AVAILABILITY AND COST OF CAPITAL FOR IPP WIND ENERGY PROJECT FINANCING IN SOUTH AFRICA

An investigative study into how financiers and investors in the South African wind power market react to perceived uncertainties in the policy and regulatory enabling environment

James White: WHTJAM006
The Energy Research Centre (ERC)
University of Cape Town (UCT)
Supervisor: Andrew Marquard

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

PLAGIARISM DECLARATION

I, James White, submit this half-dissertation as part of the fulfilment of the requirements for the degree Masters of Science in Energy and Development studies at the University of Cape Town.

I know the meaning of plagiarism and declare that all the work in this document, save for that which is properly acknowledged, is my own.

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31st March 2010

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ACRONYMS AND ABREVIATIONS

AFDB	African Development Bank
BLA	Bilateral Agency
CAA	Civil Aviation Authority
CPA	Contract Price Adjustments
DBSA	Development Bank of South Africa
DME	Department of Minerals and Energy
DSCR	Debt Service Coverage Ratio
PPA	Power Purchase Agreement
GIS	Geographic Information System
GW	GigaWatt
IDC	Industrial Development Corporation
IFI	International Finance Institutions
IPP	Independent Power Producer
IOU	Investor Owned Utility
IRR	Internal Rate of Return
IRP	Integrated Resource Plan
JIBAR	Johannesburg Interbank Agreed Rate
kW	Kilowatt
LLCR	Loan Life Cover Ratio
MLA	Multilateral Agencies
MRPSA	Mainstream Renewable Power South Africa
MTPPP	Medium Term Power Purchase Programme
MW	Megawatt
NERSA	National Energy Regulator of South Africa
NPV	Net Present Value
NUG	Non-Utility Generator
PNCP	Pilot National Cogeneration Programme
REFIT	Renewable Energy Feed in Tariff
REMT	Renewable Energy Market Transformation Project
REPA	Renewable Energy Purchasing Agency
RMC	African Regional Member Countries
ROE	Return on Equity
SA	South Africa
SBO	Single Buyers Office
SPV	Special Purpose Vehicle
WTG	Wind Turbine Generator

ABSTRACT

In recent months there has been an increased interest in the potential for a wind power sector in South Africa. This is in response to broader climate change commitments by government and the potential inclusion of Independent power producers (IPP) in the South African generation capacity. In support of this the government has set policies that indicate their support for the inclusion of renewable energy into the mix. However, this policy does not send a clear signal of certainty to investors especially with regard to the implementation. The thesis set out to review how investors and financiers have responded to these signals and how they set the cost and availability of project funding based off the uncertainty due to the gaps in the enabling environment. The thesis combined a review of international best practises sourced from the relevant literature sources, and grounded with the opinions of the potential investors and financiers that are looking to commit funds to the market.

The cost and availability of project funds are set and communicated through the set of key financing terms and variables financiers and investors extend a project. In South Africa the ranges of these variables expressed through the exploratory interviews were more restrictive than those ranges that are typically seen internationally (as sourced by the literature). This is attributed to the large degree of uncertainty in the enabling environment and the global financial crisis. However there is an overwhelming support invest and finance these projects and it is the definition of the policy and associate regulatory enabling environment that is key to secure this investment.

CHAPTER 1

INTRODUCTION

1.1. AREA OF STUDY/OBJECTIVE

The thesis' objective is to determine the availability and cost of project funding for IPP, project financed, wind power projects in South Africa. Key to establishing this is to understand how investors and financiers set their availability and cost of project funds and what factors influence this determination process. To meet this objective the area of study will cover the topics relevant to development, investment and financing of IPP, project financed wind power projects globally and in South Africa. The theory will detail the actual mechanics behind the investing and financing decisions and how these mechanisms are manipulated in response to uncertainties and risks in the enabling environment. These investing and financing decisions will determine the eventual availability and cost of project funds which will provide insight into the current financing landscape in the South African wind market.

1.2. BACKGROUND TO STUDY

There has been a recent surge in interest around the development of wind power in South Africa. The country is in a situation where it desperately needs more generation capacity to meet current and forecasted demand. Currently this demand figure sits at 250TWh which is supplied by an installed capacity of 44GW (van der Merwe [1], 2009). This demand is expected to grow significantly over the next few years as the country struggles to set the enabling environment to achieve economic growth targets 6% in 2014 (Wikipedia, 2009. Economy of South Africa. [Online] 10 December 2009; and van der Merwe [1], 2009). The economic growth will not come without a larger cost to the environment as South Africa is already placed globally in the top 25 emitters of green house gases (GHG), which can only be expected to grow in the absence of important steps to a new, cleaner modern energy mix (WRI, CAIT, 2009). In line with this, a letter to the United Nations Framework Convention on Climate Change (UNFCCC) the Environmental Affairs DDG Alf Wills said, "South Africa reiterates that it will take nationally appropriate mitigation action to enable a 34% deviation below the 'business as usual' emissions growth trajectory by 2020, and a 42% deviation below the 'business as usual' trajectory by 2025," (van der Merwe [3], 2010). Wind power can play an important role in not only achieving these CO_2 reduction targets but as part of the solution for electricity capacity building to fuel the economic growth targets.

The potential for wind power in South Africa was published off the back of an analysis done by Mainstream Renewable Power South Africa (MRPSA). The results revealed that, to date Eskom, the wholly state-owned utility, has received over 10,500 MW of applications for grid connection from wind power projects due to the REFIT and supporting signals.

Furthermore, it is argued that 5%, 5GW or 13TWh of the country's current electricity demand could come from wind power to be installed over the next 5 years. Further sources support these findings as AfriWEA claims that Eskom has received 3600MW of wind generated power and Promethium Carbon claims that 6000MW of applications have been received for wind generated power (Berry, 2009; and van Oerle, 2009). The MRPSA analysis indicated that 25% of the country's electricity demand could be met by wind power by 2025 (van der Merwe, [1] (2009). These numbers suggest the potential for wind power in the country and demonstrate the significant reaction from private investment in response to signals in the enabling environment.

This vast wind energy potential is set against a series of policy objectives and regulatory steps. The Department of Minerals and Energy (DME, or the Department of Energy, DoE, as it is known now) published the Renewable Energy White Paper, 2003. This policy document set the clear target of:

> *"…10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro."*
>
> *(*Department of Minerals and Energy [1], 2003)

The purpose of this target was to facilitate the integration of renewable energies into the mainstream energy economy or in other words, "to give a much needed thrust to renewable energy" (Department of Minerals and Energy [1], 2003). In light of this communicated target the National Energy Regulator of South Africa (NERSA) released the Renewable Energy Feed-in Tariff (REFIT) in two phases with the aim to, "create an enabling environment for achieving Government's 10,000 GWh renewable energy target by 2013 and sustaining growth beyond the target" (Nersa [1], 2009).

Some further points in the background leading up to the REFIT in the creation of a wind market in South Africa are summarised in the points below:

- 2003: Eskom Demonstration Plant: Klipheuwel Wind Farm
- 2005: South African Wind Energy Programme (SAWEP) established by the DME
- 2008: The Darling Wind Farm, Commissioned
- 2009: Eskom is advanced in the planning of their first big scale wind farm, which was ultimately delayed.
- 2009: Declaration of intent for cooperation on renewable energies between the SA Government and the Kingdom of Denmark
- 2008/9: RisØ Institute initiative to compile a wind atlas for South Africa

The above signals have set the stage for wind power industry and attracted the attention of Government, investors and financiers.

The ownership option and financing structures that are most likely to shape this industry are Independent Power Producers employing a project finance structure. The Department of Energy (DoE) has made provision for 1100 MW of IPP projects under the first integrated resource plan (IRP1) over the next 3 years (Department of Minerals and Energy [3], 2009). Apart of this 1100MW will be 500MW of wind power. These wind power IPP’s are likely to use project finance which, according to the literature reviewed, has typically been a popular structure for developing wind farms internationally in both developed and developing markets. South African IPP's will most likely use project finance to safeguard their balance sheet from the projects risks inherent in the Greenfield nature of investing in wind power projects in South Africa. This view point was supported in the exploratory interviews and this evidence is presented under section 3.4 in Chapter 3.

An exploratory review of the project financed, IPP wind power projects will now be developed throughout the thesis guided by the below key research questions.

1.3. KEY RESEARCH QUESTIONS

This research paper aims to determine the availability and cost of project funds in South Africa for utility scale wind power projects and then to determine how the level of perceived risk and uncertainty that important potential financiers, investors and developers see in this specific market influence their investing and financing decisions. In order to determine this perceived uncertainty the research will endeavour to establish how the set of key financing terms and variables selected by financiers and investors communicate their perceived level of uncertainty. In other words the research will analyse how these key financing terms and variables are altered in response to an increase or decrease in perceived project uncertainty or risk. The following set of key research questions will be the framework under which the above topic will be explored.

What are the policy objectives and the associated Regulatory Framework that pertains to the development of a wind power market in South Africa?

The wind sector's enabling environment is developed through the mesh of policy, legislation and regulations that define the mechanisms, roles and responsibilities of those entities involved. The private players require a steady policy objective and an associated defined regulatory framework, under which they can realise returns, allocate risks and maximise project value.

In order for this to happen the public players need to be unambiguous about what their targets are and make sure they support the requirement's of the private players in order to achieve these targets in the nation's best interests.

The question sets the context, under which a review of the South African's Government's, and the associated public players, set of policy objectives and implementing regulatory signals that have been communicated to the private market and the rest of the thesis will analyse how the private investment and finance have reacted to these signals and why.

What gaps exist in the enabling environment for wind power projects in South Africa?

This question essentially addresses the how the enabling framework that has been set so far creates barriers or uncertainties for investors in the form of regulatory risks. This question does not intend to list an exhaustive set of the exact barriers and uncertainties that still exist in the South African wind power project market as this is changing everyday and each financier and investor will face different barriers. Rather the intention of this question is to highlight the predominant uncertainties and sources of blockages to facilitate financing and investment and how the private players will react to these broader uncertainties, why and how will they communicate this through the cost and availability of their funds.

What is the predominant financing structure and ownership option for utility scale wind power plants globally and in South Africa?

This question will support the selection of project financing under and an IPP ownership that is expected to be the predominant structure for the development of wind power plants in South Africa in the early stages of the market's development.

Before the thesis focuses entirely on IPP project finance the predominant ownership options and financing structures will be discussed in order to understand the choices that investors must make on the structure under which they will develop the project and how this will influence the financier's decisions.

Who are the financiers and investors that have chosen to invest in response to the signals in the enabling environment?

Through answering this question the research will be able to identify the key potential players that will extend funds, in terms of debt and equity, to utility scale wind power plants in South Africa. This will serve the dual purpose of firstly, determining the potential sources of funds and how serious these entities are in committing funds to projects of this nature. Secondly, from this investigation the list of interviewees can be identified.

What project uncertainties and risks stand out to financiers and investors to the South African wind energy market?

This question will highlight the key risks that exist in the market at the time of the exploratory interviews were conducted. With these risks identified and explained the effect on the key financing terms and variables can be explored.

What are the ranges of key financing variables for project financing utility scale wind farms in South Africa?

The outcome of this question will provide the set of key financing terms and variables for South African utility scale wind farms which can then be analysed to make conclusions as to how these variables and terms reflect the perceived risks as identified from the question above.

How does this range reflect the perceived level of uncertainty financiers/investors see in the South African wind energy market?

The above set of questions will set the framework for the analysis of this question to determine the feasibility of a wind power market in South Africa from a funding perspective. In other words, is there capital and debt available for wind power project development in South Africa and if so, will these funds be offered on terms that will yield feasible projects?

What is the impact of uncertainty in the enabling environment on the availability and cost of project funds?

This will allow the paper to demonstrate how the uncertainty and risks that are apparent in South African enabling environment will affect the availability and cost of funds for wind power project development in South Africa.

1.4. METHODOLOGY

The methodology pursued was in accordance for the purpose of the research and builds off the similar methodology employed by Sabine Raab, 2009, in her MBA thesis titled “Wind Energy Developments in South Africa: A Delineation and Analysis of Barriers and Obstacles”.

1.4.1. COMPARISON OF INTERNATIONAL LITERATURE

The research methodology of this paper started with a review of international literature on the financing structures and ownership options that have and will underpin the development of large scale infrastructure projects, and more specifically, utility scale wind farms worldwide.

The influence of political, regulatory, economic and social factors on the perceived risk exposure behind these projects was explored with the purpose of understanding the eventual impact on the set of key financing terms and variables. Before this, project finance literature was explored to investigate which key financing terms and variables are most commonly used within the framework of these projects. This approach was adopted to delineate the boundaries of the area of focus and guide the set of questions that were used to develop the set of questions used in the qualitative exploratory interviews that are explained below.

1.4.2. PRIMARY RESEARCH: QUALITATIVE INTERVIEWS

The review of literature provided a baseline on the concepts and structures employed historically in other countries that have seen the development of a wind energy market. Many of the concepts identified throughout the literature sources guided the pre-defined questions that were used to guide the informal and open interviews. The majority of the exploratory interviews were carried out in a face to face discussion and guided by pre-defined questions based off the literature, with few done via the telephone such as those based outside of South Africa.

This qualitative approach is called an exploratory interview as defined by Oppenheim, 1992, cited in Raab, 2008. The format an exploratory interview follows is to place the interviewee in an atmosphere similar to that of a normal conversation where open questions are asked in combination with questions based in fact to establish the interviewee’s own opinion around the area of predefined interest (Oppenheim, 1992, as cited in Raab, 2008).

This research approach was appropriate for the purpose it was intended for as the objective of the analysis was to gain the key decision maker's, of the financiers' and investors' organisations, specific opinions on the policy objectives, institutional framework and level of risk exposure they perceived in committing funds to a utility scale wind power plant in South Africa and how they would reflect this through the key financing terms and variables.

The people targeted for exploratory interviews were the key decision makers or people with significant influence to afford debt, equity and development skills to the development of wind power plants in South Africa. Consequently, both local and international commercial banks were engaged and individuals with focus on energy, utilities and infrastructure finance were targeted. Secondly, potential investors that are looking to commit local and foreign equity into wind power projects were engaged. Thirdly, the people who are responsible for infrastructure development activities of certain organisation such as local and foreign energy companies were approached. Lastly, industry experts in the financing of infrastructure and more specifically energy projects worldwide and in South Africa were interviewed. These people offered the right combination of specific knowledge on the topics of financing, investing and developing utility scale wind farms in South Africa, and the energy finance experts who could offer a more holistic viewpoint of financing landscape. A list of the people interviewed is included in the Table 1 but please note names of individuals are only included if permission was given. The insights and opinions offered by the interviewees can be found dispersed throughout the report and these usually follow from concepts established from the literature.

Table 1: List of Interviewees

INTERVIEWEE	**POSITION**	**ORGANISATION**
Domestic Commercial Banks		
Omar Vajeth	Power and Energy	Absa Capital Investment Banking Division
Paul Eardley-Taylor	Director of Investment Banking Coverage and head of Energy, Utilities and Infrastructure in South Africa and Africa	Standard Bank
Jonathan Muller	Energy Project Finance	Nedbank Capital
Amith Singh	Energy Project Finance	Nedbank Capital
Tommie Potgieter	Capital Markets	Investec Capital Markets
International Commercial Banks		
Industry Participant	Energy and Commodities, Structured Debt	BNP Paribas
Equity Investors		
Barry O'Flynn	Regional Manager	Mainstream Renewable Power
Alasdair Maclay	Infrastructure	Actis
Development Finance Institutions		
Youssef Arfaoui,	Energy Expert from the Private Sector Department, OPSM	African Development Bank and the African Development Fund
Fatima Collins	Business Development Specialist	Renewable Energy Market Transformation Project Implementation Support Unit (REMT ISU). Development Bank

		of South Africa (DBSA)
Industry Experts/Research Institutes		
Francois Viljoen	Director	Cresco Project Finance
Chris Greenwood	Head of Research	New Energy Finance

Source: Compiled from primary research

1.5. DISCLAIMER

Please note that the opinions and reference to key financing terms and variables by interviewees in this report are by no means final or legally binding to the interviewees or the organisations they represent but rather offer insight into the response of funders to the current level of perceived risk. Any content in this regard was made in the absence of any real project but rather a general set of requirements and key financing terms and variables that could potentially apply to South Africa.

1.6. LAYOUT OF THE THESIS

1.6.1. CHAPTER 1: INTRODUCTION

Chapter one will introduce the area of study/objective of the research and set the background for the research. The methodology and layout of the report will then be introduced and explained.

1.6.2. CHAPTER 2 SOUTH AFRICAN WIND ENERGY: REGULATION, LEGISLATION AND BARRIERS TO FINANCE

The chapter will highlight the policy, legislative and regulatory steps that have been taken that are relevant to project financed, IPP wind power projects in South Africa.

It will discuss where there are gaps in this framework, as it is these gaps that serve as uncertainties to potential investors and financiers. The core discussion of this thesis aims to understand financiers and investor's response to these uncertainties in their determination of the availability and cost of their project funds. So this chapter will serve to highlight these uncertainties in South Africa in order to contextualise the rest of the thesis. This chapter does not serve as a comprehensive list of the barriers to private wind power project development in South Africa but rather to present some of the uncertainties so that the financier's and investor's response can be discussed in the presence of these uncertainties.

1.6.3. CHAPTER 3: FINANCING STRUCTURES AND OWNERSHIP OPTIONS

Chapter 3 will explore some of the investing and financing decisions that the private players will have to make with particular focus on the financing structures and ownership options that have commonly been employed in the financing and development of utility scale wind power plants. The chapter will cover project financing, corporate financing and government financing and explain how the ownership options of non-utility generator (NUG), investor owned utility (IOU) and a public owned utility (POU) interact with these financing structures. The specific advantages and disadvantages of each structure and option will be outlined and the associated risk allocation and perception to financier and investors to this risk allocation is analysed with specific to how these affect the set of key financing terms and variables of funders to these projects. Lastly, the chapter will analyse literally sources and information from the qualitative interviews to explore the most applicable form of financing and ownership option that will be common for the development of utility scale wind power plants in South Africa.

1.6.4. CHAPTER 4: PROJECT FINANCING

The main purpose of Chapter 4 is to introduce the concept of a project financing after its suitability to wind power development is established in Chapter 3. Chapter 4 will then unpack some of the elements of this structure that make it applicable to utility-scale wind power plant financing. These elements are firstly, a brief introduction and analysis of the structures main advantages and disadvantages. Secondly, the main project participants and the set of complex contractual documentation will be identified with an explanation on how the documentation connects the SPV to the different project participants. It is Chapter 7 that will develop on this concept to explain the risk allocation under these contractual agreements. Lastly, the chapter will introduce the contractual documentation framework that form the legal foundation on which South African utility scale wind farms will be developed and some of the key players or partners in this process are identified.

1.6.5. CHAPTER 5: KEY FINANCING TERMS AND VARIABLES

This chapter will deal with each key financing terms and variable by firstly introducing each one and discussing how financiers and investors manipulate these in response to the perceived level of uncertainties and risks in a particular project or market. This will then make it possible to determine the reaction of private entities to the public player’s policy and regulatory signals. This will be followed by an illustration of some of the tolerances as reflected in the literature and the qualitative interviews to facilitate the comparison of the key financing terms and variables that are currently valid for South Africa against those researched from the global literature. This comparison only serves as a rough indication as to how funders currently perceive their risk exposure in South Africa in the absence of defined project risks.

This is set against the context of researched key financing terms and variables, to determine how the risk appetite for South African project financed wind farms compares with the levels identified in the literature.

1.6.6. CHAPTER 6: PROJECT DEVELOPMENT AND SOURCES OF FINANCING

Chapter 6 will cover the two broad topics of firstly, defining the project development phases of utility scale wind farms and secondly, identifying the different types of financiers and investors, private players, that extend funding to a project financed wind power project. Furthermore, the chapter will explore which project development phase these sources of funding entities enter the project and on what premises, and indicate how each source of funding has its own drivers and interests that will shape their risk appetite which will eventually be reflected through their key financing variables as was discussed in Chapter 5. Lastly, the Chapter will introduce some of the predominant players in the funding of utility-scale wind farms in South Africa broken down into commercial banks, equity investors and development finance institutions (DFI).

1.6.7. CHAPTER 7: PROJECT RISKS AND RISK ALLOCATION

Chapter 6 identified the project development phases and the types of financiers/investors that are active in each of these development phases. Chapter 7 aims to demonstrate how each financier is exposed to risk through identifying the key broad project risk categories that are typical for a project financed, utility scale wind farm project as identified by the literature and from the point of view of potential investors and financiers in South Africa. Then, by indicating in which of the project development phases that these project risks will be apparent these risks can be matched to the project participant which will usually be responsible for the risk.

If these project risks are then unallocated, then the SPV and ultimately its financiers and investors will bear this residual risk, so this chapter will highlight which type of financier/investor will ultimately bear the residual risks through comparing the project phase where the risk is apparent and against the type of financiers/investors that are active in that phase and exposed to the adverse outcome of each project risk.

Finally, the chapter will explore how these project risks are allocated through the project documentation and risk mitigation instrument away from the SPV to the different project participants according to the guiding principle of risk allocation. This will indicate where financiers and investors are exposed to risk in the development of a wind power project and the important role that both internal and external factors can influence the cost and availability of project funding.

1.6.8. CHAPTER 8: AVAILABILITY AND COST OF WIND POWER PROJECT FUNDING IN SOUTH AFRICA

Finally, Chapter 8 will detail the broad and specific conclusions and key findings from the thesis that has used a combination of literature sources in the area of infrastructure finance and qualitative exploratory interviews with identified key players to gather information and make conclusions on the research questions, defined in Chapter 1. The findings will be used to answer the key research questions such as the impact of uncertainty on the availability of project finance and the focus on project finance structure under and IPP ownership. Furthermore, the main investors and financiers that are either actively involved or potential private participants in the South African wind market are identified with the project risks that stand out in the South African context outlined and how these private participants would like to see these project managed detailed.

Finally the key financing terms and variables that capture the broad risk categories of country and the wind energy sector are detailed and the appetite to extend funds to wind power plant projects in South Africa is explained through a review of these communicated key financing terms and variables.

CHAPTER 2

SOUTH AFRICAN WIND ENERGY: REGULATION, LEGISLATION AND BARRIERS TO FINANCE

The chapter will highlight the policy, legislative and regulatory steps that have been taken that are relevant to project financed, IPP wind power projects in South Africa. It will discuss where there are gaps in this framework, as it is these gaps that serve as uncertainties to potential investors and financiers. The core discussion of this thesis aims to understand financiers and investor's response to these uncertainties in their determination of the availability and cost of their project funds. So this chapter will serve to highlight these uncertainties in South Africa in order to contextualise the rest of the thesis. This chapter does not serve as a comprehensive list of the barriers to private wind power project development in South Africa but rather to present some of the uncertainties so that the financier's and investor's response can be discussed in the presence of these uncertainties.

The importance of setting a clear enabling environment in order to attract private investment is illustrated in the quote, “Red tape and lack of well-structured projects, rather than external funding crimped by the global downturn, are the main hurdles to boosting capacity in Africa's power sector” (Reuters, 2010). This was communicated by a group of Southern Africa interested financiers, of which, David Donaldson, a senior manager for infrastructure at the International Finance Corporation (IFC) explained that, “The problem isn't finance and never was ... if you have a decent, bankable project in the power sector in Africa, you will be able to get the finance" (Reuters, 2010). He continued to explain that the problem is in fact that many African countries have not put the enabling regulatory frameworks in place that will elicit a significant response from the private investment players (Reuters, 2010). In other words it is in response to the level of certainty in the enabling environment that the private finance community will make decisions as to whether to commit funds; to what degree; at what cost; and what sets of requirements they will have.

The chapter will now introduce the policy objectives, legislation and regulatory situation in the South Africa wind energy sector in order to highlight some of the main gaps in this enabling environment.

2.1. SOUTH AFRICAN POLICY AND INSITUTIONAL KEY PLAYERS

An important part of the enabling environment is the different entities that shape this environment. Vincent Baslé, the head of EDF's strategy and development insular power systems unit, gives a clear indication as to how these entities should be organised in South Africa, “Government should set the social criteria and the global policy; the systems operator, or ISO, would ensure that it contracted only with technically feasible entities [or IPP’s] able to meet that criteria; while the regulator would play the role of "referee", while ensuring that the tariff structure was fair and viable" (Creamer [8], 2010). This explanation serves as a hypothetical situation where there is a clear distinction and definition of roles and responsibilities for Government, a system operator, IPP's and a regulator. However, in South Africa these roles and responsibility are somewhat blurred between the South African Government and the Department of energy (DOE); NERSA; and Eskom. These entities are briefly introduced below.

The DOE is a Governmental ministry headed by the South African Minister of Energy, Dipuo Peters, with the mandate to determine policy, make regulations and promote the energy sector for the benefit of the country. With respect to wind power the DOE created the South African Wind Energy Programme (SAWEP) in 2005 with the goal to support the development of wind power in South Africa. A part of the DOE's responsibilities is the oversight of NERSA which is the regulatory authority established in terms of Section 3 of the National Energy Regulator Act, 2004 (Act No. 40 of 2004). NERSA's mandate is to regulate the electricity, piped-gas and petroleum pipeline industries in terms of the Electricity Regulation Act, 2006 and thereby implement the specific regulation for the broader policy objectives of the Government (Act No. 4 of 2006).

Eskom, the wholly state-owned utility plays multiple roles in a wind power market. Firstly, it is a generator, and hence potential competition to IPP's, as it provides roughly 95% of the country's generation. Secondly, it is the system operator as it owns the transmission network. Thirdly, Eskom stands as the off taker for potential IPP's through the mechanism of the Single Buyer's Office as mandated by NERSA under the REFIT (Nersa [1], 2009). These multiple roles of Eskom, and the lack of a clearly defined mandate, only serve to create additional uncertainty for potential investor and financiers as it becomes unclear as to where Eskom's influence begins and ends. A further effect of these multiple roles are that it places Eskom in a position of significant influence within the sector.

This means that Eskom's opinion can seriously influence the content of the sector. As Eskom is the system operator that is responsible, in consultation with the energy planner and the regulator, for the integrated resource plan development process their opinion on technologies like wind power are crucial to their inclusion in the integrated resource planning process (Government Notice No. 9116, 5 August 2009). In a time where Eskom's main goal is to add crucial generation capacity to the ageing fleet of power stations, they are relying on trusted technologies such as coal to ensure that they fill the supply gap. This commitment is evident in the IRP1 with the large capacity additions of Medupi and Kusile coal fired power stations in contrast to the limited commitment to wind power. Eskom's position for influence and their preference for traditional technologies create uncertainties to investors and financiers as to the whether they will use this position to create further barriers for wind power in the enabling environment.

2.2. SOUTH AFRICAN LEGISLATION RELEVANT TO WIND ENERGY

Table 2, below, illustrates the current policy, legislative and regulatory documents relevant to the framework for IPP wind power projects.

Table 2: Legislation Framework Relevant to the South African Wind Market

Legislation	Date	Responsible
White Paper on the Energy Policy of the Republic of South Africa	12/1998	Department of Energy
White Paper on Renewable Energy	11/2003	Department of Energy
National Energy Regulator Act, Act no. 40	2004	Department of Energy
Eskom Multi-Year Price Determination (MYPD 1)	02/2006	NERSA
Electricity Regulation Act, Act no. 4	5/07/2006	Department of Energy
Electricity Regulations On New Generation Capacity (under 35(4) of Electricity Regulation Act, 2006)	05/08/2009	Department of Energy
NERSA Consultation Paper: Renewable Energy Feed-in Tariff Phase I	12/2008	NERSA
Renewable Energy Feed-in Tariff Phase I	31/03/2009	NERSA
NERSA Consultation Paper: Renewable Energy Feed-in Tariff Phase II (Included a proposed PPA for comment)	07/2009	NERSA
Renewable Energy Feed-in Tariff Phase II	02/11/2009	NERSA
IRP1: Determination Regarding The Integrated Resource Plan and New Generation Capacity	31/12/2009	Department of Energy
Proposed Revenue Application Multi-Year Price Determination 2010/11 to 2012/13 (MYPD2)	30/09/2009	ESKOM
Revised Eskom Revenue Application MYPD 2: 2010/11 to 2012/13 (NERSA decision scheduled for 24/02/2010)	30/11/2009	ESKOM

Source: Compiled from primary research

The White Paper on Energy Policy of the Republic of South Africa (Department of Minerals and Energy [2], 1998) was introduced by the DOE (then the DME) in order to set the policy framework for the electricity sector and the energy sector as a whole. The white paper made provision for increased competition in the electricity generation sector through the inclusion of IPP's; an Independent System Operator (ISO) and an independent regulator. Importantly, this document also discussed the inclusion of renewable energies into the energy mix of the country. However, this reform process was eventually abandoned in 2004 by the Government and Eskom's already dominant role was reaffirmed however the vague commitment to renewable was not. While the policy commitment to the inclusion of IPP's was never formally abandoned there was no enabling legislation or regulation to actually implement this inclusion, and the DOE's attempt to include IPP's in 2000 had failed due to this. So while the policy makers paid lip service to the inclusion IPP's they did not provide the enabling environment to allow this inclusion to happen.

In 2003 the White Paper on Renewable Energy the DOE set the target of 10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013. This target was unclear from two perspectives: firstly, how would the target be met in terms of technologies, incentives and sectors; and secondly, how would the target be calculated i.e. would it be the total renewable energy generated in 2013 or would it be cumulative from 2003 to 2013? The DOE fuelled this uncertainty as they switched between these definitions. However, the target did create some political momentum: it was in response to this policy target that NERSA justified the creation of the REFIT. The white paper set a target with very little context under which this target could be achieved. The result of this is increased level of uncertainty as to the Government's exact electricity policy objectives. Which raises the question for investors and financiers of whether there is a future for IPP's and wind power in the South African electricity sector, and if there is what does this future look like?

The first attempt to offer a plausible incentive for private renewable energy generation came in the form of a feed in tariff. NERSA established the Renewable Energy Feed in Tariff (REFIT), Phase I and II, which set a tariff of R1.25/kWh over 20 years for qualifying IPP's (Nersa [1], 2009). However, the sub mechanisms required to actually deliver this incentive are still missing. The commitment to a set tariff over a fixed period was the first clear signal offered to potential investors and financiers. Although this favourable tariff enticed the interest of potential investors it currently still lacks the clarity to get investors to actually invest and to deliver the REFIT to IPP's.

The next step was the August regulations consisting of the Government Notice for Electricity Regulations on New Generation Capacity, the IRP1 and the selection criteria for IPP's. These regulations created two new sources of uncertainties to investors and financiers: firstly, uncertainty around the apparent tender process for the selection of wind power under the IRP1; and secondly, uncertainty as to the apparent incompatibility of NERSA's and the DOE's objectives. In the first instance, the IRP process gives NERSA the mandate to license only what is in the IRP and nothing more. Feed in tariffs should usually accept all qualifying projects however the DOE redefined this by imposing a process on the REFIT with all the hallmarks of a tender process such as a limited amount of MWs based on a set of selection criteria. The uncertainty to investors and financiers arises as under this tender-like process they need to commit early project development funds to get the project to a point where they meet the qualifying criteria for the REFIT. However, there is no certainty as to whether the project will actually meet the qualifying criteria and even if it does it may be turned down due to the limited capacity. So this creates uncertainty as to whether they will recoup their project development funds which creates a barrier to investment. In the second instance, it appears that the DOE's and NERSA's policy objectives are incompatible as the framework for the IRP seems to contradict that of the REFIT.

So the main points of uncertainties in the enabling environment which serve to reduce the availability and cost of capital are: the lack of an overall guiding policy for the electricity sector; the apparent contradiction in objectives of NERSA and DOE; the unclear set of legislation and regulations; and the multiple roles of Eskom. These broader uncertainties set the context for more specific uncertainties outlined below.

2.3. OUTSTANDING REGULATORY UNCERTAINTIES

Under the above main points of uncertainty there are a host of more specific sources of uncertainty. Mainstream Renewable Energy CEO, Dr Eddie O' Connor, offers some insight into this in saying, “The two major requests from wind-energy developers seeking to develop projects in South Africa, were: clear transparent rules for access to the national electricity grids; and clarity on who would pay for the electricity generated by IPP’s” (van der Merwe, C. [2], 2010). This is but one example of the uncertainties that are perceived by potential providers of funds to the South African wind power industry and the reaction to this uncertainty is made clear in the statement, “If we have to wait too long, we will go elsewhere where we are welcome" (O’Conner as cited in van der Merwe, C. [2], 2010). This is an example of how regulatory inaction can cause an adverse investment environment and limit the availability of private funds from investing in South Africa.

The main regulatory uncertainties that were raised in the exploratory interviews are listed below:

- A clear counter party needs to be identified as an independent system and market operator (ISMO) separate from ESKOM;
- The responsibilities and mandate of the off taker must be set;
- A workable set of project documentation needs to be put in place to access the REFIT such as the Power Purchase Agreement (PPA),

Standardised Direct Agreement, Transmission Connection Agreement (TCA), and Transmission Use of System Agreement (TUOSA);

- The transparent grid connection process needs to be set;
- The transparent and defined IPP bidding process, with a clear set of qualifying criteria needs to be documented and nominated implementing parties need to honour this bidding process.

