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Critical Success Factors for Financing Renewable IPPs in South Africa

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By

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Declaration

I, Someleze Noxolo Hamilton-Tshangela, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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Abbreviations

APEC	Asia Pacific Economic Cooperation
BASIC	Brazil, India, China and South Africa
CO2	Carbon Dioxide
CSF	Critical Success Factor
DA	Direct Agreement
DBSA	Development Bank of South Africa
DPE	Department of Public Enterprise
DOME	Department of Minerals and Energy
DPE	Department of Public Enterprises of the Republic of South Africa
ESI	Electricity Sector Industry
FIT	Feed-in-tariffs
GHGs	greenhouses gases
IPP	Independent Power Producer
HARP	Heightening your Awareness of your Research Philosophy
IA	Implementation Agreement
IRP	Integrated Resource Plan
IRR	Internal Rate of Return
MW	Megawatts
NERSA	National Energy Regulator of South Africa
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PV	Photovoltaic
RE	Renewable Energy
REIPP	Renewable Independent Power Producer
REIPPP/ REIP4	Renewable Independent Power Producer (Procurement) Programme
REWP	Renewable Energy Policy of the Republic of South Africa
RET	Renewable Energy Technology
RFP	Request for Proposal
SA	South Africa
SPIPPP	Small Projects Independent Power Producers Programme
SME	Small to Medium Enterprise
SOE	State-Owned Enterprise
UNFCCC	United Nations Framework Convention on Climate Change

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Abstract

This dissertation investigates the critical success factors in financing Renewable Energy Independent Power Producers (REIPPs) in South Africa, focusing on both programme-level and project-level elements. By analysing financial, regulatory, and operational aspects, the research explores the key elements that impact on the bankability and sustainability of REIPP projects. This study adopted a qualitative research methodology, employing semi-structured interviews as the primary means of data collection. These interviews were conducted remotely via Microsoft Teams, recorded, and transcribed to ensure responses were captured accurately. The interview framework was developed based on extant literature, in particular Gratwick and Eberhard (2016) and Kruger (2021), to explore the programme-level and project-specific success factors influencing South Africa's Renewable Energy Independent Power Producer Procurement (REIPP) programme. A semi-structured approach was employed, incorporating both open- and close-ended questions to enable guided discussions and follow-up questions for deeper insights. This research is grounded in qualitative data collected from 10 interviews with key stakeholders involved in South Africa's REIPP programme. The sample includes two REIPP developers, two financial investors, and six advisors, providing a comprehensive perspective on the programme-level and project-level factors contributing to the programme's success.

To assess the effectiveness of South Africa's REIPP programme, this study develops an analytical framework that examines both programme-level and project-level factors. At the programme level, the framework evaluates auction design and implementation, including procurement volume distribution, bidder selection criteria, and the efficiency of auctions in ensuring timely project execution (Kruger, 2021). At the project level, the framework considers determinants of project success, including financial feasibility, technical expertise, regulatory compliance, and stakeholder engagement as key determinants of project success. By integrating these factors, the framework offers a holistic perspective on how procurement mechanisms and project-level dynamics influence the overall effectiveness and sustainability of the REIPP programme thematic analysis of the interview data highlights the critical role of financial accessibility, the creditworthiness of off-takers like Eskom, the availability of skilled contractors, and the adequacy of grid infrastructure in achieving successful project execution. At the programme level, factors such as competitive bidding models, project scale, and regulatory efficiency are essential in ensuring the long-term sustainability of REIPPs. The study emphasises the importance of well-structured tariff models, transparent bidding processes, and streamlined regulatory frameworks to address current challenges.

Key strategic recommendations include enhancing financial mechanisms, increasing investment in grid infrastructure, and ensuring policy consistency to support South Africa's transition to renewable energy. These findings not only apply to South Africa but also offer valuable insights into other emerging economies seeking to develop their renewable energy sectors. Further research is recommended to explore innovative financing strategies, government policies, and long-term project performance to sustain progress in the renewable energy industry

Contents

Chapter 1
Introduction

1.1 Background to the study

Identifying and addressing the critical success factors for financing Renewable Independent Power Producers (REIPPs) in South Africa is essential in tackling two major challenges: the country's ongoing electricity crisis and the emission of greenhouse gases. Both issues have far-reaching effects on the South African economy and environmental well-being.

Until just over a decade ago, renewable energy investment in South Africa was virtually non-existent. Until 2009, the country's economy was heavily dependent on fossil fuels, with coal supplying approximately 70% of its energy needs and contributing 1.6% of the global greenhouse gas emission (Corkin, 2018; Du Toit, 2012). In 2020, South Africa was ranked the most polluted country in Africa, emitting nearly 452 million metric tons of carbon dioxide (CO2) that year (Statista, 2022). Despite being among the top three countries worldwide for solar power generation, and possessing the potential for significant wind powered energy (Corkin, 2018), South Africa had the lowest private sector investment in renewable energy among Brazil, India, China and South Africa (the BASIC group of countries) with just USD 125 million in investments (Statista, 2022). This was even though South Africa was ranked in the top 1% (top 3 countries) of the world.

South Africa's approach to renewable energy has had a turbulent history. The country first introduced renewable energy policies in 1998 with the publication of the White Paper on Renewable Energy Policy of the Republic of South Africa (REWP) (Corkin, 2018). The White Paper on Energy Policy emphasised the need to diversify South Africa's energy sources. In 2003, in alignment with South Africa's commitments under the Paris Agreement, an updated policy highlighted the necessity of cleaner energy alternatives. After extensive policy discussions and consultations with the private sector, the Integrated Resource Plan (IRP 2010) was introduced in 2010, setting long-term technological and energy production goals for the next two decades (Corkin, 2018).

However, it was only in 2011 that South Africa officially launched the Renewable Independent Power Producers Programme (REIP4/REIPPP) to stimulate the integration and development of REIPPs in the economy. This initiative aimed to fulfil the objectives outlined in IRP 2010,

with a target of generating 17,800 megawatts (MW) of electricity from renewable sources by 2031 (Corkin, 2018).

Despite these efforts, South Africa is currently experiencing a severe energy crisis. Eskom, the state-owned electricity provider, struggles to meet daily power demands. Eskom CFO, Jan Oberholzer, acknowledged that the utility is doing its best to balance supply and demand; however, its aging, unreliable infrastructure has been failing for years (Nair, 2022).

Given the need for renewable energy expansion to meet the demands of South Africa, it is paradoxical that REIPPs account for only 10% of South Africa's total electricity market (South African Government, 2021), even after more than a decade since the White Paper on Renewable Energy was introduced.

To drive the success of REIPPs, it is crucial to consolidate insights from existing literature and key stakeholders, including investors (debt and equity providers), the private sector (IPPs/REIPPS), the regulatory bodies such as NERSA, Eskom, legal and technical advisors, and other stakeholders, to determine what is required for REIPPs in South Africa to succeed.

The performance of Independent Power Producers (IPPs) varies across different countries, and South Africa’s energy sector presents unique challenges due to Eskom’s monopoly in the electricity sector (Eskom). This dominance creates significant barriers to entry, making it essential to understand the country’s energy ecosystem and the factors that drive success for REIPPs. Despite being in operation for over a decade ago, investment levels in South African REIPPs remain lower than in many other countries. In addition, the exact criteria for securing bids and establishing financially and operationally viable REIPPs remain unclear. Furthermore, currently there are very few REIPPs in South Africa in relation to Eskom, which is relies heavily on coal as a feedstock to produce electricity.

This empirical study undertakes a comprehensive analysis of literature to identify and evaluate the critical success factors for REIPPs in South Africa at both the programme and project levels.

1.2 Problem Statement

This study aims to address the following problem areas:

- The participation of Renewable IPPS (REIPPs) in South Africa's electricity sector remains low, despite the country's significant renewable energy potential. This has concerning implications for both economic growth and environmental sustainability.

- There is disconnect and information asymmetry between investors, REIPP owners, and other stakeholders regarding the factors necessary for successful bidding, financing, implementation, and operation of REIPPs in South Africa. A clearer understanding of these factors is essential to attract investment and ensure project success.

- The specific programme and project-level factors that contribute to the success of REIPPs in South Africa in the context of programme and project level factors require further investigation, revision, and refinement. Existing studies have limitations, and a more updated and detailed analysis is needed to identify key success determinants.

A. The low participation of REIPPs in the electricity sector of South Africa Case

The percentage of households with access to electricity increased from 61% in 2001 to 83% in 2011, marking essential progress in a country striving to enhance social justice. However, poor electricity capacity management led to demand surpassing supply in late 2007, resulting in widespread blackouts that persisted well into 2008. While conditions eventually stabilised, scheduled rolling blackouts, known as load-shedding, have become increasingly frequent since 2013. Load-shedding has had a significantly disruptive effect on both the economy and the daily lives of South Africans (Smarte Anekwe et al., 2024).

The REIPP Programme aimed to add more megawatts to the nation's electricity grid through private sector investment in energy sources like wind, solar, biomass, and hydro. There are several advantages to promoting increased renewable energy in South Africa. In addition to environmental benefits, renewable energy projects have significantly shorter lead times than fossil-fuelled power plants. Additionally, renewables can provide off-grid, localised power

remote areas, leveraging South Africa's abundant wind and solar resources to generate substantial energy (Smarte Anekwe et al., 2024).

Expanding South Africa's reliance on renewable energy has the potential to transform the country's persistent power shortages. However, the current market share of renewables remains low compared to fossil fuels. In 2008, only 0.63% of South Africa's electricity was generated from renewable sources, increasing 2008. By 2020, this proportion had increased to 6.25%, with coal still accounting for 88.6% of the energy used to generate power. South Africa aims to increase renewable energy's share to 25% of its energy mix by 2030, reducing coal use to "less than 60%" (Smarte Anekwe et al., 2024). Achieving this target will require more than a 50% increase in renewable energy capacity over the next years.

Since its inception in 2011, the REIPP Programme has played a crucial role in expanding South Africa's renewable energy market. Through this initiative, the government identifies renewable energy projects in phases and invites proposals from both domestic and international private sector investors (Smarte Anekwe et al., 2024). To contribute to the national grid, all REIPPs in South Africa must participate and comply with the REIPP Programme. As a result of the REIPPP, over 6 000 MW of generation capacity, primarily from wind and solar, has been allocated to successful bidders, positioning the programme as a model for other African nations (The South African Government, 2021). There is a potential for greater participation in the initiative to help mitigate power shortages and achieve the 2030 renewable energy targets. The success of the programme will depend on ensuring an efficient and transparent bidding process that supports investors.

B. Addressing information asymmetry among stakeholders to strengthen REIPPs in South Africa

Information asymmetry occurs when one party in a transaction has more or better information than the other, creating an imbalance of power that can lead to market inefficiencies or exploitation (Bergh et al., 2019). This issue has been a significant challenge in South Africa's Renewable Energy Independent Power Producer (REIPP) procurement process.

A wide range of stakeholders are involved in the REIPP process, from the initial conception of projects to their operational stages. These include bidders and investors (providing equity and debt) who rely on the information presented to them by bidders; Eskom, which currently holds

a monopoly over South Africa's electricity sector; and NERSA, the regulatory authority responsible for issuing licenses, mediating disputes, setting and approving electricity tariffs, ensuring compliance, and promoting competition. The Department of Energy (DoE) plays a crucial role in policy development, energy sector planning and regulation, promoting renewable energy, ensuring energy access, and supporting research and development. Additionally, suppliers become key stakeholders once IPPs enter the operational phase.

However, these stakeholders do not have equal access to information leading to information asymmetry. The complexity is further compounded by the bidding process, which requires inputs from multiple stakeholders for a bid to be successful. A coordinated and collaborative approach among all stakeholders is essential.

South Africa's REIPP process was designed to drive renewable energy development through a competitive bidding system (Department of Energy, Republic of South Africa, 2021). A significant challenge in this process is the unequal distribution of information between the government and potential bidders (Albertus, 2019; Xiong, Zhao, & Wang, 2019). The government has extensive knowledge of the country's energy needs, regulatory frameworks, and evaluation criteria, giving it the power to shape the bidding process and influence outcomes (Albertus, 2019; Xiong, Zhao, & Wang, 2019). In contrast, potential IPPs may lack crucial insights into government priorities, selection criteria, and market conditions. This information asymmetry makes it difficult for bidders to make informed decisions regarding project development, financial modelling, and risk assessment (Albertus, 2019; Xiong, Zhao, & Wang, 2019).

Additionally, South Africa's, Electricity Sector Industry (ESI) operates within a complex institutional and regulatory framework, shaped over time by political power dynamics and competing interests (Das Nair, Montmasson-Clair & Ryan, 2014). Limited resources and unclear mandates within the DoE and NERSA have contributed to an information asymmetry that favours Eskom, making regulatory oversight even more challenging (Das Nair et al., 2014).

Efforts have been made to improve transparency in the REIPP process. The South African government has sought to reduce information asymmetry by publishing rules, regulations, and

frequently asked questions (Department of Energy, Republic of South Africa, 2021). It has also engaged with stakeholders and industry participants to gather feedback and address concerns.

Despite these efforts, information asymmetry remains a persistent challenge. IPPs continue to struggle with accessing accurate and up-to-date information regarding policy changes, regulatory updates, and future procurement plans (Albertus, 2019; Xiong, Zhao, & Wang, 2019). This uncertainty can undermine investor confidence and hinder the growth of renewable energy projects. Addressing this issue will require ongoing efforts to enhance transparency, increase communication, and ensure that all stakeholders have access to current and reliable information.

This research seeks to consolidate the latest insights from various stakeholders and academic sources to mitigate information asymmetry in the REIPP process. Reducing these information gaps is crucial to attracting private investment and accelerating the growth of REIPPs market share in South Africa's electricity sector.

C. Limitation of the previous studies

Several authors have examined the factors that contribute to the success of Renewable IPPs. However, the REIPP landscape is continuously evolving, particularly within the South African context.

Zunguze (2017) explored critical success factors for financing IPPs in Zimbabwe; however, the Zimbwean context and South African context differ. South Africa's unique political, economic, and social circumstances influence the context-specific success factors for REIPP initiatives. Factors that drive success in one country or region may not be directly applicable to South Africa. Therefore, when interpreting findings from previous studies, it is essential to consider the South African context.

Additionally, the REIPP landscape is constantly evolving, particularly within South Africa. Gratwick and Eberhard's (2016) framework remains one of the most comprehensive and useful analytical tools for explaining IPP outcomes in Africa. However, their study primarily focused on country and project-level factors. Kruger (2021) later expanded on this work by incorporating programme-level factors for the first time to assess the South African IPP

landscape. Given that the policy and regulatory environment for REIPPs is dynamic and continuously shifting, earlier studies may have focused on specific stages of the REIPP process or analysed periods when certain policy frameworks were in place. As a result, previous studies may not fully account for future policy changes, evolving market conditions, or their impact on success factors, making some findings outdated. This study seeks to integrate the most up-to-date to reassess and refine the critical success factors for financing REIPPs in South Africa, with a particular focus on programme- and project-level factors.

Finally, variations in research methodologies, whether qualitative, quantitative, or mixed-method approaches, have led to differences in findings and interpretations in previous studies. Differences in sampling methodologies, data collection methods, and analytical frameworks make it challenging to compare and synthesise results across studies, potentially limiting the broader applicability of the findings (Monyei & Akinbami, 2016). While this study adopts a qualitative approach, which presents certain limitations, it also offers a unique perspective that contributes to the existing body of knowledge on REIPPs in South Africa.

1.3 Research question and objective

Based on the research problem statement, this study seeks to answer the following research question:

- What are the critical factors essential for project and programme success of REIPPs in South Africa?

