in 1978 by Butler et al. (1978) and found that approximately 15 million hectares (58 813 square miles is equivalent to 15.2 million hectares) demonstrated in Table 2.4, was dedicated to former homelands known as communal land. In recent years, the DRDLR and Department of Agriculture, Forestry and Fisheries conducted a Land Audit in 2017 the study identified communal land to be approximate 16 million hectares as indicated in Table 2.4. The 2017 Land Audit Report supports the estimation that 13% of the total 1,22 million km^2 land area of South Africa is communal land. The study estimates that the 1 million hectares differences is due to the inconsistent registration and unregistered communal land by government agencies.

4.3 Approach used to develop wind energy projects on communal land and privately- owned land

There is a need to understand the spread of wind energy projects among different types of land ownership structures. To ascertain this, the respondents were asked how many of their wind energy projects in South Africa were either on privately- owned land or communal land. It included projects at different stages in the project's life cycle. As shown in Figure 4.2 out of a total of 43 projects reported by the five (5) developers, 23% were initiated on communal land while the remaining 77% were initiated on privately-owned land. This shows the great disparity between the projects on communal land and the projects on privately-owned land. The obvious disparity may have been due to the extant controversies that include land disputes which are discussed by Smith (2005). Disruptive collaboration between the local elites and the political office holders manipulate land acquisition processes which may eventually cause resistance by the community and may eventually stall a wind energy project.

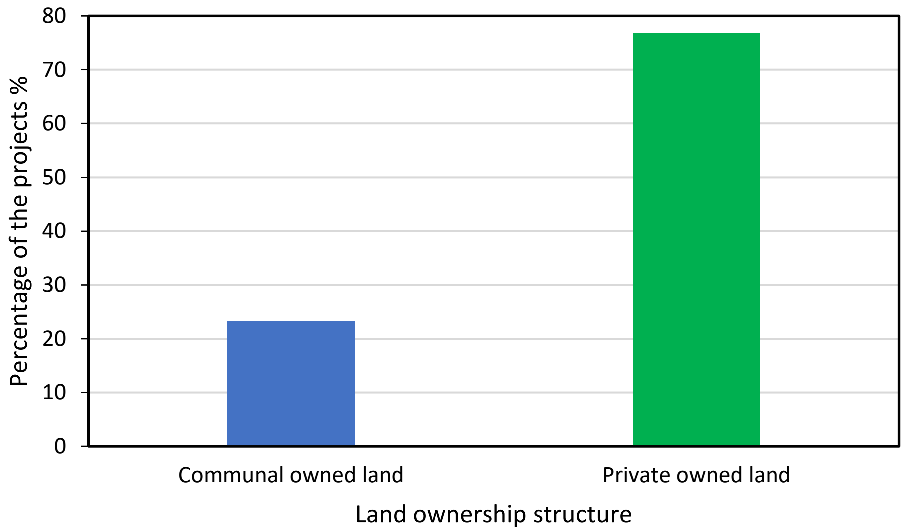

Figure 4.2: Land ownership pattern for wind projects

The project distribution for different developers on either privately-owned land or communal land were investigated. The wind energy farms presented in Figure 4.3 are at various development stages. Developers 3, 4, and 5 have three, eight, and twenty wind energy farms, respectively on privately-owned land and two, one, and seven projects, respectively, on communal land. While, Developer 2 has two projects only on privately-owned land and Developer 1 preferred not to disclose. The significant difference in land use is evidence that progressive wind development activities on communal land are dwarfed by those on privately-owned land, which amount to 76 percent.