The distinction between *uncertainty* and *risk* is explored in detail Chapter 7 but risks differ to uncertainty through a greater degree of predictability. The above set of barriers are by no means exhaustive set of outstanding problems in the enabling environment, they act as outstanding *uncertainties* that have not been defined into a set of well understood *risks* with predictable outcomes. This thesis will show how these uncertainties serve to make the financing and investment funds for IPP-owned, project financed wind power plants, limited and more costly. The overall perverse effects will be limited availability of already limited private investment capital and debt and any access to these funds becoming with more costly key financing terms and variables. The concepts of IPP, project finance and the sensitivity to the enabling environment then sets the context to review the theory on private financing of wind power plants, the typical structure of project financed infrastructure projects and the important role that project risks play in determining the key financing terms and variables or cost of project funds.

CHAPTER 3

FINANCING STRUCTURES AND OWNERSHIP OPTIONS

This chapter deals with the investing and financing decisions that must be made by private entities when considering investing in the South African wind power market; with specific focus on the financing structures and ownership options that underpin the financing and development, respectively, of utility scale wind power plants. The discussion will explore project financing, corporate financing and government financing in turn and explain and how the ownership options of non-utility generator (NUG), investor owned utility (IOU) and a public owned utility (POU) subscribe to each option. Each of these structures and options have associated advantages and disadvantages in terms of risk allocation and perception and the discussion will explore how these affect the set of key financing terms and variables of funders to these projects. Lastly, the chapter will analyse literally sources and information from the qualitative interviews to illustrate that a project financed structure under a private IPP ownership option will be the most applicable form of financing and ownership option for the Greenfield development of utility scale wind power plants in South Africa.

This is not to say that other structures will be excluded from the market, but rather the focus of this thesis will be IPP, project finance, as for example Eskom, a POU, has committed to developing 100MW wind farm in the Western Cape called, SERE or Koekenaap in 2010. However, as Eskom is struggling to raise the R400 billion price tag for its capital expansion plan, their contribution to the wind industry will be limited.

3.1. FINANCING STRUCTURES AND OWNERSHIP OPTIONS

Renewable energy projects such as wind power projects are characterised by a high initial capital outlay, before any incomes are secured and low rates of returns and in comparison to other competing more traditional technologies investors and financier revere these projects as higher risk (Sonnetag-O'Brien and Usher, 2004). In developing countries this is especially the case as the inclusion of country risk makes access to finance particularly difficult without the inclusion of guarantees, targeted subsidies and support from host governments, and support from bilateral and multilateral agencies (Dunkerley, 1995; and Sonnetag-O'Brien and Usher, 2004). Wind farms have traditionally been financed through three predominant financing structures which differ in the way debt is structured, namely: government financing, corporate financing, and project financing (Wiser 1997; and Delman, 2009). Furthermore, these financing options have been matched to three common ownership structures of: nonutility generator (NUG), investor owned utility (IOU) and public utility ownership (PUO) (Wiser, 1997). NUG and IOU's use the private forms of finance of corporate and project finance and POU's can use all three financing structures however will traditionally rely on government funds or debt.

There are multiple considerations and complex forces that guide the choice between project ownership options and financing structures and there is no single “correct” combination that will work for all developers, under all market conditions that covers all projects (Harper et al, 2007).

A large factor in this decision process are the signals that are sent by the public entities responsible in terms of policy objectives and the regulatory framework, where financiers and investors make decisions in response to the clear and transparent enabling environment set by the Government and the institutional players. Delmon, 2009, defines some broader influences that can guide this decision such as: the market concerned; the stakeholders concerned; market availability for financing; project and market risk perception; and the risk appetite of financiers and investors to bare these risks (Delman, 2009). Harper et al, 2007, explain that this decision is based on the some broad factors which are, firstly the project developer’s ability to absorb the public incentives such as feed in tariffs, subsidies, tax benefits or grants. Secondly, the project developer’s position to provide the required capital funds and the degree of debt leverage required to satisfy return requirements (Harper et al, 2007).

The ownership option and financing structure that are eventually employed are of vital importance as wind power project costs are acutely sensitive to key financing terms and variables and conditions that depict them. Wiser and Kahn, 1996, explain that project costs can vary by up to 40% with a change in ownership and financing structure. This chapter explains the advantages and disadvantages that cause these swings in projects costs and argues that the majority of wind farms in South Africa will exist under a project finance structure with a NUG or IPP ownership. However, before this discussion the chapter will provide a brief explanation of each ownership option and financing structure.

3.2. FINANCING STRUCTURES

3.2.1. PROJECT FINANCE

Project financing has been a common form of financing structure for utility scale wind farms, which is discussed in detail at the end of this chapter, as non- or limited recourse debt is granted to a special purpose vehicle (SPV) which has limited risk to the project sponsors and the SPV's shareholders (Navigator Project Finance, 2009; and Wiser and Kahn, 1996). Investing in wind farms is a relatively new investment so the non-recourse debt is favoured by developers as the investor's liability is limited to their investment in the project and does not extend to their balance sheets. More specifically the loans are extended to the project secured primarily on firstly the project's assets and secondly its future revenue stream, so it is the cashflow generated by the project that financiers rely upon for debt service (Delmon, 2009, p. 50).

A further benefit of project financing and an explanation on its popularity among investors is that the project's debt leveraging capability is greatly enhanced so expensive equity portion of a project's capital structure can be significantly reduced through access to cheaper debt which has the overall affect of reducing project financing costs and increasing returns to investors (Delmon, 2009, p. 56). The possibility for higher leverage comes through the use of a special purpose vehicle (SPV) which has a more transparent structure in terms of ownership when compared to corporate and government funding. This provides two reasons for higher leverage possibilities. Firstly, risks are easier to identify, assign, mitigate and in the worst case claim damages for than in corporate finance where the company structure can be complicated and change in management can have adverse impacts on the project. Secondly, financiers have step in rights in case of default by sponsors so they can proactively manage their loss through operation of the asset.

As senior debt takes priority over equity in a default situation, i.e. equity is “first loss”; banks can favour a project finance structure for wind farm projects. Based on the experience of Erik Sejersen, Specialist, Debt Capital Markets for Vestas Wind Systems A/S, banks have not incurred losses on Project Financed wind farms and in the worst case (caused by poor wind) banks have had to extend the repayment period. In contrast most banks have taken serious "hits" for corporate debt, since the owner's corporate balance sheets have been much less transparent and subsequent changes of management have negatively impacted long term credit rating of the corporate (Sejersen, 2010). However, this financing structure is not without its disadvantages, of which the structure’s complexity is the most prominent. Project financing requires an intricate matrix of project documentation or contracts, subcontracts, guarantees, risk mitigation instruments and financing agreements that must create a seamless allocation of risk between all parties involved in order to provide the security to both investors and financiers that the project can successfully service the debt and ROE over its lifetime (Delmon, 2009, p. 98-104). This complexity creates high transaction costs such as legal expenses and longer lead times in deal closing. A further disadvantage is that the non or-limited recourse debt that the structure relies on is offered by financiers who will always take the conservative viewpoint which means that the project will always be subject to a due diligence review from a worst cast scenario perspective.

Hand in hand with this is that financiers will offer their debt under strict key financing terms and variables as they are the project participant who has the most to lose if the project is not a success. In other words, because the debt is non or-limited recourse and the debt portion forms the majority of the project’s funds a project finance structure requires financiers to carry the bulk of the risk exposure while developers can limit their risk just to their investment in the project.

This financing and investing decision to employ a project finance structure and its implications on the key financing terms and variables are discussed in depth in Chapter 5.

3.2.2. CORPORATE FINANCING

As wind power markets mature and investors and financiers become more comfortable with the degree of project risks exposure large project developers such as utilities and large energy companies will consider securing the required project liabilities against their established corporate balance sheet and commit their own capital resources through general equity (Burton et al., 2009; and Delmon, 2009). So when IOUs, and sometimes POUs, seek debt to fund a wind power project this credit uses the income stream of their entire asset base as security and not only the future revenue stream from the individual wind power project as in project financing (Wiser, 1997; and Wiser & Kahn, 1996). Financiers, therefore, prefer this structure when compared to the riskier project financed structure because they can lay claim to established corporate balance sheet in the case of default in debt service by the project developers, which in turn means that financiers will offer debt under a set of favourable key financing terms and variables to the company as opposed to a single project.

Consequently, this structure can yield lower financing costs than project finance as financiers will usually prefer to guarantee their loans against the balance sheet of a large stable company and this preference will be reflected in the key financing terms and variables. More specifically, under a corporate finance structure there are debt and equity cost reductions, longer debt amortization periods, and the lack of project-specific DSCR requirements (Burton et al. 2009; and Wiser and Kahn, 1996).

Under this structure the overall credit rating of the company in question is used to determine the cost of debt for the project rather than using the project-specific cost structure to determine cost of debt and other key financing terms and variables (Wiser and Kahn, 1996). Based off this security of a balance sheet financiers will have fewer restrictive project specific loan covenants such as the minimum DSCR constraint as in project financing (Wiser and Kahn, 1996). However, there is limited financiers' project specific DSCR constraint that pushes up the cost of funding through a company wide limit on the degree of leverage that the company can take on, but this is limited compared to those constraints under project financing (Smith and Warner, 1979). These relatively favourable costs of debt conditions and lack of a project specific loan covenants reflect the financier's reduction in risk exposure when compared to a project financing structure. What is more is that equity is also frequently cheaper, but still more expensive than debt, under corporate finance due to the asset diversity of the company's balance sheet which means that the asset's performance is viewed as apart of a portfolio of projects as opposed to being subject to conservative, project specific scrutiny where the risk of failure cannot be diversified through the support of other project's success.

The key disadvantage of a corporate financing structure is that it can be difficult to divert funds from other "business-as-usual" activities and other investment opportunities to invest in the project and to accept the liability onto the balance sheet (Delmon, 2009, p.18-21). The minimum return on equity (ROI) must outweigh the opportunity cost of investment to forego the returns that are available through investing the funds in other opportunities and not the project (Delmon, 2009, p.18-21). Furthermore, while there are limited loan covenants from the financier' side the capital structure will still be bound by an implicit company-wide DSCR constraint or a restriction on issuing debt beyond certain limits (Wiser and Kahn, 1996).

If a company takes on too much debt this can adversely affect shareholders through the reduction of debt servicing capabilities on existing debt (Wiser and Kahn, 1996). Consequently, the capital structure is less flexible as it bound by company wide leveraging constraints which can make funding costs more expensive through the inclusion of high cost equity (Wiser and Kahn, 1996). So even though corporate financing has lower cost of debt and equity than under project financing, the cost of funding can be more expensive due to a rigid capital structure as a result of limited leveraging capabilities of the company in question. A further disadvantage highlighted by Delmon, 2009, p. 10-12, is that corporate financing does not yield the same project specific efficiencies that project financing structure does. Corporate financing structure lacks the degree of specificity found in project-financing and the importance of the project is lumped in the set of investments on the developer's balance sheet (Wiser and Kahn, 1996; and Delmon, 2009, p. 18-21).

A Corporate finance structure requires a greater commitment from project developers and sponsors in terms of risk exposure, and in contrast represents a lesser degree of risk exposure to financiers which is reflected in a more lenient key financing terms and variables. However, minimum ROI requirements need to be favourable enough to justify diversion of funds from other investment opportunities and company wide leveraging constraints yield a less flexible capital structure with a larger portion of higher cost equity.

3.2.3. GOVERNMENT FINANCING

In most cases Governments have the ability to qualify for debt, such as public bonds, at more favourable set of key financing terms and variables when compared to the private sector, especially in the case of interest rates (Delmon, 2009, p. 18-19).

This ability depends on the credit rating of the specific government and usually developed nation's government risk profile poses a smaller risk exposure to financiers when compared to a private company however a developing nation's government may have political and country risk elements that some financiers may be unwilling to accept (Delmon, 2009, p. 108-110).

Some of disadvantages of government financing structure are, firstly that governments and public departments are prone to inefficiencies in public processes which is especially the case in developing nations such as South Africa (Delmon, 2009, p. 10-12). These inefficiencies may filter into the development process of a wind power project in the form of delays, minimal incentives to manage risk correctly, and higher development costs. Secondly, Government sources of funding are usually bound by fiscal constraints and social targets that can limit the availability of government financing (Delmon, 2009, p.18-21). Therefore, in some instances private sector financing under a corporate and project financing structures may be less expensive, less time intensive, and more flexible than government financing that has less incentive or focus on generating profit in the most efficient and risk tight manner (Delmon, 2009, p.18-21).

3.3. OWNERSHIP OPTIONS

Wind power plants can be developed using a variety of ownership structures and in some cases a combination of these options such as those found under Private Public Participation projects (PPP). The predominant broad ownership options are a NUG, IOU and POU. Examples of these in South Africa would be any IPP as a NUG, Eskom as a POU and the IOUs would be companies such as DONG or EDF who are international privately owned utilities. Each one is explained in turn below and matched to the financing structure that most suits the option.

3.3.1. NON-UTILITY GENERATOR (NUG)

Wiser and Pickle, 1998, p. 361-386, argue that the majority of utility-scale, non-hydroelectric renewable energy projects that exist in the United States have been developed, owned, and financed by privately-owned renewable energy companies known as non-utility generators (NUG). The electric output is then traditionally either sold under long-term contracts to investor-owned utilities (IOU), public-owned utilities (POU), or sold on open spot markets (Wiser and Kahn, 1996). The ownership option is most commonly linked with a project finance structure and while this combination has been the most common in the U.S. its main disadvantage is that it is also the most costly combination of the existing ownership options and finance structures (Wiser and Kahn, 1996). The two drivers of this combination's cost are, firstly the inclusion of private investors in the capital structure who seek high returns on equity (ROE) to justify the commitment of funds to the wind power project as opposed to investing in other investment opportunities, which is known as the opportunity cost. So the minimum required ROE must outweigh the opportunity cost of investment. Secondly, a project financed structure sources the majority of its funding in the form of non-recourse debt from financiers who will demand strict key financing terms and variables to justify the high risk levels inherent in lending non or-limited recourse debt.

It is under a NUG ownership option that an independent power producer (IPP) option is categorised. An IPP is a standalone power generating plant that is financed based off the creditworthiness of the contract used to create and operate them with the power purchase agreement (PPA), which is the long term obligation to buy the power produced by the plant, acting as the most important contractual document (Esty, 2004, p. 25).

In South Africa IPP's are privately owned companies that sell their power to the POU, Eskom who owns the transmission and distribution system that will connect the electrical output of a project to the end consumer.

3.3.2. INVESTOR-OWNED UTILITY (IOU)

As markets are deregulated and the wind power industry begins to mature there will be a host of well established utilities that will focus on developing large portfolios of wind power projects, for example, E.On with 2200 MW installed in Europe and America; and Iberdrola with 7,000 MW of wind power plants globally (Fehrenbacher, 2008; and E.On AG, 2009). These IOU's have traditionally sought corporate financing structures based off their size and established asset base, however this is changing somewhat as IOUs have chosen to project finance wind power projects to protect their balance sheets from wind farm liabilities (Wiser, 1997; and Wiser & Kahn, 1996).

Some of the advantages of an IOU ownership are that investors and financiers under an IOU option usually offer favourable key financing terms and variables when compared to individual project financed power projects (Wiser and Kahn, 1996). This benefit is explained above under Corporate Financing, but briefly this is due to an IOU's access to corporate-finance through its asset diversity in the sense that the project is assessed as apart of an overall balance sheet so it's individual risk profile is diluted and supported under the context of an existing set of assets for investors and that act as surety to the financiers. A further IOU specific advantage is the strategic position these organisations hold in their provision of a significant portion of a country's basic power supply (Wiser and Kahn, 1996).

This means that IOU's service is so vital to a country's economy that the regulatory bodies and any public investors will be of greater assistance to IOU's rather than private NUGs (Wiser and Kahn, 1996).

As an IOU ownership option commonly employs a corporate finance structure due to its access to an established balance sheet, IOU ownership shares many of the disadvantages of corporate financing which are detailed in section 1.2. However, the most important disadvantage or cost of an IOU ownership is a less flexible capital structure: the company will usually have to maintain a conservative debt to equity ratio through working to a company-wide DSCR constraint or leveraging constraint (Wiser and Kahn, 1996). So while IOU's qualify for more favourable set of key financing variables this cost saving may be outweighed by the inclusion of expensive equity due to a less flexible capital structure when compared to NUG and project financing.

3.3.3. PUBLIC-OWNED UTILITY (POU)

A public-owned utility or POU is either wholly owned or partly owned by the government of a certain country as is the case in South Africa where Eskom's primary shareholder is the government. POUs can employ both a corporate or project finance structure however corporate financing is typically the most common when developing generating capacity (Wiser and Kahn, 1996). Under a corporate financing structure with a POU ownership option funding is raised through the combination of equity from internal funds and issuing tax-exempt bonds on public markets to raise debt (Wiser and Kahn, 1996). This public debt uses the income stream from the POUs entire asset base as collateral and for debt service for the credit as is the case in corporate financing under an IOU ownership option, with only company wide DSCR requirements and not project restrictive DSCR requirements (Wiser, 1997; Wiser and Kahn, 1996).

In other words the income stream used in the business case to calculate the cash flow available for debt service (CFADS) that will support debt service is diversified over the entire asset base and not the revenue generated only by the individual project (Wiser and Kahn, 1996).

The key advantage of a public ownership option for wind power plant development is that costs are typically lower than under a private ownership option of IOU and NUG (Wiser and Kahn, 1996).

This is due to a variety of reasons namely; public debt finance can be supported through a diverse set of assets and is largely tax-exempt with income taxes and property tax exemptions applied (Wiser and Kahn, 1996). There are no project specific DSCR requirements which all qualify the project for longer debt maturity periods and a greater use of debt in the capital structure, consequently a POU can qualify for lower financing costs (Wiser and Kahn, 1996). Furthermore, public utilities enjoy a franchise monopoly situation, especially in recently deregulated markets, with associated ratemaking authority and the ability to pass risk onto rate payers and make them the ultimate bearer of project risks (Wiser and Kahn, 1996). The key disadvantage of this ownership option is that public entities can often lack the same efficiencies throughout the project development phase that private companies can facilitate and risk allocation can sometimes not be as effective as POUs have the facility to pass risk onto ratepayers so do not share the same incentive to allocate risk efficiently (Delmon, 2009, p.18-21).

3.4. DOMINANT FINANCING STRUCTURE & OWNERSHIP OPTION FOR WIND POWER PROJECTS

3.4.1. EVIDENCE FROM THE LITERATURE

The literature reviewed holds project financing, which is most commonly linked to a NUG ownership option, as the most common form of financing for wind power project development. This view is supported by Wiser and Kahn, 1996, who claim that private ownership option and a project finance structure has, historically, been the dominant forms of finance in the wind power industry (Wiser and Kahn, 1996).

Wiser and Pickle, 1998, p. 361-386, and Wiser, 1997, make clear the link between private ownership, project finance and wind power development as they argue that non-utility generators (NUG) have generally relied on project financing to back wind power development.

Navigator Project Finance, 2009, claims that there has been a, “substantial increase in project finance structuring of wind power projects, both for green fields, brown fields and acquisitions.” While Wiser and Kahn, 1996, go on to explain that, “almost all utility-scale wind power projects were developed and financed by private renewable energy companies (non-utility generators), often through project-finance structures,” and that “true project-financed facilities with independent debt and equity investors is now the most frequently used structure” (Wiser and Kahn, 1996). Further literature match a project finance structure to projects with the following characteristics: power generation projects with a medium to large scale capital intensity (i.e. those projects with a high capital cost relative to the rest of the project costs); a well defined cashflow; and fixed off take prices secured under long term contracts (Kensinger and Martin, 1988; Nevitt, 1983; Wiser and Kahn, 1996, Navigator Project Finance, 2009).

Two reasons that private power producers, or NUG’s, have typically employed a stand alone, project finance structure is firstly, because many small, often start up, renewable energy developers simply do not have the existing balance sheet to leverage debt off of as in the case of corporate finance. Secondly, NUG’s developers can grow their project base and cashflow without compromising their parent company with new risk through additional projects and associated debt in their asset portfolio (Navigator Project Finance, 2009; and Wiser, 1997). This means that developers can set up multiple project financed SPV units, with limited effect on capital, gearing, balance sheet restrictions, and the credit rating of the parent company (Navigator Project Finance, 2009).

These two reasons rely on the point that wind energy investments are seen as high risk from the perspective of the investment community as they have relatively new technologies, are not dispatchable, have high capital costs, and associated longer payback periods so developers will want to limit their liability and risk exposure in this sort of project.

Delmon, 2009, p. 10-12, gives another reason to explain project financing as a popular financing structure to private wind power producers as he argues that project financing is the most efficient method of financing infrastructure projects due to the structure's ability to better manage commercial risks and efficiencies in the project development process.

According to the literature, a project finance structure and a NUG or private ownership option has been the most popular structure for the financing and development of wind power projects. The financial crisis has only seen this structure strengthened due to the risk adverse nature of investors and developers aiming to limit their risk exposure in turbulent times however as large energy companies and utilities continue to build large portfolios of wind energy projects new structures such as IOU's and corporate finance may overshadow project financing deals.

3.4.2. EVIDENCE FROM THE QUALITATIVE INTERVIEWS

The evidence from the qualitative interviews explain that in the early stages of South Africa's wind market development a project finance structure with access to non or-limited recourse debt will be the most popular financing structure under an IPP ownership option. This financing and investing decision is in reaction to the inherent uncertainty and risks in investing in a new market in a developing nation so investors will want to protect their balance sheets through employing project finance. However, in the long term, when the risks behind these projects are more defined, there could be some instances of corporate financing.

Vajeth, 2009 from Absa Capital, explained that in an ideal world, from a commercial bank's risk perspective, a corporate financing structure off a sound balance sheet is the most desirable financing structure for debt lending. However, Vajeth from Absa Capital, 2009, explained that in the SA power sector the only entity that could possibly corporate finance a utility-scale wind farm is Eskom, but at this stage even they have got serious funding issues, and even those developers that do will not be prepared to expose their balance sheets to that level of risk in the current market (Vajeth, Personal Interview, 2009). Consequently, in the short term there will not be an environment where large utilities could go ahead with corporate financing, however as the market and the industry matures and projects are bought and sold there may be some instances of corporate financing (Eardley-Taylor, 2009). So the predominant structure will have to be project finance as no one else has the balance sheet to support the development of a utility-scale wind project (Vajeth, Personal Interview, 2009). So, both Eardley-Taylor, 2009 and Vajeth, 2009, believe that if the ownership option is an IPP then it will most certainly be a project finance structure.

Eardley-Taylor, from Standard Bank, 2009, supports this point as he very much doubted that any wind power projects in South Africa will be financed under any other structure than project finance with IPP ownership. Eardley-Taylor, 2009, detailed that with the tariffs that have been set under the REFIT, developers would need the benefits of debt leveraging under a project finance structure to achieve the Rand return on equity of around 20% and the WACC on debt of around 11% to 12% that had been communicated (Nersa [1], 2009). Eardley-Taylor, 2009, went on to state that these sorts of projects will require a minimum of two shareholders or sponsors and this ownership structure lends itself well to a project finance structure and what's more is that these projects should be project financed as this is how it has been down in the rest of the world.

Potgieter, from Investec, 2009; Maclay, from Actis, 2009; an Industry Participant, from BNP Paribas, 2009; and Greenwood, from New Energy Finance, 2009, all believed that project finance would be the predominant financing structure in South Africa under an IPP ownership at this early stage of the market's development. Potgieter, from Investec, 2009, discussed that in South Africa, as in the rest of the world, there is a limited amount of capital. Due to the significant capital cost of wind turbine technology and its installation these projects require a large upfront investment so there will not be any entity, at this early stage of the market's development, which will concentrate all their limited capital or risk into one market through corporate financing or full recourse debt (Potgieter, 2009). This is in contrast to project finance structure due to the non-recourse loan basis, and lender and equity security is provided solely through the assets and cash flows of the project itself and not the balance sheet of the shareholders (Maclay, 2009). Consequently, there will be few developers that will not seek to leverage their projects through project financed debt and meet the outstanding amount with a portion of equity (Potgieter, 2009; Maclay, 2009; an Industry participant, 2009; and Greenwood, 2009).

Viljoen, Cresco, 2009, develops on the point of limited capital as he argues that the main reason for the project finance's dominance is that there is a severe capital shortage so attempting to use a corporate finance structure with multiple organisation's balance sheets may end up being a lot more messy than using a project finance structure with its clear debt and equity definitions. Another reason that Viljoen, 2009, identified is that many developers in South Africa view wind energy projects as non-core activity or not in line with their normal line of business so they will chose to remove the project from their balance sheet. Viljoen, 2009, concluded that there may be limited corporate financing in South Africa such as Exxaro but a Project Finance structure and an Independent power producer ownership option will be the predominant shape of utility-scale wind energy projects in South Africa under the current market conditions.

Mainstream Renewable Power is an active example of the preference for project finance and IPP ownership as their mandate in South Africa is to develop projects using only a project finance structure (O'Flynn, Personal Interview, 2009). Furthermore, Mainstream's chief development officer Torben Andersen was quoted in Engineering News, 2009, saying that their South African projects would be project financed through a capital structure of equity and debt and finally the Mainstream website claims that project finance is the preferred financing structure under which Mainstream will develop project (Mainstream website, 2009). The African Development Bank is another active example as Arfaoui, 2009, explained that the bank was looking to create loan packages for project financed deals on the wider African continent, and of the projects the AFDB are involved in, they are all project financed deals searching non recourse debt from the bank. These two examples lend evidence to the point that the majority of wind farm projects sponsors and financiers agree on a decision to employ a project finance structure in South Africa (Arfaoui, 2009; and O'Flynn, 2009).

The above evidence presents the opinions of key players in the financing of infrastructure projects in Africa and South Africa. All players have an active interest in the financing of utility-scale wind farms in South Africa and all of these individuals agreed that a project finance structure under and IPP ownership option would be the dominant structure for the financing of utility-scale wind farms in South Africa in the early stages of the market's development. This investing and financing decision is in response to the high levels of perceived risk and uncertainty in the immature market, under the context of very risk adverse, limited capital available to the market as a consequence of the financial crisis. In the long term this preference may change once project risks become more defined and investors can justify the commitment of funds secured off of their established balance sheets.

3.5. CONCLUSION

There are three main financing structures for utility scale wind farm development of: government financing, corporate financing, and project financing. These financing options have traditionally been matched to three common ownership options of: nonutility generator (NUG), investor owned utility (IOU) and public utility ownership (PUO). NUG and IOUs can use the private forms of finance of corporate and project finance while POUs can use all three financing structures however will usually rely on government funding. Traditionally, project financing under a NUG or IOU ownership option has been popular for the development of wind farms globally, especially in the early stages of the wind market's development in a certain region where there are many uncertainties and consequently a high degree of risk.

This is expected to be no different in South Africa where qualitative interviews supported the literature that a project finance structure under a private IPP ownership option will be the most common combination in the early stages of the market in response to perceived uncertainties and risks under the context of risk adverse, limited capital due to the financial crisis. Corporate financing may become a possibility as the market develops and uncertainties are worked into a defined set of risks founded in past practise.

The decision as to which ownership option and financing structure are employed by a particular developer depends on a variety of factors however the policy objectives, the consequent regulatory framework and the resulting set of uncertainties and risks will be a heavily weighted consideration. This financing and investing decision is of vital importance as wind power project costs are highly sensitive to key financing terms and variables and the conditions that depict them.

Each combination of the above financing structures and ownership options create different allocations of risk to the project participants, especially in the case of the equity investors and the debt financiers, and this increased or decreased risk exposure will be reflected in the key financing terms and variables offered by funders. Chapter 5 will discuss how risk is reflected in the key financing terms and variables; however it is the task of the developer to balance the trade off of leveraging their own capital against the restrictive covenants and costs of this leveraging.

The qualitative research and the literature review then supports the dominance of project finance and IPP ownership in the market's infancy and the possible introduction of corporate finance in the long term once many of the uncertainties have been defined into risks and identified, assessed or valued, mitigated and allocated (Esty, 2004).

CHAPTER 4

PROJECT FINANCE

The previous chapters have presented some of the reasons why IPP's employing a project finance structure will be the main project structure for renewable energy, wind power plant development. In light of this, the main purpose of Chapter 4 is to introduce the concept of a project financing structure and explore some of the elements of this structure that make it applicable to utility-scale wind power plant financing. The elements that this chapter will cover are firstly a brief introduction and analysis of the structures main advantages and disadvantages. Secondly, the main project participants and the set of complex contractual documentation will be identified with an explanation on how the documentation connects the SPV to the different project participants. It is Chapter 7 that will develop on this concept to explain the risk allocation under these contractual agreements. Lastly, the chapter will introduce the contractual documentation framework that form the legal foundation on which South African utility scale wind farms will be developed and some of the key players or partners in this process are identified.

4.1. PROJECT FINANCING

Project financing is the allocation of non- or limited recourse debt to a standalone legal entity called a Special Purpose Vehicle (SPV) through a network of contractual agreements, namely:

- Off-take agreement or power purchase agreement (PPA);
- Construction contract;
- Operation and maintenance contract (O&M);
- All other project-related agreements

Under a project finance arrangement the financing and equity security is provided solely by the cash flow generated by the project and the project's underlying assets, rather than the project sponsor's balance sheet or own credit lines. This debt is granted with a variety of security requirements or restrictions which are known as debt covenants and each financier will have different requirements with respect to this according to a variety of factors such as each financier's own risk tolerance.

Table 3: Project Finance stakeholders for a South African wind energy project
Source: Compiled from primary research

STAKEHOLDER	DESCRIPTION
Grantor	Government, and/or Regulator (NERSA)
Off taker	Utility, System Operator (Eskom)
Financier	Domestic/International Commercial Banks, DFIs
Shareholders	Stakeholders with equity stakes in the Project Company
Project Company/SPV	Standalone legal entity which will own and operate the asset made up of different shareholders or a parent company
Construction Contractor	Design and builds the project works
Operation Contractor	Operates and Maintains the asset over the lifetime

A project is made up of many stakeholders, which are those entities that have an economic interest in the project (Irwin, 2007). These stakeholders that interact under a project financed structure, which are explained in this chapter, are the grantor, off taker, financier, project company, shareholders, Special Purpose Vehicle (SPV), construction contractor and operation contractor. Where the *grantor*, the set of public players that has the legal right to enter into a concession agreement, is national or local government or government agency or some regulatory authority that has made a grant or concession to the project company to build, own and operate an electricity generation project that to date has been a service provision of the public sector or Eskom for the purposes of this paper (Delmon, 2009, p. 104-105).

The grantor is the public players that will set the regulatory requirements, tax restrictions, and tariff levels that will create the requirement to issue a concession in line with public and national policy target. The *offtaker* is the counter party that will sign the power purchase agreement (PPA) to purchase the output of a project over a predefined contractual period. In many cases the grantor and the offtaker can be the same set of entities especially in regulated markets. In South Africa, under the REFIT regulation a Single Buyers Office, ring-fenced within Eskom, will be the offtaker and is bound by the regulator to purchase the energy produced by qualifying projects under the REFIT. The *financier* is the lender or provider of non- or limited recourse debt facilities. The *project company* will own and operate the asset and will take the form of a limited liability SPV whose shares are owned by a number of shareholders such as a parent company, or group of companies, of the project that will inject equity to the project (Delmon, 2009, p.110-111). The project company or SPV will design, construct, operate, maintain and have the option to transfer the project and is made up of *shareholders* and companies that specialise in the tasks which need to be performed under the concession agreement (Delmon, 2009).

An *SPV* is a standalone legal entity which is merely the vehicle through which a large number of agreements are made (Burton, 2001). For the purposes of this paper's focus the *asset* is a wind energy power-plant, which uses a series of wind turbine generators (WTG) connected to the national electricity grid. The construction and operation contractors will be discussed in detail below.

In its simplest form project financing structure can be defined as the, "financing of a particular economic unit in which a lender is satisfied to look at the cash flows of that unit as the source of funds from which a loan will be repaid and the assets of the economic unit are used as collateral for the loan" (Navigator Project Finance, 2009). There is limited liability for the sponsor as the standalone legal entity called the SPV will be set up with accountability for all liabilities pertaining to the project (Navigator Project Finance, 2009; Wiser and Kahn, 1996). This characteristic is the main difference between a corporate finance and a project finance structure as rather than using the project sponsor's or parent company's balance sheet as collateral, the SPV and its associated cash flow and project assets secure the debt facility (Wiser and Kahn, 1996).

Project finance is then the provision of debt facilities to projects secured primarily or entirely against the cash flows the project generates and the assets with limited or no recourse to the corporate credit of the project sponsors (Potgieter, Personal Interview, 2009; Wiser and Kahn, 1996; Navigator Project Finance, 2009). As explained above the project sponsor has limited or no liability for the project as the debt facility in project financing takes the form of non- or limited recourse structure. This means that financiers have no recourse to the sponsor's or parent company's balance sheet and credit worthiness, but rather financiers have recourse to project cash flows and the underlying assets of the project (Ubajaka, 2006). This recourse extends to the liabilities defined in the contracts, sub-contracts and all guarantees with third parties providing services to the project (Ubajaka, 2006).