The corresponding research objective is:

- To explore the success factors that contribute to project and programme levels success of REIPPs in South Africa (SA)

1.4 Significance of the study

The aim of this study is to develop a comprehensive understanding of the critical success factors for financing REIPPs in South Africa, with a particular focus on programme- and project-level factors. By analysing existing literature and conducting interviews, the study identifies the key factors that financiers and other stakeholders consider essential for the successful implementation of REIPPs in South Africa. These insights will inform strategies

and recommendations that both REIPPs and financiers can adopt to enhance successful REIPP implementation in South Africa.

The study is particularly valuable for REIPPs and other stakeholders, as it provides deeper insights, into financing and implementation challenges, offering potential solutions to overcome these obstacles. Additionally, it can help REIPPs refine the elements included in their bids, ultimately improving the quality of submissions and increasing the likelihood of successful implementation and completion of REIPP projects.

On a national level, the study sheds light on the factors contributing to unsuccessful bids and explores ways to support REIPPs during the bidding process. Increasing the number of successful REIPP projects is crucial to South Africa's goal of adding 19 400 MW of renewable energy by 2030, thereby reducing the country's heavy dependence on coal and nuclear power. This transition will not only address the ongoing electricity crisis, but also contribute to South Africa's economic growth.

From an environmental perspective, climate change is one of the most pressing challenges of the century, and business as usual could lead to severe consequences if left unaddressed (Pegels, 2010). Reducing GHG emissions is therefore a critical priority. However, South Africa remains on an unsustainable trajectory of increasing fossil fuel dependency, despite its vast potential for renewable energy generation (Pegels, 2010). Increasing investment in REIPPs in South Africa will advance Sustainable Development Goal (SDG) 7: "Affordable and clean energy- ensure access to affordable, reliable, sustainable, and modern energy for all" (United Nations, 2021). By promoting SDG 7, South Africa will also fulfil its commitment as a signatory to the Paris Agreement, working to combat climate change by reducing the GHG emissions.

Overall, this study is significant as it contributes to the existing body of knowledge on REIPPs in South Africa while also examining the factors that influence the ability of individual REIPPs to secure financing successfully.

1.5 Scope and justification of the study

The study is significant as it provides a comprehensive analysis of the challenges faced within South Africa's REIPP environment. Additionally, insights from Zunguze (2017) suggest that for South African IPP developers and other stakeholders, this research offers valuable information that may help address financing and implementation challenges, ultimately facilitating the successful completion of their projects.

From an investor perspective, commercial banks and Development Finance Institutions (DFIs) may need to reassess the criteria used to allocate financing to Small and Medium Enterprises (SMEs), REIPPs, and determine whether policy adjustments are necessary. Furthermore, Key Performance Indicators (KPIs) and financial determinants previously used to assess SME REIPPs should be re-evaluated to ensure they remain relevant and effective.

The study also plays a crucial role in supporting entities committed to combating climate change and ensuring that financing criteria for IPPs are equitable. South Africa, as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, has committed to implementing policies aimed at slowing or reversing global temperature increases. In 2019 South Africa introduced a carbon tax with the goal of reducing GHG emissions by 34% in the short-term to medium-term and 42% in the long-term. It is therefore essential for South Africa to promote projects that not only address electricity supply shortages but also contribute to lowering the country's carbon footprint, which is predominantly driven by coal-based electricity generation.

For broader communities, IPPs play a vital role in job creation and economic empowerment. This study seeks to fairly assess the financial determinants used to finance REIPPs, ensuring they can gain market share and become key players in the energy sector.

1.5 Organisation of the study

Chapter 1 introduced the background of the study, focusing on the critical success factors for financing REIPPs in South Africa, particularly at the programme and project levels. It provided an overview of the history of REIPPs, the structure of South Africa's electricity sector, and the urgent need for REIPPs to safeguard the environment. The chapter also outlined the problem statement, detailing the gaps this study aims to address, followed by the study's objectives.

Section 1.4 discussed the significance of the research, highlighting its relevance to various stakeholders. Lastly, Section 1.4 elaborated on the scope and justification of the study.

The remainder of the research study is structured as follows:

Chapter 2 presents a review of the literature and relevant research on the key characteristics of REIPPs that successfully secure financing in South Africa. It explores programme and project-level factors influencing REIPP success as discussed in theory and literature, and assesses the adequacy of these determinants. The literature review also examines key outcomes in the context of programme and project level factors in South Africa. Lastly, Chapter 2 explores the literature that discusses the disadvantages as well as the advantages of private infrastructure investment from an investor perspective.

Chapter 3 presents the research methodology, including data collection and analysis procedures.

Chapter 4 presents the data analysis and the results.

Chapter 5 presents the conclusion and discussion of the study's findings as well as recommendations for REIPP developers and other stakeholders. It also provides suggestions for future research. The report concludes with sections for references and appendices.

Chapter 2

Literature review

2.1 Introduction

The next section of the study begins by defining key terms used throughout the study. Following this, an overview of South Africa's electricity sector is provided to establish the context in which REIPPs in South Africa operate. The study then examines the history of REIPPs in South Africa, evaluating their performance across different bidding windows. Understanding this background is key for capturing the perspective of REIPP owners and key stakeholders involved in the REIPP bidding programme.

Next, the study explores the barriers and challenges associated with financing energy projects, with a particular focus on the advantages and disadvantages of using project finance for infrastructure investments. Since REIPPs in South Africa are structured as project-finance ventures, it is crucial to investigate the benefits and drawbacks of this approach to structuring projects. This analysis provides valuable insights from an investor perspective, as well as from financial, legal, and technical advisors involved in IPP investments in South Africa.

Building on this foundation, the study investigates and develops a theoretical framework to identify the critical success factors for financing REIPPs, specifically at both the programme and project levels. This chapter reviews empirical literature on critical success factors in IPP financing. Finally, the chapter summary ties together the key discussions presented in this section.

2.2 Definition of terms:

2.2.1 IPPs

An IPP is a privately or cooperatively owned entity that generates electricity for sale to utilities and end users, as opposed to a public entity. These entities can take various forms, including private corporations and cooperatives (GET. Invest., 2020).

A traditional IPP is typically a privately financed and developed power plant that sells electricity to a public electricity grid through long-term contracts with the state utility (Woodhouse, 2005b). The primary offtaker is usually a state-owned electric company, although

private distributors and large private consumers may also act as offtakers. These projects are often financed on a case-by-case basis through a project-specific company. Equity is sourced from a mix of foreign and domestic investors, while debt financing is typically arranged through a banking consortium. Most projects are highly leveraged, with debt comprising a significant portion of the financing, subject to bank syndicate approval (Woodhouse, 2005a). Renewable IPPs specifically refer to those utilising clean energy sources such as solar, wind, and hydropower for electricity generation.

2.3 Overview of South Africa's electricity sector

South Africa's electricity sector is in crisis, primarily due to its heavy reliance on Eskom, the state-owned utility responsible for generating 95% of the country's electricity. Eskom's aging infrastructure, frequent breakdowns, and load-shedding issues have left the sector in a deteriorated state. Additionally, shifts in the global energy market have raised concerns about Eskom's dependence on fossil fuels. The company is a major contributor to South Africa's greenhouse gas emissions, accounting for approximately 42% of the total, largely due to its coal-based energy production. Furthermore, Eskom's operations have made the surrounding areas the second largest source of sulphur dioxide emissions in the country (Department Public Enterprises (DPE) of the Republic of South Africa, 2021; Eskom, 2021; Lawrence, 2020; Burkhardt, 2019).

2.3.1 Overview renewable energy and IPPs in South Africa

In 2011, the South African government launched the Renewable Energy Independent Power Producer Procurement Programme (REI4P) to encourage private sector investment in grid-connected Renewable Energy (RE) generation in South Africa. The REI4P aims to reduce GHG emissions and reduce South Africa's dependence on coal and nuclear energy. By leveraging private sector expertise, REI4P has successfully facilitated energy investments into grid-connected renewable energy in South Africa at competitive prices (Eberhard et al., 2014).

By 2011, South Africa had 112 renewable energy projects with a total installed capacity of over 6,300 MW. Between 2011 and 2015, project costs dropped significantly, falling below Eskom's average selling price. Notably, all 92 projects from the initial bidding rounds reached financial close by the end of 2019, with the majority comprising onshore wind, solar photovoltaic (PV), and concentrated solar power (Kruger, 2021).

The South African Government's Integrated Resource Plan (IRP) 2010-2030, managed by Eskom and the Department of Mineral Resources and Energy (DMRE), oversaw four REIPPPP bidding rounds between 2011 and 2021. These competitive tenders enabled private sector and IPP participation in the country's renewable energy market sector (Kruger, 2021).

2.3.2 Successful Case Studies: REIPP Deals in South Africa

a) Case Study 1: *Success Story of South Africa's Wind Power Project: Gibson Wind Farm Project*

Project Overview

The Gibson Bay Wind Farm is a notable example of South Africa's REIPPP. Developed by Enel Green Power (EGP) in partnership with local partner Red Cap, the project showcases the effectiveness of renewable energy initiatives in the country. EGP, a subsidiary of Enel, launched the project in 2017, making it the company's second wind farm under the programme (Engineering News, 2017).

The project was approved by the Department of Energy's during Round 3 of the REIPPPP (Engineering News, 2017). Situated in the Kouga Municipality in the Eastern Cape Province, the 111 MW wind farm comprises 37 turbines, including 373 MW Nordex Delta wind turbines. It is capable of generating approximately 420 GWh annually, supplying electricity to around 131,000 South African households, and preventing the emission of over 383,000 tonnes of CO2 per year (Enel Green Power, 2023).

Critical Success Factors of the Project

Several critical elements contribute to the success of the Gibson Bay Wind Farm within the REIPPP framework: Firstly, the programme ensured that the most competent and cost-effective projects were selected through a rigorous technical, financial, and environmental evaluation process (Enel Green Power, 2023).

The Eastern Cape's strong wind conditions attracted investors. Detailed wind studies helped minimise uncertainty, allowing for accurate predictions of energy production and financial returns (Enel Green Power, 2023).

Red Cap's local expertise was instrumental in the partnership for navigating local regulatory requirements, securing community participation, and project delivery, in compliance with South African laws and policies (Enel Green Power, 2023).

South Africa's Integrated Resource Plan (IRP) and National Development Plan (NDP) provided a strong policy framework for renewable energy (Republic of South Africa, 2019). Additionally, a 20-year Power Purchase Agreement (PPA) with Eskom ensured long-term revenue stability, reducing financial risks for investors (Enel Green Power, 2023).

Environmental and Economic Outcomes

The Gibson Bay Wind Farm has delivered significant environmental and economic benefits. The project created approximately 590 direct jobs during construction and 20 permanent operational roles, alongside skills training programs (Enel Green Power, 2023).

In terms of environmental impact, the Gibson Bay Wind Farm helps reduce greenhouse gas emissions. The project is expected to reduce CO2 emissions by approximately 420,000 tons annually, contributing to South Africa's climate action goals (Enel Green Power, 2023. By replacing fossil fuel-based electricity, the wind farm strengthens South Africa's energy security and promotes a sustainable energy mix (Republic of South Africa, 2019).

From a corporate social responsibility perspective, EGP has actively contributed to uplifting local communities through various initiatives. The project allocated 4.2% of its gross revenue to socioeconomic development, with a community trust holding a 40% share in the project company. Initially, the trust is repaying the loan before funds are directed to the community (Windaba, 2016). During the construction of the wind farm and in the operational phase, community support programmes included school meals, nutritional education, and health initiatives such as for learners, as well as free WIFI for public spaces in low-income communities (Windaba, 2016). The Soul Provider school feeding programme has benefitted approximately 2 850 learners. In addition, free EGP Wi-Fi serves local learning institutions, benefitting 1000 students (Engineering News, 2017). Additional projects include local infrastructure development and skills transfer within the community (Enel Green Power, 2023).

Financing for the Gibson Bay Wind Farm

The Gibson Bay Wind Farm secured funding through Inspired Evolution Investment Management, a venture capital firm that raised ZAR for the project (Windaba, 2016).

Summary

The Gibson Bay Wind Farm exemplifies the success of South Africa's REIPPP initiative, demonstrating how competitive bidding, strong policy support, strategic local partnerships, and sustainability-focused investments can drive renewable energy adoption, job creation, emission reduction, and community development.

b) Case Study 2: Success Story of South Africa's Wind Power Project Jasper Solar Power Project

Project Overview

The Jasper Solar Power Plant is a standout success under South Africa's REIPPP. Developed by SolarReserve, a global leader in solar thermal and photovoltaic energy solutions, this project showcases the transformative potential of solar energy in driving sustainable development. Located in the Northern Cape, the Jasper Solar Power Plant was designed to deliver 96 MW of solar photovoltaic energy. Eskom committed to purchasing 100% of the electricity produced through a 20-year PPA (Labuschagne, 2021). In May 2012, the South African Department of Energy selected the Jasper project during Round 2 of the REIPPPP bidding process (Jasper Power Company, 2023).

SolarReserve, a U.S. developer of utility-scale solar power, with a strong track record in renewable energy projects worldwide, was the principal investor, and collaborated with local partners, Kensani Capital Investments and Intikon Energy. Kensani is a South African infrastructure investment firm and Intikon is a South African renewable energy developer. SolarReserve was able to leverage off Kensani and Intikon Energy's knowledge and expertise of the South African landscape (Jasper Power Company, 2023). Jasper Solar Power is the company's third project, following the Lesedi and Letsatsi solar PV plants, both with a 75MW capacity (Jasper Solar Power Plant, Northern Cape, Kimberley, 2023).

Critical Success Factors of the Project

The Jasper Solar Power Plant's success was driven by strategic factors that amplified its impact. Similar to the Gibson Bay Wind Farm project, the REIPPP framework's transparent and competitive bidding process attracted experienced investors such as SolarReserve. This

approach ensured the selection of projects that aligned with South Africa's renewable energy objectives while possessing the technical and financial capacity for successful implementation. Policy alignment also played a critical role. South Africa's commitment to renewable energy was reinforced through the Integrated Resource Plan (IRP) and the National Development Plan (NDP), creating a regulatory framework that encouraged investment and minimised uncertainty (Republic of South Africa, 2019).

To accurately assess the region's solar potential, comprehensive studies were conducted on its solar resources. These evaluations provided essential data for energy yield predictions, enhancing both the project's feasibility and bankability (Jasper Power Company, 2023).

Community engagement was a key factor in the project's success. Through collaboration with local organisations and stakeholders, SolarReserve was able to streamline the approval procedure with local organisations and stakeholders, thus reducing potential problems. Establishing strong local partnerships was essential for the long-term sustainability of the project.

Jasper Power is committed to reinvesting in the community, allocating 1.5% of its annual revenue to socioeconomic development programs, and 0.6% to business development initiatives. Through these contributions, Jasper Power has played an active role in uplifting the Postmasburg area (Jasper Power Company, 2023).

One of the impactful initiatives was a skills development programme launched in partnership with the Groenwater Community Property Association. In 2020, Jasper Power funded training (short courses) for 10 unemployed young people, enabling them to pursue artisan training at the Petra Training Academy in Johannesburg. The training covered a variety of artisan trades, such as boiler making, welding, and drill rig operation. Additionally, the Jasper Project has undertaken various community development initiatives, including sanitation improvements, in which Sanitech was contracted to install dry sanitation toilets in the Danilskuil community within the Kgatelopele Municipal District. Social welfare projects undertaken by Jasper Power in the healthcare sector included paying the stipend of two Postmarsburg Hospital administrators, as the hospital was severely understaffed, and financing repairs and upgrades to the paediatric ward and other hospital facilities (Jasper Power Company, 2023).

Environmental and Economic Outcomes

The Jasper Solar Power Plant has made a significant contribution to reducing carbon emissions by generating clean energy. By replacing fossil fuel-based electricity, the plant supports international climate objectives and enhances South Africa's energy mix (Republic of South Africa, 2019). It produces enough electricity to power approximately 80,000 South African homes and offsets 145,891t of CO2 emissions annually (Jasper Solar Power Plant, Northern Cape, Kimberley, 2023)

Given the chronic water shortage in the Northern Cape region of South Africa, the Jasper Solar Power Plant prioritised sustainability by minimising water usage. Unlike conventional power plants that require substantial amounts of water for cooling, solar photovoltaic technology is far more water efficient. This approach not only helped conserve local water resources, but also eased pressure on the regional supply, reinforcing the project's commitment to environmental sustainability (SolarReserve, 2023).