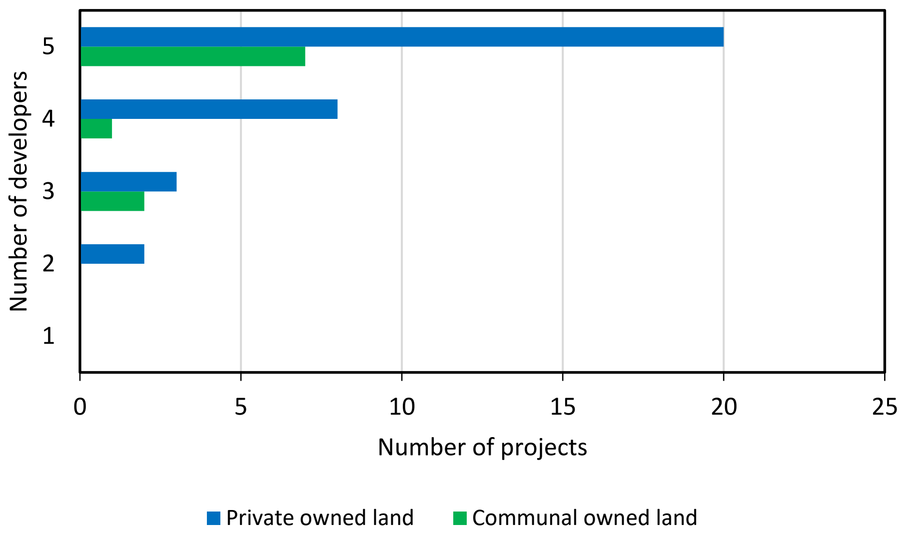

Figure 4.3 : Projects on communal and private land ownership pattern for wind projects

All the respondents agreed that there is variation in the procedure which must be followed when securing leasehold agreements for developing wind energy on communal land and privately-owned land. The varying procedure is related to the consultation process and the type of agreements which need to be put in place. There is a need to address the interest of various stakeholders differently and may lead to complex negotiation process. While in the case of privately-owned land, it may suffice to consult only the landowner, whereas to acquire a leasehold on communal land, the community, chief, government and multiple stakeholders need to be consulted before hand and continuous engagement throughout the process. Most times, various stakeholders within the community have different perceptions; some may be concerned about the monetary flow of money, others are concerned about the aesthetics of the surrounding environment while others are concerned about the disruption of their culture. This shows that there may be some idiosyncratic components which are associated with various ownership structures.

4.4 Risk associated with communal owned land in South Africa

The respondents were asked to outline (if any) the risks that are associated with their attempts to develop wind energy projects on communal land. The following risks were outlined: technical risk, legal risk, economic risk, social risk, political risk, and others. Four (4) respondents acknowledged that they encountered technical risk, legal risk and political risk consequent to the initiation of the project on communal land, while all the respondents faced social risk. Moreover, three (3) respondents encountered economic risk. Among other things, social risk was associated with infighting among the community leaders and the need to engage with owners at different levels in order to address several related or unrelated concerns.

As a result of the risks mentioned above, the project(s) were either delayed, stopped, subjected to land claim or disputes, lead to legal action or loss of equipment. All the respondents indicated that the projects were stalled as a result of communal land dispute, 4 projects were stopped, 3 projects submitted that led to legal action and land claim/dispute, while 1 experienced loss of equipment in the process.

4.5 Approach to developing on communal land and privately-owned land in South Africa

The developers were asked to highlight how the development of wind energy on the communally owned land differs from privately-owned land. The responses obtained are as below:

- **Developer 1:** “Legal issues and issues of sustainability are different, more complex with communal lands”.

- **Developer 2:** N/A

- **Developer 3:** “We have to deal with issues of ownership rights, the people versus the chiefs, we have to factor in issues of the municipality and how they and such communal land interact”.

- **Developer 4:** “Landowner engagement approach is different and the structure of payments and community investments”.

- **Developer 5:** “3 months vs 3 years for projects located on communal land under the custodianship of the Department of Rural Development and Land Reform. There are numerous red tapes and unnecessary delays in the administrative process. DRDLR have never penned down what process an investor must follow, in order to secure land rights, as such the goalposts are constantly shifting, thereby frustrating the potential investors. Securing community support is time consuming but it is not a challenge if the project is being explained in detail to communities. The issues and delays start when DRDLR gets involved”.

The responses above elucidate some of the different challenges which have been faced by different developers in their attempt to develop wind farms on communal land. Developer 5 clearly stated the cumulative impediment from the community and even the Department of Rural Development and Land Reform. Inconsistency in the procedure adopted by the government regarding communal land was lamentable for the developer.