Subsequently, in the event that a project defaults on the terms and conditions stipulated in the financing agreement with the financier, then the financier would have no recourse to the sponsor's overall balance sheet as a source of funds for settlement (Navigator Project Finance, 2009).

Financiers have a high level of sensitivity to the security behind the project revenue stream and it is this guarantee that is vitally important for leveraging purposes (Delmon, 2009). In the absence of a proven credit line or an established balance sheet as security for debt service and given leveraging the financier has to be sure that revenues generated from the asset alone will be adequate to cover the debt service commitments (Wiser and Kahn, 1996). To provide this assurance the financiers typically apply restrictive loan covenants which are included in the agreements with borrowers which in this case would be the SPV (Wiser and Kahn, 1996). The most important of these project-finance loan covenants, is the debt service coverage requirements (DSCR) which calculates the projects ability to service its debt obligations which will be discussed in detail later on in this chapter (Wiser and Kahn, 1996). A good example of where a restrictive minimum DSCRs level is used is that in project finance debt is frequently less costly than equity, so project developers will seek to maximise debt leverage, however this tendency will be limited by the debt service coverage requirements (Wiser and Pickle, 1998, p. 361-386). In other words, the project's revenue will have to cover the total debt service at a certain ratio which will have the natural effect of limiting the amount of debt a project uses in line with the ability of the project to service this debt amount.

The DSCR along with a variety of other ratios such as the profitability ratios and debt/equity ratios, are used by financiers during the due diligence process before financial close to establish sensitivities to certain risks and throughout the project, post financial close, as monitoring and control tools (Delmon, 2009, p. 55-59).

As these ratios are a good indicator of the project's financial position and its potential and actual performance over its lifetime, financiers will stipulate certain levels for these ratios the project must maintain (Delmon, 2009, p.55-59). If the project is not meeting the required levels the financiers will have included a host of interventions, some of which Delmon, 2009, p. 53, lists: blocking distributions; cash sweeping from existing accounts, applying reserve account money to debt service; taking over rights of the borrower or the shareholders; and in some cases cancellation of loans. In this way financiers can ensure that projects maintain focus in order to successfully service the debt repayment.

4.1.1. ADVANTAGES

Project financing has two predominant characteristics that gives this structure an advantage over other forms of financing such as corporate financing, these are firstly, the non- or limited recourse nature of debt and secondly, the increased debt capacity or leveraging capabilities. The non recourse nature of debt allows the sponsor to set up a stand alone SPV that will shield the brunt of the projects liabilities. This will have limited impact on the parent company's creditworthiness and balance sheet in terms of capital, gearing and other imposed balance sheet restrictions (Wiser, 1997; Navigator Project Finance, 2009). In South Africa and many other markets, IPP's entering the power market will not have a large, established balance sheet and they do not have a substantial track record in wind power plant development to finance their projects through corporate financing and any high risk finance, such as venture capital, comes at a heavy price (Ubajako, 2006). Those developers that do have experience and the balance sheet will not want to expose their balance sheet to the Greenfield development in a new market in a developing nation with sovereign risk (Eardley-Taylor, Personal interview, 2009).

However, under a project finance structure there is no requirement for an established balance sheet or any collateral outside of the project, which can enable small and medium-sized developers to participate the market and can set up a number of projects at the same time, as can large companies, without negative company-wide impacts to the shareholder's balance sheets (Ubajako, 2006; and Navigator Project Finance, 2009).

The second characteristic of project finance, a greater debt capacity, is as a result of a greater transparency to lenders through the visible structure of an SPV (Sejersen, 2010). This visible structure allows for better risk identification, assignment and mitigation. A long-term service agreement with an availability guarantee is put in place and Liquidated Damages (LD's) for poor performance are assigned which reduces technology risk, furthermore the transparent ownership structure highlights the underlying credit risk, which then can be understood by lenders and risk mitigation is possible (Sejersen, 2010). For these reasons lenders have felt comfortable extending higher leverage to project financed wind farms (Sejersen, 2010). This debt leveraging capacity allows for higher debt/equity ratios which can result in cheaper financing costs because the cost of debt is typically cheaper than that of equity (Wiser, 1997). Wiser and Kahn, 1996, explain that consistent with industry practice, project developers will have a tendency to maximise the portion of debt in the capital structure of the project which, as explained above, is constrained by lender constraints such as the minimum DSCR constraint. Lastly, due to the flexible nature of the capital structure inherent to project finance, debt to equity ratios can be maximised to reflect the cheapest financing costs for a project (Wiser and Pickle, 1998, p. 361-386).

4.1.2. DISADVANTAGES

The non- and limited recourse characteristic of a project financing structure has a host of benefits as discussed above however the limited recourse debt does not come without a price. This “price” comes in the form of higher risk to the financier which results in higher debt and equity costs to the borrower and a greater array of restrictive loan covenants such as project specific minimum DSCR requirements (Wiser, 1997; Jechoutek and Lamech, 1995; Nevitt, 1983).

Furthermore, due to the complex nature associated with arranging the various contracts, both transaction times and transaction costs are longer and larger respectively, especially with respect to higher legal fees (Jechoutek and Lamech, 1995; Nevitt, 1983; Navigator Project Finance, 2009).

These longer transaction times and the increased level of risk to the financier will mean that banks will take a conservative view when they review the project’s estimated revenue and the associated debt service ability (Navigator Project Finance, 2009). In today’s essentially risk adverse environment it is essential that independent engineers and consultants with a proven track record perform a detailed due diligence review of the power project, which is usually commissioned by the financier to the project (Sargent and Lundy LLC, 2001). In this due diligence process the banks will ensure that in even in the most conservative of cases the revenue forecasts will be sufficient to cover the debt and interest payments (Navigator Project Finance, 2009).

4.2. PROJECT FINANCING DOCUMENTATION

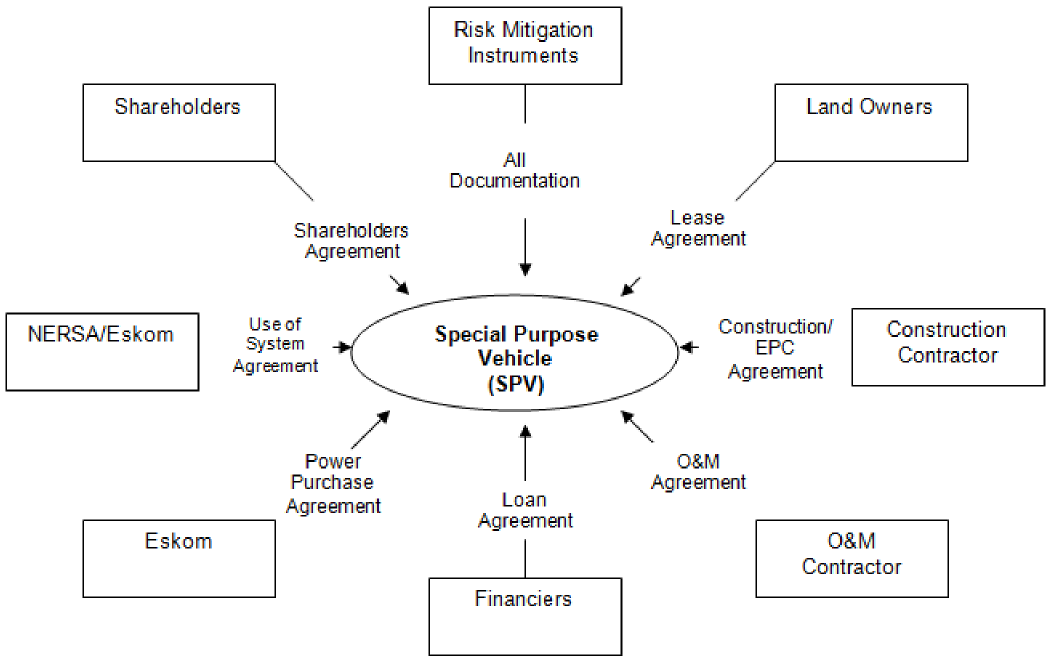


Figure 1: Typical Commercial Structure of a Project Financed Wind Farm
Source: Delmon, 2009, p.99

Figure 1, above, illustrates some of the main project participants and the documents that connect them to the SPV. The SPV is a legal entity that is founded on a set of legal contracts which typically has 40 or more contracts which define the interactions of multiple parties and it the project financed deal is only as good as the contracts or agreements that underpin it (Esty, 2004, p. 2; Sargent and Lundy LLC, 2001). A long term commitment reduces overall risk in the eyes of financiers and investors so it is the quality of supply or purchase contracts, secured into the long term, that communicate the perceived risk of the project and are therefore the basis for financing to independent power project development (Jechoutek and Lamech, 1995, p. 941-953). The project's cash flow, which is essential to obtain credit support for project-finance as discussed above, is secured contractually through the revenues defined under the off-take agreement or power purchase agreement (PPA) (Wiser and Kahn, 1996).

The PPA is an important contract but it exists in an intricate and interrelated structure of contractual arrangements, of which, the most important are: the PPA, the construction contract, the operation and maintenance contract, all other project-related agreements (Sargent and Lundy LLC, 2001). It is the strength of these underlying contractual arrangements that allows risk to flow seamlessly between different project parties and give financiers and investors the confidence to extend debt and capital to the project (Wiser and Kahn, 1996; Sargent and Lundy LLC, 2001). It is important to note that these agreements are only as good as their contractual enforceability so it is the legal activities of a project that are inherent to its success (Sargent and Lundy LLC, 2001). The guiding principle for all project documentation is that it must be compiled in accordance with the financiers' requirements as the bulk of the project funding will come from non- or limited recourse debt. The financiers will want all contracts to shield the SPV and therefore the financier from all project risks in order to obtain certainty as to their exact financial exposure over the maturity period of the loan (Delmon, 2009, p. 98).

Due to the non- or limited recourse nature of a project financing structure a complex set of legal contracts or documents are negotiated between all stakeholders with the primary focus of identifying the relevant project risks and how they can be avoided, accepted or transferred to the entity which is best placed to manage each risk (Sargent and Lundy, 2001). These documents and how they are structured ensures the ability of the project to generate a predictable income stream that will be purchased and it sets the mechanisms that create a "seamless web of risk allocation" between party participants (Sargent and Lundy, 2001).

The documentation that is a minimum requirement for a project financed deal and which stakeholders the SPV contracts with, as defined above, are listed in Table 4 below.

Table 4: Project financing documentation and connected stakeholder's for South African wind power projects

DOCUMENT	STAKEHOLDER
Concession Agreement	Government, ANC, DOE
Power Purchase Agreement	Eskom
Grid Connection License	NERSA
Loan/Financing Agreement	Financiers
Shareholders Agreement	Shareholders – Project Company/SPV
Land Lease Agreement	Land Owners
Construction (EPC) Agreement	Construction Contractor
Operation and Maintenance (O&M) Agreement	Operator Contractor

Source: Compiled from primary research

It is important to note in other power infrastructure projects there is a further document called the Fuel Supply Agreement (Sargent and Lundy LLC, 2001). However, for a for wind energy projects there are no input fuel requirements that are required to generate power, the wind turbines use the wind to turn the generators, so no Fuel supply agreement is required. However, financiers will require that the wind resource has been accurately measured and modelled over at least 12 months and correlated against long term data, and the financiers will employ independent engineers to perform a due diligence on this process.

What follows is a basic discussion of the documentation that is identified above with the purpose some of the characteristics common to these types of agreements however as mentioned above the main purpose of setting this contractual structure is to facilitate the allocation of risk which will be discussed in detail in Chapter 7.

4.2.1. CONCESSION AGREEMENT

The Concession Agreement is the project document through which the grantor grants the rights or “concession” to the project company to develop, build, and operate the project and it is between the project company and the grantor, or NERSA and Eskom in the case of South Africa. For wind farms in SA the Concession Agreement is actually a collection of documents that detail the license to generate through the permission of NERSA. More broadly this includes all the relevant published policy and legislation that creates the directive for concession but more directly the concession agreement includes the Standardised Direct Agreement, Transmission Connection Agreement (TCA), and Transmission Use of System Agreement (TUOSA) as outlined in the REFIT Phase II media release by NERSA (NERSA [2], 2009). It is through these documents that the broad project risks categories of political/sovereign risk, completion risk, and operation risk are transferred from the grantor to the project company (Delmon, 2009, p. 254-256).

The right to develop the project on “concession” from the grantor is in the sense that the provision of electricity has conventionally been a service of the public sector or Eskom (Delmon, 2009); however under the REFIT the government has set up the facility to concede the development of grid connected wind power plants to IPP’s.

Delmon, 2009, p. 253, explains that the concession can be granted in two manners: a concession by contract where the grantor will contract directly with a private company or through creating legislation and licensing as is the case with South African Government's policy the REFIT (Delmon, 2009, p.252). Under the Concession Agreement the legal system, tax and environmental obligations are defined and the agreement will specify other details such as: the completion date; performance requirements; maintenance regime; and construction and operation requirements (Delmon, 2009, p. 253-254).

In the case of South Africa the context for the concession is created by legislation and policy such as the REFIT and the 10,000 GWh renewable energy target, and concession is granted through license by the regulator NERSA through the Grid Connection License Agreement to eligible IPP renewable energy generators. The grid connection agreement will facilitate the connection of the project to the electrical power system or network to export the output from the project to the end users or other offtakers (Burton, 2001). In South Africa this agreement is also known as the Transmission Connection Agreement (TCA) and Transmission Use of System Agreement (TUOSA) (Nersa [2], 2009). Through these agreements a series of rights (or concession) is granted to the SPV to build, own and operate renewable energy power plants for the concession period, in this case the duration of the PPA or 20 years. The policy objective of the Government is to include wind power IPP's into the energy mix so in essence they are conceding the right to the IPP to design, build and operate wind power plants in SA is granted through a combination of the legislation and the Grid Connection License Agreement.

4.2.2. POWER PURCHASE AGREEMENT

Sargent and Lundy LLC, 2001, define The Power Purchase Agreement PPA is a, "critical risk element that secures that the plant will be able to sell its electric output to a reputable off-taker at acceptable rates and is contracted to continue to do this for the duration of the project." The PPAs, also known as the Offtake Purchase Agreement, is the agreement between the project company and the off-take purchaser, and is the most important document under a project finance structure.

The main purpose of the PPA is to sell the output of the project, in this case electrical power, preferably over the project lifetime, to an offtake purchaser which is usually a utility, public service provider or operator (Delmon, 2009, p.101, p.339). The offtaker will then sell the electrical output to end consumers or under negotiated long term supply contracts (Burton, 2001; and Delmon, 2009).

In the case of South Africa the offtaker will be Eskom, or more specifically the Renewable Energy Power Purchase Agency (REPA) situated in the Single Buyers Office under Eskom as mandated by NERSA under the REFIT Phase I and II:

> *"The Renewable Energy Power Purchase Agency (REPA) will be obliged to purchase the energy delivered by the renewable energy projects licensed by the NERSA under REFIT Phase I and II."*
> *(Nersa [3], 2009)*

> *"The Renewable Energy (RE) Power Purchase Agency (REPA) to be housed in Eskom's Single Buyer Office."*
> *(Nersa [4], 2009).*

The PPA is a critical requirement for project financing as it is through this agreement that project's revenue stream is secured, which in turn provides security to financiers to provide non- or limited recourse debt (Burton, 2001; and Delmon, 2009). The majority of funding for project financed deals comes from non- or limited recourse debt (see *capital structure* below), or in other words from financiers with all unallocated residual risks being borne by the financier. These financiers only have recourse to the projects future income stream and the project's assets as explained above, so long-term fixed/indexed price PPA contracts are essential prerequisite to qualify for project financing (Wiser and Pickle, 1998, p. 361-386).

It is essential that these contracts secure the revenue streams in the long term and most financiers will require that the contract period is for the duration of the project. For wind projects the project lifetime is twenty years (Delmon, 2009, p. 339) and in South Africa the REFIT PPA will extend over this lifetime as mandated by the REFIT Phase I and II:

> *"The term of the REFIT Power Purchase Agreement will be twenty (20) years." (REFIT Consultation Paper South Africa Renewable, Energy Feed-in Tariff (REFIT), Regulatory Guidelines 26 March 2009)*

The PPA will define the long term operation conditions as required by the grantor and the technical limits and standards that are needed to meet these requirements (Delmon, 2009), and any penalties for non-payment and dispute resolution provisions will be negotiated and defined in this document (Sargent and Lundy LLC, 2001). However, the REFIT mechanism that NERSA has initiated has the express goal to remove lengthy and costly negotiations between Eskom and IPP's through creating one PPA document that will stand as the standard PPA with specific provisions for each renewable energy technology.

The PPA is a critical risk element and the document allocates the market risk of demand and the price level for the project output thereby guaranteeing the financiers that there will be enough market demand for the projects output (Burton, 2001; and Delmon, 2009, p. 342). The market demand for the project's output, electricity, will vary due to a variety of factors, however the Project Company and its Financiers will want certainty as to project revenue and hence their financial exposure over the lifetime of the project at least to cover the generation costs of that output. So they will seek to allocate this market demand and the generation cost to the offtaker (Delmon, 2009, p. 342-343).

In other words if there is not enough demand to accept the output of a wind farm onto the grid when it is producing, the PPA, through different mechanisms such as "take or pay", will guarantee that the project will receive revenue for this output. It is in this way that the Project Company and the financiers will seek to minimise credit risk of the offtaker and ensure that the offtaker has the ability to accept the output and make timely payment (Delmon, 2009, p. 101). On the other hand the offtaker will want a guaranteed long-term output so if there are any shortfalls in contracted plant capacity or supply then the PPA will define the resulting lower capacity payments; however this completion risk can be transferred to other party participants in the Construction or Operation Agreement (Sargent and Lundy LLC, 2001).

The PPA is of particular importance in the case of renewable energy technology which has high upfront capital costs with the result of large front-loaded draw downs on debt with only the revenue guaranteed under the PPA as the predominant security for repayment over the life time of the project (Wiser and Pickle, 1998, p. 361-386).

The PPA is a of key importance to a project financed structure as an uncertain revenue stream is a risk that most project financing financiers will not expose themselves to (Wiser and Pickle, 1998, p. 361-386). In the instance of South Africa the public players have nominated themselves as the only entity to provide a PPA to gain access to the REFIT tariff, however to date have not defined what will be the content of this PPA. The above has highlighted the importance of the PPA so the absence of this important stands out as a massive uncertainty to the financial community and is a clear example of how the action of a public player can result in limited and more costly project funding as defined under the public-private partnership.

4.2.3. FINANCING/LOAN AGREEMENT

The Financing or Loan Agreement outlines the terms and conditions that will facilitate the provision of non- or limited recourse debt by financiers to the project SPV and can some times consist of a variety of separate agreements (Burton, 2001; and Delmon, 2009). The Financing Agreement then defines the relationship between the financiers and the SPV. As discussed in Chapter 6 financiers to a particular project can consist of one or more of the following: commercial banks, export credit agencies (ECA), bond holders, and multilateral and bilateral lending institutions, and other development finance institutions (DFIs) (Delmon, 2009). It is usually the case that a combination of financiers is used to form a financing package; so agreements, such as the Intercreditor Agreement, will exist that define the interaction and level of control between these financiers (Delmon, 2009).

For project financed structures there is a high portion of debt compared to equity so any residual or unassigned project risks will be borne by the SPV, which in turn is borne by the financiers as they have the largest investment in the project and therefore they stand to lose the most.

These residual risks are allocated to the financiers from the sponsors in the SPV and project company through the Financing Agreement. Consequently, the financiers will seek to limit or eliminate these residual risks through demanding that the project documentation is structured in a way that they are guaranteed that all major project risks have been addressed, allocated and if possible mitigated according to the principle of risk allocation or risks are assigned to those project participants that are best placed to manage them which is explained in detail in Chapter 7 (Burton, 2001). If the financiers are confident that these risks have been appropriately managed and that their risk exposure has been limited or mitigated the project is described as *bankable*.

The process that financiers will undertake to determine the bankability of the project is called the due diligence review (Sargent and Lundy LLC, 2001; and Delmon, 2009). An important prerequisite for this process is an accurate and verifiable measurement of the site's wind resource as the many of the banks requirements will be ratio driven off the back of this analysis (Potgieter, Personal Interview, 2009; and Eardley-Taylor, Personal Interview, 2009; and Burton, 2001).

4.2.4. CONSTRUCTION AGREEMENT

The Construction Agreement is the agreement under which the project company assigns the tasks of designing and constructing the wind farm to a set of engineering, supply and construction contractor and it defines the responsibilities of the subcontractors to the project company in terms of delivering the works over the construction period up until Taking over and commissioning (TOC) (Delmon, 2009, p. 285-286).

There are a diverse set of activities that are allocated to the subcontractors under the Construction Agreement and exactly what is included under the subcontractor's scope of works is highly project specific.

What follows is a review of what literary sources identify as key activities defined under this agreement. Delmon, 2009, p. 286, describes that the activities that are allocated are the design and supply of: equipment and required materials; civil works; electrical works; and erection and commissioning, while Burton, 2001, is more wind specific as he states that the purpose of the Construction Agreement is to construct, or facilitate the construction of the wind farm project and procure the wind turbines. Ruster, 1996, lists the following responsibilities of the construction companies: engineering, procurement, performance testing, obtaining permits and insurance, provision of required services (e.g. water, electricity, and fuel), and management under extreme events such as force majeure events. Sargent and Lundy LLC, 2001, refer to the Construction Agreement as the Engineering, Procurement and Construction Agreement (EPC) which will define: the critical design parameters; the technology used for the main equipment; the balance of plant systems; and the site-related issues such as geotechnical data for the foundations and civil work, water, wastewater, transmission access, and environmental issues (Sargent and Lundy LLC, 2001).

The construction Agreement allocates the risks that are apparent over the construction period and exactly what risks will be apparent is determined by site and project specific details. Delmon, 2009, p. 294; and Sargent and Lundy LLC, 2001, identify some of the general risks that one can expect to be addressed and allocated under the Construction Agreement, which are: construction risk, technology risk, performance risk, and completion risk, price overruns risk, design risk, and environmental risk. There are a number of risk mitigation instruments that can be included under this agreement to protect the SPV and the financiers over the construction period such as: assigning turnkey scope to one contractor, advanced payment performance bonds, guarantees, and retention accounts (Delmon, 2009).

The choice as to which instrument to use and the mechanism's specific details will be reflective of the level of risk that the financiers will have to bear, however, the topic of risk mitigation instruments will be explored further under Chapter 7. However, assigning turnkey scope to one contractor to deliver the project on a firm date at a fixed price with well defined penalties for defaults, warrants further discussion which is also commonly known as engineering, procurement and construction contract (EPC).

4.2.4.1. ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) CONTRACT

Due to the high level of risk to the financier under a project financed structure the financier may require that the Construction Agreement is packaged as an Engineering, Procurement and Construction (EPC) contract. This EPC requirement is commonly used as a risk mitigation technique by financiers for new technologies, situated in new markets, in developing nations where there is no past practise to draw upon with high levels of uncertainty and risk. An EPC contract, also known as a design and build or a turnkey construction contract is the contractual agreement where the project company assigns the full responsibility of the design (or engineering) and construction of the works through back-to-back documentation to one main construction contractor, usually the wind turbine manufacturer, in order to deliver a fully operational, turn-key facility to the project company upon a prescribed completion date, on a fixed lump sum price basis at each completion milestone (Delmon, 2009, p. 286-294; Ruster, 1996; and Burton, 2001). The end result is that the risks that are apparent during the construction development project phase are allocated to the EPC contractor (Burton, 2001).

The responsibilities that are allocated to the construction contractor through an EPC contract cover the design of the entire works; coordination of the interfaces between the design and construction project participants; and these responsibilities must be in accordance with the contractually predefined time for completion, performance targets; and specified contractual standard of care (Delmon, 2009, p. 286-287). In other words the works must be completed by a certain date to perform at certain targets and the contractor must perform the works at a prescribed level of care (Delmon, 2009).

The main benefit of employing an EPC contract structure to govern the risk laden construction phase of the project is that there is a single point of responsibility for the design and construction of the works which is the main construction contractor (Delmon, 2009, p. 286-294). So in the event that any default occurs during the construction phase, or as a result of the works performed during the construction phase, the project company and financiers can deal with one project participant to remedy the problem as opposed to the host of participants required to design and construct the works. Another important benefit of using an EPC contract is that the agreement will provide a fixed price lump-sum structure with milestone payments where payment is made at each completed milestone with little to no room for price increases other than those that are carefully indexed (Delmon, 2009, p. 286-294). This contract framework has the dual result of incentivising the EPC contractor to work more efficiently to meet milestone completion dates with no cost overruns as to not to erode margins constrained by the predefined fixed contract price, and this then provides greater certainty of the SPV and therefore the financiers' financing exposure over the construction phase of the project (Delmon, 2009). This certainty over the construction period is of particular importance to wind energy projects due to the capital intensive nature of these projects, which will require a greater degree of upfront debt and equity than more traditional power plants with lower capital costs (Wizelius, 2007).

However, this allocation of risk to the construction contractor comes at a price which is a risk premium that is included in the fixed contract price that will depend on the level of risk that is borne by the construction contractor (Delmon, 2009, p. 294).

The risks that are transferred from the Project Company or SPV to the construction contractor through the Construction Agreement are all the construction risks apparent over the construction phase of the project, more specifically the risks are: completion risk, performance risk, and cost overruns risk (Delmon, 2009, p. 294-297). The construction contractor does not only bear risk over the construction period but there will be a defects liability period where the responsibility to remedy defects, such as latent defects, in the works that the construction contractor was responsible under the construction phase and this will be for a predefined period after completion (Delmon, 2009). There is generally a requirement for EPC contracts for the financing of wind farms in South Africa according to the findings of the qualitative interviews.

Arfaoui, 2009, from the AFDB stated that one of the “key elements” that must be in place for project financing to take place is an EPC contract, a point that, Maclay, 2009, from Actis agreed with as they require an EPC contract to cover Construction Risks to facilitate their equity involvement. Viljoen, 2009, from Cresco Project Finance concluded that a project will not be able to get away without having at least an EPC contract in place under the South Africa conditions. In stark contrast to this, Eardley-Taylor, 2009, from Standard bank explained that they do not need EPC contracts based on the European ethos that the contractors that exist in the market are well known to the bank they are confident that they are bankable so there is no need for an EPC contract. When it comes to construction risk, Eardley-Taylor explained that particularly in the SA market this is a very low risk area for Standard bank.

Standard bank knows all the civil and electrical works contractors that exist, they have banked them all on previous projects and what's more is that wind energy projects are relatively simple in these two areas. It is then very important for project developers in South Africa to ensure that the contractors and consultants that are used have a track record of expertise in the area they are to fulfil and in addition to this track record must be bankable from the perspective of the bank. So for South Africa an EPC contract is generally a requirement to facilitate project financing and funding with some exceptions as is the case with Standard Bank. This requirement is in response to the level of uncertainty that exists around the development of wind power plant projects in South Africa from a project delivery, construction, and execution perspective as there is no significant track record of the projects in South Africa.

4.2.5. OPERATION AND MAINTENANCE AGREEMENT

The operation phase is an extremely important phase of the project as it is here that all revenues are generated which are used to service debt, pay operating costs and disburse returns on equity to the shareholders (Delmon, 2009). For this reason the financiers will demand that the project company signs an Operations and Maintenance (O&M) Agreement which defines the conditions on the operator to ensure the continued and efficient operation of the asset over the 20 year lifetime (Delmon, 2009; Burton, 2001; and Sargent and Lundy LLC, 2001). The O&M Agreement is between the project company and the operator and will require that a fixed price is given for the operation and maintenance of the project and that the methods of calculation are clearly detailed with any price increases clearly indexed and explained (Delmon, 2009).

Delmon, 2009, outlines some of the primary O&M contractual structures that are used for project financing structures where the operation and maintenance responsibilities and obligations can be assigned to one or more of the following entities: the project company; a third party; a shareholder or its subsidiary; or the obligations can be split between multiple contractors (Delmon, 2009, p. 321-322). In today's financial climate financiers will require that whoever the project company assigns the task of operation and maintenance to, that this operator has a proven track record in operating wind power projects under the context of similar political and commercial conditions of those characteristic of the host country (Delmon, 2009). For wind power plant projects the O&M Agreement will usually be signed with a wind turbine manufacturer, which, according to the risk allocation principle, is the project participant that is best placed to manage and influence the risk. Suppliers such as Vestas have standard service packages such as the AOM4000 that covers all scheduled and unscheduled maintenance to ensure guaranteed availability of 97% park availability and where there is capacity and availability shortfalls the O&M Agreement will hold the operator to certain penalty clauses (Sargent and Lundy LLC, 2001).

The Concession Agreement and PPA will stipulate operating requirements and obligations that must be performed to meet a standard of performance for the project and the responsibility for this is past onto the Project Company through these agreements. In other words when the construction phase of the project has come to an end which is signalled by completion of the works and take over has taken place the management of the operation of the project; the provision of maintenance for materials and equipment; and the adherence to the offtaker's requirements will become the responsibility of the project company (Delmon, 2009). The O&M Agreement will then pass these obligations and responsibilities onto the operator to ensure the availability and efficient operation of the wind farm and where these responsibilities are not clear the operator will be contracted to a set of standards and criteria of performance (Delmon, 2009, p. 321-326).

The *availability* and *efficient operation*, mentioned above, of the wind power plant can be defined as the capacity of the project to operate at certain performance levels inline with the operating requirements that, as discussed above, are outlined under the Concession Agreement and PPA by the grantor and the offtaker respectively (Delmon, 2009). This capacity to perform must be in line with the levels of efficiency that satisfy the revenues forecasted by the financial model as it is this forecasted revenue that forms the bulk of the security to financiers (Delmon, 2009).

The O&M Agreement allocates the risks that are apparent in the operation phase of the project from the project company to the operator. These risks are: operating risk; performance risk; increase in cost risk; and political risk. The last risk listed, political risk, is present in South Africa as the project company is supplying service that has been supplied public sector which should needs to be in accordance with public expectations (Delmon, 2009).

4.2.6. SHAREHOLDER AGREEMENT

The Shareholders Agreement establishes and defines the relationship between the different shareholders and owners that have a stake in the Project Company or SPV and this agreement defines the rights and obligations of these entities with respect to the project company (Burton, 2001; and Delmon, 2009, p. 271). There is the opportunity for different shareholders to be active in a project along the different project development stages: for example in some instances a development company will move the project to completion and take over utilising its own funding then they will sell on their equity stake to longer term investors such as pension funds for the operation period of the project (these different equity options are explored in greater detail in Chapter 7).

Due to the changing composition of the shareholders in a wind power project the Shareholder Agreement is either dynamic or is the group term used for all the documentation that defines the relationship, rights and obligations between shareholders in the project company. Some of the documentation that the Shareholders Agreement may cover are, but not limited to: the development agreement or pre-financial close sponsor's agreement; joint venture agreement; articles of association; constitutional documents; and stand-by credit and equity (Delmon, 2009, p. 100).

The Shareholders Agreement aims to address the rights and obligations and the relationship between all the shareholders with respect to the project company. Under these broad topics there a variety of topics that are addressed under the Shareholders Agreement and its exact content is dependent on the project specifics and shareholder's preferences but some general topics that are included are now discussed. Firstly the details of establishing the SPV, the conditions precedent to its creation, and the structure of the SPV are defined under this agreement (Delmon, 2009, p. 100).

Secondly, the management and governance structures that define decision making and voting details are defined. Thirdly, the allocation of costs and revenues, the commitment of resources and contributions of each shareholder, and the transfer and issuance of shares are outlined (Delmon, 2009, p. 100). The Shareholders Agreement will define the priority of payments made from the cashflow and revenues generated by the project with employees and tax authorities paid first; then contractual obligations to third parties are settled; then financiers' senior debt servicing, then any reserve funds and contingencies accounts are maintained, and finally the shareholder's disbursements or returns on equity are settled (Delmon, 2009).

Fourthly, any other issues, and how the shareholders address them in the event that they occur, are addressed, namely: conflict of interest; confidentiality; restriction on transfer of shares to any third party; and non-competition clauses (Delmon, 2009).

The Shareholders Agreement will allocate the residual project risks amongst the different shareholders with an investment in the project company. This can be explained as all the project risks that are not borne by the grantor and offtaker will be transferred to the project company under the Concession Agreement and the PPA and it is then the responsibility of the project company to allocate risks away from the SPV to other project participants because the residual risks that are unallocated will be borne by the shareholders and the financiers. The proportion of the financial exposure that the shareholders and the financiers will bear will be determined by the capital structure of the project or the debt to equity ratio, so the shareholders will usually, through a contribution clause, only be liable up until the amount of their investment in the project and how these risks are shared or allocated amongst the shareholders within the project company will be addressed in the Shareholders Agreement (Delmon, 2009). It is for this reason that financiers will manipulate this capital structure ratio depending on the level of residual uncertainty and risks.