Financing for the Jasper Solar Power Project

The project was developed with an estimated investment of ZAR 2.3bn ($260m), financed through a combination of equity and debt. Equity investors included Google, the Public Investment Corporation (PIC), Kensani Capital Investments, SolarReserve, Intikon, Development Bank of South Africa, and the P.E.A.C.E. Humansrus Fund. Notably, this was Google's first investment in renewable energy in Africa (Jasper Solar Power Plant, Northern Cape, Kimberley, 2023).

Rand Merchant Bank acted as the sole mandated lead arranger for the debt-funding portion. Legal and financial advisory services were provided by Baker & McKenzie and Kensani Eaglestone Capital Advisory, respectively (Jasper Solar Power Plant, Northern Cape, Kimberley, 2023).

Summary Jasper Solar Power Project

The Jasper Solar Power Project demonstrates how renewable energy initiatives can drive economic growth, environmental sustainability, and social empowerment. By integrating policy support, technological feasibility, strategic investment, community development and

empowerment, and sustainability, the project serves as a model for future energy developments.

Finding the common thread: Critical Success Factors of Successful REIPP Projects in South Africa

The critical success factors for the two cases discussed are not unique to each project. While they differ in size, technology, and location, several common factors contribute to their success. This section identifies the essential traits that make these projects successful.

Government Support and robust regulatory framework

The South African government's commitment to renewable energy is evident through legislation, incentives, and support for the REIPP programme. Policy consistency and stability have played a key role in attracting investors.

Successful REIPP projects benefit from an unambiguous regulatory environment that simplifies project planning, funding, and management. The programme streamlines negotiations and approvals by providing standardised power purchase agreements (PPAs) and clear guidelines. Transparency in project selection, evaluation, and contract awarding ensures fair competition and strengthens stakeholder trust.

Participation of the Private Sector

Successful REIPP projects often involve private-sector businesses specialising in renewable energy. These businesses contribute their technological expertise, efficient management practices, and financial resources, enhancing project viability and quality.

Technology Advances

Integrating cutting-edge technology, such as energy storage systems, improves the reliability and efficiency of renewable energy projects, ensuring a stable power supply and seamless grid integration.

Innovative Financing Models

Many successful projects utilise innovative financing strategies that combine private funding, business loans, and public support programmes. This diversified stakeholder funding approach reduces financial risk and helps overcome funding barriers.

Local economic engagement and environmental considerations

Environmental sustainability is a priority for successful projects, which adhere to strict environmental impact assessments and mitigation strategies to minimise ecological disruptions.

Moreover, these projects contribute to local economic development through job creation, local procurement, and community development initiatives. This fosters public support and project acceptance.

2.4 Conceptual Framework: Critical success factors (CSFs)

A Critical Success Factor (CSF) is a key element that must be executed correctly to ensure project success and achieve stakeholder objectives (Qiao, Wang, Tiong, & Chan, 2001). In this study, a successful outcome is defined as one where investment results in favourable pricing (low costs that still allow for profitability) and where projects are successfully realised.

Gratwick and Eberhard (2016) developed one of the most comprehensive frameworks of contributing elements (Table 1) for analysing IPP outcomes in the Africa. However, this focused primarily on country and project level factors. Kruger (2021) later expanded this framework to incorporate programme level factors, offering a more holistic perspective (Figure 1). By integrating Gratwick and Eberhard's (2016) framework and Kruger's (2021) enhancements, this study evaluates private power investment outcomes for REIPPS in South Africa at both the project and programme levels. These frameworks provide the conceptual foundation for this research, which have been further expanded upon in this study.

Figure 1: Country, programme and project level factors

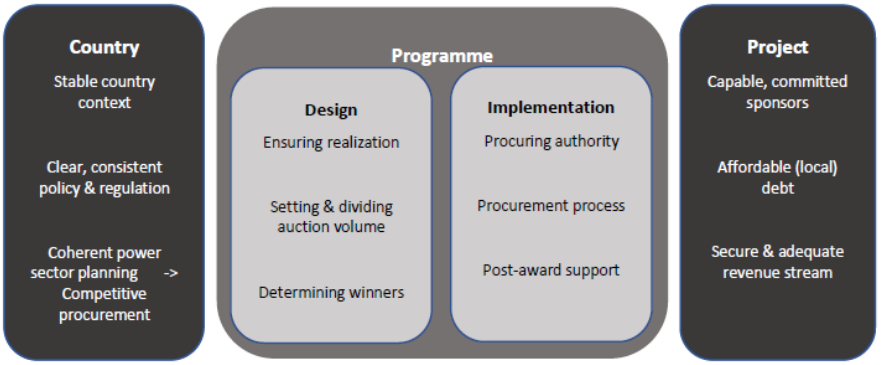

Figure 1: Country, programme and project level factors (Kruger, 2021)

Table 1: Country level and Project level factors contributing elements of success for IPPs in Africa

Factors	Details
Country level	
Stability of economic and legal context	Stability of macroeconomic policies Extent to which the legal system allows contracts to be enforced, laws to be upheld, and arbitration to be fair Repayment record and investment rating Previous experience with private investment
Energy policy framework	Framework enshrined in legislation Framework clearly specifies market structure and roles and terms for private and public sector investments (generally for a single-buyer model, since wholesale competition is not yet seen in the African context) Reform-minded 'champions' to lead and implement framework with a long-term view
Regulatory transparency, consistency and fairness	Transparent and predictable licensing and tariff framework Cost-reflective tariffs Consumers protected
Coherent sectoral planning	Power-planning roles and functions clear and allocated Planners skilled, resourced, and empowered Fair allocation of new-build opportunities between utilities and IPPs Built-in contingencies to avoid emergency power plants and blackouts
Competitive bidding practices	Planning linked to timely initiation of competitive tenders/auctions Competitive procurement processes are adequately resourced, fair and transparent
Project level	
Favourable equity partners	Local capital/partner contributions are encouraged Partners have experience with and an appetite for project risk A DFI partner (and/or host country government) is involved Firms are development-minded and returns on investment are fair and reasonable
Favourable debt arrangements	Competitive financing Local capital/markets mitigate foreign exchange risk Risk premium demanded by financiers or capped by offtaker matches country/project risk Some flexibility in terms and conditions (possible refinancing)
Creditworthy offtaker[16]	Adequate managerial capacity Efficient operational practices Low technical losses Commercially sound metering, billing, and collection Sound customer service

Secure and adequate revenue stream	Robust PPA (stipulates capacity and payment as well as dispatch, fuel metering, interconnection, insurance, *force majeure*, transfer, termination, change-of-law provisions, refinancing arrangements, dispute resolution, and so on) Security arrangements are in place where necessary (including escrow accounts, letters of credit, standby debt facilities, hedging and other derivative instruments, committed public budget and/or taxes/levies, targeted subsidies and output-based aid, hard currency contracts, indexation in contracts)
Credit enhancements and other risk management and mitigation measures	Sovereign guarantees Political risk insurance Partial risk guarantees International arbitration
Positive technical performance	Efficient technical performance high (including availability) Sponsors anticipate potential conflicts (especially related to O&M and budgeting) and mitigate them
Strategic management and relationship building	Sponsors work to create a good image in the country through political relationships, development funds, effective communications, and strategic management of contracts, particularly in the face of exogenous shocks and other stresses

Table 1: Country and project level contributing elements of success for IPPs in Africa (adapted from Eberhard & Gratwick, 2016)

From an investee/bidder perspective, securing a winning bid in the IPP process comes with challenges. Research by Eberhard and Naude (2016) highlights key qualification criteria including: Project structure; legal criteria and evaluation; land acquisition and land use criteria and evaluation; environmental consent criteria and evaluation; financial criteria and evaluation; technical criteria and evaluation; economic development criteria and evaluation; and value for money.

For SMEs, these requirements can be daunting. However, focusing on the last two points, the economic development requirement includes three sub requirements. The first requirement is at least 40% South African entity participation in the project. From an investee perspective, this can present as an obstacle, since at least 40% of the capital must be sourced from local investors. Secondly, the project must have a minimum BBBEE contributor level of at least 5. Lastly, compliance with job creation, local content, and a minimum socio-economic development threshold must be met (Eberhard & Naude, 2016).

Additionally, the value-for-money criterion evaluates the project's price competitiveness, Internal Rate of Return (IRR), economic development commitments, and foreign exchange risk for Eskom and the government. Notably, bid tariffs have dropped significantly from BW1 to BW4. The blended weighted average tariff decreased by 65% from ZAR 202/kWh in BW1 to ZAR 70/kWh in BW4 (Eberhard & Naude, 2016). Lower prices could reduce profit margins, particularly for new entries, which would then impact the IRR negatively, but do they?

Most renewable energy technologies (RETs), except for biomass, require significant capital investment. The cost of capital greatly influences investment decisions (Walwyn & Brent, 2015). Walwyn and Brent's (2015) study emphasises the need for low-cost capital structures for competitive REIPP bids. However, Walwyn and Brent (2015) also predict that increased competition, innovation, learning by doing, and economies of scale will drive down renewable energy costs. Their predictions are based on learning curves. An important finding from their study was that solarpholvatic (PV) energy costs would fall below coal-generated power by 2015. This insight was not fully acknowledged in energy policies (Walwyn & Brent, 2015). However, economies of scale benefit larger REIPPs with increased output of a product. This can present a constraint for SMEs who may struggle to achieve economies of scale due to their smaller size and output capacity. The study by Walwyn and Brent (2015) is clearly targeted for larger REIPPs who are able to achieve economies of scale and do not have their margins squeezed by lower prices.

Walwyn and Brent (2015) identified four key success factors for implementing REIPPs in South Africa; namely Policy, Marketing and Funding, Industry Regulations and Social Development. Under Marketing and Funding, Walwyn and Brent (2015) determine that balancing stability and adaptability is less relevant since the tender process does not allow pricing deviations. Access to affordable capital has been recognised as a key success factor. However, only partial compliance is required, as South Africa generally has a higher Weighted Average Cost of Capital (WACC) compared to other developed nations. Similarly, research and development for Renewable Energy Technology (RET) compliance is only partially necessary, as increased funding for RETs would only be essential if a stronger local industry is planned for REIPPs (Walwyn & Brent, 2015).

If PV energy is both more cost-effective than coal and environmentally sustainable, a key question arises: why has there not been a complete transition to PV and other eco-friendly electricity generation sources? Furthermore, with decreasing tariffs that compress profit margins, what should investors consider when evaluating newer bidders? From a financial and administrative standpoint, are SMEs adequately equipped to compete in the bidding process, or does the system inherently favour large conglomerates with access to substantial capital? Conversely, by examining the key determinants or KPIs that investors use when financing

REIPPs, it is possible to indirectly determine how successful REIPPs in South Africa secured funding and won the bidding process.

The Development Bank of South Africa (DBSA, 2017) highlighted a project initiated by the DOE to support small-scale REIPPs in becoming key players in the renewable energy sector. These projects had capacities ranging from 1-5MW. In the first round in 2015, the Minister selected 10 bidders utilising wind, solar, PV, and biomass REIPPs. However, only five of these projects secured financing from the IDC (Industrial Development Finance of South Africa Ltd) and Mergence Africa Capital, with subsidised funding from the African Development Bank. The remaining five projects failed to secure funding at viable rates, which impacted their sustainability (DBSA, 2017).

A major constraint to implementing small REIPPs has been private sector financing. The DBSA notes that SMEs in the REIPP sector have struggled to obtain equity and debt financing from commercial banks due to their SME status and limited experience in renewable energy. Notably, no commercial bank was willing to finance any of the 10 preferred bidders. While development finance institutions provided some funding, it was not insufficient to enable these bidders to reach financial closure. Even in cases where developers secured commercial debt, the credit margins were too restrictive for projects to maintain their bid tariffs and generate reasonable returns. Additionally, transaction costs for SME bidders were disproportionately higher than those for larger, well-financed projects (DBSA, 2017). This scenario reflects a market failure, where commercial investors are unwilling to fund REIPPs with an SME profile. As a result, the DBSA stepped in to provide funding to such projects (DBSA, 2017).

Research by Walwyn and Brent (2015) identifies key success factors for REIPPs broadly, while Eberhard and Naude (2016) analyse the criteria for winning the bidding process, focusing on production and pricing outcomes of successful bidders. However, a clear gap remains in identifying the key determinants or KPIs for investing in SME REIPPs.

2.4.1 Country level factors

Eberhard and Gratwick (2011) categorise the key success factors for IPPs into both country-level factors and firm-level factors (Eberhard & Gratwick, 2011). Their research, based on observed outcomes in Sub Saharan Africa, highlights that for an IPP to thrive at the country

level; there must be a favourable national environment, clear policy and regulatory framework, and well-structured power sector strategies and competitive procurement mechanisms , among other factors (Eberhard & Gratwick, 2011). Notably, they found that a country's unique national context significantly influences success, necessitating investment strategies tailored to fit local conditions (Eberhard & Gratwick, 2011; Zunguze, 2017). Furthermore, a combination of country, programme, and project-level factors is essential for the success of REIPPs, though the study primarily focuses on programme and project-level factors.

2.4.2 Programme Level Factors

At the programme level, analysis focuses on how procurement programmes are designed (auction design) and executed (auction implementation). Key considerations include defining and distributing (auction volume) procurement volumes (amount of energy or electricity), selecting winning bids (winner selection), and ensuring timely project completion (auction effectiveness) (Kruger, 2021). The following selection elaborates on the programme-level factors that contribute to the success of REIPPs.

2.4.2.1. Ensuring project realisation

One of the primary risks faced by IPPs participating in auctions for electricity generation capacity is that winning bids do not always lead to timely project completion, or in some cases, projects may not be constructed at all. This phenomenon, known as "bid non-realisation" (Kruger, 2021), is attributed to three key factors supported by both theoretical and empirical literature.

First, the option to abandon a project reduces bid prices while increasing the likelihood of bid non-realisation (Kruger 2021; Board, 2007; Parlane, 2003). To mitigate this risk, project terms and agreements with key stakeholders should incorporate mechanisms such as penalties (Kruger 2021; Board, 2007; Parlane, 2003).

Secondly, some bidders may not be committed to project completion, instead using the bid award as a hold option (Kruger, 2021). In such cases, bidders may leverage the award until they are able to operate in a time and manner suitable for them, simultaneously preventing other qualified bidders from securing the project. Additionally, bidders may leverage the award to negotiate better terms with suppliers (Kruger, 2021). This could happen where for instance

they need to drive actual costs with suppliers, particularly if their initial budgets were overly optimistic or unrealistic in terms of operating and profitability margins (Kruger, 2021.

Thirdly, bidders may fall victim to "winners curse", which occurs when they underestimate costs due to inexperience or excessive uncertainty about project implementation (Kruger, 2021; Kreiss, Ehrhart & Haufe (2017), Thaler (1988) originally described this phenomenon, where bidders submit exceptionally low bids only to face financial losses upon project execution (Kruger, 2010). Kruger (2021) explains that increased competition can drive aggressive bidding, leading to lower bid prices and a higher risk of the winner's curse due to either irrational bidding strategies or unrealistic cost projections (Del Rio, 2017f; Estache & Iimi, 2012). As a result, bidders may find themselves struggling with squeezed profit margins in an attempt to secure contracts by offering the lowest possible price.

The risk of non-realisation in REIPP auctions is significant, as unsuccessful projects fail to meet stakeholder requirements and undermine investor confidence. On one hand, bidders face cost-related uncertainties, and on the other, there is a real possibility that the project will not materialise at all, resulting in "non-realisation" (Kreiss, Ehrhart & Haufe, 2017).