In addition, for Developer 5 it was observed that the time difference for the reaching financial close on privately-owned land and communal land differs by 2 years and 8 months. A development of this nature may be a sheer discouragement to both developers and funders. Ultimately, the respondents were asked if the wind energy projects that they initiated have reached financial close. As shown in *Table 4.1*, only one project reached financial close within the projected time, while 3 reached financial close outside the scheduled time and, at least five projects have not reached financial close. Although the actual stage of these projects could not be ascertained as at the time of this reporting. Developer 2 categorically stated that “only their projects on private land have reached financial close”. The evidence from this exploration showed that wind energy projects initiated on communal land suffer more delays than the projects initiated on privately owned land.

Table 4.1: Wind projects on communal land that have reached financial close (no of of projects). Source: Authors’ questionnaire responses

Developer	Yes (Projects within scheduled time)	Yes (Projects outside scheduled time)	No
1	0	1	2
2	-	-	-
3	1	2	2
4	0	0	1
5	0	0	0

The respondents were asked to rate 12 project-related risks (not important, moderately important, essential) in the order of their severity regarding the development process of wind energy farms. 80% of the respondents rated land ownership risk between moderately important and essential on the scale to determine the project-related risks faced by developers in the development process. All the respondents rated environmental permit, grid connection, project performance, and off-taker risks higher than land ownership risk. This further confirmed the need to evolve a working strategy to address land ownership issues which can hamper the progress of wind energy projects in South Africa.

4.6 Factors militating against reaching financial close on communal land

From various feedbacks which were obtained from the respondents, the following factors were identified as being responsible for the delay in reaching financial close on projects developed on communal land.

The respondents stated that at times it was difficult to identify the main stakeholder where there was no title deed. Such stakeholder’s interest may jeopardize the success of the wind energy project. Where there were multiple stakeholders, there were at times conflicting interests which stalled the progress of the project. It was also reported that where there is no title deed, it became a burdensome process to secure a leasehold agreement on communal land.

Some respondents reported that administrative bottlenecks and opaque land acquisition processes elongated the period within which the leasehold agreement can be obtained. Some respondents stated that because of weak policy framework protecting communal land, communities were generally suspicious of social justice and environment degradation. In addition, respondents also alerted that there was mutual suspicion among the government, the developer and the community. These challenges are discussed in section 4.7, together with a possible ways to mitigate them.

4.7 Mitigating the challenges associated with communal land ownership

Stakeholder identification and management- The effective management of stakeholders is highly important and very critical to reaching financial close on wind energy projects, although its significance may decrease as the project progresses to the construction stage. Generally, developers avoid initiating development of wind energy projects on communal land due to the burdensome process involved in securing leasehold agreements on these tracts. This is sometimes attributed to the activities of the stakeholders in the community. Often it is relatively difficult to identify the stakeholders whose interests need to be considered on the communal land.

Apart from the stakeholders who are involved in the initial stage of the feasibility study, there are often some external parties that are not envisaged at the conception of the project. This category of stakeholders may significantly influence achieving financial close, if not leading to outright rejection of developmental plan. Dealing with stakeholders on the wind energy project at pre-financial stage involves some steps which include; stakeholder identification and analysis, stakeholder prioritization, and formulation of management strategies. Different stakeholders must be identified, and their interests analyzed. The supportive stakeholders and the opposing stakeholders in the community must be identified. This will provide a strong basis towards gaining the vital support for a wind energy project on communal land. Bryson (2004) proposed a technique for identification and analysis of stakeholders for wind energy projects, though it was suggested that the techniques should be tailored to address the uniqueness of different stakeholders.

Adequate community consultation- Public opinion and perception of the people has a significant effect on the off-taker of any project within a community (Raftery,1999). At times, the resistances which were noted from the stakeholders may be associated with the fact that their views are often ignored. Securing community support is time consuming but not a challenge if the project is being explained in detail to communities. Therefore, the first objective after the stakeholders have been identified is to develop a decision-making institution such as community committee to receive and respond to the concerns raised by the community.

While it is impossible to address all the interest of the shareholders since they are sometimes conflicting, it is necessary to prioritize and address in the order of severity. This means the stakeholders whose interests have the most severe impact on reaching financial close for a wind energy project is prioritized.

Addressing administrative tailbacks and an impervious land acquisition process- In several cases, it could take a while to secure a leasehold agreement after large capital investments had been spent on other pre-financial procedures. In some case, there is no clarity in the description of the variation between the property deeds and the actual situation on the ground. Some of the lands are state lands which have not been properly documented or registered.