4.2.7. SITE AGREEMENT OR LAND LEASE

The Land Lease or Site Agreement is between the land owner and the project company and it is an essential facet to the development and operation of a wind farm as it secures access to the site where the asset will be constructed and operated over its lifetime. The agreement defines the relationship and the remuneration details with the landowners; it secures the permission to measure and construct a wind farm on the land; and ensure access to the site over the lifetime of the project (Burton, 2001; and Wiisbye, 2004).

Firstly, this agreement should include permission to install a number of met masts on the land and measure the wind conditions for at least one year but more preferably this permission should extend to the full 20 years of the project (Wiisbye, 2004). Secondly, the agreement will outline the conditions to construct a wind farm if the feasibility study proves successful and similar agreements might be necessary to establish the same permission with nearby landowners to make sure there are no major objections to the wind farm and to secure the land for future development (Wiisbye, 2004). Thirdly, and most importantly the Land Lease will define way in which the land owner is remunerated for the use of their land and the exact land owner remuneration methods employed will normally be project specific (Wiisbye, 2004). For instance in Sweden the land owner is normally remunerated through a set lease at roughly 2-4% of the gross annual revenue from the wind farm, or a corresponding up front lump sum payment when the wind farm in constructed (Wizelius, 2007).

However the following broad options are often seen in the wind power industry in the different stages of the project's development: In the prefeasibility and feasibility phase of the project a small annual fee can be paid to the land owner for holding the right to develop a wind farm on the land or a small annual fee can be paid for the permission to install a met mast and measure the wind conditions on site (Wiisbye, 2004). Once the feasibility study is complete and it makes sense to develop a wind farm on the land a larger fee is paid to the land owner (Wiisbye, 2004). These fees can sometimes be avoided through negotiating with the land owners to guarantee them future revenues contingent on the suitability of the site to wind farm development.

Once the wind farm is developed there are two different approaches to remunerate land owners over the operation period of the project: fixed fee or annual royalty.

In the first instance a *fixed fee* is paid when the wind farm is commissioned and it is usually a percentage of project contract value and in the second instance an *annual royalty* is paid based on the wind farm performance (Wiisbye, 2004). In reality a combination of a fixed fee and an annual royalty is often chosen as this will secure that the landowner is compensated from the beginning but it will also secure that the landowner is more willing to assist in securing the projects optimum performance during the project lifetime with the incentive of higher annual royalties (Wiisbye, 2004).

4.3. CONCLUSION

This chapter has introduced the concept of project financing, discussed the connection between the project participants and contractual documentation; and lastly explored this application in South Africa. The main advantages of project finance structure are firstly the non- or limited recourse nature of debt and secondly, the increased debt capacity or equity leveraging possibilities. While the disadvantages are that due to higher risk to the financier there will be higher debt and equity costs to the borrower and a greater array of restrictive loan covenants. This is Furthermore, due to the complex nature associated with arranging the various contracts, both transaction times and costs are longer and larger respectively, especially with respect to higher legal fees.

The main project participants under a project finance structure are discussed above and while the above mentioned set of government, financiers and investors are currently in place to be the ones to execute the contractual documentation, there is the strong possibility that these players could change as the market moves forward from its uncertain position. These entities will be connected through the project documentation which has the main goal of creating a seamless web of risk allocation between party participants that is both efficient and effective according to the guiding principle of risk allocation (discussed in Chapter 7).

CHAPTER 5

KEY FINANCING TERMS AND VARIABLES

This chapter will deal with each key financing term and variable by firstly introducing each one and discussing how they reflect the risk tolerances of the funding entity through revealing their and perceived level of risks they see inherent in a project. This will be followed by an illustration of some of the tolerances as reflected in the literature and the qualitative interviews to facilitate the comparison of the key financing terms and variables that are currently valid for South Africa against those researched from the global literature. This comparison only serves as a rough indication as to how funders currently perceive their risk exposure in South Africa in the absence of defined project risks. This is set against the context of researched key financing terms and variables, to determine whether the risk appetite for South African project financed wind farms is in line with the rest of the world or completely out. To make definite conclusions about this would require the South Africa wind market to be more advanced in terms of more defined risks as opposed to larger uncertainties which could yield a more South Africa, wind project specific set of key financing terms and variables.

When financiers and investors extend debt and equity respectively to a project financed wind power project there will be a cost for this input and a set of requirements or terms that must be met before either one of these entities feels comfortable to fund the project. The cost of debt and equity are debt interest rates and return on equity respectively and the potential sources of funds will stipulate their terms through a set of variables and ratios that communicate the levels of overall performance of the project and the debt servicing capabilities, namely: capital structure (debt/equity ratio); debt interest rate; debt maturity period; debt amortisation schedule; debt service coverage ratio (DSCR); and return on equity.

The majority of these terms, variables and ratios deal with the provision of debt and the restrictions or "loan covenants" that are placed on the project which is due to the majority of funds for a project financed project coming from financiers in the form of non- or limited recourse debt. Furthermore, each of the financing structures that are discussed in Chapter 3 have their own specific set of values for these variables and associated terms which is reflective of the varying risk levels inherent to each structure. For instance a corporate financing structure will qualify for more favourable terms when compared to project financing as in the first instance the bank has recourse to an established balance sheet. However, for the purposes of this paper this discussion will be restricted to project financing.

For a project financed project financiers will lend based off the viability of the project structure, the business plan and the forecast revenue stream (Delmon, 2009). So before financiers consider a project they will perform a due diligence review of the financial viability of the project to establish the performance of the project; its debt servicing capabilities; and finally their overall financial or risk exposure on the funds (Delmon, 2009).

Their main focus will be to determine the full extent of the negative potential of the project and how they can structure the project to provide the necessary security they require to mitigate their exposure to these negative potentials (Ubajaka, 2006). Financiers will consequently adjust their interest rates and default terms, or key financing terms and variables, to the level of risk exposure on debt that financiers perceive in the project with most lenders requiring some form of equity investment in the project to communicate the investor's commitment (Ubajaka, 2006). Similarly, equity investors will review the potential return on their equity and will usually have a hurdle rate, below which, they will not invest. Based off this review, and their associated risk exposure of funding the project, both financiers and investors will decide whether or not they will get involved in the project; what the degree of their involvement will be; and the cost and terms of their involvement which will then be reflected through the key financing terms and variables.

The set of values behind the key financing terms and variables are vitally important as they have a significant influence over overall costs and returns (Wiser and Pickle, 1998, p. 361-386; Wiser, 1997). Consequently, a project financed deal can not materialise without a contribution of debt and equity so it is vitally important to understand how these variables and terms reflect financiers' and investors' risk tolerance and overall appetite before a discussion on how to manage, allocate, and mitigate these risks to package projects in a way that qualifies the project for the most favourable key financing terms and variables, in coming chapters.

The structure of this chapter will start with a general discussion about the financing terms and variables for the South African market, followed by a discussion of how the ranges of values of the variables given in the qualitative interviews match up to the ranges of values from different global literature sources.

Then each variable will be discussed and how this variable is altered in response to the level of perceived risk and uncertainty that the particular financier/investor believes there to be in extending the funds to the project.

5.1. KEY FINANCING VARIABLES

Table 5 gives the ranges for the key financing terms and variables as sourced from the literature while Table 6 illustrates the ranges that were expressed by the qualitative interviews held with potential and existing financiers and investors to the South African utility scale wind energy projects.

Table 5: General value ranges of the key financing terms and variables from the international literature sources vs. the qualitative interviews

KEY FINANCING VARIABLE	EXPLANATION	TOLERANCE	
		Literature	Exploratory Interviews
Capital Structure	Debt to equity Ratio	50/50 – 90/10	60/40 – 80/20
Debt Interest Rate	Interest Rate	8.5% – 14.90%	12% – 14%
Debt Maturity	Length of the Loan, years	10 – 15 yrs	8 – 15 yrs (refinance)
Debt Amortisation	Debt payment schedule	Mortgage-style Repayment	Sculpted and Mortgage
Debt Service Coverage Ratios	Minimum acceptable value for the DSCR	1.35 – 1.60	1.2 – 1.4
Equity Return	Return on Equity (ROE), Internal Rate of Return (IRR)	16% to 20% USD IRR	ZAR: 18% - 20% Dollar: 11% - 25%
Payback Period (Equity)	Number of years	-	12 years

Source: Compiled from primary research

There seems to be a great deal of uncertainty due to the many undefined market, regulatory and project risks in South Africa that have not been defined into well understood risks at this early stage of the market's development for financiers and investors to confidently comment on the specific set of key financial variables assumptions and the specific tolerances (BNP Paribas, 2009; and Viljoen, 2009). Viljoen, 2009, from Cresco Project Finance explained that when it comes to specific key financial variable assumptions and the specific tolerances of financiers and sponsors it is dependent on two main factors: firstly the outcome of what the proposed PPA structure will be, and secondly the quality of each specific project and whether or not all the major risks have been addressed and assigned appropriately (Viljoen, 2009). So the tolerances to the financing variables will be project specific and it is too early to comment specifically so once the first project passes through the bank's credit approval process many of these uncertainties will unfold and the risk profile defined. It is only once the risks are defined and the specific value of each possible outcome is understood can financiers and investors effectively price the associated risk exposure. It is only once this has happened that financiers and investors can reflect their tolerances to this calculated risk profile through the key terms and financing variables.

Many of the financiers and investors that were interviewed shared this view that the terms and variables would be project specific as Vajeth, 2009, from ABSA Capital explained that it will be difficult for them at this stage to define exactly what the bank would require to pass a project through their credit approval process until they see the first transaction go through. The credit in ABSA is not familiar with wind projects and the team at the bank will have to test their credit requirements before they can confidently list their requirements and risk tolerances. Greenwood, 2009, from New Energy Finance suggested that in the absence of any defined project on the table it is difficult to determine the specific set of assumptions for the South Africa wind energy market. However, the following tolerances that underpin global developments would be a good start.

Arfaoui, 2009, from the African Development Bank explained that the actual level of the key financing variable varies to such a degree over the different project structure, country, PPA format, and other project specific details that is difficult to quote any specific numbers that can be used to capture the whole African continent region that it covers and that the level or tolerance to these variables depends on the unique risk of each project (Arfaoui, 2009). In other words, it is only once these broader market level uncertainties are defined and captured in an appropriately packaged first project that financiers and investors will be able to perform their due diligence review and advise their set of key financing terms and variables (BNP Paribas, 2009). As this will be discussed in later chapters the public players in South Africa have a large influence over the level of perceived uncertainty in the market at this stage due to an undefined regulatory framework to deliver the REFIT tariff. This means that the public players have a direct influence on the availability and the cost of potential project funds.

Many of South Africa's commercial banks and foreign/local equity investors are waiting for the first project to be successfully licensed, constructed and connected to the grid to pave the way for others to follow and to define many of the outstanding uncertainties of the financiers and investors. In other words they are adopting a wait and see attitude to see if wind power has a place in South Africa's future energy mix. When questioned as to the specific tolerances that potential and existing financiers/investors have with regards to their set of key financing terms and variables, many commented that it is too soon to communicate an accurate and tailored set of financing terms and variables for South African utility scale wind farms, however a general "rule of thumb" can be applied to these variables that capture the global, company, sector, and project type risks that banks, DFIs and investors will use to tailor their products to the projects under review.

Vajeth, 2009, from ABSA Capital, demonstrated how this tailoring process will play out as there are different levels of certainty, such as P50 or P90, and for each of these levels ABSA has a matrix that returns a certain risk profile which they use as a starting point for determining the associated tolerance or hurdle rates for the key financing variables at each level of certainty. So the exact packaging requirements, debt pricing and financing terms is ratio driven off the back of the certainty levels behind the key risks of a project under review and these will only become apparent once the first project has passed through their credit's approval process. Vajeth, 2009, showed how this demonstrated the importance of the first utility-scale wind farm in South Africa and he stressed that this will be a milestone as it assure financiers of what these projects entail and what the impact is for financing purposes. Unfortunately, for the first project bank's credit facilities will demand a higher level of certainty, P90, which will give them more comfort especially under the context of a global financial crisis.

That said financiers and investors can give a "rule of thumb" range of financing terms and variables that captures their broader global, company, sector and country specific risk tolerance. O'Flynn, 2009, from Mainstream Renewable Power said that the banks are giving similar gearing and margins as other forms of infrastructure in the market and these key financing variables will be in line with the rest of the world and Greenwood, 2009, from New Energy Finance explained that the tolerances that underpin global developments would be a good start. With this in mind any indication that is given as to the level of these variables acts as a "rule of thumb" that captures the global, company, sector, project type risks rather than providing an accurate and tailored set of financing terms for South Africa utility scale wind farms (Industry Participant, BNP Paribas , 2009). Cresco Viljoen, 2009, explained that although the exact hurdle rates to the key financial variables are project specific and financier specific there is a broad range of tolerances over these set of variables.

Viljoen stressed that any tolerances communicated at this stage, act as mere guidelines at this stage and financiers/sponsors may demand more or less as the market and project specific detail becomes apparent or in other words as the uncertainties are defined into a clear set of risks.

The ranges of key financial terms and variables that are described in this paper, as summated in Table 5, are to be treated as a general, pro forma set of "hurdle rates" or tolerances for the key financial variables, but it is only once the major uncertainties, such as the format the PPA will take, NERSA's procurement process, and the technical issues of grid connection and dispatch, start to unravel that the more market and project specific key financial variables' assumptions can be tailored for South Africa wind energy projects and financiers and sponsors will be able to accurately formulate their South African wind energy specific risk tolerances and communicate this appetite through a set of key financial variables (Viljoen, Personal Interview, 2009). These tolerances that are explained through these personal interviews are useful in communicating the general project risks; current global risks; wind power specific risks; existing company best practise; and broad assumptions about South Africa. In other words once the PPA has been published and the first project has been successfully developed financiers/sponsors will understand where South African wind projects sit on the risk scale and where in this range their key financing terms and hurdle rates will be to reflect there desired risk exposure. From this one can see that uncertainty in the regulatory framework can have a severe impact on financiers and investors.

It is because of the uncertainties and lack project specifics, as outlined above that, at the early stage of the market, it will be inaccurate to profile each specific financier's and investor's risk tolerance and appetite based off their communicated key financing terms and variables so this report will aim to profile the overall tolerance of potential financiers and investors to the inherent risks of project financing utility scale wind farms in the South African market as reflected in their key financing terms and variables. Before this is discussed this chapter will explore how Table 5 was formulated, through a review of each variable in turn and how they reflect the financier's/investor's risk tolerance to perceived project risks.

5.1.1. CAPITAL STRUCTURE

The capital structure of a project is the combination of debt and equity that is used to finance a project, with the proxy of this combination being the debt/equity ratio (Wiser and Pickle, 1998, p. 361-386; Wiser, 1997; and Wong, 1995). Debt is often cheaper than equity so the project company will seek to maximise the amount of debt in the capital structure and reduce higher-cost equity capital, thereby reducing overall project costs (Delmon, 2009; Wiser, 1997; Wong, 1995; and Wiser and Kahn, 1996). The capital structure of a project is flexible and can be optimised to reduce overall financing cost however, the contribution will depend on the relative costs of debt and equity; how much equity financiers require depends on the financier's risk exposure of the project which is expressed through the minimum DSCR constraint (Wiser, 1997; Wong, 1995). It is the requirement to meet this DSCR constraint that limits the ability to optimise the capital structure of privately developed and owned wind power plants because this constraint is the financier's way of stipulating the minimum amount of equity they require to lend debt to the project which is determined by the financier's perceived risk exposure of the project (Wiser, 1997; Wong, 1995; and Wiser and Kahn, 1996).

The capital structure reflects the risk tolerance of the financiers as the proportion of the financial exposure that the shareholders and the financiers will bear will be determined by the capital structure of the project or the debt to equity ratio.

The higher the debt to equity ratio is, or the higher the portion of debt in the project, the more the financier is exposed to project risk so for projects with a high level of inherent risk, financiers will require a greater equity contribution or "ownership" of shareholders in the project which is considered a form of commitment from developers and sponsors (Delmon, 2009, p. 56; and Ubajaka, 2006).

This is because shareholders will only be liable up until the amount of their investment in the project due to the non- or limited recourse nature of debt so financiers will require a greater equity stake in accordance to the level of perceived which will assign greater exposure of the residual risks to shareholders which will increase their incentive for project success (Delmon, 2009; and Ubajako, 2006). In other words the requirement for a higher injection of equity is the key protection against risks as it acts as a cushion against risk for financiers as equity sits lower on the list of priority of payments than senior debt servicing (Donaldson, 1992, as cited in Ubajako, 2009). Other factors that influence this minimum level of equity investment from shareholders in the project company are: security available, the creditworthiness of project participants, the project specific detail, the country risk and the degree of involvement of government entities (Delmon, 2009, p. 56).

Table 6 below represents some of the debt/equity ratios sourced from a variety of literature that has been reviewed which covers the financing and risk management of utility scale wind farms globally.

Table 6: Capital Structure (Debt/Equity) from the Literature

CAPITAL STRUCTURE [Debt To Equity Ratio]	
Source	**Tolerance**
Wong (1995) (1994)	50/50-70/30
Wiser & Kahn (1996)	Flexible - 50/50
Burton et al (2001)	80/20
Ubajaka (2006)	75/25
Wizelius (2007)	80/20
Delmon (2009)	70/30 - 90/10 (40/60 high risk)
NERSA REFIT (2009)	70/30

Source: As stated in table

The observation from Table 6 above is that this variable is flexible and the level is dependent on project, country, company and sector specifics which is evident from the different levels expressed above. However there is a range that can be deduced for project financed utility-scale wind farms with the lower bound being 50/50 and the upper bound being 90/10. The upper bound in this instance is unrealistic under the current risk adverse context of the financial crisis and for the lower bound Wiser, 1997, argues that the optimal capital structure for a wind power plant in the US is approximately 50/50, however this comment is outdated as he goes on to say that, “The capital structure of recent [1995] US wind plants is consistent with this analysis” (Wiser, 1997; Wong, 1995). Delmon, 2009, p. 57, explains in a more current report, that for power projects a “ball-park” debt/equity ratio is around 70/30 to 90/10, however for projects with a higher degree of inherent project and market risks financiers will require a larger share of equity with debt/equity ratios in the range of 45/55 to 40/60 (Delmon, 2009, p. 57). Finally, the REFIT Consultation Paper Phase II, NERSA, 2009, published a capital structure of 70/30 for South African utility-scale wind power facilities.

To determine where South Africa will lie along this range key financiers, investors and industry participants were questioned as to the contribution of equity that South African financiers will require. Table 7 lists the results from this qualitative analysis.

Table 7: Capital Structure (Debt/Equity) from Qualitative Interviews

CAPITAL STRUCTURE [Debt To Equity Ratio]	
Interviewee	**Tolerance**
Nedbank Capital	70/20-75/25
Investec Capital	60/40-75/25
Standard Bank	Ratio driven P50/90 production
Absa Capital	Ratio driven P50/90 production
BNP Paribas	70/30-80/20
African Development Bank (AFDB)	70/30
Actis Equity Fund	Project Specific
Mainstream Renewable Power	80/20
Cresco Project Finance	60/40-70/30
New Energy Finance	80/20

Source: As stated in table

The debt/equity ratios that were communicated in the qualitative interviews are in the middle range of the range determined by the literature of 50/50 to 90/10 as explained above. The lower bound of these qualitative results is 60/40 with the upper bound of 80/20 which shows that while financiers will provide the majority of the funds to a project financed deal in South Africa they will still require a significant portion of equity to shield against the largely undefined project risks in South Africa.

Potgieter, 2009, from Investec agreed with this range and indicated that debt to equity ratios will range from 60/40, on the conservative side, to 75/25 on the optimistic end of the spectrum which was in line with a industry participant from the French international bank BNP Paribas, 2009, explained that only a well structured project where all the major project risks have been addressed and assigned to those best placed to deal with them will be able to qualify for limited recourse debt that will cover up to 80% of the project, however, a 70/30 debt equity ratio is more realistic from domestic commercial banks.

Both O'Flynn, 2009, from Mainstream Renewable Power and Greenwood from New Energy Finance remain confident that, despite impact of the credit crisis, there is still sufficient appetite from domestic and international commercial banks to facilitate an 80/20 debt-to-equity ratio (Andersen, as quoted in Engineering News, 2009). The Development Finance Institutions (DFIs) with the ability to take on a higher degree of political and country risk are still within this range of offering a capital structure 70/30 i.e. at least 30% of equity from project sponsors which Arfaoli, 2009, African Development Bank explained.

Both ABSA Bank and Standard Bank require a confidence level of P90 sensitivity on production modelling to lend project finance debt and their hurdle rates to the key financing variables are essentially ratio driven off the back of this production modelling (Eardley-Taylor, 2009; and Vajeth, 2009). So the windier sites will qualify for a more relaxed set of hurdle rates while sites where the wind resource is marginal banks will be stricter and require more equity as the project has less ability to reliably service senior debt.

5.1.2. DEBT INTEREST RATE

When financiers lend funds to a project in the form of non-or limited recourse loan there will be an opportunity cost to financiers for giving this money to the project rather than another investment where they would earn a certain return, so they will reclaim this money through the *debt interest rate*. The focus of this discussion will be on real interest rates where inflation is taken into account as this is what the project actually pays for using the debt, as opposed to nominal interest rates where the effect of inflation is not factored in. So the *cost of debt* to the project company for using the funding from the bank is the interest rate charged.

The actual interest rate charged depends on a variety of factors, some which are country and bank specific, but those relevant to this study are the perceived risk of the project and the maturity period of the loan in the sense that interest rates will usually rise with the length of the debt maturity period as the opportunity cost to the financier is larger as funds are tied up in the project for longer (Wiser and Kahn, 1996; Wiser and Pickle, 1998, p. 361-386). Interest rates are sensitive to the perceived project risks as the higher this risk is the higher the cost of this debt will need to be for financiers to be remunerated for taking on this risk (Wizelius, 2007). This is how the debt interest rate reflects the risk appetite of financiers as traditionally the higher the risk is the higher the interest rate is, however to determine the actual appetite of financiers this interest rate needs to be compared against the inherent risk in the project and if this is exposure is low and so is the interest rate then financiers have a high risk appetite and vice versa. Furthermore, this illustrates how financiers firstly determine the inherent level of perceived risk or uncertainty and price their exposure of the debt so it is these factors, uncertainty and risk, that drive the level of this opportunity cost or debt interest rate.

Table 8 illustrates the debt interest rates that literature sources have compiled for studies covering general wind farm development and some isolated to certain regions.

Table 8: Debt Interest Rates from the Literature

DEBT INTEREST RATE [Percentage]	
Source	**Tolerance**
Karas (1995) (1994)	8.50-10.50%
Wong (1995) (1994)	8.50-10.50%
Hoffman (1995)	8.50-10.50%
Kahn (1995)	8.50-10.50%
Wiser & Kahn (1996)	9.5%
Wiser & Pickle (1998)	9.5%
Burton et al (2001)	10-20%
NERSA (2009)	Nominal:14.90% Real:6.39%

Source: As stated in table

The range of interest rates from the literature as illustrated in the Table 8 is 8.5% to14.90% with 20% acting as an outlier. It is difficult to make a comparison of interest rates from across countries as central banks, country inflation and fiscal or monetary policy have a significant affect on how banks will set the interest rates they will extend to projects. This process for South Africa is discussed below and the interest rates that were communicated in the qualitative interviews are listed in Table 9.

Table 9: Debt Interest Rates from Qualitative Interviews

DEBT INTEREST RATE [Percentage]	
Interviewee	**Tolerance**
Standard Bank	12%
Absa Capital	Ratio driven P50/90 production
African Development Bank (AFDB)	Better rates than banks
Mainstream Renewable Power	12-14%

Source: As stated in table

The South African market has high real interest rates when compared to the rest of the world and both Eardley-Taylor, 2009, from Standard Bank and Greenwood, 2009, from New Energy Finance and Maclay, 2009, from Actis identified the high interest rates in South Africa and globally as a variable that will be very important for project financed deals which is due to the role of the interest rate in determining the cost of debt. They stressed that the interaction between a high inflation rate and nominal interest rates result in relatively high real interest rates which will result in lower returns on equity which could potentially act as a deterrent for foreign investors.

Eardley-Taylor, 2009, from Standard Bank explained how Standard bank, a leading commercial bank in South Africa, sets its real interest rates that it will offer to a project. To start the Johannesburg Interbank Agreed Rate (JIBAR) is 8% which is the money market rate or the average of the rates indicated by local and international banks that is used by South Africa (Answers.com, 2009). JIBAR is calculated as a yield and then converted into a discount which is calculated daily after all of the rates are received by participating banks (Answers.com, 2009). The interest rate that Standard bank then lends off is determined by the following components. *Component number one* is the central banking costs which are normally 30 basis points.

The *component number two* is the "cost of money" which is a critical component as this is essentially tied to liquidity of the banks. Before the financial crisis banks would take the liquidity risk of a potential mismatch between the cost of debt they lend to a project and the cost of money that the bank pays for its own funding. However, banks have now been encouraged to become increasingly conservative and price their cost of debt off their own cost of external funding. This is where the variability in different banks interest rates originates as different banks get their funding from different sources. Standard Bank gets their funding from the market and the bank gets charged the full market prices for liquidity. So if they lend a ten year loan they need to raise ten years of liquidity from the market and the cost of this is reflected in the interest rate or cost of money they charge on project financed debt which is in the order of 150 basis points. *Component three* is the normal credit margin which is roughly 20 basis points so all in for screening purposes the interest rate of project finance debt from Standard Banks is 12% (Eardley-Taylor, Personal Interview, 2009).

Arfaoui, 2009, from the African Development Bank explained that DFIs, with their ability to absorb political/sovereign and country risk, will be able to offer better debt interest rates than some commercial banks. So the range for South African wind energy project financed deals will be between 12% to 14% which falls in the range stipulated in the literature of 8.5% and 14.9%, but will be project specific and dependent on the components as explained above and the degree of clarity offered by the public players on the uncertainties identified in Chapter 2.

5.1.3. DEBT MATURITY

The debt maturity period, also known as the amortisation period, is the length or amount of years that the project company will be liable to pay yearly amortisation both the principal and interest in the repayment of the loan (Wiser, 1997).

Financier's risk tolerance is reflected in the length of the debt maturity period as a project with a high degree of perceived project risk to the financiers will be reflected through financier's offering a shorter debt maturity period as they will want to get their money in and out of the project as quick as possible, make their interest, and invest the money in the next investment (Wiser, 1997). The shorter this maturity is, the greater the up-front burden of these principal payments on the project company will be on the project company (Wiser and Kahn, 1996). So maturity periods will increase inversely to the level of perceived financier project risk exposure.

Some of the debt maturity periods from the literature are listed in Table 10.

Table 10: Debt Maturity Periods from Literature

DEBT MATURITY PERIODS [Years]	
Source	**Tolerance**
Wong (1995) (1994)	10-15 yrs
Hoffman (1995)	10-15 yrs
Wiser & Kahn (1996)	12 yrs
Wiser & Pickle (1998)	12 yrs
Wizelius (2007)	10-12 yrs
Private Placement Letter (2008) source?	20 yrs

Source: As stated in table

The range of debt maturity periods from the literature, as illustrated above in Table 10, is from 10 to 15 years with 20 years as an outlier, where the lower bound is that characteristic of commercial banks while the upper bound of the range being representative of DFIs, MLIs, and BLIs with the ability to bear more risk than commercial banks.

Hoffman, 1995 and Wong, 1995 state that 10-15 year debt maturity periods are common in wind power project-finance, and Wiser and Kahn, 1996 agree with a 12 year debt term.

However, these debt maturity periods are predominantly from the '90s and with the occurrence of the financial crisis financiers have become increasingly risk adverse. Table 11, below, illustrates some more current debt maturity periods as expressed by potential and existing financiers and investors to the South African project finance wind energy industry.

Table 11: Debt Maturity Periods from Qualitative Interviews

DEBT MATURITY PERIODS [Years]	
Interviewee	**Tolerance**
Nedbank Capital	10 yrs (refinance)
Investec Capital	Banks: 13-17 yrs / DFI: 20yrs (refinance)
Standard Bank	15-17 yrs (refinance)
Absa Capital	Ratio driven P50/90 production
BNP Paribas	8 yrs (refinance)
African Development Bank	15 yrs
Cresco Project Finance	Banks: 10 yrs / DFI: 12yrs (refinance)
New Energy Finance	10 yrs (refinance)

Source: As stated in table

The range for given by the individuals interviewed was, for commercial banks, between 8 to 17 years with refinancing required and between 12 and 20 years for DFIs such as African Development Bank. There is also an option to refinance at the end of these periods to gain access to longer maturity periods. Refinance will be of benefit to both the financiers and the project company.

As the financers will be given the chance to reconsider the loan once the many of the project risks, especially post the risk heavy construction phase, have been defined and mitigated; while the project company will benefit from lower interest rates and better financing terms due to the lower risks in their project.

So while the range communicated through the qualitative analysis fall in the range of the range as deduced from the literature, the banks will cover themselves with the requirement to refinance at a lower level of project risks. Eardley-Taylor, 2009, from Standard Bank explained this concept as although Standard Bank is still writing 20 year loans they are effectively not 20 year tenures as the customer is required to refinance at year 6 or 8. The concept of refinancing at year 6 to 8 rests on the assumption that the funding markets will be in a better place and that many of the outstanding uncertainties will have become more clearly defined so projects will qualify for longer tenures and cheaper prices (Eardley-Taylor, Personal Interview, 2009).

Potgieter, 2009, from Investec stipulated the debt maturity periods that South Africa is likely to see is in the range of 13 to 17 years from commercial banks while Eardley-Taylor, 2009, from Standard Bank was slightly more optimistic with a range of 15 to 17 years with the condition of refinancing. The DFIs, on the other hand, will be the only organisations that will be able to offer 20 years based on the 20 year PPA under the REFIT, according to Potgieter, 2009, from Investec although Arfaoui, 2009, from the African Development Bank said that the AFDB as a general rule of thumb is only looking to fit debt with a maturity period of maximum 15 years with two to three years grace period depending on the project. Multilateral Lending Agencies (MLA) such as the AFDB have the facility to stretch lending tenures well past standard commercial maturities according to Khatib, 1997, and an industry participant, 2009, from BNP Paribas agreed with this point as he expressed that MLAs were an avenue for developing nations to pursue longer debt tenures where it will be possible qualify for tenures of up to 17 years.

As explained there are uncertainties that financiers and investors have highlighted in South Africa in terms of gaps in the regulatory framework and process for wind farms accessing the REFIT tariff and connection to the grid.
These uncertainties, if not addressed, will result in limited and expensive debt for these projects from the commercial banks; however, the development finance institutions have a greater capacity to absorb this risk so this states the importance of these institutions for South Africa and developing nations at large.

An industry participant, 2009, from BNP Paribas explained that there is likely to be a mismatch between the loan tenures and PPA periods due to the financial crisis more than as a result of the country or project specific risks in South Africa (Quaye, 2009). It is likely that the banks, both domestic and international, will not share the long term view that the proposed REFIT tariff has outlined, more specifically, commercial banks will be looking at 8 year maturity periods even though the REFIT promises a PPA that will run for 20 years. This can be attributed to the limited liquidity in the market at the moment which will make banks eager to get their money in and out as quickly as possible and reduce their exposure to project and market risks (An industry participant, 2009, from BNP Paribas). This then means that project developers may have to rely on the MLA's development finance to take the shortfall in debt that is required past the 8 years that the commercial banks will offer. The issue of refinance will then be an important tool for South African wind power project's funding.

5.1.4. DEBT AMORTISATION (DEBT PRINCIPAL PAYMENT SCHEDULE)

Debt amortisation refers to the debt payment schedule and total yearly debt service includes both principal and interest payments that are made through the maturity period of the loan and for senior debt repayment for privately owned, project financed wind farms there are two primary debt payment schedules that are common, namely: mortgage-style debt repayment and sculpted-style debt repayment (Wiser and Kahn, 1996; and Wiser and Pickle, 1998, p. 361-386).

The first payment schedule is mortgage-style debt repayment has historically been used for wind farm financing and this takes the form of a constant annuity repayment profile. More specifically this is where equal annual payments, consisting of changing interest and principal payment, are made in repayment of the loan, with the proportion of principal payments increasing and interest payments decreasing with time (Wiser and Kahn, 1996; and Wiser and Pickle, 1998, p. 361-386).

The second payment schedule is a sculpted-style debt repayment which is more tailored to wind power generation as it takes into account the seasonal oscillations of the wind resource (Navigator Project Finance, 2009). As the wind resource varies from season to season the Cash flow Available for Debt Service (CFADS) is also variable, so by sculpting debt repayments around a constant DSCR, debt repayments will be sculpted to pay more during high wind months and lesson the debt servicing burden during lower wind months. The main benefit of sculpting debt repayments is that the actual debt repayment each month will be driven by the constant DSCR ratio and the seasonal CFADS (DSCR=CFADS/Debt servicing), thereby taking into account the seasonal variation in wind resource and maximising the potential of the project to service senior debt.