Non-realisation is a major concern in Renewable Energy Support (RES) auctions, particularly in terms of expansion goals and the broader adoption of auction mechanisms for RES (Kreiss, Ehrhart & Haufe, 2017; Del Rio & Linares, 2014). Project non- realisation is seen as a primary risk as the auctioneer will not be able to fulfil the investors' financial expectations, and the initial investment will fail to generate returns for creditors and stakeholders. Consequently, mitigating project non-realisation is essential to sustaining investment interest in REIPPS. The next section explores practical measures to address this issue.

2.4.2.1.1 Mitigating project non-realisation risk

Financial Prequalification

A financial prequalification requires bidders to provide a deposit either before the auction or upon being awarded a contract. This security deposit is refunded if the bidder does not win the auction or successfully completes the project on schedule (Kreiss, Ehrhart & Haufe, 2017). These requirements serve two primary purposes: ensuring that bidders have the financial capacity to execute their projects and incentivising project completion (Kreiss, Ehrhart & Haufe, 2017). This ensures that bidders are financially committed to the project and will make

sure that it succeeds. Kreiss, Ehrhart & Haufe (2017) further highlight that higher financial prequalification requirements increase project realisation by making non-realisation less appealing.

Physical Prequalification

Physical prequalification criteria, which can be project-specific or bidder-specific, act as "entry requirements" for auction participation (Kreiss, Ehrhart & Haufe, 2017). Project-specific prequalification mandates that bidders meet to participate in the auction in relation to the project (Kreiss, Ehrhart & Haufe, 2017). Kreiss, Ehrhart & Haufe (2017) provide an example where bidders are required to conduct feasibility studies or submit land use plans as a prerequisite for qualifying to bid. These requirements serve to reduce bidders' uncertainty regarding project requirements, planning, and future implementation. The auctioneer may mandate compliance with these conditions before the auction takes place. Consequently, a bidder must assess whether they meet these prequalifications before entering the auction (Kreiss, Ehrhart & Haufe, 2017).

Bidder-specific prequalification refers to the qualifications, experience, or expertise a bidder must possess before entering an auction. This may include prior project experience, proficiency with the necessary technology, and relevant technical expertise (Kreiss, Ehrhart & Haufe, 2017).

The following section discusses the second factor affecting the design under programme level factors; setting and dividing the auction volumes.

2.4.2.2 Setting and dividing auction volume

Auction volume can be determined using one of three primary methods: capacity (MW), generation (MWh), or budget ($) (Pueyo & Bawakyillenuo, 2017). In sealed-bid auctions, project developers submit proposals simultaneously, along with undisclosed price proposals for selling electricity. The auctioneer then ranks and selects projects until the total awarded capacity matches the auctioned energy volume (Pueyo & Bawakyillenuo, 2017).

In contrast, multi-round descending-clock auction starts with the auctioneer proposing an initial price. Developers then submit bids indicating how much they are willing to supply at that price.

The auctioneer progressively lowers the offered price in subsequent rounds until the total bid volume aligns with the quantity required (Pueyo & Bawakyillenuo, 2017).

The effectiveness of allocated volumes is measured by how much of the awarded volume is ultimately constructed, commonly referred to as "realization rate effectiveness" (del Río, Haufe, Wigan & Steinhilber, 2015a). The debate surrounding volume allocation stems from the theoretical correlation between auction volume and the level of competition within the procurement programme, both in terms of number and strength of bidders (Kruger, 2021; Friedman 1956).

A key challenge in volume allocation is balancing the competing interests of auctioneers and bidders. Auctioneers aim to minimise the risk of project non-realisation by setting project size limits and diversifying across multiple projects instead of awarding contracts to a single bidder (Kruger, 2021). Additionally, renewable energy projects are particularly vulnerable to climate and geographical concentration risks (Kruger 2021; Del Rio 2017). This is especially relevant for energy sources such as solar and wind, where supply fluctuations can lead to grid instability. Distributing projects across multiple bidders and locations helps mitigate these risks.

On the contrary, overly restrictive project limitations may discourage bidders. Firstly, which may be too small for bidders may be a disincentive. Firstly, economies of scale may be lost, as structuring a small project can involve costs similar to those of a larger one, yet with distinctly lower returns (Kruger, 2021). The combination of offered price and project volume may not be sufficient to cover these costs. Secondly, auctioning excessively small projects may deter market interest, as the costs associated with bidding and project organisation are often high and not necessarily proportional to project size (Kruger, 2021). Therefore, ensuring that auction volumes strike a balance between meeting the needs of the bidders, attracting market interest, and maintaining grid stability may prove to be a complex challenge.

2.4.2.2.1 Auction Rounds

The literature highlights that competitive tenders and auction rounds yield better investment pricing compared to directly negotiated prices, which tend to be more expensive under alternative procurement methods (Eberhard et al., 2016; Eberhard & Naude (2017a). Regularly scheduled auction rounds with capped power capacity per round are key to the success of IPP

auctions (Kruger, 2021; Ferroukhi, Hawila, Vinci, Nagpal, 2015). These mechanisms enhance competition and drive tariff reductions by ensuring that demand exceeds supply in each round.

Multiple bid windows are attractive to investors, as they provide repeated opportunities to secure contracts, thereby increasing market participation (Eberhard & Naude, 2017a). However, it is crucial to ensure that volumes allocated per round are sufficient (not too small) to attract investors (Eberhard & Naude, 2017a). The structure of auction rounds is a key determinant of price outcomes – ensuring that bid volumes are neither too high nor allowing unofficial bidding rounds - is key to maintaining lower tariffs (Kruger, 2021). Notably, in countries like Germany and Brazil, auction prices increased in later rounds due to excessive bid rounds and auction volumes (Kruger, 2021; Grashof, 2020; Hochberh & Poudineh, 2018).

Another advantage of auction/bidding rounds is that previously unsuccessful bidders can refine and resubmit their projects in later rounds, improving project realisation rates (Kruger, 2021). Given that the renewable energy sector is relatively new, many investors and bidders are still gaining experience. As REIPPs and investors gain more experience, understanding and knowledge of the local market, their risks and costs decrease, allowing them to bid more competitively manner in later rounds (Eberhard & Naude, 2017a). This fosters greater investor confidence, enhances competition, and ensures a steady pipeline of projects, even for those declined in earlier rounds. Additionally, the type of renewable technology used influences setting and dividing the auction volumes. This is explored further in the next section.

2.4.2.3 Technology-specific or technology neutral competitive tenders

Auctions can be structured either as technology-neutral programmes, where all renewable compete, or as technology-specific tenders, where projects compete within designated technology bands. For any country, this choice depends on factors such as the country's renewable energy resources, grid constraints, and specific electricity requirements (Eberhard & Naude, 2017b). Auctions can be designed such that only renewables compete against one another without demand bands for each technology (Kruger, 2010). Technology neutral auctions have been criticised in literature for forcing projects with varying risk and cost profiles to compete against one another, thus limiting the viability of renewables in the profiles with higher costs and riskier profiles (Kruger, 2021; Eberhard & Naude 2017b). This approach may inherently favour more mature technologies over less developed ones. A notable example is

recent auctions in Germany, where nearly all allocated solar PV capacity was awarded instead of onshore wind (Kruger, 2021; Enkhardt, 2018). As a result, technology-neutral auctions tend to be biased toward certain technologies and disadvantageous to specific bidders, potentially hindering diversity and investment growth in the REIPP landscape.

In contrast, an emerging approach involves setting technology-specific volume bands based on an integrated planning framework with the flexibility to adjust these bands post-bidding according to pre-established price-sensitive guidelines (Kruger, 2021; Eberhard & Naude 2017b). A key advantage of multiple technology bids is that they provide insight into relative market costs and highlight which technologies offer the greatest potential for cost and price reductions (Eberhard & Naude, 2017b). This method fosters technological diversity by ensuring competition occurs within designated bands rather than across different technologies. In addition, post-bid adjustments offer post-award support by allowing revenue modifications for projects using less mature technologies, which often face greater uncertainties than their more matured technology counterparts.

Eberhard and Naude (2017b) propose another strategy to increase participation: allowing smaller scale technologies to compete within separate plans, distinct from mainstream RE options, whose auction structure will have reduced transaction costs and align risk profiles more appropriately. While this serves as a viable alternative to multiple technology bids, it requires dedicated leadership and resources to implement effectively within a given country. The next section will address the third factor influencing programme design: "determining winners."

2.4.2.4. Determining Winners

2.4.2.4.1 The battle of the bids: sealed vs open & pay-as-you-bid vs uniform

Auctions are a widely utilised method for promoting renewable energy growth worldwide. Governments provide financial support to project developers because the price of power produced from renewable sources still remains higher than that from fossil fuels. Many countries have either recently established, or plan to establish competitive processes such as auctions to minimise excessive expenditure (Haufea & Ehrhart, 2018).

2.4.2.4.2 Pricing rule: Pay as you bid vs uniform

Haufea and Erhart (2018) conducted a study examining the factors contributing to the success or failure of auction-based renewable energy support, specifically comparing pay-as-bid auctions with uniform price auctions. In a pay-as-you-bid auction, the price awarded is determined by the bidder's own submitted bid, which also affects their probability of winning (Haufea & Erhart, 2018). As a result, bidders are incentivised to bid above their actual costs to secure both victory and profit. However, bidding too high reduces the likelihood of winning, creating a trade-off in bid placement (Haufea & Erhart, 2018).

According to Myerson (1981), bidders exhibit greater risk aversion, the balance shifts toward an improved probability of winning, leading to a decrease in exaggerated cost-related estimates. Research suggests that individuals tend to behave with risk aversion in experiments settings (Harrison, 1989). As a result, bidders frequently submit lower offers in actual implementations than they would in theoretical conventional risk neutrality assumptions (Haufea & Ehrhart, 2018a). Consequently, in real-world implementations, bidders often submit lower bids than they would under theoretical risk-neutrality assumptions. The key advantage of pay-as-you-bid auctions is that bidders have certainty regarding their award price, as it directly corresponds to their bid. Additionally, these auctions tend to be more resistant to negative bidding behaviors. However, a significant drawback is that awarded prices can vary among bidders (Haufe & Erhart, 2018), which may be perceived as unfair, particularly where profit margins are already tight for lower bidders despite delivering the same output (MW or MWh) (Haufe & Erhart, 2018). In a scenario where cost structures differ due to variations in technology or project locations, such discrepancies may be more justifiable. To address this, bids can be categorised based on technology types and/or project location.

Pay-as-you-bid auctions also introduce two regret effects. Firstly, the winning bidder may later regret not having bid higher, realising they could have secured the contract at a better price. Conversely, unsuccessful bidders may regret bidding too high offer and losing out, particularly if the awarded price(s) exceeded their own cost (Haufea & Ehrhart, 2018).

For multiple-item static auctions, the final price can be determined through different mechanisms, including pay-as-bid and uniform-price auctions paying either the amount of the lowest rejected bid or the highest accepted bid. Bidders all submit one sealed offer per project.

For multiple-item dynamic auctions, pricing options include ascending clock auctions and descending clock auctions. Clock auctions are quite established because of their fast realisation. For instance, in the Netherlands, flowers in wholesale are sold via clock auctions within seconds.

In juxtaposition to pay-as-you-bid, all successful bidders in an auction with a uniform price are given the same award price. There are two potential ways to calculate this uniform award price: either using the lowest rejected bid (LRB) or the highest accepted bid (HAB). The two variations offer various incentives to bidders (Haufea & Ehrhart, 2018). An additional key factor in determining winners in the REIPP process/programme is whether the bids will be sealed or open. This is discussed further in the next section.

2.4.2.4.3 Sealed vs Open Bid

The auction designers need to choose between obtaining single sealed bids from bidders or using an open descending clock option that is combined with a final single bid, this is also known as a dynamic auction (Eberhard & Naude, 2017b). In single sealed bids, all bidders are required to submit single price bids by a predetermined date and do not know what others have bid due to strict confidentiality undertakings in the single sealed bid tender. Sealed bid tenders are utilised in the REIP4 programme in South Africa. As a general rule, static (sealed bid) auction forms are more appropriate for preventing collusion than dynamic auction formats, as the latter permit implicit collusion methods during bidding (Haufe & Erhart, 2018). This makes perfect sense; although dynamic bidding appears transparent by having information symmetry around costs for the bidders, in reality, it also promotes collusion. As such, the literature seems to favour sealed bid auctions for this reason, as they prohibit collusive bidding behavior because bidders cannot observe their competitors' bids, are simpler to implement, and represent a standard bid format familiar to procurement authorities (Haufe & Erhart, 2018;).

2.4.2.5 Project evaluation and scoring

To decide the auction winner, projects might be evaluated solely based on price, or on price combined with other characteristics (Kruger, 2021). These "other" characteristics are predominantly technical criteria designed to incentivise bidders to improve a project's quality, commit to shorter implementation times, or improve their overall performance (Kruger, 2021). In certain cases (such as in South Africa and Uganda), the evaluation also considers a basket

of socio-economic and environmental impact criteria (Kruger, 2021; Kruger & Eberhard, 2018). The weighting of these other factors generally tends to be lower than the pricing factor; for example, a weighting of 80:20 in favour of price.

These factors, although they may seem softer and insignificant in relation to price, carry significant weight in determining the winners of bid rounds. If these minimum requirements are not met, a bidder cannot win a bid despite meeting the price requirements and other requirements. Thus, bidders need to ensure that they meet these "other" characteristics to win a bid.

2.4.2.6 Other key characteristics in design

Ceiling Price (Price caps)

Setting a maximum price for an auction prevents the auctioneer from overspending. Setting a ceiling price that is too low might reduce the effectiveness of an auction, leading to less capacity or fewer projects. A market-perceived low ceiling price could restrict competition by discouraging bids, leading to price increases (Kruger 2021; Ehrhart et al., 2020)

Trust in the auctioneer & Trust in bidding process

Trust in the auctioneer in the context of REIPP investments is conceptually associated with an optimistic view of the private sector's role in development and infrastructure investment (Kruger, 2021, Eberhard Kolker, Leigland, 2014; Eberhard & Naude, 2017b). An agency administering auctions that is viewed by the market as competent, principled, and open to the private sector is more likely to attract more bids, resulting in increased competition and lower project costs. Similarly, an agency judged to lack these attributes may see less bidder interest, decreased competition, and increased pricing (Kruger, 2020). This is logical since millions are invested by bidders in hopes that the investment will be profitable. Thus, trust is indeed a key factor in determining whether bidders will participate in the bidding process.

Who runs the auction — considering their ability, integrity, and altruism/commitment — and how it is being run, that is, whether the process is viewed as fair and whether it produces fair results, has a significant impact on gaining bidder confidence and boosting competition (Kruger, 2021).

2.4.3 Programme level factors impacting the Implementation

2.4.3.1 Procuring Authority /Trust in the auctioneer

The success of an auction depends on both strong auction design and bidder trust in the auction process. The establishment of a mandated, trustworthy, well-equipped, and well-resourced body tasked with coordinating and implementing the auction process is considered to be a critical success factor (Tolmasquim, de Barros Correia, Porto, & Kruger, 2021; Eberhard et al., 2014).

Naturally, bidders must place trust not only in the auctioneer, but also in the governing bodies to run a successful IPP project. An auction agency seen as professional, principled, and open to the private sector is more likely to attract more bids, thereby increasing competition and lowering project prices (Kruger, 2021). Conversely, we would expect less competition and higher prices where trust in the auctioneer is lacking.

2.4.3.2 Procurement/Bidding Process

As described in the previous section, trust in the "who" is an important success factor. Equally important is trust in the "how" —the way the project is run. The cost of bidding is not cheap; thus, establishing trust holistically in both the agency and the programme's execution is essential before the bidding process begins. Auction design theorists concur that bids must be binding, that bidders must receive at least their bid price, and that the best offers must win to ensure investors and the general public accept auction outcomes (Kreiss, Ehrhart & Haufe, 2017).