The inability to secure land tenure means that the project process cannot progress, therefore no financial instrument can be committed to the project. A streamlined and clearly articulated lease holding procedure which can ensure a speedy security of land leasing agreement could be achieved through an intergovernmental task force drawn from the community and the Department of Rural Development and Land Reform. Also, the government can take ample advantage of artificial intelligence in the documentation of land search together with regular update on the potential encumbrance which could delay the project development on communal land.

4.8 Summary

The focus of this study was to investigate the risks associated with wind energy development on communal land and the extent to which these risks inhibit the development of wind energy projects to reach financial close. This chapter discussed the research findings obtained from the data gathered and the result, thereof, on the account that wind resources in South Africa are prevalent on the coastal Cape regions, while also noting that the Western Cape has no recorded communal land registered. As such, the Eastern Cape accommodates the large share of communal land with strong wind resources in the country.

Literature and the REIPPP Programme auction state that developers are unable to participate in utility scale auctions without leasehold agreements or options to lease. As such, the study approached several wind energy developers in an attempt to understand the differences in the approach to how developing wind farms on communal land differs from privately-owned land. The findings indicate that there is significant disparity in wind projects developed on privately-owned land to that on communal land. The data suggests there are substantially more wind projects developed on privately-owned land. The disparity owes to the subsisting controversies in land ownership and land disputes that are prevalent in South Africa. Furthermore, the study found that there are multiple challenges that impede on the progression of wind development, such as lack of community involvement, the inconsistency, the absence of a clear process from DRDLR and supporting regulation.

As a consequence of the risks listed by the developers, these are subject to land claims, disputes, legal action or the loss of equipment. The study has highlighted the fact that the lack of land-ownership structures causes a significant delay in onshore wind energy project development and this could negatively affect reaching of financial close. The strategies that were proposed can be applied in an attempt to mitigate the challenges, such as, identifying the stakeholders involved in land lease acquisition, adequate community engagements in all the development stages, and addressing administrative tailbacks and impervious land acquisition processes. The government agency, DRDLR, which is supposed to enhance the process of land related engagements was said to have caused significant hiccups, resulting in prolonged land related agreements. Ultimately, it was concluded that all the stakeholders need to be adequately identified and the interests of all the supporting stakeholders should be reasonably protected in order to ensure timely wind energy project delivery.

5 Chapter Five: Conclusions and Recommendations

5.1 Conclusion

This study aimed to investigate the pre-financial close risks associated with communal land ownership rights in developing wind energy projects. This was motivated by the global quest for renewable energy, the ongoing interest by investors in wind energy projects in South Africa and the consequential land requirement for wind project infrastructures. The need to understand the spread of wind energy projects among different land ownership structures fuelled the objectives of the study. The research objectives were pursued on the basis of the research questions which sought to establish how much land in South Africa is categorized as communal; how the approach to developing projects on communal land differs from privately owned land; and finally what risks are associated with development on communal land and how can these risks be mitigated.

The study reiterated the complicated land structures of communal land and the undocumented mechanism to facilitate ownership processes. While certain regulatory policies, such as the Communal Land Rights Act, was intended to devolve decision-making powers from the state to traditional authorities entrusted with making decisions on behalf of the community, the legal security tenure of communal land-dwellers has not been a challenge. The Department of Rural Development and Land Reform (DRDLR) has not served those already disadvantaged by their social and political status. The findings suggest that the Department has not established a streamlined process that developers can follow to secure communal land leasehold rights, given that the process is time-consuming

The responses from developers also exposed the inefficiency on the part of the government agency saddled with the responsibility of ensuring a seam-free lease holding process. Specifically, based on the subsidiary questions, the following conclusions could be drawn:

- In the case of privately-owned land, it may suffice to consult only the landowner who holds the title deed. In contrast, in the case of communal land, multiple stakeholders need to be consulted before the land lease agreement can be reached. In most cases, various stakeholders within the community often have conflicting interests. These findings indicate that differences exist in land negotiation approaches for communal and privately-owned land.

- Effective stakeholder management and adequate consultation are highly relevant and very critical to reaching financial close. The research identified the prominent role of stakeholders, the need for consultation and the formation of an intergovernmental task force which could fast track the engagement between the developers and the communal landowners toward a timely financial close.