Table 12: Debt Amortisation (Debt Principal Payment Schedule) from Literature

DEBT AMORTISATION [Schedule]	
Source	**Tolerance**
Wiser & Kahn (1996)	Mortgage-style repayment
Wiser and Pickle (1998)	Mortgage-style repayment

Source: As stated in table

Table 12 above illustrates some of the debt amortisation schedules that are characteristic of wind farm development historically as discussed by Wiser and Kahn, 1996, and Wiser and Pickle, 1998, p. 361-386. From the literature reviewed a mortgage-style repayment schedule has been common for wind farm project debt servicing which is in line with what Nedbank Capital, 2009, expressed as their preference for their debt servicing to South African wind farm project financing, as illustrated in Table 12. This is in contrast to what Eardley-Taylor, 2009, from Standard Bank expressed, who detailed that the debt amortisation schedule that Standard Bank would require would be a sculpted repayment schedule ratio where it is ultimately the wind speed that determines the schedule of repayment. The ultimate schedule required by banks will depend on the degree of experience the bank has in financing wind farm facilities where first time banks will aim for mortgage-style amortisation schedule, as are found in more traditional power plant financing, where as those banks with a track record in wind power financing will aim to maximise the debt servicing capabilities of a variable wind farm output and employ a sculpted-style repayment schedule.

Table 13: Debt Amortisation (Debt Principal Payment Schedule) from Qualitative Interviews

DEBT AMORTISATION [Schedule]	
Interviewee	**Tolerance**
Nedbank Capital	Mortgage-style repayment
Standard Bank	Sculpted; Ratio driven off the wind speed

Source: As stated in table

5.1.5. DEBT SERVICE COVERAGE RATIO (DSCR): PROJECT FINANCE LOAN COVENANTS

The debt-service cover ratio (DSCR) is the ratio of the Cashflow Available for Debt Service (CFADS) of a project to the total debt repayments which consists of the loan principal plus interest (DSCR = CFADS / Total Debt Service principal + interest) and the ratio is used by financiers to measure the ability of a project to service debt repayments. This ratio is the most important measure of project debt servicing capabilities as it compares the CFADS which is the total cash flowing into the project or its revenues minus operation costs, but before interest, taxes, depreciation and amortization of a certain period against the total amount of debt service obligations that are due in the same period (Ruster, 1996; Delmon, 2009; and Wiser and Kahn, 1996). In other words it shows how many times a project's CFADS will cover the total debt servicing obligations of a loan and this ratio must never fall below one as then default on loan repayments will occur.

This key financing variable comes in many distinctions from minimum, average, default, and warning DSCR both from a short term and long term point if view (Potgieter, Personal Interview, 2009).

The short term DSCR is what is discussed above where the CFADS from a certain period is compared against the loan repayment from a certain period; whereas the long term DSCR is actually called the Loan Life Cover Ratio (LLCR). This is similar to the short term DSCR but instead of taking the revenues generated in one period it takes the Net Present Value (NPV) of all the future revenues over the maturity period of the loan and compares it against the total amount of debt repayments over the whole maturity period (Delmon, 2009, p. 57). This ratio is useful as it can be used to verify that the LLCR meets the minimum loan covenant requirements as defined through the financing agreement, throughout the maturity period of the loan (Delmon, 2009, p. 57).

The DSCR is the ratio that financiers use to limit the tendency of project developers to maximise the leveraging of debt which is frequently less expensive than equity, by stamping a minimum acceptable value for the DSCR. If the financiers expect that the project's DSCR will fall below the minimum DSCR constraint then financiers will require more upfront equity from the project company (Wiser, 1997). So the higher the minimum DSCR is the more equity, and therefore less debt, the project company is required by financiers to inject into the project (Wiser and Kahn, 1996). It is the minimum DSCR requirement that decreases the amount of debt leverage capability of the project company and will increase the requirement for more equity, with the further effect of reducing the projects debt fraction in the capital structure and increasing the overall project costs to the project company through the use of expensive debt (Wiser, 1997). Wiser and Kahn, 1996, explain that financiers of project-financed wind power projects typically apply stringent project-specific DSCR requirements on these projects.

The minimum DSCR constraint reduces debt leverage and increases overall levilised project costs, as explained above, but further to this it locks-in the revenue from the first few years of operation, when revenues are at minimum, predominantly to maintaining the DSCR requirement; this is called the "first-year DSCR constraint" (Wiser and Kahn, 1996). For these reasons this first-year DSCR constraint has historically been a barrier to entry for private power wind project developers (Wiser and Kahn, 1996). However, developers have traditionally used two techniques to mitigate the affect of this first year DSCR constraint which are front-loading of the power purchase price and/or back-loading of debt repayment (Wiser and Kahn, 1996). The back loading debt payments is where developers contract with financiers through the financing agreement to make debt repayments larger outside the first few years of the project where revenues are not at a minimum and this from of first year DSCR constraint mitigation has become relatively common in wind power project financing (Wiser and Kahn, 1996; Hyuck, 1995; Wong, 1995; and Amitz 1995). The front-loading power purchase price is the second technique that wind power project developers have used to mitigate the first year DSCR constraint. This front loading of power purchase price is achieved by assuming a non inflation adjusted or constant PPA energy price. In this way energy payments are larger in the beginning of the project and decrease over time (Wiser and Kahn, 1996).

To reduce the risk associated with project default, lenders typically require that a project or corporation maintain a minimum ratio of the available cash to total yearly debt service (Wiser and Kahn, 1996; and Kahn, 1995). The risk tolerance of financiers is reflected in the minimum DSCR constraint the higher the inherent risk in a project, the higher the minimum DSCR constraint as stipulated by financiers. This will mean a larger multiple of cash flow has to be held in relation to the debt-service, consequently, the project can take on less debt and requires more equity, which in turn reduces the risk exposure of the banks. For example, if a wind project generates a net income of one million per annum and the bank requires a DSCR of 1.3, the project could take out a loan for which the debt service would be a 770,000 per annum.

Table 14: Debt Service Coverage Ratios from the Literature

DEBT SERVICE COVERAGE RATIOS (DSCR)	
Source	**Tolerance**
Wong (1995) (1994)	1.35-1.40
Karas (1995) (1994)	1.4
Wiser & Kahn (1996)	1.4
Delmon (2009)	1.2-1.6

Source: As stated in table

Table 14 lists some of the minimum DSCR constraints that were sourced from the literature that range over 1.35 to 1.6. Karas, 1994 as cited in Wiser and Kahn, 1996 argues a constant DSCR of 1.4 is a reasonable assumption for wind power projects that are attempting to sculpt the amortisation schedule to the wind resource variability. Delmon, 2009, p. 57, explained that financiers will set their DSCR constraint within the range of 1.2 to 1.6 however this is country, site, commercial sector, and the financiers specific which is in line with what was expressed in the qualitative review of this report explained above. The results from this qualitative analysis are detailed in Table 15 below.

Table 15: Debt Service Coverage Ratios from Qualitative Interviews

DEBT SERVICE COVERAGE RATIOS (DSCR)	
Interviewee	**Tolerance**
Nedbank Capital	1.3
Investec Capital	1.2-1.4
Standard Bank	P50: 1.4 / P90: 1.15-1.2
Absa Capital	Ratio driven P50/90 production
BNP Paribas	1.3
Mainstream Renewable Power	1.25-1.3
Cresco Project Finance	1.4-1.5
New Energy Finance	1.25-1.3

Source: As stated in table

These results range over 1.15 to 1.6 where projects with low perceived risks will qualify for the lower end of the range and vice versa for projects with a level of risk so the level that financiers will actually require over this range for financing wind farms in South Africa will reflect their specific tolerance to the project risks they perceive to be apparent.

Eardley-Taylor, 2009, from Standard Bank and Vajeth, 2009, from ABSA Capital discussed that their minimum DSCR constraint is determined off the back of the wind speed production modelling so at P50 a DSCR of about 1.4 is required however at P90 DSCRs of 1.15 to 1.2 can be attainable (Eardley-Taylor, Personal Interview, 2009). O'Flynn, 2009, from Mainstream Renewable Power believe that the minimum DSCR constraints they will get from their financiers will be in line with international best practise of around 1.25 to 1.3 and Greenwood, 2009, from New Energy Finance agrees that this range is in line with those DSCR constraints they have seen around the world.

Potgieter, 2009, from Investec was more prudent in saying that the range for this variable will be 1.2-1.4 and an industry participant, 2009, from BNP Paribas was within this range at 1.3 which is the "rule of thumb" level for power projects in South Africa but this is subject to refinement as project specific details become apparent. Potgieter, 2009, from Investec continued to explain that the exact level of this minimum DSCR constraint is highly dependent on a multitude of mitigating factors, such as the project variables, risk levels and the environment within which the project exists, and key to this structure is securing a long term off-taker that is secured through a PPA. However, one of the predominant determinants of the DSCR, from the perspective of the commercial banks, is that of the equity portion in a project: as a rule the higher percentage of equity, and the associated lower percentage of debt, the lower the minimum DSCR constraint will be. It is logical the lower DSCR constraint will be as a result of the lower debt portion will be easier to pay off but in addition to this it is the commitment from equity partners in a project that communicates to the bank the support for the project and that the debt will be made good.

5.1.6. EQUITY RETURNS

Equity investors will put an upfront capital outlay into the project and in exchange for the use of these funds the investors require a minimum expected return on this investment (Wiser and Pickle, 1998, p. 361-386). These equity returns are a residual claim on all of the surplus revenues that are generated by the project company and these equity returns come in the form of direct cash flows and tax shields to those project participants with claims on equity called shareholders (Wiser and Kahn, 1996; and Wiser and Pickle, 1998, p. 361-386).

The proxy for the return equity is the Internal Rate of Return (IRR) which can be defined as the discount rate that makes the net present value (NPV) of all future cash flows from a project equal to zero and generally the higher the IRR is the more desirable the project is (Investopedia, 2009). The IRR can be used to rank all projects under consideration and, with all else equal, the project with the highest IRR is considered to be the best and should be pursued above the others (Investopedia, 2009).

The equity rate of return is expressed as a yearly percent return on the equity invested or IRR and it indicates the value of investing in the project in terms of the return on equity it will generate over time against the returns that are possible on other investments (Wiser and Pickle, 1998). So if the equity investor invests their money in the wind farm project they will not be able to invest this money elsewhere so there is an opportunity cost of investing in the wind farm and this is the returns that are possible through investing in other investments. It then follows that the return on investing in the wind farm project must outweigh the returns that are possible on other investments and that ROE must equal the opportunity cost of not investing in other investments.

It is because of this requirement that many equity investors will have a minimum return on equity (ROE) or hurdle rate, which must facilitate a 'reasonable' return on capital which is market driven concept and benchmarked at some market-clearing level (Jechoutek and Lamech, 1995, p. 941-953). Any investment that is below this predefined minimum ROE the investors will not invest and this minimum cost of equity is what makes equity funds more expensive than debt funding which results in the tendency for project developers to maximise the debt fraction in the capital structure of the project (Wiser, 1997).

This hurdle rate or minimum required return on equity is also driven by the level of inherent and perceived risks in the project.

Wiser and Kahn, 1996, explain that the, “required equity returns for privately owned, project-financed wind power projects depend on perceived technology and resource risks.” The higher the degree of project risk in the project the higher the required return on equity will be to remunerate and incentivise the equity investors for taking on these project risks. On the other hand a project with a high level of security and liquidity, which is how easily an investor can cash out their investment from a project, reduces overall project risks which will in turn decrease the cost of capital to a project (Jechoutek and Lamech, 1995, p. 941-953). Some of the minimum ROEs as sourced from the literature are listed in Table 16 below.

Table 16: Equity Returns communicated through the Literature

EQUITY RETURNS [IRR]	
Source	**Tolerance**
Wong (1995) (1994)	16% USD
Amitz (1995)	20% USD
Hoffman (1995)	20% USD
Wiser & Kahn (1996)	18% USD
Wiser & Pickle (1998)	18% USD
NERSA (2009)	Real, after tax, 17% ZAR

Source: As stated in table

The minimum ROEs from the literature range from 16% to 20% USD IRR while NERSA published a real, after tax, return for South Africa renewable energy projects under the REFIT Consultation Paper, Phase II, 2009, of 17% on project IRR in nominal terms.

From this comparison it seems that NERSA expects that the potential investors under the REFIT would expect a return that is in the lower end of the spectrum from the range expressed in the international literature, however, this could be due to the provision for CDM revenue to be boost the returns. Potgieter, 2009, from Investec commented that international investors are used to lower returns of around 11% on power projects so this is in the right ballpark.

Table 17: Equity Returns communicated through Qualitative Interviews

EQUITY RETURNS [IRR]	
Interviewee	**Tolerance**
Investec Capital	11-25% ZAR
Standard Bank	20% ZAR / 14% USD
Absa Capital	Ratio driven P50/90 production
Actis	20-25% USD
Mainstream Renewable Power	10-15% USD / 18-20% ZAR
Cresco Project Finance	< 20% ZAR

Source: As stated in table

Table 17 illustrates the range of returns that were expressed by potential financiers and investors for South African wind project financing. This range is 11% - 25% Rand IRR return and 10% - 25% USD IRR return.

Maclay, 2009, from Actis discussed as an equity investment fund the ROE is Actis' most important key financial variable and that they required a Dollar ROE IRR of 20 to 25% with a payback on equity of four years. O'Flynn, 2009, from Mainstream Renewable Power are seeking lower returns and he explained that internationally for infrastructure projects investors would be expecting a EURO or Dollar leveraged IRR of between 10% to 15%.

For South Africa, however, the cost of debt can be up to 14% and the equity returns should be higher than the cost of debt otherwise there would be no reason to invest at all, so a Rand IRR of between 18 to 20% would be required to spark investment in the SA wind sector, although there may be some tweaks depending on the risk appetite of the equity fund and its perceptions of risk in the South African market. Eardley-Taylor, 2009, from Standard Bank was in this same range for expected ROE from the South African power projects with an approximate return of 20% Rand return and 14% Dollar return and a Payback Period for power and infrastructure projects that will go cash positive on IRR after roughly 11 to 12 years. Potgieter, 2009, from Investec was in line with this as Investec requires a shareholder's ROE of 22%, while the general range Potgieter, 2009, listed was between 20-25% for investment banks.

Eardley-Taylor, 2009, from Standard Bank explains that the equity return is a product of the wind speed, as the higher the wind resource the higher the revenue that will be generated which will result in a greater residual revenues for shareholder disbursements, and the degree of leverage in the project. While Potgieter, 2009, from Investec explains that the cost of equity or the return on equity is dependent on the drivers behind the sponsor's decision to invest in the project and is influenced by the perceived risk in the investment. As explained in Chapter 6, equity investors can come with a variety of intentions: Strategic investors; Institutional investors; Equity investors (leverage their equity exposure); Project Development finance and CDM finance. All these investor typologies will require a different level or form of return on their equity. O'Flynn, 2009, from Mainstream Renewable Power discussed that equity returns each equity investor will require will vary over different markets, investments and countries.

The predominant determining influence is where the investor sources that equity from; the level of perceived risk in the project and what are the requirements and arrangements between that shareholder and the investor. So there are variety of factors that determine the minimum ROE that is required to facilitate each investor's decision to invest but broadly the project specifics; perceived risks and the investors own source of financing will be large determining factors.

5.2. AFFECT OF THE FINANCIAL CRISIS ON WIND POWER PROJECT FINANCING

Financiers interested in the power industry in Southern Africa explained that, "red tape and lack of well-structured projects, rather than external funding crimped by the global downturn, are the main hurdles to boosting capacity in Africa's power sector" (Reuters, 2010).

This highlights the prominent role that the public players play in encouraging the involvement of private funds however one cannot ignore the impact of the financial crisis: making financing institutions and sources of funding more stringent in their risk appetite with limited liquidity, capital and debt being afforded only to those entities with credibility and tightly packaged projects in terms of risk. This tighter risk tolerance will result in a more thorough due diligence requirement which means it should take longer to secure financing than before the financial crisis (Webb, 2009). The major impact of the financial crisis on project financing is a stricter, and more expensive set of key financing terms and variables in the sense that the crisis has left a limited amount of capital and debt in the market that is being chased by a great number of projects (Potgieter, 2009; Industry Participant, BNP Paribas, 2009; and Engineering News, 2009). There is then the situation where there is a high demand for funding versus a low supply of funding which means that the cost of this funding will be expensive (Potgieter, 2009).

More specifically the cost of both debt and equity will increase; the minimum DSCR constraint will be set at a higher rate; and capital structure will swing more in favour of expensive equity as opposed to relatively cheaper debt (Potgieter, 2009; Engineering News, 2009). However, due to the scale required in developing nations such as South Africa it is still possible to project finance infrastructure projects in the country with an active appetite from financiers and developers.

The financial crisis has had the impact on the global wind energy market of a general slowdown in market growth where key financing terms and variables are much tighter with only highly solvent entities such as utilities and established energy companies being likely to qualify for the limited debt and liquidity in the market (Hays, 2009). It is the large utilities with their fixed revenue streams and diverse asset base, or balance sheets, which are most likely to get projects over the line and be one of the main drivers of wind growth under the unfavourable financial crisis environment (Sala de Vedruna et al, 2009).

South Africa has not suffered the effects of the financial crisis to the degree of some other developed countries however it has seen staggered economic growth along with a flight of capital, limited liquidity, less international aid and tighter risk requirements as many developed nations are experiencing (Pringle [2], 2009). Nonetheless, these constraints need to be matched against the required infrastructure projects needed to carry the growth targets of South Africa and Africa as a whole (Pringle [2], 2009). Eardley-Tayler, 2009, from Standard Bank agreed with the above impacts of the crisis on South Africa in that liquidity was scarce, therefore debt was limited, risk horizon have shrunk significantly and project timelines have lengthened, however he argued that the rationale for investing in the South African wind sector was still there as the majority of wind projects will be financed by the domestic banks.

This does, however, not mean that conservative international funding market conditions will not have some impact on the way domestic banks will lend to projects: for example, as a result of the financial crisis tenure periods offered by banks are shorter; however, the banks are encouraged to offer longer tenures to guarantee project’s success over the long term. The cost of debt or interest rates offered by commercial banks now more closely matches the cost of money that the bank pays on its external funding. This has the effect of debt becoming more expensive as the liquidity risk is now passed on to the project through higher interest rates as the banks will no longer bare a potential mismatch between the rate at which they lend and the rate at which they receive funding (Eardley-Taylor, Personal Interview, 2009).

Eardley-Taylor, 2009, concluded that the lack of debt is putting challenges on balance sheets and there is a greater focus on the lower hanging fruits, which has the effect of pushing marginal deals off the radar screen (Eardley-Tayler, 2009). "Small is beautiful... downscale the megawatts targets, set realistic projects ... only doable deals will get done these days and that will remain the case for at least the next two years" (Eardley-Tayler, 2009). Private investors are still keen to invest in Africa's power sector as long as projects are realistic, well structured, have government backing and their risk credentials are sound (Webb [1], 2009). This is where development funding institutions (DFIs) will need to take the lead to balance the local need for infrastructure and development against the constraints imposed by the global financial crisis (Webb [1], 2009).

5.3. CONCLUSION: SOUTH AFRICAN FINANCIERS' AND INVESTORS' CHOICES IN REACTION TO RISK APPETITE

This chapter has reviewed the ranges of the key financing terms and variables as illustrated in Table 5 at the start of the chapter, and shown how the actual value selected by a specific financier or investor reflects their appetite to accept project risk; how they reflect their tolerance to a project's perceived risks and the remuneration they require to take on a higher degree of risks.

To determine the risk appetite the financiers and investors interested in the South African wind energy market it is worth comparing how the ranges in Table 5 of those in the literature against those sourced from the international to see how they compare. The capital structure from the interviews fell over a narrower band of 60/40 – 80/20 compared to the range in the literature of 50/50 – 90/10, however there is consistently higher portion of debt in the capital structure. South Africa has higher interest rates in the range of 12% – 14% while internationally this band is 8.5% – 14.90%. This is in line with what Eardley-Taylor of Standard Bank, 2009, explained that the South African market has high real interest rates. What's more is that financiers will offer shorter debt maturity periods of 8 – 15 yrs which will be conditional on refinance at year 6 to 8 which is compared to the 10 – 15 yrs from the literature. To counteract this, South African wind power plant developers will have to use the refinancing and development finance institution's ability to absorb more risk as tools to secure longer term debt. The minimum DSCR constraint from the interviews will are within the band of those found in the literature, with a lower range of minimum DSCR constraints of 1.2 – 1.4 compared to 1.35 – 1.60 from the literature. The debt amortisation schedule will be mortgage which is in line with the literature but there is the addition of sculpted-style repayment schedule. Finally the minimum returns on equity requirements are higher for South Africa at ZAR: 18% - 20% Dollar: 11% - 25% as compared to 16% to 20% USD IRR.

So the ranges from the South African interviews were within and below the ranges as stipulated in the literature which means that while South African banks and financiers are willing to extend a higher portion of funds in the capital structure they will offer this debt on stricter terms and at a higher cost of debt which reflects their low risk appetite and tolerance in the South African wind energy project finance arena. This is true for equity investors too who require a higher minimum ROE than those published internationally. However, this stricter set of key financing variables and the lower risk appetite is set in the context of the limited liquidity and tighter risk tolerances under the global financial crisis, whereas the majority of the ranges from the literature were documented before the advent of the financial crisis. However, this risk adverse attitude is in line with the Q2 results of Vestas Wind Systems A/S, where the CEO, Ditlev Engel, explained that, “New banks were also prepared to lend to projects, Vestas said, but it added that the more thorough due diligence they were insisting on meant it took longer to secure financing than before the credit crunch” (Webb, 2009).

Another important issue to remember to explain this risk adverse attitude is that there is no first project on the table for reference and the outcome some regulatory uncertainties with respect to access to the REFIT and to the grid network are still unclear, consequently there are many undefined uncertainties at this early stage of the market and this uncertainty is reflected through the key financing terms and variables which will evolve as these uncertainties unfold. This uncertainty is largely created and controlled by the public players in their lack of action on certain aspects of the regulatory framework, such as the PPA document and access to the grid, remain as drivers for a stricter set of key financing terms and variables. However, even under this uncertainty banks are at least willing to consider wind power project financing in South African, albeit from an extremely conservative perspective.

CHAPTER 6

PROJECT DEVELOPMENT PHASES AND SOURCES OF FUNDING

Chapter 6 will cover the two broad topics of firstly, defining the project development phases of utility scale wind farms and secondly, identifying the different types of financiers and investors that extend funding to a project financed wind power project. Furthermore, the chapter will explore which project development phase these sources of funding entities enter the project and on what premises, and indicate how each source of funding has its own drivers and interests that will shape their risk appetite which will eventually be reflected through their key financing variables as was discussed in Chapter 5. Lastly, the Chapter will introduce some of the predominant players in the funding of utility-scale wind farms in South Africa broken down into commercial banks, equity investors and development finance institutions (DFI).

6.1. PROJECT DEVELOPMENT

Burton et al, 2001, explain that the development of a wind power project follows the general phases of a power infrastructure project, of which Khatib, 1997, identifies three distinct phases and infrastructure project will move through on its development path, namely: pre-investment, investment and operation. Each of these broad development phases are now discussed before we explore the specific development stages that underpin project financed wind power projects.

6.1.1. PRE-INVESTMENT STAGE

The pre-investment development phase covers all the activities that take place from the initial identification of the need for the project all the way through to the time the project reaches financial close. When a project reaches financial close it can be defined as the stage in a financial agreement when the all the project finance documentation has been executed and all the conditions precedent to this have been satisfied or waived so that draw-downs on the funds are now permissible (Business Dictionary.com, 2009). In the pre-investment phase the key activities that must take place are: procurement of the and preparation of the project, tendering, negotiation of project documentation, and securing debt and equity funding to reach financial close (Delmon, 2009, p. 64).

The first step in developing an infrastructure power project is the identification of a need for the output of the project. In the case of South Africa the need for this output was established by the policies and regulations communicated by the public players: the setting of the 10,000GWh of renewable energy by 2013 target in the Energy White Paper, 2003, which will be implemented through the REFIT programme as defined in the Consultation Papers Phase I and II, 2009, are the signals to the private sector to establish the need for renewable energy projects and more specifically wind energy projects in South Africa.

With this need established the next step is to conduct a prefeasibility study which is primarily concerned with documenting the demand for the output and exploring all the alternatives. So the pre-feasibility study defines the demand, location, size, technology, fuels, costs and environmental impacts of the project through the preparation of the support studies such as the EIA and the financial model and economic analysis (Khatib, 1997).

If the pre-feasibility study proves that a successful project is possible then the project moves through the feasibility study. Khatib, 1997, describes the feasibility study's main focus as, "defining the project in a manner which allows implementation to proceed." Key to this purpose and before any implementation can take place the project must make financial close or in other words secure funding to pay for the implementation. It is then of vital importance that the feasibility study contains all the necessary detail to facilitate a decision to invest in the project in line with the requirements of all potential sources of funding (Khatib, 1997). This detail must include all the information from the prefeasibility study, which generally speaking should cover the broad topics of: demand, power system analysis, technical, financial, economic and environmental (Khatib, 1997). In other words the feasibility study must be packaged in a way where all project financing documentation, as discussed in Chapter 4, is structured in a bankable format. In today's financial markets the perceptions of what financiers understand the bankability of projects to be have become a lot more stringent which means that project developers will have to carry out increasingly more detailed feasibility studies with an associated increase in cost (Marais, C. as cited by Pringle, C., 2009).

To determine the bankability of a project the financiers will perform a project appraisal or due diligence review which is performed by an independent engineer contracted by the financiers.

The due diligence review is a detailed appraisal to determine the accuracy of the feasibility study and contingent on the outcome of this review financial close will be reached and the project will move into the next broad phase, as defined by Khatib, 1997, called *investment*.

6.1.2. INVESTMENT

The signal for the beginning of the *investment stage* is once financial close has been reached so that all the project's parameters have been completely defined, the due diligence review is successful and draw downs on the funding is available (Khatib, 1997). Khatib, 1997, indentifies a variety of activities that need to happen under the investment stage of the project which are: implementing the organisational, legal and financial measures; land acquisition; engineering work; tendering, evaluation of bids and contracting; construction work; recruitment and training; plant commissioning, completion, and hand over.

6.1.3. OPERATION

Upon completion, the project will be handed over to the eventual owner and operator and at this stage the project is in the operation phase of its development (Khatib, 1997). The activities that are important under this phase of the project's development are operation and maintenance of the power plant's main machinery to ensure the availability of the project to produce output, hence revenue which is the foundation on what the debt is secured off of (Khatib, 1997).

Table 18 shows the project development phases of a project financed wind farm project that are detailed through a variety of literature sources and how they fall under the three broad development stages that Khatib, 1997, identified. These development stages are discussed with specific reference to the activities that are unique to wind farm development in order to determine the most comprehensive set of wind farm specific project development stages.

Table 18: Project development stages as defined by the literature

LITERATURE SOURCE	**STAGES OF PROJECT DEVELOPMENT**		
Khatib, 1997	1. PRE-INVESTMENT	2. INVESTMENT	3. OPERATION
Vestas, 2009	1. Feasibility (incl. pre-feasibility) 2. Financing and PPA	3. Contracting and Planning (Financial close) 4. Construction	5. Operation and Maintenance (O&M)
Burton et al., 2001	1. Initial site selection 2. Project feasibility assessment and PPA 3. Preparation and submission of planning application	4. Construction	5. Operation; 6. Decommissioning and land reinstatement
Wizeluis, 2007	1. Early Dialogue with Authorities and Neighbours 2. Land Acquisition 3. Detailed Planning: Micrositing 4. Second Dialogue: EIA 5. Permission for Building 6. Contract signed: PPA, Grid License	7. Supplier contracting off successful tendering 8. Installation of turbines and connection to grid	9. Transfer to wind power plant to the buyer or owner

Source: As stated in table

6.2. THE PROJECT DEVELOPMENT OF A WIND FARM PROJECT

The process discussed by Khatib, 1997, above is a general project development process for a power plant project. While the development of a wind farm falls under these broader stages, namely: pre-investment, investment, and operation, there are specific characteristics that are unique to the development of these projects. Table 18 illustrates how these more detailed, wind specific development stages fit under the broader stages that Khatib, 1997 defined that are explained above.

Vestas Wind Systems A/S defines the stages in the development of a wind farm as falling into five project stages: feasibility; financing and PPA; contracting and planning; construction; operations and maintenance. The first stage, Feasibility analysis usually takes one to two years to complete while the next three stages can take up to one to two years to complete depending on the size of the development. It is important to note that there is almost always some overlapping between the initial stages and it is not unusual to have some stages running concurrently to each other. For instance, financial close can conclude some time during the contracting and planning stage. Burton et al., 2001 define the stages in wind farm development as initial site selection; project feasibility assessment and PPA; preparation and submission of planning application; construction; operation; and decommissioning and land reinstatement (Burton et al., 2001). While Wizeluis, 2007, is more specific through defining the project development process as moving through the following stages: early dialogue with local authorities and neighbours; land acquisition and contract negotiation with land owners; detailed planning to decide the number and size of the turbines; second dialogue to present detailed plan to authorities and the public (EIA); permission for building; contracts signed with grid operator and power company/utility; purchase based of successful tendering offers; installation of turbines and connection to the grid; and the transfer to wind power plant to the buyer or owner

(Wizelius, 2007). These stages are combined to produce Figure 2 to show a detailed flow chart of the various activities and the stages they fall under that are involved in developing a project financed, utility scale wind farm.

Figure 2: Wind farm project development stages
Source: Compiled from primary research

1. PRE-FEASIBILITY
- Initial site selection
- Preliminary wind measurements
- Early Dialogue with Authorities and Neighbours
- Identify any "show stoppers"

2. FEASIBILITY
- Land Acquisition
- Project pre-feasibility assessment
- Execution of Support Studies
- Detailed Planning: Micrositing

3. FINANCING & PROJECT DOCUMENTATION
- Sourcing of debt and equity funding
- Project documentation executed (incl. PPA)

FINANCIAL CLOSE

4. CONTRACTING & PLANNING
- Tendering and selection of bids
- Supply contracts negotiated and executed
- Planning behind delivery and construction is determined

5. CONSTRUCTION
- Installation of wind turbines
- Balance of plant construction
- Testing and completion
- Hand over (TOC)

6. OPERATION & MAINTENANCE
- Maintenance and operation to maintain availability

7. REPOWERING, *OR* DECOMMISSIONING
- Renegotiation for repowering

OR

- Land reinstatement

6.2.1. PRE-FEASIBILITY AND FEASIBILITY

The pre-feasibility and feasibility stage's main focus is to determine the commercial and technical viability of the potential wind farm. The key outcome of this process is to determine the overall indication of the feasibility of the project and this development stage takes the project all the way to just before financial close if all steps are successful, and puts the project in the position to begin sourcing funding. The process starts with a preliminary analysis of the wind and site conditions, electricity grid access, expected capital cost, and any potential show stoppers or obstacles.

One of the most important steps in the feasibility stage is conducting wind monitoring on the proposed site or sites. This is an essential requirement in determining the commercial potential of a wind farm as it is the wind conditions that determine the amount of energy that can be generated and therefore the revenue stream that the project will produce over its lifetime. As discussed before financiers look to the project's revenue to establish the ability of the project to service debt and hence the amount of debt that can be leveraged by the project, keeping in mind that debt is often cheaper than equity. In practise wind monitoring equipment, in the form of metrological masts (met masts), erected on at hub height (80m) at an average location with no obstacles such as trees, buildings or mountains that could potentially interfere with the readings. Sets of wind vanes and anemometers are placed at two to three different heights along the met-mast to establish the firstly, the minimum required data which is: date; time; average wind speed and direction in degrees with standard deviation in 10 minute intervals; and the pressure and temperature (Browne, Personal Interview, 2009). Secondly, the recommended data from the wind measurement process includes: maximum and minimum wind speed and direction for each 10 minute period; pressure; and wind Shear (Browne, Personal Interview, 2009).

Most banks and wind turbine manufacturers require that the above wind data is collected over at least 12 to 18 months which should be measured at hub height from a mast correctly situated on the proposed site. Furthermore, it is a requirement that this data is correlated to long term data from the area such as data found at other wind farms, airports or weather stations in close proximity to the site. These requirements exist to remove the uncertainty of seasonal variation and yearly variation of the wind conditions on the site to ensure that the project's potential revenue is modelled accurately.

The next step is that if both the preliminary screening and the wind measurements yield encouraging results then more in-depth feasibility analysis are conducted through the following support studies: Environmental Impact Assessment (EIA), power grid interconnection assessment, construction site mapping, and building zoning and permitting, Civil Aviation Authority (CAA) approval, financial model and economic analysis. In South Africa an EIA and the CAA approval is required to erect a met-mast at 80m and for the project as a whole. The support studies of the financial modelling and economic analysis will be contingent on the outcome of the micrositing analysis as the key outcome of this process will be an annual production figure, and the associated cost structure. These will be used as the basis for forecasted revenue, off which financiers will determine the debt servicing capabilities of the project and investors will determine the potential return on equity. Micrositing can be defined as the modelling of the optimal combination of wind turbines of different size, nominal power and different manufacturers, and in different layouts, where the production figure (and associated economics) are plugged into the financial model and for each option and based on all local constraints the best option is chosen (Wizelius, 2007).