2.4.3.3 Post award support by the auctioneer

The real work begins once the bid is won, and the projects must reach financial close and commercial operation, in other words project realisation. IPPs operate in a highly regulated environment where reliance is placed on the public sector to provide grid connection facilities, issue permits and licenses, and sign contracts such as PPAs and IAs (Kruger, 2021; Eberhard and Naude, 2017a, Ferroukhi et al., 2015). What makes it particularly difficult is that bidders rely on several government agencies, departments, and enterprises which are beyond the bidder's control (Kruger, 2021).

A key factor impacting project realisation and determining project outcomes is institutional quality. Institutional quality in the context of renewable energy auctions refers to the prevalence and strength of formal institutions and their ability to set, monitor, and enforce rules at both the country level, (such as enforcing the rule of law that ensures contract honoring) and at a programme level (such as adhering to the rules of the procurement programme) (Kruger, 2021). An efficient auction programme can help mitigate many of the investment and project development challenges caused by a poor institutional framework (Kruger, 2021).

2.4.4 Project Level Factors

IPPs (in Africa specifically) are inherently defined in literature as "power projects" that are primarily privately planned, constructed, operated, and owned; have considerable private financing; and have long-term power purchase agreements with a utility or another off-taker. Considering the structure of IPPs and how they have been developed over time, it is necessary to examine which factors contribute to the success of REIPPs in this context. Despite the apparent dominance of country-level influences, scientific and anecdotal data suggest that project-level factors have a major impact on the performance of IPPS (Woodhouse, 2005a). Woodhouse (2005a) reviewed the investment environment and IPP experience in China, Mexico, the Philippines, Poland, and Turkey. He (2005a) observed a startling degree of heterogeneity in the experience of individual projects, indicating that project management, contracts and other project-level factors are significant explanatory variables. Therefore, analysing and understanding project level factors for IPPs is key to understanding how these factors impact their performance.

At a project level, the goal is to implement factors that lead to positive project performance, both an implementation and operational level. The desired outcome is therefore the success of the project which then meets the expectations of key stakeholders (Woodhouse, 2005a). A success factor is defined as any factor that results in a project's success in meeting the expectations of key stakeholders, including investors, the host country, creditors, the host country, creditors, and policymakers.

2.4.4. 1 Favourable Financial Arrangements: the right debt and equity partner

Project Structure

The currency in which revenue is generated should ideally match the financing raised to minimise the risk of foreign currency exposure. However, given the limited capital in sub-Saharan Africa, relying exclusively on local equity and debt partners may not be feasible. From a project sponsor's perspective, local shareholding has been suggested as a means to reduce risks – especially around renegotiation and creeping expropriation (Woodhouse, 2005a). It has also been proposed that a firm's origin could play a role in increasing project resilience, based on the assumption that firms from developing countries may be better able to anticipate and navigate challenges inherent in the African power sector (Woodhouse, 2005a).

Out of WACC: a balancing act

A key consideration in project finance is balancing debt and equity to achieve the most efficient capital structure. The debt-to-equity ratio needs to be sustainable, allowing the project to meet its financial obligations while maintaining operational viability, liquidity, and solvency over its lifetime.

Debt is often preferable as it provides financing without diluting shareholdings. However, excessive debt in a project's capital structure can lead to "brittle legal and financial structures" (Woodhouse, 2005a). Woodhouse based this observation on a study of five countries: China, Mexico, the Philippines, and Turkey in 2005. Debt requires repayment of the initial capital and interest regardless whether sufficient profits are generated, leaving little room for unexpected changes or negative fluctuations in cash flow.

2.4.4.2 Investor Composition

DFI and donor funding: key to unlocking successful outcomes

Currently, DFIs and donors actively support renewable energy programs, including small-scale initiatives, worldwide. Sub-Saharan African countries should leverage this support to close funding gaps. Donor financing offers additional advantages; it can enhance internal capacity by providing consultants and subsidising procurement expenses (Eberhard et al., 2014). Other key benefits include credit enhancements for project sponsors and significant reductions in project preparation costs through standardised documentation (Eberhard et al., 2014).

Furthermore, partial risk guarantees from DFIs can bolster sovereign government guarantees in nations with sub-investment-grade credit ratings (Eberhard et al., 2014).

Foreign donors can be insulated from increased investment risk in developing countries. Contracts can be structured to protect foreign equity or debt providers. For example, in the joint venture agreement for the Shajiao C facility in China, the state-owned equity holder was required to compensate foreign investors for losses caused by tariff increases (Woodhouse, 2005a).

2.4.4.3 Security, Adaptability and Sustainability

2.4.3.1 Secure and adequate revenue stream

Bidders need to bankable[*1], non-negotiable contracts, including a robust PPA and a sovereign guarantee (in the Implementation Agreement), supported by a Government Framework Support Agreement. These measures reduce debt and equity costs, encourage competition, and enhance the bankability and realisation of awarded projects (Eberhard & Naude, 2016; Eberhard & Gratwick, 2011).

The structure and flexibility of the project are its success. Securing minimum volumes in offtake arrangements is also key to ensuring adequate revenue streams to cover the fixed costs of the project over the project term.

Power projects—like many large infrastructure investments — require substantial upfront capital and are highly vulnerable to opportunism or changing circumstances (Woodhouse, 2005b). The ability to demonstrate secure and adequate revenue streams is critical. The PPA agreement, negotiated with the offtaker, outlines the tariff, duration, and potential contract renegotiations, providing insight into the project's profitability and sustainability.

The obsolescing bargain redux

The obsolescing bargain model, first proposed by Raymond Vernon in 1971, suggests that the negotiation power in a large private infrastructure projects shifts over time. Initially, governments attract private investors with favourable terms. However, once the project is operational, the government has already secured the necessary infrastructure, while investors require a lengthy amortisation period to achieve their anticipated returns. This misalignment

often leads to governments seeking to alter the initial agreement — either through outright nationalisation or by reducing revenue streams. This then results in the initial agreement becoming obsolete. The theory then predicts that the host (government) will impose a change in terms, either by outright nationalisation or by reducing revenue streams to the maximum extent possible (Vernon, 1971; Woodhouse, 2005b).

Contracts must allow for renegotiation. Across the IPP experience, renegotiation has often been mutually beneficial, enhancing project competitiveness, clarifying contract terms, and improving investment sustainability for both parties

2.5 Empirical Literature

One of the earliest papers written on IPPs (outside of the World Bank) by Hoskote (1995) provided an overview of IPPs as it offered insights into the concept, structure, and role of IPPs in the energy sector. The study also focused on the significance of private sector involvement in power generation and the challenges that IPPs face. The study by Hoskote (1995) provided a critical foundation and template for future analysis of IPPs; despite the IPP landscape changing significantly since then, many of the concepts discussed in the paper are still relevant for the IPP environment today.

An APEC Best Practices Workshop for Independent Power Producers (IPPs) was conducted at the East-West Center in Honolulu, Hawaii, spanning April 23-24, 1997. It attracted 90 participants from 14 APEC member economies. Attendees represented various sectors, including business, finance (including multilateral lending agencies), regulation, the IPP industry, legal counsel, and government officials. This workshop aimed to facilitate dialogue and collaboration in shaping best practices for IPPs across the APEC region. This manual provided useful information and perspectives from key stakeholders in the IPP process and was a useful tool for other countries that have IPPs. The manual described “critical success factors for IPPs” and “agreed principles of best practice for IPPs” (APEC Energy Working Group, 1997).

A study by R Bacon, (1999) offered a valuable resource for assessing and monitoring energy reform endeavours in developing countries. This publication introduced a structured framework or scorecard designed to evaluate the effectiveness and progress of energy sector

reforms in these countries. Such reforms often aim to enhance energy infrastructure, promote efficiency, and encourage private sector participation (Bacon, 1999). The scorecard encompassed a range of key performance indicators and metrics, allowing policymakers, organisations, and stakeholders to systematically assess various aspects of energy reform efforts. By providing this scorecard, the journal served as a practical tool for governments, international organisations, and researchers to measure the success of energy reforms. It assisted in identifying areas that require improvement and highlighted successful strategies that can be replicated in different developing contexts (Bacon, 1999).

In 2004, a study was conducted as a paper that marked the beginning of an in-depth analysis of IPPs in developing countries. The paper was the beginning of an extensive IPP research on multiple countries that would be conducted globally under the direction of Stanford University's Program on Energy and Sustainable Development (PESD). The main goal of the study was to assess the IPP experiences across different countries and projects to identify best and better practices for the future (Victor, Heller, House & Woo, 2004).

The paper by (Victor, Heller, House & Woo, 2004). recognised that a complex system of institutions and complementary changes, including those in public finance and corporate governance, was necessary for successful reform in developing countries (Victor, Heller, House & Woo, 2004). The study centered on the IPPs themselves through in-depth analyses of approximately three dozen projects and looked into the variables that account for the wildly disparate results for IPP investors and the host countries. The study looked at independent variables that were expected to vary across countries and across projects (Victor, Heller, House & Woo, 2004).

The study by (Victor, Heller, House & Woo, 2004) was done in tranches to look into specific countries and projects to test whether (and under what conditions) those factors actually explain the variation in IPP outcomes. The results from subsequent tranche studies resulted in journals examining the country and project level variables for various developing countries including those in Africa such as Tanzania (Gratwick, Ghanadan, & Eberhard, 2006). The Tanzanian study included in-depth information about how and why IPP development in Tanzania, its current effect, and lessons learned, along with steps forward for IPPs in Tanzania. These lessons included various country and project level factors such as power sector planning

coordination, independent regulation, competitive bids and process, as well as the benefits of partnering with the private sector. In subsequent tranche studies conducted for Africa, similar themes involving country-level and project-level factors emerged (Eberhard & Gratwick, 2005a; Eberhard & Gratwick, 2005b).

The Program on Energy and Sustainable Development at Stanford University undertook a detailed review of the IPP experience in developing countries, reaching a conclusion in October 2005. Following this, Woodhouse (2005b) presented the conclusions and analysis of the study of the experience of investment in greenfield IPPs in developing countries in a paper (Woodhouse, 2005b). Woodhouse explored the political and economic influences on IPP projects in global infrastructure contracting. The study highlighted how factors like political stability, regulations, and negotiations impact project outcomes. Lessons were drawn from varied IPP experiences, emphasising a comprehensive approach that considers economic and political contexts for successful international infrastructure development (Woodhouse, 2005b).

In 2008, Katharine Nawaal Gratwick and Anton Eberhard (2008) published a critical paper that aided in the progress of understanding the experience of IPP investments in Africa, as well as identifying the contributing elements of success at a country level and project level specific to the African context and relevant to the current energy landscape in Africa (Gratwick & Eberhard,2008).

Eberhard & Gratwick (2011) investigated the performance of independent power projects (IPPs) in Sub-Saharan Africa. After investigating 20 projects that had taken place by that time, they identified project and country-level factors critical to a project's success (Eberhard & Gatwick, 2011). This study focused specifically on critical success factors impacting Sub-Saharan IPPs.

Subsequently, Eberhard, A., Kolker, J., & Leigland, J. (2014) published a paper exploring South Africa's transition from feed-in tariffs to competitive bidding for grid-connected renewable energy. It addressed key questions: Why and how did this shift occur? How was the government's programme established and managed, distinguishing it from others? What were the investment and price outcomes of the bid rounds? Who were the prominent private sector

players and financial institutions involved? And, finally, how did prices and economic development factors, like local economic impact, relate to, and influence each other?

Considering that the REIPP programme was launched in South Africa only in 2011, Eberhard et al. (2016) sought to answer questions such as the following: How do we account for the power investment trends outlined in the previous chapter? Why have some countries been more successful than others in attracting private investment? What are the key elements of the enabling environment for independent power projects (IPPs)? To what extent does the structure of a power sector affect the levels and rate of investment in new power generation capacity? What are the other key factors that can facilitate investment in new capacity? (Eberhard, Gratwick, Morella & Antmannm, 2016). They examined the IPP Programme in five countries: Kenya, Nigeria, Tanzania, Uganda, and South Africa. At the time, South Africa had reached its fourth bid window period. While the list outlined was not exhaustive, a framework for "Understanding the Enabling Environment for IPPs" was developed, building on the study conducted in 2011. The framework considered country and project level factors.

The study by Kruger and Eberhard (2018) summarised the performance of the five case study countries (South Africa, Kenya, Tanzania, Nigeria, and Uganda), and evaluates the enabling environment for independent power project (IPP) investments, including power sector reforms and the crucial issues of generation expansion planning, procurement and contracting processes, and the creditworthiness of off-taker utilities. This study was key to understanding and comparing renewable energy programmes, particularly in South Africa (Kruger & Eberhard, 2018).

Kruger (2021) then expanded on this study to include programme-level factors for the first time. Thus, a combination of the framework from Gratwick and Eberhard (2016) and Kruger (2021) formed a framework to assist in evaluating and understanding private power investment outcomes for REIPPS in South Africa at both a project and programme level. These frameworks served as an initial conceptual foundation for this study.

2.6 Chapter Summary

This study investigated the critical success factors for financing Renewable Energy Independent Power Projects (REIPPs) in South Africa, addressing the urgent need to alleviate

the country's electricity crisis and reduce greenhouse gas emissions. The analysis identifies programme and project-level factors influencing the success of the REIPPs.

The research begins by highlighting South Africa's energy challenges, emphasising the importance of increasing REIPPs' share in the electricity market. It explores challenges faced by infrastructure projects reliant on private financing, such as long payback periods and political risks. The study also delves into project finance's advantages and disadvantages, noting the advantages in mitigating agency costs and risk management while acknowledging higher transaction costs.

The South African case study, which examines the success of various REIPPs in detail, reveals a successful programme due to factors such as competition, project size caps, and technology bands. It demonstrates that well-designed auction programmes can reduce energy prices, attract investor trust, and contribute to renewable energy growth. The study concludes that South Africa's experience with competitive tenders in the REIPPs can offer valuable lessons for policymakers in other developing nations aiming to enhance their renewable energy sectors.

Chapter 3
Methodology

3.1 Introduction

This chapter outlines the methodology that was used to answer the following research questions:

- What are the critical factors essential for project and programme success of REIPPs in South Africa?

The research methodology elaborated on the research approach, research philosophy, research design, the target population, the data collection tools, techniques used, and the data analysis method. The goal of research methodology is to enable the researcher to obtain data, to process the data, and to analyse and/or interpret the data. This chapter also outlines the limitations of the study.

3.2 Research Approach

The research approach that was used is qualitative in nature, as this was considered appropriate to address the research questions. As mentioned in Chapter 1, the purpose of the study was to firstly identify the critical success factors that contribute to the Success of REIPP in SA by stakeholder, in the context of project and programme level. This was done through interviews.

The objective of the qualitative research was to gain a greater understanding of events to which humans assign meaning. In addition, it allows for a more in-depth understanding of the study setting, and its structure is more adaptable so that different parts of the research can be highlighted in order to avoid generalisation. In addition, qualitative research allows the researcher to immerse themselves in the study process.

In addition to being qualitative, the research is also exploratory in nature. According to Kothari (2004), exploratory research studies are undertaken when the researcher aims to gain increased insights into a phenomenon and increase understanding on a specific subject matter. This research adopted an exploratory research design to appropriately understand the main research question in the study and thereby identify the critical success factors that impact the financing of REIPPs in South Africa.

The qualitative approach was thus considered when studying contexts concerned with exploring perceptions or experiences of study participants. This approach was important when aiming to analyse underlying human preferences (Kothari, 2004). The study aimed to use a qualitative approach to understand and explain the insights of the study participants in the context of the stakeholders in the REIPP sector in South Africa. A noteworthy disadvantage of the qualitative approach is the possibility of bias due to the subjective data analysis (Rahman, 2017), although a finer depth of understanding of the phenomenon can be gained.