As evidenced in the cases of Kinangop, and Turkana Wind Projects in Kenya, when governments and developers overlook the process of identifying and effectively engaging with affected communities, they expose themselves to the risk of financial loss, reputation damage and multiple risks to development. In South African, the dispute over communal land too has halted the development of R 1.1 billion biomass energy facility.

Ultimately, this study highlighted the impact of land ownership structure on the reaching financial close. It was noted that wind energy projects located on communal land have experienced significant delays due to land related challenges. Moreover, the identification of stakeholders involved in land lease acquisition, adequate community engagements in all the development stages, and addressing the administrative tailbacks and impervious land acquisition processes were suggested as strategies to mitigate the identified challenges.

5.2 Recommendations

The following recommendations are proposed in order to take this study further;

Recommendation 1: While the questionnaire for this study included wind project developers, it omitted communities and government departments due to time and resource constraints. In order to achieve a balance, a further study which incorporates the opinions of the communal landowners and the government agencies should be included to create a body of understanding from multifaceted perspectives.

Recommendation 2: South Africa is well endowed with vast renewable energy resources and a large share of communal land lies in the eastern and the northern pockets of the country. It would, therefore, be of interest to expand the study to incorporate all other renewable energy resources on communal land.

Recommendation 3: A further study which can quantify and model the cost and socioeconomic impact of delay at the pre-financial close stage of wind projects should be undertaken.

Recommendation 4: It would be critical for the Government to establish policies and procedures to register communal land and to protect land tenure on communal land to establish a well-documented process the for lease and the acquisition process on communal land to encourage private sector investment. Further research is required to determine the types of policies that could be an impetus to renewable energy investment in rural communities living on communal land.

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7 Appendix

7.1 Ethics Report

Application for Approval of Ethics in Research (EIR) Projects
Faculty of Engineering and the Built Environment, University of Cape Town

APPLICATION FORM

Please Note:
Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form **before** collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: http://www.ebe.uct.ac.za/ebe/research/ethics1

APPLICANT'S DETAILS		
Name of principal researcher, student or external applicant		Bothokgami Mokone
Department		Mechanical Engineering
Preferred email address of applicant		bothokgami@yahoo.co.uk
If Student	Your Degree: e.g., MSc, PhD, etc.	MPhil
	Credit Value of Research; e.g., 60/120/180/360 etc.	120
	Name of Supervisor (if supervised):	Dr Amos Madhlopa
If this is a researchcontract, indicate the source of funding/sponsorship		Click here to enter text.
Project Title		Investigation of the risk to investment in renewable energy projects associated with communal land ownership rights

I hereby undertake to carry out my research in such a way that:

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

SIGNED BY	Full name	Signature	Date
Principal Researcher/ Student/External applicant	Bothokgami Mokone	Signature Removed	**17 Febraury 2018**

APPLICATION APPROVED BY	Full name	Signature	Date
Supervisor (where applicable)	Dr Amos Madhlopa	Signature Removed	**19 Feb 2018**
HOD (or delegated nominee) Final authority for all applicants who have answered NO to all questions in Section1; and for all Undergraduateresearch (Including Honours).	Prof Harald Winkler	Signature Removed	Click here to enter a date.
Chair : Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the above	pp. S. Keen	Signature Removed	28/3/18

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7.2 Consent form

INFORMATION SHEET & CONSENT FORM

A study on communal land ownership rights in South Africa: Investigating pre-financial close risks in developing wind energy projects associated with communal land ownership rights

This Informed Consent Form has two parts:

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signature if you choose to participate)

Information Sheet

My name is Bothokgami Mokone, I am conducting a research study towards a master's degree in Energy and Development Studies at the Energy Research Centre, University of Cape Town. I am researching the pre-financial close risks in developing wind energy projects that are associated with communal land ownership rights, and I would like to invite you to participate in the project.

As renewable energy has become industrial in scale, score of land is required to develop and generate renewable energy sources. However, for community's land remains a key resource from which value can be derived. We are therefore interested in finding out about delays, stoppages and legal interventions due to communal land ownership rights during the development stage of wind energy projects. We would like to understand the importance of land related risks in investing in wind energy projects and understand the developer's perspective in investing for a sustainable future. We would like the participation of developers who are within the renewable energy sector and/or have previously participated within the Renewable Energy Independent Producers Power Producer Procurement Programme (REIPPPP).