The feasibility study will cover all the activities from the initial recognition of the need for the project to financial close and its main purpose is to determine the overall feasibility of the project from a market demand, power system, technical, financial, economic and environmental perspective. If successful, project developers will move the project into the second major phase in the development process, financing and project documentation.

6.2.2. FINANCING AND PROJECT DOCUMENTATION

This development phase can run concurrently with the feasibility stage but it is contingent on a successful feasibility analysis. So with the feasibility study and support studies in place a project can still not commit to firm order to a wind turbine manufacturer or carry out any construction the developer until it has secured financing or gets financial close. The majority of the financing is usually debt/loan financed (in the order of 60-70% of required financing). In this phase all the project finance documentation is executed which will accompany the feasibility report and be put to the scrutiny of the financiers and a due diligence review to determine bankability. The most important of these documentations is the PPA and before these finance guarantees are concluded the developer must secure a long term power purchase agreement (PPA) with an off-taker such as a utility or municipality. This is the security to the financiers that the project will generate revenue over its lifetime so it is usually required that the PPA spans for the project lifetime. Once the project reached financial close draw downs on the funding becomes available so all contracting and planning of subsuppliers can take place.

6.2.3. CONTRACTING AND PLANNING

Once financing has been secured the supply contracts with all the suppliers of the components that make a wind farm must be negotiated. The suppliers of the wind turbines, transportation, installation, civil works and electrical works are tendered and contracted with the availability of each supplier coordinated into a planning process to time the delivery and construction of all the works and services into a seamless timetable. Planning and contracting are interdependent as the timing of construction is critically dependent on the supplier's availability.

6.2.4. CONSTRUCTION

The construction phase of the project is the most risky stage of the project's development for two main reasons, firstly, the majority of the funds are drawn down in this period especially for renewable energy projects that are capital intensive and secondly, an incomplete project is not worth much to the financiers. The construction of a wind farm is subject to sound planning and implementation as defined in the previous stage. The main elements in this stage are road construction, laying turbine foundations, turbine installation, and electrical connection to the power grid. Mainstream Renewable Power define the stages of construction as: design; specification; tender construction contracts; construct civil and electrical works; deliver of turbines to site; turbine erection; first power; plant commissioning; and finally hand over to operations (Mainstream website, 2009). The termination of these steps can take up to 12 months plus depending on the size of the development.

Once the wind turbines have been installed and connected to the grid completion testing will take place and depending on this success, the facility, and the liability for the remaining major risks, will be transferred to the buyer, owner, or operator (Wizelius, 2007).

6.2.5. OPERATIONS AND MAINTENANCE

Once construction and the initial testing are completed the wind farm will start producing energy will begin its commercial operation. Like any machines the wind turbines will require regular maintenance to cover all scheduled and un-scheduled maintenance. Most large wind turbine manufacturers will offer service contracts that will cover the farm for up to 10 years with option to renew on completion of this period. At the end of 20 years the project can either be re-powered, revamp the wind turbines, or they can be decommissioned and the land restored back to its initial state or prepared for a different function.

The development of a utility scale, project financed wind farm moves through seven unique steps, some that run concurrently, as it moves from identification of the initial need for the project to decommissioning or repowering. These stages are illustrated in Figure 2, namely: pre-feasibility; feasibility analysis; financing and project documentation; contracting and planning; construction; operation and maintenance; and repowering or decommissioning.

6.2.6. TYPES OF FINANCIERS/INVESTORS IN A WIND PROJECT FINANCED DEVELOPMENT

Under a private ownership, NUG, project financed structure the sources of funding come in the form of predominantly non-or limited recourse debt and equity, the combination of which is defined under the capital structure or debt/equity ratio. This debt and equity can be sourced through a variety of entities, all with their own specific requirements, drivers and financing structures that will appraise and analyse projects from different standpoints to make choices as to their level of involvement and terms of this involvement (Wiser and Kahn, 1996; and Wiser and Pickle, 1998).

Equity investors can be broadly grouped under three typologies, namely: strategic investors, institutional investors and equity investors (Harper et al., 2007). While the sources of debt funding can be grouped under institutional financiers and development finance institutions (DFI). Each of these groups defined above are discussed in turn, with the stages at of the project development they enter the project identified and finally some detail is given as to the investors and financiers that are active or monitoring the developments in the South African wind energy market. The section will end with an outline of the potential sources of funds for the development of project financed wind farm facilities in South Africa.

Table 19, below, gives an indication as to under which project development phase, as defined above, the different types of investors and financiers will be most active according to the literature and the qualitative interviews. This is not a definitive description as each project's funding package is different and tailored to the unique set of requirements. So the distinctions in Table 19 serve to give the best description of where the financiers and investors to the South African wind energy market are most likely to become active, i.e. contractually involved, in a South African, project financed, wind power project to understand the issues they are exposed to according their presence in a development phase.

Table 19: Table to show where different sources of funding are typically most active along the project development phases in South Africa

<table>
<tr><th>PRE-FEASIBILITY</th><th>FEASIBILITY</th><th>FINANCING & PROJECT DOCUMENTATION</th><th>CONTRACTING & PLANNING</th><th>CONSTRUCTION</th><th>OPERATION & MAINTENANCE</th><th>REPOWERING OR DECOMMISSION</th></tr>
<tr><td colspan="7">EQUITY -INVESTORS</td></tr>
<tr><td colspan="3">Strategic Investors</td><td colspan="4"></td></tr>
<tr><td></td><td></td><td></td><td colspan="4">Institutional Investors</td></tr>
<tr><td></td><td></td><td></td><td colspan="4">Equity Investors</td></tr>
<tr><td></td><td>CDM Buyers</td><td></td><td></td><td></td><td>CDM Buyers</td><td></td></tr>
<tr><td colspan="7">DEBT - FINANCIERS</td></tr>
<tr><td></td><td></td><td colspan="5">Commercial Banks</td></tr>
<tr><td></td><td></td><td colspan="5">Institutional Debt Investors</td></tr>
<tr><td colspan="3">Domestic DFIs</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="5">International DFIs</td></tr>
<tr><td></td><td></td><td colspan="5">ECAs</td></tr>
</table>

Source: Compiled from primary research

KEY	
Most Active	
Limited Activity	
No Involvement	

6.2.7. EQUITY

Wiser and Kahn, 1996 describe how equity for project financed wind farms have traditionally been provided through project development companies such as utilities or IPP's and/or sourced through outside equity sources. Harper et al., 2007, identifies three broad types of investors that fill the equity portion of a project financed, private ownership wind farm project, namely: strategic investors, institutional investors, and equity investors. Another category is evident in developing nations such as South Africa and that is CDM investors which can be further broken down into compliance buyers and those that buy CERs to trade on markets such as the Emissions Trading Scheme (ETS).

According to Harper et al., 2007, *strategic investors* offer active type equity and are significant equity capital investors in the project that have strategic drivers behind their specific investments in the wind energy sector. These strategic interests are usually derived from the point that the development company has wind power project development as part of its basic business activities, usually with a large existing portfolio of wind power projects. In South Africa, this type of investor will usually be in the form of project development companies that are looking to build, own/transfer and operate wind power projects. It is these forms of investors that will typically be most active in coordinating the project in the early stages of the project's development and secure and other sort of investors in the later stages.

Mainstream Renewable Energy, an Irish renewable energy developer, is an example of a strategic investor that is active in the SA wind power market and will be used as an example to profile this sort of investor.

They have established a growing international project pipeline covering four continents of projects covering a multitude of renewable technologies. Its core business is the development, construction and operation of wind, solar thermal and ocean current plants with the key goal to deliver a successful business that accelerates global progress towards a sustainable future. Mainstream is investing heavily in the South African wind power market and is looking to develop a portfolio of 500 MW of wind-energy capacity in South Africa by 2014 through its newly formed South African-European renewable-energy joint venture between Irish Mainstream Renewable Power (who will hold 85% of the new venture) and South African Genesis Eco-Energy (O'Flynn, Personal Interview, 2009). Mainstream finds the South African market of strategic importance due to the scale of investment required to match the rapidly developing country's demand for power and what is more is that this growing demand needs to be matched in a way that is sustainable for the environment.

Mainstream's financing activities are pertinent over the whole project development process: feasibility, financing and PPA, construction and operation and maintenance. The forms of financing Mainstream employs throughout this process ranges from, initially, a combination of shareholder equity and corporate debt to inject pre-investment finance to acquire Greenfield, early stage projects, and/or joint venture projects. Then in the second stage of project construction, Mainstream utilises the financial instruments of construction equity, junior/mezzanine debt from financial institutions and non-recourse Senior debt from commercial banks. Finally, in the project operation and maintenance stage, long term non-recourse project finance is used as a source of finance while in some markets tax equity such as the US where favourable tax incentives exist (Mainstream website, 2009).

Mainstream are project developers so they will not be looking for a ROE such as IRR but rather once the project is operational, Mainstream will target three revenue streams that they look to generate from the project: developer's profit from sale of the asset; long term O&M contract; and asset outperformance fee. In the first instance, Mainstream will sell the project to a long term investor and the profit from the sale is then recycled to the development of further projects (O'Flynn, Personal Interview, 2009; Mainstream Website, 2009). The second way in which Mainstream seeks a return is to maintain and operate the asset on behalf of the owner through an O&M fee. Finally, in the case where a wind farm outperforms Mainstream will arrange a sharing agreement in this excess revenue with the owner (Mainstream Website, 2009). In the last two cases an operating and maintaining income is generated which is then recycled through Mainstream's business activities. In South Africa, Mainstream intends to apply the business model explained above to finance the project development stage and the construction process. They will then look to sell on their equity portion to long term financing institutions such as the pension funds or infrastructure funds (O'Flynn, Personal Interview, 2009).

On the other hand, there are the commercial banks such as Investec Capital Markets and Macquarie Capital who are acting as developers and according to Vajeth, 2009, from ABSA Capital the biggest push is coming from Macquarie from the development side. This point of view is backed up by Eardley Taylor, 2009, from Standard Bank. These institutions blur the line between strategic investors and equity investors as they have a strategic interest in the sector based off an existing portfolio in Australia but are mainly looking to leverage their equity exposure with project debt which lends more to an equity investor typology (Harper et al., 2007). It is unclear at this stage as to whether these investors will treat these investments as long term investments where they will look to earn an IRR or develop and sell to gain quick returns (Vajeth, Personal Interview, 2009).

Investec have been involved in a variety of wind farm projects on different capacities all over the world. For instance in Canada and all over Europe, Investec have provided project finance debt while in Australia the bank has focused on the development side of things with a growing capacity in Western Australia. In South Africa, Investec, in conjunction with GDF Suez and Windlab Systems, are developing three sites in South Africa. As it stands they have 100% of the project equity which they aim to maintain a 10-20% retainer at financial close. Investec will bring in other interested equity partners with consideration to the important stake that will have to come from BEE investors. So Investec which is a strategic investor or equity investor will be most active in the phases preceding financial close. This does not mean that Investec will adopt a purely developer role in the South African wind market but if they are approached by other developers with a project that matches what the bank is looking for Investec could be in the market to provide limited or non-recourse debt to South African utility-scale wind energy projects.

The second type of equity investor that Harper et al., 2007 identifies is that of the *institutional investor* who usually offer a more passive type equity capital than that of strategic investor and are mainly interested in the tax benefits, as in the US; long term returns; and investment for compliance purposes. While strategic investors will take an active role in the development process of the project, institutional investors will take a passive role in this process but fit the necessary funds required to qualify for the benefits of the addition of renewable energy to their portfolio. Eardley-Taylor, 2009, from Standard Bank, explained that there will be the international compliance buyers who are looking into the market to see where they can invest for compliance purposes at a cheaper rate then they would be able to achieve in their base countries, predominantly in Europe.

Another example is that of CDM compliance buyers such as DONG Energy is an example of an institutional investor as they have communicated publically in South Africa that they are seeking to purchase CERs through the CDM mechanism of the Kyoto Protocol to meet the reduction targets that it is subject to in Europe. In South Africa, Viljoen, 2009, from Cresco Project Financed explained that it would be the large corporates such as the dominant mining houses who will be acting as Institutional Investors looking to reduce their carbon footprint.

Harper et al., 2007 identify a third investor typology called the *equity investor*, who is simply looking to leverage their equity exposure by layering on debt financing. Delmon, 2009, p. 276-277, describes that this type of investor offers *paid in equity* which comes from cash that the shareholder has borrowed against its own balance sheet thereby making its own debt portfolio more expensive through increased leveraging or diverted some of its own resources/revenues from other investment opportunities (Delmon, 2009, p. 276). Consequently, these equity investors will require a rate of return sufficient to justify taking on more debt or the opportunity cost of diverting investment away from other opportunities, which is the reason equity is frequently more expensive than debt (Delmon, 2009).

An example of an equity investor that is monitoring the South African wind energy market is Actis which is an equity investor that is looking to leverage its equity exposure in investments exclusively in emerging markets with a minimum investment size of US$50 and projects that meet their hurdle rates (Maclay, 2009). These funding packages come with different ownership preferences as Actis is willing to accept a controlling to a minority stake which is project specific and depends on the existing shareholders preferences.

They will invest at all stages of the project's development from providing development or expansion capital to acquiring mature operational assets. Maclay, 2009, indicated that the sector is a "key investment market" and that they have earmarked the South African energy market and more specifically the South African wind energy market as an important component to their diversified portfolio.

The other form of *equity investor* is the specialist investment vehicles such as mezzanine finance or subordinated debt (Maclay, Personal Interview, 2009; and Delmon, 2009, p. 276-277). Sonntag-O'Brien and Usher, 2004, defines mezzanine finance as, "a variety of structures positioned in the financing package somewhere between the high risk/high upside equity position and the lower risk/ fixed returns debt position." While Delmon, 2009, p. 276-277, calls this subordinated debt which he explains is provided at a fixed interest rate, thereby excluding it from any equity upside from better than expected project performance and it will rank junior to senior debt but senior to pure equity which protects it from any potential downside that pure equity is subject to (Delmon, 2009, p. 276-277).

These equity investors and their input to a wind power project can vary over the different stages of project development. For instance smaller strategic investors such as development companies and smaller IPPs will initiate a project and focus on the development stage of new projects with capital that they have earned through selling projects that are ready to go on line onto larger strategic investors or institutional investors such as the large Utilities with an existing portfolio of projects that they own in operation (MAKE Consulting, 2009). With the global trend of an ever increasing favourable investment climate for renewables globally many equity investors have come into the ownership of wind energy facilities, such as unit trusts, banks and private investors, in search of the opportunity to leverage their equity exposure (MAKE Consulting, 2009).

Figure 3 demonstrates the top 20 owners of installed capacity globally in terms of MW and illustrates how many of these IPPs and utilities have been involved in a variety of activities such as: project development (except Babcock and Brown), asset ownership, and operation of wind power facilities globally (MAKE Consulting Companies, 2009). This demonstrates that the majority of investors to the wind energy market to date have taken an active role in the project's development and can be explained as strategic investors. The South African developers are likely to take the same route as these global players as due to the Greenfield nature of projects the owners will have to take an active role in the development to be in control of the risks and manage their investment.

Figure 3: Table to show the leading IPPs and Utilities' involvement at different stages of project development

Diversification Structure of Selected Leading IPPs and Utilities

	Development	WTG manufac-turing	EPC	Asset Ownership	Operation	M&S
Iberdrola	X			X	X	X
ENEL	X		X	X	X	
NextEra	X		X	X	X	X
Invenergy	X			X	X	
MidAmerican	X		X	X	X	
Babcock & Brown				X	X	
Edison Mission	X		X	X	X	
AES	X			X	X	
EDF	X		X	X	X	X
E.ON	X		X	X	X	
EDP	X		X	X	X	X
International Power	X			X	X	
GDF-Suez	X		X	X	X	
Acciona	X	X	X	X	X	X
Longyuan	X		X	X	X	
Datang	X			X	X	
Guohua	X			X	X	
Huaneng	X			X	X	
Huadian	X			X	X	
Ningxia	X			X	X	
Beijing Energy	X			X	X	
Shangdong	X			X	X	
DONG	X			X	X	
Vattenfall	X			X	X	
Theolia	X			X	X	X

Source: Make Consulting Companies, 2009

6.2.8. DEBT

Under a project financed structure the majority of the funds are sourced from financiers who will provide non- or limited recourse debt. This debt can be obtained through public markets, such as project bonds sold on the capital markets, or other financial intermediary such as bank loans and institutional debt (Wiser and Pickle, 1998; Delmon, 2009). Delmon, 2009, p. 72, describes that these financiers who provide this debt under a project finance structure can consist of one or more of the following: commercial banks, multilateral and bilateral lending institutions, and export credit agencies (ECA). Wiser and Kahn, 1996, explain that debt for renewable energy projects has historically been sourced from institutional financiers such as insurance companies, long term pension funds, and commercial banks. This section will discuss these financiers (commercial banks, pension funds, MLAs, and ECA arrangements); comment on where each entity will be active through the project development phases; and discuss the financiers that have responded favourably to the signals sent from the public players in the South African wind energy project financing space as communicated through the qualitative interviews.

When compared to investors of equity, the majority of financiers are a lot more risk averse as the Financing Agreement defines a fixed obligation for the project company to pay defined principal and interest payments so the financier will not claim the potential upside of greater than expected project performance beyond a predefined level so it is not in their interest to take on any unnecessary risks (Wiser and Pickle, 1998; and Delmon, 2009). Due to this, financiers will only take on those uncertainties that are measureable and defined into measured risk so to ensure that they have certainty to their financial exposure over the debt maturity period (Delmon, 2009). Therefore, in contrast to investors of the equity component, financiers will usually review a project from a worst-case perspective (Wiser and Pickle, 1998, p. 361-386).

Consequently, financiers will be involved in all the key aspects throughout the project development phases and they will use an independent engineer with the skills necessary to accurately review each process to perform a due diligence review of all the project documentation to determine the bankability of the project and gain certainty as to their financial exposure and inherent risks of financing the project under review (Delmon, 2009, p. 86).

Viljoen, 2009, from Cresco Project Finance explained that it is of utmost importance for South wind energy projects can tie down a sizable sponsor with support from some sort of development finance institution initially however it is third party financial interest that will make or break South Africa wind energy projects. According to the individuals interviewed under the qualitative portion of the research the domestic commercial banks will be dominant in providing the finance for project financed wind farms in South Africa with international banks taking a back seat. The development finance institutions (DFIs), such the IDC, DBSA and the AFDB, will also have an important role to play in South Africa and Africa as a continent due to their ability to absorb a higher degree of country risk and consequently offer better financing terms and variables (Potgieter, Personal Interview, 2009; and Pringle [2], 2009). Viljoen, 2009, from Cresco Project Finance expressed this view and indentified three main debt providers: commercial banks; DFIs such as European Investment Bank, IDC and the DBSA; and finally the infrastructure funds such as Pan Africa and Macquarie. O’Flynn, 2009, from Mainstream Renewable Power has been in discussion with the domestic commercial banks and the development banks and commented that there is a “huge appetite” amongst these institutions for infrastructure projects such as wind power plants.

The first two categories of financiers, commercial banks and DFIs, will be active from the *financing and PPA* phase of the project when project developers are sourcing financiers based off a project that is bankable from their perspective, all the way to the end of the debt maturity period where they will have continued interaction as the project is usually refinanced. Finally, the institutional investors such as the pension funds may fill the long term refinanced debt and equity space over the operational phase of the project. Maclay, 2009, from Actis and Potgieter, 2009, from Investec explained that these institutional investors will be the financial institutions such as the major pension funds of Old Mutual, who is in partnership with Macquarie Capital, and Sanlam.

6.2.8.1. COMMERCIAL BANKS

The domestic commercial banks will be dominant in the project financing of wind power in South Africa and the international banks will maintain a local presence as they adopt a "wait and see" approach as many of the uncertainties unfold with regards to the South African wind power market. Eardley-Taylor, 2009, from Standard Bank argues that the majority of wind power projects in South Africa will be financed by the domestic commercial banks as the volatility of the Rand is a large barrier to entry for international banks with the result of many of the international banks pulling out or scaling back operations in South Africa. He went on to say that these domestic banks are quite well defined with "four and a quarter" domestic commercial banks that are actively exploring the industry, namely and in order of financing willingness to the wind industry: Standard Bank, First National Bank (FNB), ABSA Capital and Nedbank Capital. The "quarter" is Investec as their balance sheet is not nearly the size of the other four (Eardley-Taylor, Personal Interview, 2009). An industry participant, 2009, from BNP Paribas, shared this view and explained that South Africa has a strong and well developed financial system so the domestic commercial banks will be large players that are well placed to service the demands of these projects.

Among these commercial banks that he outlined were Standard Bank and Investec, which were the banks were actively looking for projects in South Africa. Maclay, 2009, from Actis and Greenwood, 2009, from New Energy Finance; and Potgieter, 2009, from Investec, were also in line with this point as they explained that South Africa's large commercial banks will be the most important sponsors of projects on both the debt and equity portions, with Investec, Nedbank, Standard Bank and perhaps Rand Merchant Bank (RMB) playing an important role.

The roles of commercial banks are that they can offer a variety of services to advance to project's development, such as: a financial advisor, arranger and underwriter of senior, mezzanine debt and equity for all large capital projects (Standard Bank Website, 2009). More specifically the project finance services that many commercial banks offer are: project evaluation and feasibility studies; financial modelling and sensitivity analysis; risk management; evaluation and risk mitigation strategies; advice on the structure of project contracts; financial structuring; arranging of multi-source funding, including development finance and export credit (political risk structuring); and underwriting and lending (Standard Bank Website, 2009). With this myriad of services a commercial bank can really be involved at any phase of the project's development.

As explained above Standard bank, ABSA Capital and Investec are some of the domestic commercial banks that are pegged to be large providers of finance to wind power facilities in South Africa. These banks were interviewed and all of them expressed that they are totally supportive of this sort of investment are looking to expand their financing portfolio in the South African renewable space through providing project financed debt to project developers (Vajeth, Personal Interview, 2009; Potgieter, Personal Interview, 2009; and Eardley-Taylor, Personal Interview, 2009).

Vajeth, 2009, stated that there is definitely "space for wind and it is going to happen" but it is just a matter of ABSA getting comfortable on many of the risk elements and surrounding issues that stand out to them at this point in time: such as the market risk, grid connection, wind resource modelling and regulatory framework. Once the bank is comfortable that the risks have been appropriately mitigated, Vajeth, 2009, stated that debt will not be a problem. Viljoen, 2009 supported this view that if the delivery of the REFIT is structured correctly through the clarification on the PPA, he sees no reason why raising of debt financing should be a problem in South Africa. In other words, if the environment is right then the debt will flow easily into the project so while financier to the South African wind power project finance market will offer debt under strict financing terms and conditions, as discussed in Chapter 5, the banks still have a large appetite for providing non- or limited recourse debt to wind power projects as long as all the major risks are packaged in a way that is compliant with the bank's set of requirements. This then pushes the initiative onto the public players to make the environment right through strong policy signals and a clearly defined regulatory framework to create a space where all major risks can be appropriately identified, assessed, mitigated and allocated to facilitate the provision of this debt.

6.3. MULTILATERAL LENDING AGENCIES AND DEVELOPMENT FINANCE INSTITUTIONS

The development finance institutions (DFI), also known as multilateral lending agencies (MLA) and multilateral development banks (MDB) can be involved in a project's financing package under many auspices, depending on their motives, they have the facility to provide small equity investments, or guarantees and insurance.

For South African wind power projects they are pegged to play an implemental role in providing a portion of the debt finance required from its own sources or act as an organiser of funding from one or more commercial banks (Delmon, 2009).

MLAs or DFIs, including export credit agencies (ECA) are international, predominantly political entities that are owned and funded by one or more nation or a grouping of nations respectively (Delmon, 2009, p. 108). The main benefit that these agencies promote is that, through the way in which they are structured, they have the increased ability to absorb a level of political and country risk that are inherent to investing in especially developing nations that commercial banks will simply refuse to bear as it is beyond their credit limits (Delmon, 2009, p. 108; and Khatib, 1997). Financing renewable energy project have a high level of *perceived* risks as it is a relatively new area for financing institutions especially in developing nations such as South Africa, with the addition of political risk and country risk. Khatib, 1997, highlights this country risk attached to Africa through the following statement, "Africa's potential to attract mainstream financing has traditionally been inhibited by poor economic performance, weak governance and the high levels of political risk perceived by prospective commercial investors." Consequently, for projects where other sources of funding are too risk adverse or simply credit lines do not have the risk capacity sometimes these projects are only possible through the involvement of one or more MLA's (Bronicki, 2000 as cited in Ubajako, 2006; and Khatib, 1997).

Arfaoui, 2009, from the African Development Bank, supported this view as he explained that the AFDB can offer more favourable terms than some commercial banks as the due to the size and purpose of the bank it can absorb more risk than some commercial banks who are subject to more restrictive lending constraints (Arfaoui, 2009). This can be demonstrated through the cost of debt, or interest rate, which the AFDB can offer better terms than some commercial banks, however by how much all depends on the project (Arfaoui, 2009).

As a result, DFIs can offer softer financing; longer maturities than standard commercial maturities; and insurance/guarantees against such risks as: transfer restriction; expropriation; breach of contract; war and civil disturbance (Khatib, 1997). However, in return for these terms they will place strict requirements on the project structure and the financing arrangements to ensure that certain social and environmental aspects of the project are highlighted and advanced (Delmon, 2009, p. 108-110). This is due to the point that MLAs and ECAs will carry out the wish of the nations or group of nations that it represents and will require that these drivers are met in return for favourable financing terms and variables (Delmon, 2009). These drivers can cover a variety of issues or specialise in certain geographic regions, some of these issues are outlined by Delmon, 2009, p. 108, as, “fostering to market economies, alleviating poverty, supporting the development of new markets, and providing commercial banks and companies with support and incentives to enter certain markets.”

The above discussion explore a DFIs important role as a source of funding to projects where the perceived country and political risk are too high for the credit limits of commercial banks, however there are other roles that DFIs play in the development of a project financed wind energy project. Firstly, DFIs can act as a source of advice on how the project should be structured to ensure commercial viability (World Bank, 2009, p. 57-59). Secondly, they can offer guarantee instruments that provide a degree of protection against public sector payment risk and other political risks for the private sector (World Bank, 2009, p. 57-59). Thirdly, DFIs can provide funding in local currency to mitigate foreign exchange risk (World Bank, 2009, p. 57-59). Lastly, through the involvement of a DFI the project’s credibility can improve to provide greater assurance to other financiers, investors and party participants such as contractors.

In the early stages of the project's development DFIs can offer indicative and conditional terms of finance which act as a vital early endorsement of the project while the developers are still working towards a position of bankability (World Bank, 2009, p. 57-59).

There is a lot of DFI activity in South Africa currently as these institutions move to fill the need created by the lack of movement from private institutions as a result of the financial crisis. The international Clean Technology Fund (CTF), a World Bank initiative has approved $500-million in October 2009 and these funds have been committed to the development of a portfolio of low-carbon energy projects in South Africa (Creamer [5], 2009). Apart of this portfolio will be the development of Eskom's 100 MW utility-scale wind power plant in the Western Cape Province (Creamer [5], 2009). Furthermore, in a trip to South Africa, Jean-Michel Severino, the CEO of Agence Française de Développement (AFD) which is the French DFI, is signing over R3,5-billion worth of development finance in South Africa with a focus on the energy sector and sustainability (Creamer [6], 2009). The AFD will look to encourage the development of a share of renewable energies in the South African economy with €100-million loan to Eskom for the financing of a wind farm and a €120-million credit line made available to the Industrial Development Corporation (IDC), Nedbank and Absa for funding of renewable energy and energy efficiency projects (Creamer [6], 2009).

The Development Bank of Southern Africa (DBSA) CEO Paul Baloyi, as cited in Pringle, 2009, explained that there is a growing funding gap in the funding required to finance South Africa's increasing infrastructure demands which he estimated this gap to be in order of R787-billion over the next three years. Baloyi, 2009, expects that nearly 50% of these outstanding funds could be provided by "properly leveraging" South Africa's DFIs (Baloyi as cited in Pringle, 2009).

It is clear that South African wind energy projects could benefit from some of the services that DFIs can offer and the African Development Bank (AFDB is discussed below to profile a typical DFI that will be active in South Africa.

6.3.1. AFRICAN DEVELOPMENT BANK

The African Development Bank (AfDB) is multilateral development Bank (MDB) or a development finance institution (DFI) that is geographically focused with the mandate to promote sustainable, economic and social development of its 53 African Regional Member Countries (RMCs) (Khatib, 1997; and Creamer Media Reporter [2], 2009). The AFDB is made up of the following three institutions: the African Development Bank; the African Development Fund; and the Nigerian Trust Fund through which it offers traditional lending operations to governments and a range of financial products to the private sector initiatives that advance the DFI's mission targets (Creamer Media Reporter [2], 2009; and Khatib, 1997). These financial products are debt, equity and further to this it offers technical assistance in all aspects of a qualifying project with the ultimate goal to wean African countries away from offshore credit lines towards a greater independence (Khatib, 1997). The private sector operations of the AFDB is primarily focused on the development of infrastructure projects, especially energy projects and the bank help local companies implement international best practise to ensure competitiveness at domestically and on an international stage (Creamer Media Reporter [2], 2009). The AFDB has communicated that it wants to play a more active role in privately financed schemes and this involvement has averaged USD 1.5 billion annually (Arfaoui, Personal Interview, 2009; and Creamer Media Reporter [2], 2009).

For the wind energy sector in Africa the private sector operations of the AFDB is looking to be a debt financier to project financed, utility scale wind energy projects. Currently the AFDB does not offer project equity for this type of investment however Arfaoui, 2009, suggested that this is an area that the bank could explore in the future. The project pipeline that the AFDB is currently exploring is concentrated in five countries in Africa: South Africa, Morocco, Egypt, and Tunisia. Table 20 outlines the AFDB's project pipeline in terms of MW and the associated expected total capacity for each country according to Arfaoui, 2009.

Table 20: The AFDB's project pipeline and potential country capacity

COUNTRY	AFDB ACTIVE PROJECTS	POTENTIAL CAPACITY
South Africa	700 MW	3000 MW
Morocco	300 MW	1500 MW
Egypt	250 MW	2000 MW
Tunisia	120 MW	800 MW

Source: Arfaoui, Personal Interview, 2009

Further to the provision of debt the AFDB can offer project development technical assistance and expertise to ensure that the project is developed in a bankable manner (Arfaoui, Personal Interview, 2009). Through legal assistance, environmental assessment, a modelling team, technical backup and risk management capabilities the bank can work with the developer to prepare the feasibility study, financing plan, wind feasibility, technical material and all the required detail to ensure that the project is brought to a bankable level that both equity sponsors and the financiers, including the bank itself (Arfaoui, Personal Interview, 2009).

6.3.2. INDUSTRIAL DEVELOPMENT CORPORATION

An important state-owned development finance institution in South Africa that has expressed that it will become increasingly active and involved in the South African energy sector is the Industrial Development Corporation (IDC) (Creamer, 2009). This will for increased involvement has been demonstrated through the IDC's support for three IPP entities so far with discussions for further interaction in both the renewable energy and conventional power projects (Creamer, 2009). The renewable energy sector is being paid particular attention by the IDC and explained that there has been strong interest from renewable energy IPP's over various technologies spurred by the NERSA's approval of a workable REFIT (Creamer, 2009). For the wind industry the IDC has been approached for funding on, among other RE technologies, a 500-MW wind farm, in the Western Cape, however all of these requests still require PPAs with Eskom (Creamer, 2009). The IDC is another important local DFI that could be implemental in getting wind energy projects over the line if this source of funding is properly leveraged and effectively and efficiently utilised.

6.3.3. DEVELOPMENT BANK OF SOUTH AFRICA (DBSA)

The Development Bank of South Africa (DBSA) is a local, state-owned DFI that will offer pre-investment grant finance through a project they will implement called the Renewable Energy Market Transformation Project (REMT) and they will offer assistance in sourcing post investment finance (Collins, Personal Interview, 2009). Most institutional and equity investors and financiers will view the provision of early equity, or pre-investment finance, as too risky for the wind energy sector in South Africa with so many undefined uncertainties at this stage.

Vajeth, 2009 from ABSA Capital, explains this point that it will be very difficult for the bank to provide early equity, or project development finance, to projects especially in today's financial climate of serious constraints on balance sheets. Consequently, the DBSA will play an implemental role in filling this crucial gap that will not necessarily be filled by the private sector. This role played by the DBSA is as the implementation agency for the REMT and the implementation was started in November 2008 for a duration of 4 years with $6-million in donor funds by the GEF/World Bank through the Department of Energy (DoE). Nomawethu Qase, director of new and renewable energy from the DoE was "begging you [project developers] to assist us in spending that money" (Van der Merwe, 2009).