Given the obvious absence of updated local academic research in this subject, it was thought that employing a qualitative technique to explore success factors for financing REIPPS in South Africa would be a good approach to obtaining on-the-ground opinions and experiences. REIPPs that are looking to enter into the bidding process can use this study as an additional resource when considering factors in their bids, being cognisant that the results are broad generalisations based on a small sample size. This research approach also assisted with the practical and academic understanding of REIPPs in South Africa.

Research philosophy

The research philosophy is a specific way of cultivating knowledge to define and shape the philosophical paradigm and pertains to a belief in the methods for collecting, analysing, and using data about a phenomenon (Chetty, 2016).

There are five major philosophies in business and management: positivism, critical realism, interpretivism, postmodernism and pragmatism (Saunders, Mark, Lewis & Thornhill, 2009). After exploring the research philosophy through HARP (Heightening Awareness of Research Philosophy), it became clear that the research philosophy adopted for this study was interpretivism. With respect to the ontology, there is a flux of processes, experiences, and practices, as well as multiple meanings and realities. With respect to the epistemology, there is a focus on narratives and stories. The axiology indicates that there will be new understandings through this study, and the researcher's interpretation is key to the contribution. Typical research methods involve small samples and in-depth investigations (Saunders, Mark, Lewis & Thornhill, 2009)

It can therefore be deduced that the ontology of this study sought to understand the different realities of stakeholders in the electricity sector to make sense of and understand their portrayals of the REIPPP environment/electricity sector in South Africa, whilst also identifying programme- and project-level factors that assist REIPPs in achieving their objective and becoming successful in South Africa through literature.

The study recognised that the research is intrinsically motivated by the researcher's ideals and desire to take effective action to solve a specific set of problems (Elkjaer & Simpson, 2011). The aim of the study was to improve the design and implementation of renewable energy auctions in South Africa, thereby ensuring their success whilst also alleviating the power and environmental crisis that currently faces South Africa (Kruger, 2021; Elkjaer & Simpson, 2011). The goal of the study was to successfully inform policy and auction design decisions to promote investment in affordable, sustainable power generation in South Africa (Kruger, 2021).

3.3 Research Design

The research design was the overall strategy for addressing research questions. It included specific objectives derived from the research questions, as well as the sources from which data were collected and how it was collected and analysed (Saunders, Mark, Lewis & Thornhill, 2009). The research design should address ethical issues as well as the limitations, such as data access, time, location, and money (Saunders, Mark, Lewis & Thornhill, 2009). It should, above all, show that the components of the specific research design have been carefully considered (Saunders, Mark, Lewis & Thornhill, 2009).

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The qualitative, exploratory case-study-based research design was used in this study and employed an abductive approach to theory development. The philosophy of this research study sought to explore and interpret (with a specific focus on design and programme factors), which determinants contribute to successful renewable energy auction outcomes in South Africa.

This study reflected on the current institutional framework in South Africa that promotes, finances, and supports REIPPs. The study also drew on current studies and the design of REIPP projects and the current REIPP programme in South Africa and weighed up the advantages and disadvantages of their structure, the structure of their financing, as well as the structure of the

stakeholders around them. Furthermore, the research looked into how the current REIPPP programme is aligned with the expectations and perspectives of REIPPs. Qualitative research is a good fit for expanding knowledge in this research area that involves human behaviour (Creswell, 2009). Since the information was interpreted within a political, social, and economic context, the qualitative research design added an essential element to the study.

3.3.1 Target population and sampling

The purpose of researching is to realise the principles that would be fit for universal application; however, it would be unfeasible and unrealistic, if not impossible, to study an entire population to reach generalisations. There is no single rule to determine the size of the sample. It depends on the researcher's precision in estimating the population parameter at a certain confidence level (Singh & Nath, 2007).

3.5.1 Target Population

The following section explains the sampling, data collection, and data analysis techniques used for the first qualitative phase of the study. The qualitative phase was used to gain a comprehensive understanding of the REIPP outcomes in South Africa, as well as to identify key success factors for financing from the perspective of key stakeholders.

The knowledge and experience range from investors (debt and equity providers), technical, financial, and legal advisors, IPPs/REIPPs (successful and unsuccessful bidders, owners) to representatives from IPPs, as well as other stakeholders in the electricity sector in South Africa who represent the target population. This diverse range is necessary in order to obtain a comprehensive view of REIPPs.

3.5.1.1 Sampling

The population and sampling method directly correlate with the proposed research method, which is a qualitative research method. Furthermore, a purposive sampling method was used in this study. The participants in this study were chosen on the basis of their knowledge and experience with the research topic. Because this was a qualitative study, a non-probability sampling procedure was used.

For the research to have a balanced view, different perspectives need to be obtained. A purposive sampling strategy was used to select interview candidates (Saunders, Mark, Lewis & Thornhill, 2009) based on their background, knowledge, and involvement with REIPPs. However, due to limited access to certain stakeholders, a mixture of convenience and purposive sampling was used. An investee/private sector perspective was represented by South African REIPPs that have been successful (or unsuccessful) in the bidding process and in their operations. An investor perspective included financiers (debt and equity providers), such as South African commercial banks that have/have not offered finance to REIPPs; South African DFI's that have/have not offered finance to RE IPPs. Other key stakeholders include project sponsors/developers, legal/technical advisors, regulator (NERSA), the Department of Mineral Resources and Energy of the Republic of South Africa, and Eskom. Entities within the population were thereby distinctly chosen for the study (though not all representatives of the various stakeholders were obtained from the population through the sampling method).

The target population was therefore all stakeholders involved in the screening, development, and implementation of REIPPs in South Africa. These stakeholders were experts within their respective fields. This research made use of non-probability, heterogeneous purposive sampling to select the population for the study (Ritchie et al., 2013; Holloway & Wheeler, 1996). In non-probability sampling, the characteristics of the population are used as the basis of selection (Ritchie et al., 2013). Thus, it is the most suitable type of sampling for small-scale and in-depth research required of this nature. In purposive sampling, samples are chosen to represent a location or type in relation to a key criterion (Ritchie et al., 2013). The aim of a heterogeneous sample was to identify central themes that cut across the variety of cases (Holloway & Wheeler, 1996).

A total sample of 10 was chosen for the interviews, with a total of 10 interviews conducted: Two REIPP developers, two financial investors, and six advisors. Ritchie et al. (2013) explain that qualitative samples are usually small in size because they are rich in detail. In terms of the research approach and research philosophy described for this study, primary data was gathered through in-depth interviews with REIPPs, financiers (private banks and DFIs), and other stakeholders who perform due diligence when deciding to finance REIPPs, to obtain a comprehensive understanding of the topic. In Maximum Variation Sampling, the researcher determines the categories of interest in relation to the research topic and then seeks out

participants or settings that represent the widest range of possible differences in the phenomena being examined. This was the approach taken for the study.

3.5.1.2 Data Collection and Research Instrument

Good research makes use of reliable and valid data (Roller & Lavrakas, 2015; Singh & Nath, 2007). Research involves gathering either new data from first-hand sources — primary data or utilising existing data that is fit for a new purpose — secondary data — or a combination of both (Matthews & Ross, 2010). This study used primary data to conduct the research. For this study, the researcher collected primary data via interviews with the 2 IPP developers, financial investors (banks), advisors (legal and other), government entity, NERSA (regulatory) and Eskom.

Data collection instruments

The method that was utilised to gather data is referred to as the data collection instrument (Matthews & Ross, 2010). Primary data was collected to inform the research, via semi-structured interviews with the study participants, which are commonly used for qualitative research. These interviews were conducted virtually through Microsoft Teams and were recorded in order to obtain a detailed transcript. The detailed transcript and video recording were then accurately transcribed to capture direct quotes from the interviewed candidates.

Interviews

Interviews can be open-ended or structured. In a structured interview, the respondents are all asked exactly the same questions, which are prepared beforehand, whereas unstructured interviews do not entail specific questions or a fixed format (Bryman & Bell, 2007). Semi-structured interviews were conducted in order to allow for comparisons and to consolidate responses, and recordings were made with scripts from these recordings kept. During these interviews, essential questions from the research objectives, as well as additional questions, were asked. The goal of the semi-structured interviews was to identify success criteria for REIPPs in South Africa. Interviews are more personal than questionnaires because they allow the researcher to gain a deeper comprehension of the study's subject matter. The researcher conducted interviews using both open and close-ended questions. This was beneficial as the researcher was able to further probe the responses of the expert interviewees to provide

meaningful insights that would not have been possible from a broader public survey. The interviews conducted were guided conversations rather than fully structured ones.

Instrument Design

An interview framework was developed with various questions derived from Gratwick and Eberhard's (2016) literature on the success factors for REIPPs in South Africa, as well as Kruger's (2021) research on programme and project level factors that impact REIPPs. The researcher conducted interviews using open and close-ended questions. The details of the interview framework are provided in **Appendix B.**

3.5.2 Data Analysis

Prior to the data analysis, the researcher performed data cleaning, which is an essential component of qualitative data analysis. Qualitative data analysis is defined as "the process of making sense of research participants' views and opinions of situations, corresponding patterns, themes, categories and regular similarities" (Vosloo, 2014, p. 5).

To analyse the qualitative data, the intended analysis was guided by the following steps, as outlined by Creswell (2009) and Vosloo (2014):

- Reducing the amount of raw data, and categorising it thereafter
- Sort through what is significant and what is trivial
- Identifying noteworthy patterns through coding: With interview data, open coding involves looking for the distinct concepts and categories in the data. The researcher highlighted the identified concepts as the basic units of analysis.

This method aimed to synchronise and find a common theme across the various stakeholders regarding the critical success factors for financing REIPPs in South Africa. The transcripts were analysed using Nvivo7, which is a software package for qualitative data analysis.

3.7 Trustworthiness and Credibility (Qualitative)

To ensure the credibility of the study, professionals with five years or more of experience were targeted to ensure they had sufficient expertise to provide insightful responses. The study focused on REIPPs in a South African context and, therefore, only South African corporations were targeted. The data was obtained within South Africa, and the interviews were conducted in 2025 with professionals familiar with current processes and structures, ensuring

dependability. The results from the study were compared against literature from reliable authors, newspapers, and other sources to confirm whether they aligned with previous studies.

3.8 Research Ethics: Key Considerations

Permission to conduct the study involving human participants was obtained from the University of Cape Town's Ethics Committee on 05 February 2024, prior to commencing the study, to ensure ethical compliance. Prior to the interviews, all prospective participants were sent a formal invitation to participate in the study and an informed consent form (see Appendix A) via email, which also explained the purpose of the study and how the findings would be used. The form also highlighted that the participants were free to withdraw from the study at any time. This form was signed by each respondent before the start of the interview. Each respondent was assigned a pseudonym, specifically a number, to conceal their identity. Any direct quotes from participants were identified only by those numbers for example: Respondent 2.

Chapter 4

Discussion of Findings

4.1 Introduction

This chapter examines and interprets findings from semi-structured interviews with experts on various aspects of critical success factors for financing IPPs in South Africa. It begins by outlining respondents' overall perspectives on the country's IPP landscape. The subsequent section explores key themes at the programme and project levels, as well as risk-related factors that experts believe contribute to the level of investment in IPPs in South Africa. The chapter also presents strategies to attract greater investment and enhance project execution. It concludes with a list of critical success factors identified for financing IPPs in South Africa.

4.2 Description of the participants

A total of 10 qualitative Microsoft Teams interviews were conducted. Various stakeholders from different backgrounds were selected in order to have a variety of views and balanced findings. The respondents had on average 14 years of experience in the energy sector, and at least 2 of respondents held senior positions within their organisations. The research benefits from diverse expertise, including private equity investors, finance analysts, and public finance professionals who provide insights into financial structuring, risk mitigation, and policy support for REIPP financing. Additionally, legal experts, infrastructure specialists, and academics contribute perspectives on regulatory frameworks, contract enforcement, technical feasibility, and economic policies, all of which are critical success factors for securing and sustaining REIPP investments.

Table 2 below presents the distribution of respondents interviewed by stakeholder grouping.

Table 2: Respondents profile

No.	Participant ID	Role in the organisation	Education qualification	Type of Organisation	Duration of Interview	Date of Interview
1	Investor	Investment professional	Accounting/Finance	Private Equity	41 minutes	24 Nov'24
2	Advisor	Public finance analyst	Politics/Development Studies	Development Finance Institution: National Treasury	36 minutes	12 Jan'25
3	IPP	Finance analyst	Engineering	IPP/REIPP/Development Company	38 minutes	21 Jan'24
4	Advisor	Senior lecturer	Economics, political science and development studies	University	56 minutes	24 Jan'25
5	Advisor	Partner	Economics and Law	Legal Advisory/Law Firm	1 hour 11 minutes	22 Jan'25
6	Advisor	Senior policy analyst	Economics	Government national administration	44 minutes	17 Jan'25
7	Advisor	Energy director	Mechanical Engineering (as well as MBA)	Engineering Consulting/ Technical Advisory	44 minutes	29 Jan'25
8	Advisor	Senior legal counsel	Law	IPP	38 minutes	14 Jan'25
9	Advisor	Investment professional	Accounting/Finance	Private Equity	35 minutes	06 Feb'25
10	IPP	Executive infrastructure development & implementation	Civil Engineering	Automotive Sector (Infrastructure Development & Implementation)	36 minutes	15 Jan'25

Source: Research data

4.3 Critical Success Factors: Programme Level factors

The thematic analysis of the interview responses identified competitive bidding prices, scale of the project, physical prequalification and bid preparation, winner selection and trust in the bidding process as well as financial prequalification as the programme level factors that are critical for the success of Renewable IPPs (REIPPs) in South Africa. The discussion of each of the themes is provided in the following sub-sections.

4.3.1 Competitive bidding prices

Regulators are also responsible for approving generation tariffs contained in PPAs. A key issue was that tariffs that were set too low in the REIP programme; especially in later rounds, thus impacting ability of IPPs to reach financial closure. Respondent 5 states:

"A number of projects in Round 5 of REIPPPP have not been able to close because of low prices bid, and global price shocks impacting the sponsors' ability to deliver the projects…. round five of REIP, where there are a couple of particular project developers that submitted a bid to the government of South Africa to the Department of Mineral Resources and Energy at the time, and they, because it's a competitive bidding process, they bid very low, very competitive pricing."

Thus, tariffs must be set at a reasonable level that still allows projects to remain profitable without squeezing margins at an unreasonably low level.

Regulators also oversee the licensing process for generation, transmission, and distribution activities. However, these procedures can be complex, expensive, and without guaranteed outcomes. Respondents noted that although some of the processes of obtaining the required licensing is a bit onerous, it is however an important requirement to ensure project readiness. Respondent 8 stated:

"The good part about that is that most of the criteria required to actually submit for the tender is to ensure project readiness. So that all your ducks have to be in a row before and when you submit the project, so that you're not submitting something that when they happen to a occur, then you have to go to the background work."

4.3.2 Scale of the project

There was consensus amongst the respondents that scale is a key factor for success for an IPP. Respondent 2 notes:

"Scale is very important as it allows for utility scale pricing, which mean more competitive tariffs, lower projects costs per MW."

While the scale of the project presents an opportunity for economies of scale; it also ensures the adequate coverage of the required capital and operational expenditure. As pointed out by respondent 10:

"The business model of the IPP pivots on the scale of the project. This is vital to calculate the sustainability of the Project as the CAPEX and OPEX outlay is burdensome. The Projects have to be long term in excess of 25 to 30 years to make the generation feasible. Break even point for these investments is normally realised at midpoint of the contracting period. Scale therefore plays a huge factor."

At the same time; however, the larger the project, the more difficult it is to reach project realisation and the greater the risks for the project. Respondent 8 stated:

"There is complexity in projects across the board, but the larger the project, the more risk, generally."