Participation in this study is voluntary. If you choose not to participate, there will be no negative consequence. If you choose to participate, but wish to withdraw at any time, you will be free to do so without negative consequences.

The questionnaire relates to wind energy development in your line of work and can be completed in your comfortable space. Completion of the questionnaire would require approximately 10-15min of your time, no traveling on your part will be involved and there are no financial benefits from participating in this study. The researchers would like to contact you for a semi-structured telephonic interview as a follow-up to the questionnaire. Although there will be no direct benefit to you, your participation in this research is likely to contribute to the understanding of the risks associated with communal land ownership rights.

Anonymity and Confidentiality

There is a risk you may share confidential information, therefore, the participant is free to state what they will allow to be used in the research.

The researchers understand the high levels of confidentiality in the renewable energy process, therefore the researchers are resolved to maintain confidentiality by signing a confidentiality agreement. During data cleaning and analysis, the responses will be kept anonymous by allocating an identifier for projects and developers. The identifiers will be stored in a protected file, while the data used for the research will be stored in a separate protected file.

On the completion of the research, all the participants in the study will have an opportunity to review and comment on the research draft prior to the final submission.

Please sign below to acknowledge your participation in this research.

Name of participant ....

Date ....

Signature of participant ....

7.3 QUESTIONNAIRE

UNIVERSITY OF CAPE TOWN

Faculty of Engineering and the Built Environment

QUESTIONNAIRE
WIND ENERGY DEVELOPERS

Energy Research Centre
University of Cape Town
2019

Project title: A study on communal land ownership rights in South Africa: Investigating pre-financial close risks in developing wind energy projects associated with communal land ownership rights

The point of departure for this study is that communal land ownership rights have previously affected development of renewable energy projects. In view of this, the study aims to identify and investigate the pre-financial close risks associated with wind energy development on communal land and the extent to which those risks inhibit development of wind energy projects.

Important: Participants may remain anonymous in their response

Name of Institution: ………………………………. ………………………………………

Name of Respondent (Optional):

………………...………………………………………….

Email (Optional)………………………… telephone (Optional)…………………………...

Please use a separate sheet to answer questions should the spaces provided below be insufficient.

1. Are you a wind energy developer?

YES	NO

2. In which countries does your organization operate?

3. Have you been involved in developing wind energy projects in South Africa?

YES	NO

If **yes**,

a. how many of those projects are pursued or developed on community land?

b. how many of those projects are pursued or developed on private owned land?

4. Does your organization follow a defined procedure in securing leasehold agreements from **private landowner**?

YES	NO

5. Does your organization follow a defined procedure in securing a leasehold agreement from **communal owned land**?

YES	NO

6. How does the approach to developing wind farm projects on communal land differ from privately owned land?

____
____
____
____

7. Have you encountered difficulties (risks) in developing wind projects on communal land in South Africa?

Yes	No

If **yes**, please select nature of difficulty/ risks

Technical risks	
Legal risks	
Economic risks	
Social risks	
Political risks	

Where a **risk is indicated**, please share your experiences

____
____
____
____
____

8. As a result of the risk(s), did the project (s) experience the following

Outcome	**Tick √**	**Number of projects**
Delays		
Legal action		
Stoppages		
Land claim/ disputes		

9. Have the projects mentioned above reached financial close?
   a. **Yes** – within scheduled time
   b. **Yes -** ________________________________ period from schedule
   c. **No** – it has been ___________________________time outside schedule

10. Rank the following **12 project risks** according to severity in the development process

    Where

- **1** is major concern; and
- **12** is not a concern

Political uncertainty	
Environmental permits	
Grid connection	
SED commitments	
Project performance	
Land ownership	
Site quality risks	
Off-taker	
Social unrest	
Skills deficit	
Procurement process	
Currency	

11. Additional comments on project risks in developing on communal land.

12. Additional comments on project risks in developing on private owned land.

Disclaimer: *This questionnaire may change depending on the outcomes of the research in the different phases of the study. The researchers would also like to contact you to expand on your answers.*