The REMT was launched to tackle three objectives: to help eliminate the barriers to renewable energy development; strive to reduce SA's greenhouse gas (GHG) emissions; and assist in the country to reach the renewable energy target of 10,000 GWh contribution to final energy consumption by 2013. These objectives will be coordinated through the project's two main components: the Renewable Energy Power Generation (REPG) sub-component and the Solar Water Heating (SWH) sub-component. The development of wind power in SA will fall under the REPG subcomponent for which the REMT strives to provide policy, regulatory and institutional capacity building support at the national level. The REMT project looked at assisting developers in bringing projects to bankability through assistance with feasibility studies and environmental-impact assessments (van der Merwe, 2009).

As discussed DFIs are important sources of funding however they also have a technical advice function. The DBSA is no different and under the REFT and its Help Desk function is set up to create a mechanism for dialogue with project developers and investors. It will act as a "one stop shop" for all queries with regards to the development of renewable energy generation projects.

This will offer support in the form of communicating a guideline or road map that will offer direction in the development process for renewable energy projects and will cover the issues such as how to apply for the REFIT, sign a PPA, grid licensing, and grid-code compliance. Furthermore, the Help Desk will act as a vehicle to liaise with NERSA, ESKOM, the Single Buyers Office and the Government in fast tracking the outstanding regulatory or policy issues such as the PPA, grid licensing for IPP's and grid connection.

The REMT does not offer any investment phase financing such as equity, debt or mezzanine finance but is solely focused on providing pre-investment finance in the form of a "Matching Grant" (MG) through the project's REPG subcomponent. This facility will offer matching grants of up to US$200,000 equivalent per company and US$100,000 per project over the course of the qualifying REMT project, which can only be used to finance up to 50 percent of any eligible expenditures (Collins, Personal Interview, and DBSA, 2009). The MG is a market-based incentive for strengthening the capacity of the private sector to implement RE power projects and for moving to best practise in the REPG industry. The MG is on a cost-share basis and requires a "Rand to Rand" investment from the company receiving the grant (Collins, Personal Interview, 2009). The MG is for project development activities such as capacity-building to assist the beneficiary projects to identify, prepare, finance and improve their business and market development capabilities towards financial closure (DBSA, 2008). The activities and organisations active in a wind power plant project's development qualify for this funding and the DBSA will play an important role in the early phases of the project's development as it aids in securing the bankability of the project through offering an early endorsement, credibility and crucial project development funding.

6.3.4. EXPORT CREDIT AGENCIES

An Export Credit Agency is an international DFI that can offer, and facilitate debt to project financed wind farms in South Africa. An ECA is aligned with a certain country or a department of a country's government, with the primary mandate to encourage the export of goods and services and foreign investment of the host nation (Delmon, 2009, p. 110). Examples of ECAs globally are the Export-Import Bank of the United States; ECGD of United Kingdom, and Japan Bank for International Cooperation (JBIC); and Eksport Kredit Fonden (EKF) from Denmark (Khatib, 1997).

According to Khatib, 1997, an ECA can offer three primary services. Firstly, an ECA can offer fixed or floating interest rates which enable host country exporters to secure international buyers with favourable financial packages (Khatib, 1997). Secondly, ECAs will provide insurance against non payment and repayment guarantees to provide exporters with the confidence to sell to developing nations and give further certainty to financing banks respectively (Khatib, 1997). Thirdly, offering investment insurance and guarantees to protect host nation companies against political risks inherent to investing in other countries (Khatib, 1997). The two predominant financial products and services that they offer are firstly, buyer or supplier credit guarantee and insurance facilities in the case of political risk, currency transfer risk and changes in law and secondly, direct non- or limited recourse financing for the goods and service of exported from the host country at up to 85% of the total export price (Khatib, 1997; Delmon, 2009, p. 110).

Khatib, 1997 explains that, "insurance and financing by ECAs play a key role in supporting trade and investments into developing nations which may not have materialised due a high level of political and/or commercial risk involved in the project." South Africa, being a developing nation, stands to benefit from this type of DFI involvement and to date Eskom has secured funding through this channel.

An ECA loan agreement was signed between Eskom and BHF-BANK as the lead arranger of a consortium of 7 banks: HypoVereinsbank, BNP Paribas, CALYON Crédit Agricole (CIB), Commerzbank, KfW IPEX-Bank, and Natixis (Creamer, [4], 2009). While this arrangement was not for a project financed deal it demonstrates that ECA-type deals have happened in South Africa and Vajeth, 2009, from ABSA Capital explained that they had good connections with the European ECAs that were interested in getting involved in project financed wind farms in South Africa. This function could be extremely important for South Africa as these guarantees can offer a potential shield for foreign developers to the gaps in the regulatory framework and the corresponding indefinable uncertainties.

6.4. CONCLUSION

A typical project financed, utility-scale wind farm project goes through seven identifiable project development phases, namely: pre-feasibility; feasibility analysis; financing and project documentation; contracting and planning; construction; operation and maintenance; and repowering *or* decommissioning. Along this development process different sources of funding are utilised in the form of both the debt and equity contributions. Four broad ranges of equity funders are strategic investors, institutional investors, equity investors and CDM buyers and debt providers can be broken down into commercial banks, institutional investors like pension funds and development finance institutions (DFIs). In the initial stages of the project strategic investors will develop wind farms with the help of DFIs and move the project to a position of bankability at which point institutional investors, commercial banks, and pension funds can take over ownership and financing activities.

In South Africa the strategic investors that have responded to the policy and regulatory signals and are likely to develop large portfolios will be RES, Macquarie Capital, Investec/GDF Suez, and Mainstream Renewable Power with smaller developers pursuing individual projects. These investors will be active throughout the development process with all of them focusing on development and the majority looking to operate the wind farm but with limited ownership in the operational phase of the project. On the debt side it is clear that there will be four, possibly five domestic commercial banks who will dominate financing activities. These banks will be Standard Bank, FNB, Nedbank and ABSA, while Investec may enter this financier market if approached with the right project. There is an overwhelming support from these banks and all of them are more than willing to extend project debt if all major risks have been appropriately packaged so it is up to the public players to create the appropriate environment to facilitate the correct packaging of risks.

While these commercial banks will become involved after bankability has been proven the DFIs such as World Bank, AFD, AFDB, IDC and DBSA will play an important role in facilitating pre-investment finance and technical assistance to move the projects from identification of the need for the project to financial close. The DFIs will also play an important role in South Africa in absorbing the higher degree of uncertainty where private investors and financiers otherwise will not.

CHAPTER 7

PROJECT RISKS AND RISK ALLOCATION

Chapter 6 identified the project development phases and the types of financiers/investors that are active in each of these development phases. Chapter 7 aims to demonstrate how each financier is exposed to risk through identifying the key broad project risk categories inherent in each development phase. These broad risk categories are those that are typical for a project financed, utility scale wind farm project as identified by the literature and from the point of view of potential investors and financiers in South Africa. Then these risks will be matched by indicating in which of the project development phases that these project risks will be apparent and the project participant which will usually be responsible for the risk. If these project risks are then unallocated, then the SPV and ultimately its financiers and investors will bear this residual risk, so this chapter will highlight which type of financier/investor will ultimately bear the residual risks through comparing the project phase where the risk is apparent and against the type of financiers/investors that are active in that phase and exposed to the adverse outcome of each project risk.

Before a review of this risks can happen the difference of uncertainty and risk are explored as the financiers and investors to the South African wind power market are faced with more uncertainties at the early stages of the market than risks. The significance of this is that uncertainties are unmanageable whereas risks can be valued and assigned.

Finally, the chapter will explore how these project risks are allocated through the project documentation and risk mitigation instrument away from the SPV to the different project participants according to the guiding principle of risk allocation.

7.1. UNCERTAINTY

The literature defines the distinction between *uncertainty* and *risk*, where uncertainty refers to an unstructured perception of the future where the probabilities of the different outcomes are unknown, whereas risk is used to explain the situation where the alternative outcomes have been specified and probabilities have been assigned to them (Venetsanos et al., 2002; and Nevitt and Fabozzi, 2000, as cited in Irwin, 2007).

Venetsanos et al., 2002, p. 293-307 outline six broad areas of uncertainty that are apparent for the development of wind farm projects. These categories of uncertainty are: political; electricity market structure; demand for electricity; supply; initial capital requirements; technological issues and environmental regulations pertaining to wind farm development. These issues are briefly discussed to understand the context behind the individual project risk explained thereafter. The *political* will of a nation's government will usually determine the enabling environment for wind energy especially from a regulatory perspective. Government regulations and policies can make or break the economics underpinning wind power projects (Ubajako, 2006).

The political uncertainty largely affects the uncertainty of *market structure* which refers to how the market for the electrical output of the wind project is structured and who ultimately bears the risk of production cost volatility (Venetsanos et al., 2002, p. 293-307). In regulated markets this risk is passed onto end consumers through tariff structures while in the environment of recently deregulated power markets such as Brazil the question of who the end consumer becomes blurred i.e. is it a consumer or an intermediary (Venetsanos et al., 2002, p. 293-307).

The uncertainty of demand and supply for electricity will cast concerns on the ability of the market to offtake the project's electrical output as either demand will outstrip supply in both the short term and long term, and vice versa, with the electrical gird unable to handle the input of the project's output. Furthermore, there is a lag between demand recognition, investment decision and the commissioning of an operating power plant. This lag time needs to be factored into power system planning in the long term, where demand grows at a relatively more predictable rate, and in the short term, which is more challenging as demand or peak demand grows at an unpredictable rate with sudden peaks (Venetsanos et al., 2002). The supply uncertainty is that the supply system of generation, transmission and distribution will need to maintain a reserve margin to meet demand at all times, so the uncertainty for a wind power plant developer and their financiers is whether the addition of the wind power plant will be in line with the maintenance of this reserve margin (Venetsanos et al., 2002). Essentially the demand and supply uncertainty is the uncertainty as to whether there will be a market for the project's output over the lifetime of the project, therefore ensuring the project's ability to generate income (Venetsanos et al., 2002, p. 293-307).

Other uncertainties such as what will be the exact initial capital requirements, which for wind energy account for a significant proportion of the total energy production cost, and what will be the possibility of cost overruns and increased costs due to time delays during the construction period (Venetsanos et al., 2002; and (Ubajako, 2006). There will be technological issues with uncertainty relating to the technology employed and its availability to generate over the lifetime of the project. The technology can become economically obsolete due to technological advance, the question of the quality of the technology, and its suitability to the site (Venetsanos et al., 2002, p. 293-307). Finally, the Environmental Regulations or restrictions that dictate how the power plant must fit into the environment with limited impact, while this is less pronounced for clean technologies such as wind power the facility must take into account its impact on the surrounding environment and whether the projects development will be blocked or delayed due to infringement of environmental regulation (Venetsanos et al., 2002).

The uncertainties applicable to the development of a wind power plant, outlined above, are the broad context from which many of the project risks arise. These uncertainties have a variety of uncertain outcomes, so individual risks are those uncertain outcomes that have been assigned a probability of occurring which then lends a degree of predictability to the situation. Financiers want to have certainty as to their financial exposure over the debt maturity period so they will seek a business environment that is predictable, so individual risks differ to uncertainties through a greater degree of predictability. However in most reality the exact probabilities of uncertain outcomes are unknown but project developers will be charged with assigning subjective probabilities to these events so in reality this distinction between uncertainty and risks may not be matter (Knight, 1921, as cited in Irwin, 2007). The financiers and investors that were reviewed in the exploratory interviews all agreed that it is the broader policy and regulatory uncertainties that is the main barrier to investment and financing.

This is due to the above definition in the sense that uncertainties are unmanageable so funders can not price or value to potential loss or gain of value from the risk not eventuating or if it does, respectively. This means that they cannot determine the true exposure or the risk that the funds they commit to a project and consequently cannot express their key financing terms and variables. In other words, faced with uncertainty, financiers and investors cannot accurately determine the cost and availability of their funds, which will result in more conservative, or costly, terms. With the distinction of uncertainty and risk in mind and how this affects funder’s decisions, the following chapter will discuss the common *risks* that appear on project financed wind farms.

Table 21: A table to show where each project risk is apparent over the project development phases

<table>
<tr><th>PRE-FEASIBILITY</th><th>FEASIBILITY</th><th>FINANCING & PROJECT DOCUMENTATION</th><th>CONTRACTING & PLANNING</th><th>CONSTRUCTION</th><th>OPERATION & MAINTENANCE</th><th>REPOWERING OR DECOMMISSION</th></tr>
<tr><td colspan="7">Country Risk</td></tr>
<tr><td colspan="7">Political Risk</td></tr>
<tr><td colspan="7">Credit/Default Risk</td></tr>
<tr><td colspan="7">Environmental Risk</td></tr>
<tr><td colspan="6">Production/ Resource Risk</td><td></td></tr>
<tr><td colspan="3">Development Risks</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td colspan="2">Completion Risk</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Construction Risk</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Commissioning & Performance Risk</td><td></td><td></td></tr>
<tr><td colspan="3">Cost Increase Risk (Evaluation period 1)</td><td></td><td colspan="2">Cost Increase Risk
(Evaluation period 2)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Technology Risk</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Resource Risk</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Production Risk</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Operation Risk</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Market Risk</td><td></td></tr>
</table>

7.2. PROJECT SPECIFIC RISKS

Project risks can be defined as the possibility of loss in project value associated with each uncertain, but possible, undesirable outcome where subjective probabilities have been assigned to the uncertain outcomes eventuating by project participants. Irwin, 2007 gives a comprehensive definition of risk as, "Unpredictable variation in value arising from unpredictable variation in a risk factor or random variable, where a risk factor is a variable whose outcome affects total project value and whose value is uncertain." So risk impacts project value so while this value can be estimated over the life time of project it can never be accurately captured but rather the value of each alternative outcome and the probability of each outcome eventuating can be determined at a certain confidence level to determine the most probable overall project value. This paper indentifies 14 broad risk categories namely: country risk, political risk, credit/default risk, development risk, completion risk, environmental risk, construction risk, commissioning and performance risk, cost increase risk, production risk, resource risk, technology risk, operation risk, and finally market risk.

Each project risk will occur at certain phases of the project's development and Table 21, above, gives an indication as to where the responsible project participant will be exposed to this risk eventuating. This is not to say that these risks are only apparent in the project phases identified in Table 21, but rather this serves as a guide as in which project development phase these risks are likely to occur. In the same way these risk categories are not mutually exclusive so a risk can be classified under more than one broad category. The project participant that is responsible for this risk will be the entity best placed to manage the risk in a situation where risks are allocated by this guiding principle of risk allocation (explained later under Risk Allocation).

If, however, these risks are not appropriately allocated the financier and investor will ultimately bear the unallocated or residual risks (this concept is further explained under risk allocation, below). Table 19, in Chapter 6, illustrates which development phase each financier and investor is typically active. If we compare Table 21, above and Table 19, from Chapter 6, we can see which financier/investor will bear the residual risk under each project development phase which will in turn be reflected in their key financing terms and variables.

In Chapter 5 the paper demonstrated the affect of risk on a financier/investor's key financing terms and variables. Wiser and Pickle, 1998, p. 361-386, describe how an increase in risk will interact with key financing variables as an increase in residual risks will have the result of financers and investors offering shorter investment horizons, increased equity requirements, reduced debt maturity, and larger debt and equity risk premiums. Ubajaka, 2006, supports this view as he explains that project risks affect the amount, timing and availability of funds for project finance and in the sense that for financiers a higher level of residual risks will decrease the loan amount, increases the interest rate and shortens debt maturity period. On the other hand, an increase in residual risks for equity investors will increase their minimum ROE requirements or cost of equity (Ubajaka, 2006).

The identification and management of risks along the development process and who they affect is vitally important to a project finance structure as these risks have a significant impact on the key financing terms and variables that underpin the provision of project funds. However, each project is specific in terms of project participants, their requirements, their risk tolerances and their interaction which will ultimately determine how risks are allocated amongst them (Delmon, 2009).

A common point to most project financed structures is that any unallocated, or residual risks, will be borne by the SPV, and ultimately it will be the financiers and the investors to this SPV that bear these residual risks (Delmon, 2009, p. 98).
What follows is a discussion of the broad categories of project risks that a wind power plant will likely be exposed to at each phase of its development and which financier and/or investor will ultimately bear the residual risks if risks are not appropriately allocated. It is important to note that no risk should be discussed in isolation as risks rarely affect one project participant at a defined stage in the project but rather each risk will interface with other risks, between project participants and across different project development phases (Delmon, 2009, p. 158-159). What follows then does not attempt to give a conclusive list of project risks, exactly when they occur, and who bears the residual risk, but rather the discussion aims to portray a guideline as to identify 14 broad categories of project risks, where in the development process are they most likely to be apparent, which financier/investor is most likely to ultimately bear the residual risk, and finally provide the views from the qualitative interviews for risk pertinent to South Africa.

7.2.1. DEVELOPMENT RISK

Development risk is the broad risk category that prevalent in the development phase of the project, from pre-feasibility to financial close and covers all the activities that occur in these phases (Delmon, 2009, p. 162-163). The initial phases of a project requires a heavy outlay of funds, called pre-investment finance, to move the project to a position of bankability and eventual financial close, especially due to the complexity of negotiating project documentation and these funds are provided by project sponsors, usually strategic investors, and DFIs (for South Africa it is the domestic DFIs who will provide pre-investment finance) as discussed in Chapter 6 (Delmon, 2009, p. 162-163).

So in the absence of financier's debt it is the investor of this high risk pre-investment finance that will bear the development risks with the chance, but not guarantee, of future return on equity once the project is operational, on sale of the asset at financial close, or through this equity can be treated as subordinated debt or equity in-kind to be re-payed once senior obligations are met (O'Flynn, Personal Interview, 2009; and Delmon, 2009).

For South Africa, Arfaoui, 2009, from the DFI African Development Bank, explained that development risk was particularly pertinent. The AFDB requires a project champion to carry their investment that understands the host of activities that need to be carried out under the development phase in a manner that is ultimately bankable. Consequently, the AFDB will only engage with a project developer with the expertise or track record to understand the magnitude of this task. Both Arfaoui, 2009 and an industry participant, 2009 from BNP Paribas voiced their concern as to the level of the expertise of the domestic developers in South Africa and that it remained to see if international developer's development portfolios were structured to accept South African development risk. In other words other markets such as China and India where the structure of market is clearer could present a more reliable investment (An Industry Participant, Personal Interview, 2009).

7.2.2. PRODUCTION RISKS/RESOURCE RISK

Resource risk can be explained as the risk that the resource that is required to power the project's technology is inadequate, which has the affect of decreasing production and hence revenue, which ultimately reduces the cash flow required to service debt repayments (Ubajaka, 2006).

Wind power technology does not rely on costly input fuel as is the case with traditional power plants, so while wind energy projects do not present a fuel supply or resource risk in terms of availability and price fluctuations, there is still a resource that needs to be accurately measured and modelled. Furthermore, while accurate modelling techniques exist today that bring some degree of certainty to this how this resource will behave you are still modelling something is an intermittent resource with variability over the site, the seasons, and the years (Viljoen, Personal Interview, 2009; and Ubajaka, 2006). For this reason, Wiser, 1997, discusses that renewable energy technologies such as wind energy are perceived by to have high resource risk by the financial community and that the majority of financial institutions lack significant experience in evaluating renewable energy resource risks.

To understand the wind resource on site is the pivotal activity that largely determines how a wind power project is structured. The wind resource is preliminarily investigated at in the pre-feasibility stage, measured and modelled through the feasibility phase for 12 to 18 months and has an impact throughout the project until the decision to repower or decommission. Therefore this resource risk is apparent over the life of the project and a miscalculation in the feasibility stage in the measurement process can render a project ineffective in future phases such as the operational phase. Financiers require 12 to 18 months of correctly calibrated wind data and their key financing terms and variables are then ratio driven off the confidence interval (P90 or P50) of this data in the sense that data provided at a P90 sensitivity will qualify for more favourable key financing terms and variables when compared to that provided at P50, as the former provides better certainty to the revenue generation ability of the project with subsequent increased certainty to financiers as to their financial exposure (O'Flynn, Personal Interview, 2009; Delmon, 2009; Vajeth, Personal Interview 2009; Eardley-Taylor, Personal Interview, 2009; and Viljoen, Personal Interview, 2009).

If the data was incorrectly measured and logged in the initial stages of the project, then it is ultimately the project company and its shareholders and financiers who will shoulder the reduction in value as a result of the adverse outcome of the resource risk which will occur in the operation phase of the project.

For Vajeth, 2009, from ABSA Capital, the risk that stands out the most in South Africa, at this stage of the market's development is resource risk. More specifically, there is limited wind data for South Africa both on a national level and on a project specific level (Maclay, Personal Interview, 2009). This insufficiency makes it difficult to determine the real performance of wind power projects which in turn makes it difficult for financiers to specify exact key financing terms and variables and for investors to determine the real return on equity at this early stage (Maclay, Personal Interview, 2009). Consequently, ABSA Capital, a commercial bank had not made a positive conclusion as to the wind resource in South Africa from the information they had seen and remain on the conservative end of the spectrum when reviewing this risk (Vajeth, Personal Interview, 2009). Under the context of this conservative view from banks it is essential that project developers measure and log the wind resource in order for this data to be presented in a bankable format. O'Flynn, 2009, from Mainstream Renewable Power explained that in many new markets for wind power development, he has experienced that local developers are attempting to do things in the cheapest way possible which in most cases renders the project unbankable or qualifies the project for unfavourable and costly key financing terms and variables.

7.2.3. COMPLETION RISK

Completion risk is the risk that the works will not be completed in time, and in accordance, with the bankable project documentation, project specifications and requirements. Delmon, 2009, p. 163-164, defines completion risk as the, “risk that a project will not be able to pass its completion test within the time for completion” (Delmon, 2009). While Ubajaka, 2006, describes this risk as the risk that the project is not completed on time, or is never completed and thus never generates revenue to service the existing draw-downs on debt repayments or yield a return for investors.

The completion risk is most likely to be apparent in the construction phase of the project as the construction contractor(s) work to design and builds the works in time for completion testing and commissioning of the project (Delmon, 2009, p. 163-164). Consequently, it is the construction contractor who bears the loss in value due to the outcome of completion risk and this risk allocation is passed through the Construction Agreement from the SPV (Delmon, 2009). So if this risk is correctly allocated there should be no residual risks that would be ultimately the responsibility of the SPV’s shareholders and financiers. According to Table 19, in Chapter 6, this could possible affect the investors and financiers active in the construction phase, namely: strategic, institutional or equity investors on the equity side and commercial banks, DFIs and ECAs on the debt side in South Africa.

The completion risk is the broad risk category that captures the undesirable outcomes of incomplete works, time delays, and sub optimal performance from completed works all in the construction phase and the defects liability period in the operation phase.

So a review of completion risk can not be isolated from construction risk, commissioning and performance risk as they all deal with the issue of whether the design and works are fit for purpose as defined by the Concession Agreement.

7.2.4. CONSTRUCTION RISK

Construction risk can be defined as the probability of cost overruns and delays in completion occurring with the result that that the project is not constructed in accordance with specifications to be fit for purpose, leading to a shortfall in capacity and resulting in increased interest and lengthening of repayment profile (Ubajaka, 2006). Renewable energy technologies are capital intensive and therefore they require a large outlay of upfront funds with the largest drawdown on funding occurring in this phase of the project's development (Wizelius, 2007). The primary form of security to financiers will be the total value of the project and its ability generate income, but until completion has occurred the project assets have little value. Furthermore, the construction phase is where most delays and cost overruns usually occur, which makes the construction phase the phase with the most risk exposure and potentially the most costly (Delmon, 2009, p. 164).

If the undesirable outcomes eventuate, and risks are not appropriately allocated through the construction agreement then this phase implicates the majority of equity and debt providers to bear the residual risks, as explained above under completion risk, which will result in harsher key financing terms and variables or even refusal to grant the loan by financiers or non-investment by investors. Construction risks include all the risks that could occur through the construction period, some of which are: incomplete scope of work, cost overruns, unexpected site and foundation conditions, availability of materials, infrastructure and services, political and natural force majeure all with related price extras (Delmon, 2009; Sargent and Lundy LLC, 2001; and Ubajaka, 2006).

Through the Construction Agreement the SPV transfers the construction risks to the construction contractor who then has the obligation to ensure that the design and works are sufficient for the purpose intended for the project as defined under the Concession Agreement from the grantor (Delmon, 2009). Any residual risks will be the ultimate responsibility of the financiers and the investors in the SPV.

Viljoen, 2009 form Cresco Project Finance explained that the construction risk for South Africa were largely undefined as a project of this nature has not been constructed in South Africa to date which means there is no benchmark for potential project financiers/sponsors to evaluate the practical rollout and the hidden risks. Consequently, the development of the first utility scale wind farm in South Africa will be closely followed by all industry stakeholders.

7.2.5. COMMISSIONING RISK

Completion risk is the risk of the works not satisfying the completion tests that verify that these works comply with project specifications, with external systems and that the plant's equipment and systems all interface correctly (Delmon, 2009, p. 165-166). Upon completion testing the completed works can either not be fit for purpose or they can be incomplete, and it is for this reason that you can not separate the analysis of completion risk and commissioning risk as the latter is a sub-category of the former. Commissioning risk can occur in all the activities that move the project from financial close to successful commissioning and take over, or in other words from the end of the financing and project documentation phase to the end of the construction phase when completion is ascertained through successful commissioning (Delmon, 2009, p. 166). The project participants are exposed to these risks at the end of the construction phase when commissioning tests take place and the uncertain outcome becomes certain.

Completion is essential to the SPV and its shareholders who want to maximise revenue by bringing the asset online as soon as possible; both the offtaker and grantor who require the output of the project; and finally the financiers who will want to claim back the debt extended to the project over the construction period (Delmon, 2009, p. 166).

It is for these reasons that these interested parties will want to allocate the commissioning risk to the construction contractor(s) through the Construction Agreement and when completion is evidenced then a large transfer of risk occurs away from the construction contractor who will then be paid for the services rendered (Delmon, 2009, p. 166). There is a period called the defects liability period where the construction contractor(s) will remain liable for certain defects in the works in the operation phase of the project. If the risks are not appropriately allocated through the Construction Agreement it will be the SPV, and consequently, its shareholders and financiers that bear the residual risks.

7.2.6. PERFORMANCE RISK

Renewable energy technologies are perceived to have a high degree of performance risk as they are viewed as unproven (Wiser, 1997). The construction contractor(s) will be responsible for the design and building of the wind farm, a responsibility allocated through the Construction Agreement by the project company. There are three sets of performance criteria that the works should meet upon completion, commissioning and take over which are: those fit for purpose requirements stipulated by the grantor through the Concession Agreement and the loan repayment and return on equity requirements as defined by the financier and the investors through the Financing Agreement and the Shareholders Agreement respectively (Delmon, 2009, p. 173).

The interested project participants, grantor, financiers and investors, will include performance clauses, warrantees and penalties for default in the Construction Contract which will hold the construction contractor(s) responsible to deliver works that meet a minimum level of performance and in the case of default on this they are liable for any loss in value caused by inadequate works and hence the performance risk (Delmon, 2009, p. 173-176).

Performance risk is apparent in all the activities involved over the construction phase and project participants will be exposed to these risks from completion and over the operation phase of the project. The construction contractor will be bear this risk as discussed, however any unallocated elements of this risk or residual risks will be the responsibility of the investors and financiers.

7.2.7. TECHNOLOGY RISK

Technology risk is the risk that the technology installed will not perform according to the predefined requirements and specifications of the grantor, shareholders and financiers so there will be a loss in value resulting in the actual revenue falling short of the forecasted revenue with implications on offtake obligations, ROE and debt servicing (Ubajaka, 2006). Or in other words the technology is inadequate for the purpose that it is intended (Sargent and Lundy LLC, 2001). Technology risk is typically apparent through the construction with the exposure over the operational period where defaults can occur. Renewable energy technology is relatively new with sharp incremental and radical innovation learning curves rendering technology obsolete which is why renewable energy technologies are considered to have high perceived technology risk by the financial community (Ubajaka, 2006; Wiser 1997).

Wind power technology, a renewable energy technology, is a relatively new technology when compared to other more traditional fossil fuels and as a consequence there is a high level of perceived risks by the financial community. This high level of perceived risks are reflected through the key financing terms and variables that the financial community has typically offered financing to privately owned, project financed wind power projects when compared to more traditional forms of energy generation technology (Wiser and Kahn, 1996).

However due to the rapid deployment of wind turbine generators around the world this technology is maturing, security such as warrantees are developing and the skills to evaluate this performance result in readily available information to the financial community these key financing terms and variables may become less restrictive for project financed wind farms due to a drop in the level of perceived and real risks by the financial community (Wiser and Kahn, 1996; Delmon, 2009; and Navigator Project Finance, 2009).

The technology that is employed and the probability of any default will be allocated to the construction contractor through the turbine equipment supplier in the form of performance related damages and latent defects liability period that extends into the operation phase of the project (Delmon, 2009, p. 174). If the technology risk is based on proven technology the financiers will usually be willing to take some of the performance risk or this drop in the level of real and perceived risks will be reflected through less restrictive key financing terms and variables (Delmon, 2009, p. 173-176). The financiers that will be exposed to the residual technology risk will be those active over the construction and operation phases of the project, namely: strategic, institutional, and equity investors; CDM buyers; and commercial banks, institutional debt investors and DFIs/ECAs.

The financiers, investors and industry participants that were interviewed agreed that wind turbine technology that is in the multi-megawatt range of 2 to 3 MW which is provided by a large trusted turbine supplier would not pose much of a technology risk for South African projects. Wind power is a tried and tested technology with over 1,250,000 MW installed globally, so technology risk is not a huge concern. Eardley-Taylor, 2009, from Standard Bank, agreed with this as long as it comes from a large, trusted supplier.

O'Flynn, 2009, from Mainstream Renewable Power explained that the way in which they will mitigate technology risk in South Africa will be to only source their turbines from top quality manufacturers, such as Vestas, General Electric, and Siemens, and they do not even consider turbines from suppliers without a bankable track record and significant international capabilities. Greenwood, 2009, from New Energy Finance further backed this point up as he stated that the international machines were trusted by potential financiers and sponsors. Finally, Arfaoui, 2009, from the AFDB, explained that the technology risk is no risk what so ever with wind turbine technology as this is a well established and proven technology. Furthermore, the security packages, insurance and warranties that large turbine suppliers offer cover the well defined risks to great degree in the view of the AFDB.

On the other hand some of the experience interviews revealed that financiers and investors had concerns about the performance of these international machines under South African conditions remained to be determined, especially their connectivity to the South Africa grid. Maclay, 2009, from Actis Equity Fund; an industry participant, 2009, from BNP Paribas; and Viljoen, 2009, from Cresco Project Finance, all agreed that there is no uncertainty as to whether the technology works but how the technology will perform in South Africa was the question, particularly with reference to whether there will be capacity to effectively service and maintain these machines over the 20 year project life time.

7.2.8. COST INCREASE RISK

Cost increase risk, or cost overrun risk, is the risk that the actual costs incurred are greater than those forecasted under the financial model with an associated impact on revenue, debt servicing ability, and the level of ROE returned to investors (Delmon, 2009, p. 167-173).

Cost increase risk is apparent over all the activities where the future cost for a project input, such as equipment or services, are forecasted and input into the financial model off which funding is extended to the project. However, there are two periods over the project's development where this risk is evaluated: firstly, the period between pre-feasibility to financial close at the end of the financing and project documentation phase; and secondly, from financial close to through construction and into the operation phase (Delmon, 2009, p. 167-173). This allows for funder to evaluate if the financial model has varied greatly to the forecasted model they agreed to invest in or finance (Delmon, 2009, p. 167-173).

Cost increase risk is the broad risk category that captures a variety of potential adverse outcomes and Delmon, 2009, p. 167-173, outlines some of these risks that the project participants are exposed to over the first and second evaluation periods are: inflation rate increase risk, interest rate risk, exchange rate risk, and refinancing risk, construction cost increase, input price increase, operation cost increase, cost of spare and replacement parts, and variation in off-take tariffs. All of the above elements can result in a mismatch between actual revenue and forecasted revenue thereby causing a revenue gap which will have a significant impact on the project's viability. An example of where this risk can impact on a project is that of construction cost increase risk where due to the time frames required to complete works in this period the price of inputs that are quoted under a lump sum fixed price basis under an EPC construction contract can often increase over these timeframes.

Steel and cement prices are a prime example for wind power projects, as these inputs can vary substantially over the time from invoicing to that of supply (Delmon, 2009, p. 167-173). However, while financiers will want project documentation to allocate this risk away from the SPV to the construction contractor and the equipment suppliers through the requirement for a lump sum fixed price these project participants will include contract price adjustments (CPA).

CPAs are used to peg these key material inputs to indices such as the Steel and Engineering Industries Federation of South Africa (SIEFSA) escalation index and the Association of Electric Cable Manufacturers of South Africa (AECMSA). Despite the cost overrun risks being allocated to the construction contractor and equipment suppliers, financiers will still require that additional funds are made available by the SPV and its shareholders (Delmon, 2009 p. 167-173). These additional funds can come in the form of: contingency margins, stand-by subordinated debt, advance on capital draw downs, and stand by credit/debt facilities (Delmon, 2009, p. 167-173). There is a host of risk allocation instruments but if these are not included in project documentation the residual risks will rest with all financiers and investors active over the project's lifetime due to the two evaluation periods and the broad category that this risk covers.