It has also been noted that project size limits are necessary in the REIP programme to promote competition and allow more players to enter. It is noted that IPP players welcome this limitation. When asked if project size limits are necessary for the programmme, Respondent 2 stated:

"…if the intention is to introduce competition by making sure that you don't just have a single three GW project that's really cheap that wins the whole round, and that's OK. That introduces competition, and that's fine… So you get economies of scale on the bigger projects, but you get competition when you have project sizes."

4.3.3 Winner selection and trust in the bidding process

A critical success factor for IPPs participating in the REIP progamme is transparency in the winner selection process as well as trust in the bidding process itself. IPPs need to have a clear understanding of the bid scoring criteria in order to ensure that they submit appropriate bids. Respondent 2, who is an IPP, indicated that they trust the bidding process:

"I think that the process is clean. I don't I think there is any kind of corruption or anything in the process, so the trust is high. We're always going to suspect things- of other companies kind of manipulating the system, not in an illegal way-just in a way that is to form some form of advantage. Not through any form of illegal means and not accusing anyone. But just of manipulating it within the rules. But yeah, I think we have no reason to doubt the process."

4.3.4 Physical qualification and bid preparation

The physical prequalification process, such as obtaining permits, land rights, and grid access, play a pertinent role in the REIPP process as well as any IPP process. They assist in ensuring project readiness for project realisation. Although this may be onerous, Respondent 3 emphasised the importance of physical prequalification and bid preparation.

"Yeah, I think they do play obviously an important role. And with the REIPP process, the good part about that is that most of the criteria required to actually submit for the tender is to ensure project readiness. So that all your ducks have to be in a row before and when you submit the project, so that you're not submitting something that when they happen to a occur, then you have to go to the background work. So I think to answer this question at a physical prequalification level it is appropriate what is required for us to submit. Some of it is a bit onerous and straining because it comes at stages; you need to apply for "this" to get "that", and sometimes they want you to get "that." Meaning you put in all this work to get all these ducks in a row."

A significant barrier that has to be noted to ensure project readiness is that these development costs can be quite high. The development costs for Independent Power Producers (IPPs) can be prohibitively high due to several factors. These include securing land rights through lease agreements or negotiations with landowners, conducting resource studies (such as solar irradiation or wind assessments), and obtaining necessary environmental and regulatory approvals. For instance, a project may require anemometers to collect wind data for a year

before environmental authorisation can be granted. Developers need to have the financial resources to fund all of these development costs.

Additionally, project development is often handled by specialised firms that later sell the project rights to IPPs for bidding into procurement programmes, adding another layer of cost. Regulatory approvals, such as a Section 53 approval under the Mineral and Petroleum Resources Development Act (MPRDA) for land use rights, further contribute to expenses. These complexities, along with commercial negotiations and varying project development fees, make the overall cost structure highly variable and potentially significant.

Respondents unanimously agree that these costs can be prohibitively high. This can be considered a barrier. Respondent 2 details additional factors that contribute to these costs as follows:

"Project development costs are considered to be prohibitively high and this is due to the setup of the project. So, the predevelopment studies, including the environmental impact assessments, feasibility studies, all the licensing, the land permit use and all the other permits that go with it. So, predevelopment studies would be the first category. And then the second category of factors that drive the costs are the actual financing, advisory and legal fees because getting these projects to reach financial close takes a huge amount of expertise from the financing and legal side. So, these complex contracts and the legal requirements required around the financing drive up the cost as well. And also, the long timeline in general; as currencies fluctuate and balance sheets change from year to year- the long timelines actually drive the costs up in terms of the regulatory and approval processes- the longer they take that actually has an impact on the cost. So, ya, those are the three things that I see that drive up the project development costs."

4.3.5 Financial Prequalification

The financial prequalification involves a deposit that the bidder is required to submit either before the auction or after being awarded the project. This payment acts as a security deposit and is reimbursed if the bidder does not secure the project or successfully completes it within the stipulated timeframe. These requirements serve two main functions: first, to confirm that the bidder has the financial capacity to complete the project if funding is provided; and second, to incentivise the successful bidder to follow through with project completion. This approach

helps ensure that bidders are financially invested in the project, thereby increasing the likelihood of its success. Higher financial prequalification requirements enhance the probability of project completion, as the consequences of failing to proceed with the project become less desirable. The financial prequalification process is therefore considered a critical success factor for IPPs. Respondent 3, who is an IPP, agrees with this notion. They state the following:

"I mean they perform an important role in the process. They ensure some form of accountability as long as the bonds get pulled if the bidder has not met their obligations or if they have acted in an illegal way or whatever the case is. The bonds have a set of rules and in each of those then I think it's important that the bond gets pulled. It's not certain at this stage how effective it is actually holding Ipps or developers to account, but it does require a certain size, and perhaps a certain calibre of company that would actually participate in the REIPP Programme because it creates a barrier. It's a hurdle. Not, not any "joe" can participate in the process. You also have an application fee for the documents year or registration fee registration form, which is 35,000 rand. That's another kind of hurdle and barrier. I think it's important- I don't think it's high risk, but I think it's an important step."

4.4 Critical Success Factors: Project Level Factors

The thematic analysis of the interview responses identified favourable debt and equity partners, creditworthiness of the offtaker, government guarantees, quality of the construction contractor, grid infrastructure, and grid capacity as the project-level factors that are critical for the success of Renewable IPPs (REIPPs) in South Africa. The discussion of each of the themes is provided in the following sub-sections.

4.4.1 Favourable debt and equity partners

There was unanimous consensus among all respondents that there is an appetite in the domestic market for financing IPPs. South Africa's domestic market has demonstrated a growing capacity to finance Independent Power Producers (IPPs), particularly in the renewable energy sector. The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), initiated in 2011, has been instrumental in attracting private sector investment. As of 2023, the programme has secured over ZAR 194 billion (approximately USD 16 billion) in private investments, leading to the development of 6,200 MW of installed capacity across 123 projects. Respondent 2 notes:

"Yes definitely, there's local banks that are involved but there is limited capacity for that due to local banks; like Standard Bank or Nedbank participating but often they do partner with international financiers. So, there's appetite; especially REIPP projects that have been approved that are co-financed by Standard Bank or Nedbank- those two specific banks."

Despite these advancements, challenges remain. The scale of investment required for South Africa's energy transition is substantial, with estimates reaching up to $500 billion over the next three decades. To bridge this financial gap, local banks are increasingly stepping in to provide necessary funding. Thus, while South Africa's domestic market has made significant strides in financing IPPs, particularly through programs like the REIPPPP and active participation from local banks, ongoing efforts are essential to meet the extensive funding needs of the country's energy transition.

Key outcomes required from the right debt and equity partner

Finding the right debt and equity partners for Independent Power Producers (IPPs) is essential for financial viability and project success. Outcomes from the interviews indicated that ideal debt partners include banks, development finance institutions (DFIs), and institutional investors. They should offer: competitive interest rates and long-term financing, limited recourse project financing, experience in energy infrastructure, a flexible risk appetite with financial covenants, and access to concessional funding or blended finance.

Equity investors take on more risk in exchange for returns. The right partner should have: strong financial backing and sector expertise, a risk-return profile aligned with the project, long-term strategic alignment, local market knowledge, and regulatory understanding.

4.4.2 Creditworthy of the off-taker and government guarantees

The creditworthiness of an off-taker is critical for the success of Independent Power Producers (IPPs) in South Africa. A financially stable off-taker ensures bankability, secures project financing, and provides revenue stability through timely payments. It also mitigates default risks, influences electricity tariffs, and attracts private sector participation. Given Eskom's financial challenges, strengthening its position and diversifying reliable off-takers is essential for a sustainable and investor-friendly energy sector in South Africa.

Government guarantees are crucial for the success of Independent Power Producers (IPPs) in South Africa, providing financial security that attracts investment, lowers financing costs, and ensures stability in the energy sector. These guarantees mitigate Eskom's credit risk, facilitate competitive electricity tariffs, and support the country's renewable energy transition. Removing them would increase investment risk, raise electricity prices, expose IPPs to offtaker defaults, and potentially delay or cancel projects, worsening the energy crisis. To maintain investor confidence and ensure sustainable energy development, government-backed guarantees remain essential.

Respondent 5 notes the following with respect to the creditworthiness of the off-taker and government guarantees:
"So in South Africa we've got Eskom as the off taker, the signing the power purchase agreement. But Eskom hasn't always been the healthiest institution. I think it's on a good wicket now it's getting better. But financiers have insisted on a government guarantee from the government of South Africa to gain the assurance that even if Eskom is unable to pay, that the government of South Africa will stand behind those payments.

So, the government guarantee has been a very important feature in bankability and in other words, convincing lenders that even if Eskom runs into trouble, that there will still be enough money to pay down their debt and the principal and interest making up their debt."

4.4.3 Quality of construction contractor

Respondents noted that the quality of the construction contractor is crucial for the success of IPPs in South Africa, ensuring timely project completion, cost control, regulatory compliance, and long-term reliability. A reputable contractor reduces risks related to delays, budget overruns, equipment failures, and safety hazards while enhancing investor confidence and operational efficiency. Poor construction quality can lead to financial losses, legal issues, and reduced plant performance. Given South Africa's energy challenges, selecting experienced and capable contractors is essential for the sustainability and success of IPP projects.

Lenders and insurers assess the quality of the appointed contractor as part of their risk evaluation. A well-established contractor with a strong track record improves investor confidence, making it easier to secure financing and favourable insurance terms. If a project is

constructed by an unreliable contractor, financial institutions may view it as a high-risk investment, making funding more expensive or difficult to obtain.

Respondent 5 states:
"I'd say another important barrier would be what is the quality of your construction contractor. There's a lot of risk in the construction phase and lenders and investors will want to know that the right people are building the project and building it properly. So, there isn't bad equipment or a series of breakdowns which causes the project not to be able to generate the revenue. So, there'll be an examination of the construction contractors, and actually you may know in South Africa quite a few construction companies have gone insolvent in the last number of years. And there's only two or three really coherent construction contractors left in the country. So, I think that's a barrier."

Respondent 2 states:
"With so many projects being developed (and the brain drain effect on skilled engineers, lawyers, etc), good advisors, consultants and contractors are stretched thin and in high demand. For an IPP who does not have these skills in-house (most IPPs have limited in-house), this is a challenge."

4.4.4 Grid Infrastructure and grid capacity

There was consensus among respondents that grid infrastructure and capacity are critical for the success of IPPs in South Africa, enabling efficient energy transmission, system stability, and investment attraction. However, the country faces significant risks, including grid congestion in renewable energy zones, aging infrastructure, slow expansion due to bureaucratic delays, high upgrade costs, and the risk of energy curtailment. Without urgent grid modernisation and investment, these challenges could hinder renewable energy integration and exacerbate the energy crisis. Expanding and strengthening the grid is essential to unlocking South Africa's renewable energy potential and ensuring long-term electricity security.

Respondent 2 identifies this as one of the top three risks facing IPPs and presents a mitigating strategy. They state the following:

"The third risk is the grid connection. We can set up as much production as we want, but we don't have the capacity to connect this extra intermittent renewable energy to our grid. So, grid connection is the infrastructure bottle neck "

Respondent 2 also states this as one of the top 3 risks facing IPPS and states the following:

"The South African grid is becoming constrained, and grid strengthening is slow. Competition for connections is high, and this kills many projects"

4.5 Discussion of Results

The financing of Independent Power Producers (IPPs) in South Africa is influenced by a combination of project-level and programme-level factors. This section synthesises the key findings of the study to answer the question: "What are the critical success factors for financing IPPs?" The discussion also integrates comparisons with existing literature to provide a comprehensive understanding of these factors in the South African context.

A well-established financial ecosystem is fundamental for attracting private investment in IPPs. The study found that South Africa has a relatively mature renewable energy financing landscape, largely reliant on local banks, Development Finance Institutions (DFIs), and institutional investors. However, the need for financial innovation and increased international partnerships remains pressing due to the scale of investment required for the energy transition.

These findings align with prior research, such as Eberhard et al. (2014) and Baker and Phillips (2019), which highlight the pivotal role of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in mobilising investment. Nonetheless, while global markets leverage diversified financial instruments such as green bonds and climate funds (Gatzert & Kosub, 2016), South Africa remains heavily dependent on local debt financing (Eberhard et al., 2017). This study suggests that improved risk mitigation strategies and policy certainty are essential to expanding access to international finance.

Eskom's financial instability remains a major concern for IPP bankability. Historically, government guarantees have mitigated lender risk, but discussions about phasing them out have introduced uncertainty. The study supports literature (Eberhard et al., 2017; Mazzucato &

Semieniuk, 2018) that emphasises the critical role of sovereign guarantees in de-risking investments in financially unstable markets. However, while global markets have moved towards alternative de-risking mechanisms such as credit enhancements and liquidity support from multilateral banks (Polzin, 2017), South Africa's investment landscape remains dependent on government-backed guarantees. This study finds that the slow transition to alternative risk mitigation strategies is a key divergence from international trends, underscoring the need for increased financial innovation.

The study confirms that contractor experience and financial stability are crucial for project success, reducing risks of cost overruns and delays. This aligns with findings by Fugar and Agyakwah-Baah (2010) and Ofori (2015), which highlight that construction inefficiencies in developing countries often stem from inadequate contractor selection. Compared to global best practices, where strict prequalification and financial support mechanisms improve contractor reliability (Doloi et al., 2012), South Africa faces unique challenges, such as economic instability and limited contractor funding. Addressing these constraints requires stronger training programs, targeted financial assistance, and regulatory enforcement to enhance contractor capacity and project outcomes.

Aging transmission networks and grid congestion pose significant barriers to renewable energy integration. The study aligns with prior research (Eberhard et al., 2017; Pegels, 2010), which emphasises South Africa's reliance on an outdated grid designed for coal-based energy.

Internationally, countries such as Germany and China have adopted government-led grid modernisation initiatives (IRENA, 2021). In contrast, South Africa's study findings suggest that private wheeling agreements and public-private partnerships (PPPs) may be more viable solutions given fiscal constraints. The findings support global literature advocating for proactive grid investment strategies to accommodate renewable energy expansion.

Low tariffs in competitive bidding rounds, particularly in Round 5 of REIPPPP, have led to financial distress for developers due to rising costs and external disruptions. This study aligns with literature (Eberhard & Naude, 2016) that highlights the risks associated with aggressive bidding, including stalled projects and financial strain. Globally, markets have adopted mechanisms such as tariff flexibility and risk-sharing agreements (IRENA, 2020) to mitigate

such risks. The study suggests that South Africa's rigid tariff structure may need adjustments to ensure long-term project viability while maintaining competitive pricing.

The study finds that economies of scale in larger projects enhance cost efficiency but increase financial and technical complexities. Literature (Tushman & Anderson, 1986) similarly recognises the trade-off between size-related cost savings and investment risks.

Internationally, markets such as India and Chile balance large and small project participation through tailored bidding processes (IRENA, 2021). South Africa's approach aligns with these best practices, ensuring market diversity while preventing monopolisation by large developers.

Transparency in the procurement process fosters investor confidence. Respondents expressed trust in the fairness of REIPPPP, aligning with literature (Eberhard et al., 2017) that emphasises the role of clear bid scoring criteria in maintaining market credibility. Compared to global trends, South Africa's REIPPPP is considered a model of transparent procurement. However, continued monitoring and enhancements to regulatory oversight remain crucial for sustaining investor confidence.

Prequalification requirements, including securing land rights, permits, and financial guarantees, are critical for ensuring project feasibility. However, high development costs and lengthy approval timelines create barriers to entry. The study aligns with findings by Montmasson-Clair & Ryan (2014) that identify regulatory hurdles as significant cost drivers. While financial prequalification enhances project credibility the study suggests that balancing these requirements is essential to encourage participation from smaller developers without compromising investment security (Montmasson-Clair & Ryan, 2014)

Chapter 5
Conclusion and Recommendation

5.1 Introduction

This final chapter presents the conclusion and recommendations for further studies. The purpose of this study was to identify the critical success factors for financing Renewable Energy Independent Power Producers (REIPPs) in South Africa, with a specific focus on programme and project-level factors. This was determined by analysing key financial, regulatory, and operational elements that influence the success of REIPP financing and assessing their impact on the bankability and sustainability of these projects.

The chapter outlines key conclusions and strategic recommendations aimed at addressing financing challenges within the REIPP sector. The findings are directed towards policymakers, financial institutions, investors, and project developers, enabling them to better structure financing mechanisms that enhance the viability and scalability of REIPP initiatives. By addressing programme- and project-level financial barriers, these recommendations seek to support the broader transition to renewable energy in South Africa and strengthen the country's energy security and economic growth.

5.2 Summary and Conclusion

This dissertation set out to identify the critical success factors contributing to the success of Renewable Energy Independent Power Producers (REIPPs) in South Africa (SA), focusing on the perspective of various stakeholders and examining both project and programme-level factors. The study provides a comprehensive analysis of the key factors that influence the development and execution of renewable energy projects under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), while also offering practical recommendations for addressing the challenges faced by developers and stakeholders.

The findings indicate that the success of IPPs is highly dependent on a combination of financial, regulatory, and operational factors. At the project level, several critical elements shape the feasibility and execution of renewable energy projects. These factors include access to financing, the creditworthiness of off-takers (mainly Eskom), the quality of construction

contractors, and the availability of grid infrastructure. South Africa's robust financial sector is generally supportive of renewable energy investments, but Eskom's financial instability presents a significant risk to developers. Eskom's creditworthiness is a pivotal factor that impacts the ability of IPPs to secure funding, and as such, the government's role in offering guarantees or alternative credit enhancement mechanisms is crucial to mitigating these risks.
Moreover, the study highlighted the limited availability of experienced and financially stable construction contractors as another barrier to the successful execution of renewable energy projects. This shortage increases the likelihood of project delays and cost overruns, ultimately undermining the financial viability of projects. In addition to this, the study found that grid infrastructure issues—specifically grid congestion and aging transmission systems—remain one of the most significant barriers to renewable energy integration in South Africa. With a growing demand for renewable energy, there is an urgent need for investment in grid expansion and modernisation to ensure that new capacity can be absorbed into the national grid without disruptions.

At the programme level, the study found that the structure of the REIPPPP itself plays a key role in the success and sustainability of IPP projects. Competitive bidding has been instrumental in driving down costs and promoting efficiency within the renewable energy sector. However, it has also led to financial pressures on developers, especially in Round 5 of the REIPPPP, where low tariffs created financial distress for some bidders. While competitive pricing ensures cost-effectiveness, it must be balanced with financial sustainability to prevent project failures. The study advocates for a careful review of tariff structures to ensure that they are both competitive and financially viable for developers.
The scale of projects within the REIPPPP is another critical factor identified in the study. Larger projects benefit from economies of scale, leading to lower costs per unit of energy produced. However, they also bring about increased complexity and risk. Strategic project sizing is therefore essential, as overly ambitious projects can strain resources, leading to delays and unforeseen costs. Policymakers must, therefore, strike a balance between encouraging large-scale investments and ensuring that smaller, more manageable projects are not overlooked in favor of large developments.

Trust in the bidding process is another critical factor for ensuring the long-term success of REIPPs. The study found that transparent bidding processes, where clear bid-scoring criteria

are communicated to all participants, help foster market confidence and competition. This transparency is essential for encouraging new participants and ensuring that the most competent and financially capable developers are selected. However, the study also noted that the stringent physical and financial prequalification requirements imposed by the REIPPPP can act as barriers to entry for smaller developers or those lacking the financial resources to meet these criteria. While these prequalification requirements are necessary to ensure that only capable developers participate, consideration must be given to the potential exclusion of smaller players from the market.

The study's findings also indicate that regulatory barriers remain a significant challenge for the successful implementation of renewable energy projects. Lengthy approval processes, coupled with inconsistent regulatory frameworks, create uncertainty and delays, increasing project costs and potentially discouraging investors. Streamlining regulatory approvals and enhancing coordination between government bodies and developers will be crucial in mitigating these risks. By ensuring that regulatory processes are clear, predictable, and efficient, policymakers can reduce delays and help expedite the deployment of renewable energy capacity.

In conclusion, the success of IPPs in South Africa's REIPPPP is contingent on a combination of well-structured financial mechanisms, robust regulatory frameworks, and operational efficiencies. The study finds that while South Africa has made significant progress in promoting renewable energy through its competitive bidding process, there are several areas that require refinement. Policymakers and stakeholders must address challenges related to financing, grid infrastructure, project scale, transparency, and regulatory efficiency to foster a sustainable and competitive renewable energy sector. Ensuring fair pricing, optimising project sizing, and maintaining transparency in the bidding process will be key to securing long-term investments, reducing risks, and ensuring the successful integration of renewable energy into the country's power sector.

The findings of this study contribute to the broader discourse on renewable energy development in emerging markets, providing valuable insights into the factors that influence the success of IPPs. By continuously refining these critical success factors, South Africa can strengthen its renewable energy sector, attract investment, and achieve its energy transition goals. These insights can also serve as a guide for other countries looking to implement similar renewable

energy procurement programmes, ensuring that the lessons learned in South Africa can benefit other emerging economies seeking to expand their renewable energy capacity.

5.3 Recommendations and Future Outlook

For South Africa to fully harness the potential of IPPs and renewable energy, a multi-faceted approach is required. Policymakers must prioritise:

- Regulatory certainty and policy stability to encourage long-term investment.
- Continued financial innovation to meet the growing capital demands of the energy transition.
- A diversified and financially stable offtaker market to mitigate reliance on Eskom.
- Investment in transmission infrastructure to support increased renewable energy integration.
- A balanced approach to competitive bidding that ensures financial viability for IPPs.

By addressing these challenges, South Africa can enhance energy security, attract sustained investment, and transition towards a cleaner, more resilient power sector. A collaborative effort between government, financial institutions, private sector stakeholders, and development partners will be crucial in achieving a sustainable and competitive renewable energy market that meets the country's long-term economic and environmental goals.

5.4 Recommendations for future research

The study's outcomes reveal that various elements pertaining to the advancement of Renewable Energy Independent Power Producers (REIPPs) in South Africa necessitate additional refinement and, in certain cases, complete re-evaluation. A detailed examination of these factors is imperative and would offer substantial benefits for the country. There are prospective avenues for future research to delve into the critical success factors for financing REIPPs in South Africa.

- **Government Policies and Regulations:** Examine how policies and regulations from the government influence the financing of REIPPs. Evaluate the impact of current policies, identify areas for improvement, and propose modifications that will make renewable energy investments more attractive to both domestic and foreign investors.

- **Innovative Financing Models and Financial Instruments in the REIPP space:** Explore innovative financial tools and funding approaches for the REIPP sector. Examine the viability and impact of financial instruments such as climate funds, green/eco-friendly bonds, and public-private partnerships in facilitating the mobilisation of capital for renewable energy projects.
- **Long-Term Project Performance and Monitoring:** Analyse the long-term performance of Renewable Energy Independent Power Producers (REIPPs) in South Africa and evaluate the efficiency of monitoring mechanisms. Examine how post-construction monitoring, assessment, and adaptive management play a role in ensuring prolonged success and addressing challenges that may emerge in the operational phase.

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Appendix B

Questions

Critical Success Factors for Financing Renewable Independent Power Producers in South Africa

Thank you for taking time to participate in our survey. Please note that the questions below will need to be addressed prior to the recorded interview. Your responses to these specific questions will be crucial to shaping our discission during the interview,

Section 1: Demographic information

a. Gender of respondent:
b. Age of respondent:
c. Nature of business:
d. Years of experience:
e. Current role in business:

Section 2: Interview/Survey questions

2) General Questions

All participants will be asked this set of questions regardless of stakeholder grouping.

A: General Information on Interviewee and Organisation

1. What type of organisation do you work for?
   a. Pension Fund
   b. Private Equity
   c. Asset Management
   d. Commercial Bank
   e. Public Utility
   f. Independent Regulator
   g. Development Finance Institution
   h. IPP/REIPP/Development Company
   i. Legal Advisory/Law Firm
   j. Financial Advisory
   k. Other (specify)

2. What is your position/role and job function in the organisation?

3. How long have you worked for the organisation?

4. What is your educational background?
   a. Accounting/Finance/Economics
   b. Business Administration/Business Management
   c. Natural Science/Engineering
   d. Politics/Development Studies
   e. Arts/History/Law
   f. Other (please specify)

5. Briefly describe your experience with IPPs/REIPPs and energy infrastructure projects.

B: General Questions on IPP Financing and Development in South Africa

Country Level Perspective

6. What is your view on the level of private participation in generation in South Africa? Prompt: How do you think it compares to other countries in the region?
7. Has the introduction of the REIP4 (Renewable Independent Power Producer (Procurement) Programme) aided or hindered the development and financing of IPPs?
8. What is your view on the current IPP licensing and tariff framework in South Africa? Prompt: What are its strengths or shortcomings?
9. Do you think a competitive bidding framework for IPPs in South Africa is effective?
10. Do you think there is adequate support for IPPs by government
11. What institutional or regulatory changes, if any, would you suggest to increase investment and the participation of private players in general

Project Level Perspective

1. What stage of the project development process do you think is most critical for the success of an IPP – procurement, construction or operation?
2. How important do you think the scale/ size of a project (planned installed capacity) is for the success of an IPP?
3. What are the top three risks at the project level for an IPP developer in South Africa?

The following schedules contain questions that will be asked to each stakeholder grouping separately.

Please answer section 3 OR 4 OR 5.

3) Interview Schedule for IPPs

(To be completed prior to the recorded interview)

Project Details

1. How many of your power projects have reached financial closure, are in construction, have been commissioned or are in operation?
2. What type of projects are they? Prompt: Hydro, solar or other
3. What is the installed capacity/ size of each project?
4. What is the total project cost for each project?
5. What was the duration of 1) planning 2) construction 3) operation? Prompt: (planning includes feasibility, design and negotiation)
6. What was the project finance structure in terms of what percentage of the total investment is equity/debt?
7. Did you employ any advisors to assist you with project implementation?
8. Did you acquire any government guarantees for the project(s)?
9. What security arrangements did you make for the project(s)?

(To be answered in recorded interview)

Programme Level Perspective	
Auction Design	
Ensuring Project Realisation	• **Financial Prequalifications:** How would you assess the financial prequalifications, including bid bonds, in the REIPP process? Were they set at an easily attainable level, fair, or too high, and do you believe they were effective in ensuring the project reached financial close?
	• **Physical Prequalification:** What was your experience with physical prequalifications in the REIPP process, such as obtaining permits, land rights, and grid access? Were these requirements set at an appropriate level, and do you think they played a significant role in the project's successful realization? *Physical qualification criteria include project development tasks that a developer has to perform in the course of project realisation, such as obtaining permits, land rights, building rights, grid access, for instance.
	• **Penalties**; Can you share insights into any penalties you may have encountered during the REIPP process? How do you perceive the effectiveness, necessity, and fairness of penalties in the REIPP process, and what impact do you believe they have on project realization, considering both the pros and cons?
Setting And Dividing The Auction Volumes	• How did the auction volumes set in the REIPP bids impact your decision to participate? Were they at an easily attainable level, fair, or too high, and how did these volumes influence your strategic planning for the project?
	• In your experience, do you believe project size limits are necessary, and how did you decide on the appropriate project size for your participation? Do you think project size should be considered in the REIPP process when determining timelines for reaching financial close?
	• Considering the observed decline in prices with each bid window in the South African REIPP process, how did this influence your decision to invest, and what insights can you share regarding the effectiveness of the auction volume-setting in promoting competition and driving down costs?
Determining Winners	• How satisfied are you with the REIPP auction format, particularly the sealed bid and single round structure of REIP4? Please elaborate on any specific aspects that contribute to your satisfaction or areas for improvement.
	• Regarding project evaluation and scoring, South Africa employs a multi-criteria scoring system that considers factors beyond just the price. How important do you believe this approach is, and what, in your opinion, are the pros and cons of using multiple bid scoring criteria? How did this impact the way you framed your project during the bidding process?

	• What factors did you take into consideration when determining the price to submit in your bid, and are you satisfied with the final tariff price? Additionally, do you think introducing ceiling prices to the REIPP process would be beneficial? If so, should these prices be disclosed to bidders beforehand or undisclosed, and how do you think a ceiling price should be determined?
Implementation	
Trust in the auctioneer and bidding process	• How would you describe your level of trust in the REIP4 bidding process and the auctioneer facilitating it? Please elaborate on the impact that trust, or lack thereof, has on your experience as a bidder. • In your opinion, how important is it to have trust in the bidding process as a whole—ranging from the transparency of the auction to the reliability of the auctioneer? Would you categorize this as not important, fairly important, or very important?
Post award support by the auctioneer	• Could you share insights into any post-award communication or support you have received from the auctioneer? How significant do you consider post-award support from the auctioneer, ranging from not important to very important, in ensuring the successful implementation of the project?

General Questions

1. How would you characterize your experience with the REIPP process in negotiations with the government, and in your perspective, who held the stronger position when bargaining for the PPA contract terms?
2. Can you share your experience with the off-taker in terms of payment for electricity generated? Have you encountered any payment disputes, and if so, how were they resolved?
3. Do you have any other remarks you would like to make?

4) Interview Schedule for Advisors

(To be answered in recorded interview)

1. What are the major reasons, in your opinion, why some licensed project developers fail to reach financial closure in South Africa's IPP space?
2. Are the typical project development costs for IPPs considered prohibitively high, and what factors contribute to these costs?
3. What project characteristics do investors prioritize when assessing the financial feasibility of a project in South Africa's energy sector?
4. Does the domestic market have any capacity to participate in financing IPPs? What, if any, are those local financing sources?
5. What external financing sources are accessible to projects in South Africa? What are the main barriers to accessing external financing for projects in South Africa?
6. To what extent are Development Finance Institutions (DFIs) involved in the development of IPPs and other energy projects in South Africa?
7. What is the most common form /feasible financing structure for IPP projects in South Africa? Prompt: project finance or corporate finance?
8. What are the typical financial and legal conditions precedent required by debt financiers or investors in South Africa?
9. Is international arbitration a possible recourse for IPPs in South Africa, and how is it addressed in project agreements?
10. What key risks do financiers or investors need to be covered for in order to invest in South Africa, and what government support/guarantees are available to mitigate these risks for IPPs? In your experience, what kind of government support/guarantees are available to cover these risks for IPPs in South Africa?
11. Considering that the transmission utility is the sole off-taker for IPPs in South Africa, with the PPA central to securing revenue, do you perceive this as a hindrance to securing financing for IPPs? If so, how do you believe this risk could be effectively mitigated in the South African context?
12. What security arrangements are commonly available to IPP developers in South Africa, and what are the essential conditions for successfully arranging these security measures?
13. Do you have any other remarks you would like to make?

5) Interview Schedule for Investors

(To be answered in recorded interview)

1. What is your organisation's investment mandate? Does your organisation have an appetite for energy projects in South Africa?
2. How many energy projects in South Africa, if any, have your organisation invested in? How many of those were REIPPs?
3. What is the typical investment size your organisation makes?
4. Do you use equity instruments, debt instruments or both? If equity, what is the minimum equity stake you look for?
5. What project characteristics do you consider in assessing the bankability of a project in South Africa
6. What is the hurdle rate your organisation targets for investments?
7. Briefly describe the key components of your organisation's investment appraisal process.
8. Briefly describe your organisation's investment approval procedures.
9. What are your key concerns when considering an investment in the energy sector in South Africa?
10. What in your opinion are the major risks associated with investing in South Africa?
11. What measures in your opinion would reduce the risk of financing projects in South Africa?
12. What security arrangements do you expect, at the very minimum, when investing in South Africa?
13. Do you have any other remarks you would like to make?