7.2.9. EXCHANGE RISK

Delmon, 2009, p. 167-168, defines the exchange rate risk as the risk that comes from the exchange rate movement between the main project currencies and exchange risk is a sub-risk under the broad cost increase risk category (Delmon, 2009). This is demonstrated through the following example, if an international lending institution awarded debt to an IPP in SA in Dollars and Eskom, the off-taker, pays in Rands under the REFIT.

So cash available for debt service will be in Rands while debt servicing is in Dollars so any devaluation of the Rand against the Dollar will have an impact on the returns of the project and can be treated as a cost increase. Maclay, 2009, from Actis explains this concept and how Actis as an equity investor will be exposed to exchange risk as a dollar investor in the sense that project revenue will be calculated in Rands, the project's local currency however the revenue will then be subject to the Dollar/Rand exchange rate which can have a significant impact to the project's detriment if the Rand weakens and vice versa if the Rand strengthens against the Dollar.

Both Greenwood, 2009, from New Energy Finance and O'Flynn, 2009, from Mainstream Renewable Power, shared this concern as he explained that the wind turbines will be sourced from the large manufacturers in Europe, which means that nearly 70-80% of the projects total cost will be in EUROS or Dollars. It is then rational that both financiers and investors will inject money into the project in these currencies and consequently will require that any return is returned in EURO or Dollars (O'Flynn, Personal Interview, 2009). The issue with this is that the cash flow from the project will be generated under the REFIT in Rands which means to remunerate financiers and investors the project is exposed to the currency exchange risk when converting from Rands to Euros or Dollars (O'Flynn, Personal Interview, 2009).

As exchange risk is a sub-component of cost increase risk, it too is apparent over the two evaluation periods as identified under cost increase risk and any residual risks will be borne by the same financiers and investors. This exchange risk exposure can be mitigated through firstly, matching the currency of funding to that of revenue and expenses, secondly, through allocation of this risk to project participants best placed to handle it, thirdly, by hedging the risk directly on the currency market, and finally through the involvement of DFIs who can afford international funds in local currencies (Delmon, 2009, p. 167-168).

However, in South Africa, Eardley-Taylor, 2009, from Standard Bank explains that exchange risk is not a major issue when it comes to financing renewables projects as these are smaller in terms of value when compared to base load projects, so with a liquid currency market the banks can put up the FOREX required for the relatively small renewables FOREX requirements.

7.2.10. OPERATION RISK

The operation risk is the risk inherent in the components that could potentially have an adverse affect on the operation expenditure and the project output over the life time of the project with an overall loss in project value (Delmon, 2009, p. 176-177). This risk is apparent from successful completion, and the occurrence of take over from the construction contractor(s) all the way through the operation phase to the end of the project. The operation risks are the responsibility of the SPV, the majority of which are allocated to the operator with all residual risks borne by the SPV (Delmon, 2009, p. 176-177). According to Table 19, Chapter 6, the financiers responsible in the operations phase will be commercial banks, long term institutional investors, international DFIs and ECAs. Financiers will want these risks allocated away from the SPV so they will usually require that the service packages offered by wind turbine equipment suppliers cover the following aspects: scheduled maintenance; all unscheduled but statistically-predictable routine maintenance; and scheduled major overhauls and subsystem replacements (Delmon, 2009, p. 176-177).

7.2.11. MARKET RISK

Market risk is the risk that for some reason the price received for the project's output or the amount of output sold does not satisfy the minimum ROE and debt servicing requirements over the operation phase of the project.

A change in the price for the output or the amount of output that can be sold can be caused through a variety of influencing factors but predominantly these changes come through the likelihood that the utility cannot pay for the power it has agreed to buy, described as counterparty risk, and supply and demand forces that determines the amount of output required from the project in line with peak load curves (Sonntag-O'Brien and Usher, 2004; and Delmon, 2009).

This risk will usually be allocated to the offtaker through the PPA which will guarantee a certain tariff to be paid for the output, that is usually indexed to inflation, which will be defined for the majority of, preferably the entire, of the project's lifetime, with any residual risks will be borne by the financiers and investors active in the operation phase of the project. Wiser and Pickle, 1998, describe how an increase in market risk will interact with key financing variables with increased equity requirements, reduced debt maturity, and larger debt and equity risk premiums (Wiser and Pickle, 1998, p. 361-386). Consequently, an increased level of perceived market risks by the financiers and investors can result in stricter and more expensive key financing terms and variables.

In South Africa, O'Flynn, 2009 from Mainstream Renewable Power explained that there was a limited adherent merchant risk. According to O'Flynn, the feed-in tariff makes a significant difference to reducing the levels of merchant risk as it guarantees a revenue for the project at least R1.25/kWh for the 20 year lifetime of the project. This is a prime example where regulation from the public arena has removed uncertainty for the investors and financiers this example is the prime reason for the private interest in the South African wind industry. Whereas, Vajeth, 2009, from ABSA Capital, believed the contrary, as he identified significant market and counterparty risk in the connection and management of these wind power plants to the South African grid network. Counterparty risk can be defined as the likelihood that the utility cannot pay for the power it has agreed to buy (Sonntag-O'Brien and Usher, 2004). So the counterparty risk, in this case, is that a wind power plant can only produce electricity when the wind blows so ABSA would like to see some sort of guarantee that at whatever time of day/night these wind farms are producing power Eskom will not block the off-take as there is not enough demand on the grid to prevent gird network stability failure or there is a cheaper source of energy that is readably available at the time.

In other words, the degree to which Eskom's grid network is prepared to accept the influx of wind energy power on an intermittent dispatchable basis and whether Eskom will pay for this power is of critical concern for ABSA as a financier of to project financed utility scale wind farms in South Africa. This issue refers directly to the regulating capacity that adapts power production to actual power consumption which Eskom has to use to adapt the system to the variations in the wind and the output of the wind turbines (Wizelius, 2007).

7.2.12. COUNTRY RISK

Energy projects are considered to have a high degree of potential political or sovereign risk due to their political importance and size (Godier et al., 2009). Country risk is the broad risk category that covers a variety of country specific risk elements that are inherent to doing business in a particular country such as political risk and regulatory risk (Delmon, 2009). Due to the broad nature of country risks the project is exposed to these risks over its entire development and all the financiers and investors that contribute to a project will bear these risks and the loss in value if they eventuate. Godier et al., 2000, "Africa's potential to attract mainstream financing has traditionally been inhibited by poor economic performance, weak governance and the high levels of political risk perceived by prospective commercial investors."

This risk category is of prime importance to the South African wind industry as it is the political risk and weak governance or regulatory risk that are the key limiting factors on the availability and cost of finance and investment in the South African wind market. These risks are described in detail below.

7.2.13. POLITICAL RISK

Political risks are those risks that occur outside of the project and the project participant's sphere of influence which make these risks particularly difficult to manage with conventional insurance and risk mitigation instruments, and in many instances elements of the political risk will be inherent in investing in a particular country (Delmon, 2009, p. 179-187). A project will be exposed to political risks over its full lifetime as the political setting is the context under which the project exists and some of the risk elements under the broad risk category of political risk are defined by Delmon, 2009, p. 179-187, as: change in budget, government or political will; expropriation of the asset; war; rebellion; terrorism; default and delay from public sector project participants; change in laws and the regulatory environment and force majeure risk.

The grantor, which is Eskom in South Africa, can accept this risk through the Concession Agreement as Eskom, as a public utility, is best capable to influence the outcome of political risk as a state-owned utility (Delmon, 2009, p. 179-187). Another option is the involvement of DFIs who can provide cover for political risk through specialist political risk insurance and financial instruments, in addition DFIs usually provide funding for the political entities' projects so they are unlikely to ignore the requirements of a DFI backed project which lends political visibility on an international and local scale. Furthermore, the involvement of local lenders, local shareholders and subcontractors can align the project with national development targets through providing employment and social upliftment which increase the political will for the project's success.

These activities, however, can only allocate a portion of this far reaching risk away from the SPV and the rest will be borne by all financiers and investors active in the project (Delmon, 2009, p. 179-187).

7.2.14. REGULATORY RISK

The challenge for regulatory setting entities is to provide private investors with the incentive, predictability and reassurance to attract their capital into the sector which is provided through effective, stable and defined market signals and mechanisms which are communicated to the market through setting policy and regulation that have affect over the long term (Wiser and Pickle, 1998; Jechoutek and Lamech, 1995; Raab, 2008; Wizelius, 2007 and Sonntag-O'Brien and Usher, 2004). The focus of these policies should be concentrated on reducing costs and improving revenues which have the overall affect of increasing profitability, and on reducing uncertainty and risks for investors and financiers, in a manner that best answers broader policy objectives (Raab, 2008).

All financiers and investors require is that the business environment is predictable so they have the security and liquidity in order to maintain the cost of capital at a reasonable level so this policy framework must create a situation where those who invest in wind power projects are guaranteed a market for their output and revenue certainty from these activities (Sonntag-O'Brien and Usher, 2004). It is then the challenge of the regulator entities to create an enabling environment to facilitate a predictable business environment (Jechoutek and Lamech, 1995, p. 941-953). America, Europe and an increasing number of developing nations have guaranteed a fixed price power through regulatory mechanisms and have been successful in creating an enabling environment through the setting of major structural and policy reforms and they have been successful in attracting capital to their power sector, reduce renewable energy risks, and therefore reduce financing risk premiums (Jechoutek and Lamech, 1995; Dunkerley, 1995; Wizelius, 2007; and Wiser and Pickle, 1998). In other words it is the public players who have a direct impact on the availability and cost of project funding.

The regulatory risk element that exists in the South African IPP wind power market is more of an uncertainty at this stage than a well defined risk. In the NERSA document “Regulatory Rules for Power Purchase Cost Recovery” they set rules that are in line with the broader policy objectives under the Electricity Regulation Act, 2006. One of these rules is to, “promote transparency, consistency and predictability in regulatory approaches and minimise perceptions of regulatory risks.” This is a clear example of the mandate that NERSA, a public player, has set it self. However, to date they have not been successful in implementing a clear institutional framework and thereby minimising perceived regulatory risks. This uncertainty comes from many undefined processes such as the outcome of the REFIT and the PPA documentation process; the outcome of the DOE’s Integrated Resource Plan 2 (IRP2); the regulatory issues pertaining to how wind power projects will interact with the national grid; and the timeframe that it will take to define these regulatory uncertainties which all lead to insecurities for investors (Boust, 2009; and Raab, 2008).

Potgieter, 2009, from Investec, supported this view as he explained that regulatory risk is vital to any financier, investor or stakeholder in a domestic wind market as it is under the regulatory framework that all activities along the value chain are regulated and controlled. Without a reliable regulatory framework there can be no enabling environment to set the structure for how value moves among stakeholders throughout the value chain. Potgieter, 2009, clearly stated that there is only one important project risk in South Africa and that is regulatory risk. The specific components of this project risk, ranked in order of importance, are firstly the generating license; secondly the PPA; and thirdly the grid connection (Potgieter, 2009).

This point is further stressed by Sipha Ndawonde, from Frost and Sullivan as quoted in Creamer [3], 2009, "What is required now is more dialogue between the regulators of the renewable energy industry on issues such as grid stability, grid connection costs and the timeframe in which these issues will be resolved" (Creamer [3], 2009).

It is this "dialogue" that is key to the successful development of a wind industry and the effective attainment of the broader national policy objectives. It is the public players in South Africa that currently hold the key to unlock this market's potential.

7.2.15. REGULATORY TIMEFRAME

Wizelius, 2007, argues that political policy influences the pace of wind power development in a country's power sector in two manners: firstly, in setting of the regulation that defines the procedures and permissions that are necessary to develop a wind power project; and secondly, the setting of the framework to allow for the economic conditions to facilitate that the output of the project can be sold and distributed. The pace of the wind power development varies with the varying levels of support given by governments to wind power policy and regulation (Wizelius, 2007). The IRP1 and 2 will contain the portfolio of generation sources that will satisfy South Africa's energy demand over the long term and it is this document that will control the amount of wind power that will be included in this long term energy plan. Once the financial community understands the amount of wind power that will be included in South Africa, or the size of the market, as stipulated in the IRP, there will be a significant portion of uncertainties that will be defined, the largest of which, is the Government's commitment. This is a clear regulatory risk in South Africa under the current market conditions.

Further regulatory concerns for both international and domestic commercial banks, according to Eardley-Taylor, 2009, from Standard Bank is on two levels: firstly, that the state understands the detail of renewable projects and that they get the documentation done in a way that works from the bank's perspective; and secondly, that these processes are executed in a timeframe that will not render existing projects financially unattractive.

O'Flynn, 2009, from Mainstream Renewable Power, shared the same concern as he believes that there is an "open arms" attitude from a regulatory point of view in South Africa and, through Mainstreams relationships with the appropriate levels of government, they believe that all indications are that regulatory body want renewables to happen and it is the *how* and *when* factor that is the issue rather then the *if* factor (O'Flynn, Personal interview, 2009). The how and when factor is the influx of international expertise that brings along with international best practises in terms of PPA structure, grid licensing, grid procedures and project development. O'Flynn, 2009, from Mainstream Renewable Power identified the finer regulatory details that stand out as uncertainties: the format of the PPA document; the response time for grid applications; the actual cost to connect to the grid; and actual grid licensing and other issues with dispatch into the grid. O'Flynn, 2009, explained that, "the majority of the puzzle pieces are there and the only thing outstanding at the moment are the finer details of the regulatory issues that will only really be flushed out as the first project moves through the development path."

7.2.16. REFIT AND THE PPA PROCESS

The Renewable Energy Feed-in Tariff (REFIT) has created a clear signal to both financiers and investors as to the political will of the South African Government and the potential to earn returns off their investment through the guarantee of a tariff for the project's output.

Maarten van der Horst, from GDF Suez as cited in Creamer, [2], 2009, explained that the REFIT created a “strong incentive” to the financial community and that proposed tariffs under the REFIT, particularly for wind power, creative the incentive for investors to “seriously” consider investment opportunities in South Africa. This signal has essentially created the basis for the industry and caught the attention of private investors of both equity and debt, the next step is to define how, when and what returns are available.

Phase 1 of the REFIT policy mechanism defined the tariff levels and qualifying technologies in NERSA’s media statement, “NERSA Decision on Renewable Energy Feed-In Tariff (Refit)” as released on the 31 March 2009. Phase 2, NERSA Consultation Paper on the REFIT was then released on 17 July 2009, which identified further qualifying technologies and included a proposed PPA document for public comment which was finalised in a media statement, NERSA decision on renewable energy feed-in tariff (REFIT) Phase II, made on the 02 November 2009. At this point there are three uncertainties that require clarity: the structure of PPA, the REFIT Cost recovery mechanism, and finally the criteria for selecting IPP’s and the procurement process.

The undetermined, vital project document of the PPA is a significant outstanding uncertainty. Viljoen, 2009, from Cresco Project Finance supported this view as from his perspective the real outstanding issue is a stable regulatory framework under which this financial process can act with certainty. Financiers and sponsors want to know that a project has a secured, stable and attractive cashflow over the life of a project. This stability can only come in the form of a PPA which is the key outstanding issue that stands between the South African wind energy projects and financing. The NERSA Phase II, 2009, media statement state that, “the standardised Direct Agreement, Fuel Supply Agreement (FSA), Transmission Connection Agreement (TCA) and Transmission Use of System Agreement (TUOSA) be included as Schedules of the REFIT PPA in the first annual review of the REFIT." So without the PPA and it associated schedules, much of the vital project financing documentation is undefined. In other words it is the timing and the structure of the PPA that will define these outstanding uncertainties that will eventually drive the risk and risk appetite in South Africa (Industry Participant, BNP Paribas, 2009). Maclay, 2009, from Actis describes this uncertainty of an undefined PPA process as the largest barrier to South Africa wind project financing.

As explained before with project-finance arrangements, the lender looks primarily to the cash-flow and assets of a specific project for repayment rather than the assets or credit of the promoter of the facility. This means that in the absence of a well defined PPA debt cannot be forthcoming and investors cannot commit capital to the project. Maclay, 2009, described that Eskom, NERSA and the Government are all the same when it comes to opening a PPA to potential developers and it is only once this issue is clearly defined that the financing and its specific terms will become clear. Maclay, 2009, stated that Actis were happy about the level of the REFIT but how this tariff is implemented is the biggest uncertainty at this stage and once the PPA is defined will it be sufficient to facilitate the returns that Actis is looking to gain.

From the debt side, Eardley-Taylor, 2009 from Standard Bank gave the example of the MTPPP and the PNCP which were two programs that were not supposed to be financed under a project financed structure. So when it came to the REFIT PPA, NERSA sent a PPA document to the major banks to comment on, however when they finally announced the REFIT it was stated that the PPA would build off the structure of the MTPPP. This PPA discussed "day ahead dispatch" which is not a possibility for RE technologies that rely on intermittent resource supply. It is this type of misunderstanding in the format that the important project finance documentation for Renewable energy projects should take that stands out as a major concern for Standard Bank (Eardley-Taylor, Personal Interview, 2009).

Eskom's role, as defined under the REFIT, is as the renewable energy purchasing authority (REPA), and the single buyer office (SBO) is also situated within the power utility, thereby designating Eskom as the offtaker and responsible for the long term purchase of wind generated electrical power (Haffajee, 2009, as cited by van der Merwe, 2009). This means that Eskom will have to pay renewable energy generators the premium tariff proposed by the REFIT from the revenue they receive from the existing Eskom consumer tariff. However doubts existed as to whether these tariffs would be able to support the payment of the REFIT tariff over the long term, which is also a market risk, as it was estimated that to meet the 10,000GWh target by 2013, or nearly 700 MW of renewable energy power, would cost in the order of R3 billion annually for Eskom to recover the cost of purchasing that power under existing consumer tariff levels which were already under pressure from Eskom's R460 billion new-build programme (Haffajee, 2009, as cited by van der Merwe, 2009).

The criteria for selecting IPPs has not been specifically clarified in full and exactly what would qualify one project over another remains to be seen, furthermore the specific contribution of wind energy to the country's energy mix in the long term will remain unclear unless the DoE's 20 year integrated resources plan 2 was gazetted, while clarity as to whether the IRP1 and the 500MW assigned to wind from 2010 to 2013 would be a final number and not open to variation (Haffajee, 2009, as cited by van der Merwe, 2009). Viljoen, 2009, from Cresco Project finance identified the lack of clarity on the procurement process of Renewable energy/IPP power in South Africa as the largest outstanding uncertainty under the current environment. This procurement process uncertainty is made up of the lack of a defined PPA; whether it will be an open or closed process in terms of amount MW required; and whether it will be a tender process or not?

The above uncertainties are by no means an exhaustive list but all these uncertainties have the affect of leaving the key financing terms and variables largely unspecific which reflects the lack of clarity that the financiers and investors still have with regards to financing utility scale wind farms in South Africa. Inaction by the government and the associated energy public players has the direct affect of creating uncertainty which in turn affects the availability and cost of project finance for wind power projects in South Africa.

7.2.17. INTERACTION WITH THE NATIONAL GRID

The gird connection of wind power projects in South Africa stands out as a significant uncertainty in the financial community. The abundant wind resource in South Africa is often far away from the centres where the power is needed the most, therefore to transmit and distribute this power is of vital importance. So the uncertainties that stand out are firstly, the time it will take to connect and strengthen the grid from where it is generated to where it is consumed, and secondly, who would bear the costs of this called wheeling costs. Yousuf Haffajee, 2009, the Eskom market development manager, as cited in Engineering News, claimed that, "the challenge of connecting generators to the grid should not be underestimated, as it was substantial." Furthermore Haffajee, 2009, stated that, "the development of renewable energy power plants, which sat idle because they were unable to connect to the national grid was a situation to be avoided" (van der Merwe, 2009). Eardley-Taylor, 2009, from Standard Bank, agreed with this issue as he explained around the world the issue of grid connection stands out when it comes to the development of wind farm projects and in South Africa, Eardley-Taylor, 2009, indicated that this will be a major problem in South Africa and a source of potential completion risk. The significance of this uncertainty is further supported by O'Flynn, 2009; from Mainstream Renewable Power as he state that access to the grid is a significant outstanding risk at this stage.

Greenwood, 2009, from New Energy Finance further identified the uncertainty of matters relating to the grid as he said that grid connection and capacity for wind energy projects would be larger issue in the minds of the financial community (Greenwood, 2009).

On the matter of grid connection, Eardley-Taylor, 2009, from Standard Bank discussed that in South Africa there are two major issues when it comes to connecting renewable projects into the grid: grid connection and grid strengthening. Eskom’s transmission and distribution business is responsible for this activity however Eskom is facing major funding problems and they have limited personal capacity so the thought of Eskom having to execute 20 plus concurrent grid connections in the Western, Eastern and Northern Cape plus strengthen the surrounding grid to support the new influx of power is shaping up to be the major barrier or delaying point at this stage of the market. What is more is that Eskom are already behind on upgrading the grid for their own new build projects so the probability of them prioritising grid connections and upgrades for IPP’s renewable energy projects is very unlikely so according to DOE and NERSA it will have to be the project developer’s expense to connect the project to the grid and to field the cost of this connection (Eardley-Taylor, Personal Interview, 2009). O’Flynn, 2009, from Mainstream Renewable Power explained that it takes more than a favourable feed in levy to facilitate wind power generators onto the grid and Mainstream is concerned as to the degree all the players involved understood what is required in connecting these generators to the grid. Currently there are no procedures or policies in place that facilitated the connection of IPPs to the Eskom owned transmission and distribution network, which stands out as a concern to Mainstream (O’Flynn, Personal interview, 2009). So it whether Eskom has the capacity, funding and skills necessary to facilitate the connection of wind energy generators to the grid stands out as a major uncertainty for potential financiers and investors in South Africa.

Potgieter, 2009, from Investec brought up the concern as to the cost of this grid connection that project developers would have to pay, as to date none of the developers have a clear indication as to what the cost of this process will be. The legislation around this topic that exists today is that the potential generator must make an application to NERSA which they will issue a cost with a 65% confidence interval to the project. However, Potgieter, 2009, explained that these estimates vary vastly between quotes for projects in close proximity to each other geographically and of similar structure. The exact cost of the gird connection in SA remains an uncertainty and a further risk component from the financier/investor’s perspective.

7.2.18. ENVIRONMENTAL RISK

Environmental Risk is the risk that the project will have an adverse affect on the natural environment that it will be built within and what the economic, administrative and environmental consequences will be and what the ultimate loss in total project value will be (Delmon, 2009, p. 187-190). The best wind resource is usually located in areas that are environmentally sensitive such as coast lines, mountains and natural protected areas, for instance in South Africa the West Coast where an abundant wind resource exists also contains the protected and endangered fynbos biome so micrositing will have to take into account these protected areas as defined under the EIA (Delmon, 2009, p. 187-190). Greenwood, 2009, from New Energy commented on this point as much of the land that has been earmarked for wind farm development is close to environmentally sensitive land such as nature reserves and settlements. A further element of environmental risk is that of force majeure, which can be explained as the risk of uncertain outcomes that pertain to the environment that are outside of the sphere of influence of the project its project participants (Delmon, 2009, p. 187-190). Environmental risk exists over the lifetime of the projects full development from recognition of need to decommissioning or repowering.

It is the environmental impact assessment (EIA) that officially outlines the potential impact of the project on the environment and it is required before a project can move out of the feasibility stage. In South Africa the environmental risks, resulting in an adverse affect on the project or a change in the environmental specifications, was becoming a larger consideration for financiers and sponsors (Pringle [2], 2009).

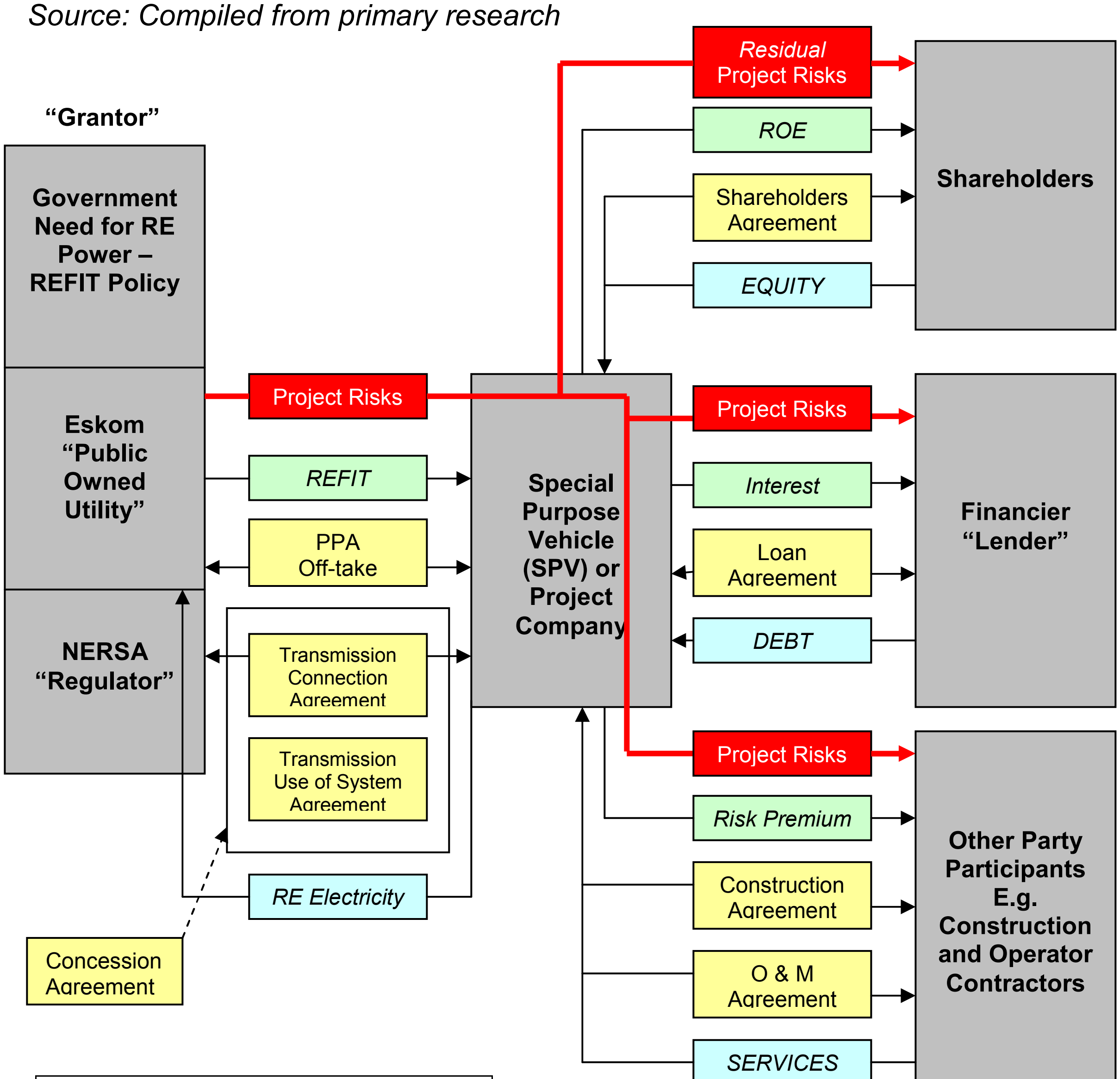
7.2.19. CREDIT/DEFAULT RISK

Credit risk, or default risk, is the risk that a project participant will be unable to perform the scope of their services according to the terms and conditions set out in the project documentation or supporting contract, with the consequence of a loss in overall project value (Delmon, 2009, p. 191-192). The investors to a SPV will be charged with the task to ensure that all the project participants are well placed to perform their obligations from the following perspectives: financial stability, technical capacity, available resources, longevity, capacity to bear risks and managerial capacity of each participant (Delmon, 2009, p. 191-192). This risk will be apparent from the pre-feasibility phase over the life of the project as different project participants have their input into the project. This risk can be allocated away from the SPV, its shareholders and the financiers through third party warrantees, bonds and retainage accounts that cover and default of contractual obligations.

7.3. RISK ALLOCATION: PROJECT FINANCE

Figure 4: Project Finance Structure and risk allocation

Source: Compiled from primary research



KEY	
Flow/Allocation of Project Risks	RED
Risk Remuneration	GREEN
Project Documentation	YELLOW
Project input	BLUE

Figure 3, above, identifies the project participants in a typical project financed wind farm in South Africa, it demonstrates the flow of project risks between project participants, the project documentation that transfers or allocates these risks amongst the project participants, indicates the risk remuneration vehicles and finally the project inputs of each project participant which each participant delivers in return for the risk premium they receive.

Major infrastructure projects require permission or enabling legislation from a governing body such as the state or relevant local authority which in most cases will be separate from the grantor of the concession agreement (Delmon 2009). In the case of South Africa, the government, implemented through the DOE and NERSA have made the policy provision for renewable IPP's in the country's power market through the 10,000GWh by 2013 renewable energy target, the mandate of 30% of new build must come from IPP generators, and finally the REFIT to mention the predominant governmental regulations. These policy objectives and the associated regulatory moves have created the space or demand for IPP's, so by an IPP filling this space the project company or SPV and its shareholders, financiers and other project participants will take on the project risks inherent in developing a power project in return for the R1.25/kWh REFIT tariff. These risks flow through Eskom, the state-owned utility, through the Concession Agreement which is made up of the PPA, which is signed by the Single Buyers Office (SBO) in Eskom as mandated under the REFIT Phase 1, and the Grid License, which is awarded by NERSA the regulator which also regulates the whole process which is mandated by the National Energy Regulator Act, 2004 (Act No. 40 of 2004). The REFIT Phase II was published on 2 November 2009 explains the Concession and power purchase agreement documentation that will be applicable under the REFIT of the standardised Direct Agreement, Fuel Supply Agreement (FSA), Transmission Connection Agreement (TCA) and Transmission Use of System Agreement (TUOSA).

These project risks then flow through the SPV and are allocated to different project participants so it is then essential, under a project financing structure, to identify risks, allocate them appropriately, and ensure that the responsible parties are adequately incentivised to manage their risks efficiently (Esty, 2004; Navigator Project Finance, 2009). This incentive comes in the form of remuneration for bearing a risk, which is increase in value the risk bearing entity receives in compensation for bearing the potential loss in value from worlds where the risk eventuates (Irwin, 2007). Each project participant will seek this risk remuneration through different vehicles: return on equity to shareholders; interest rates (cost of debt) from financiers; higher prices or risk premiums included in the contract price charged by project participants for bearing certain risks (Delmon, 2009, p. 157).

An SPV is set up under a project financed structure and the capital structure of the SPV will be a split between equity from investors and debt from financiers. By creating a space for IPP's in the generation mix in South Africa the government has handed over certain project risks to IPP project owners, for bearing such risks the SPV and its owners are remunerated through the return on the investment. However, it is the paid up equity from shareholders that will ultimately bear the majority of any unallocated risk as it is "first loss" or it is ranked junior to senior debt provided by banks (Sejersen, 2010). So, all residual risks that are not effectively allocated will in the first instance be borne by the SPV and it's the shareholders that are first loss when faced with any downside from residual risks (Delmon, 2009, p. 157).

If the shareholders cannot absorb the full impact of a residual risk, it is the financiers who will then be exposed. Financiers are risk adverse and are not the party best placed to manage many of the project specific risk, such as those found in construction and operation, so when financiers evaluate the project structure they will take great care in ensuring that as many of the project risks are allocated to the project participants away from their debtor; or the SPV (Delmon, 2009, p. 157). So it is the exposure of both shareholders and financiers to residual risk that will ultimately determine the cost of equity and debt respectively.

The other project participants, beyond the shareholders and the financiers, who will accept risk for remuneration, are the construction contractor(s) and the operator who will provide services, such as BOP works, during the construction and operation periods in return for a risk premium included in their fixed contract prices respectively. So the flow of construction project risks are allocated to the project company through the Concession Agreement and PPA and transferred to the construction contractor through the Construction Agreement and the operator through the Operation and Maintenance Agreement (Delmon, 2009). The ideal situation is where all the project risks are transferred to the other project participants and away from the SPV and this is called a back-to-back risk allocation basis (Delmon, 2009, p. 161). To accomplish a complete back-to-back risk allocation all the project documentation should mirror the terms of the project risks transferred to the SPV under the Concession Agreement between the off-taker and the SPV (Delmon, 2009, p. 161).

The risk management framework can be explained as identifying all project risks, understanding each project participant's risk tolerance, then deciding how each risk will be addressed and whether it can be avoided, accepted, or transferred according to the principle of risk allocation; to the party best placed to manage the risk, as to achieve back-to-back allocation of project risks (Sargent and Lundy LLC, 2001). This is essential under a project financed structure as risks can not be passed down to ratepayers, as is the case with utilities, but the risk is the ultimate responsibility of the developer, SPV and the shareholders and financiers (Sargent & Lundy LLC, 2001).

The financiers and sponsors will therefore require that through the contractual structure of the project documentation that risks are allocated away from the SPV to other project participants best placed to mange these risks in order to limit the exposure of the financiers and sponsors (Delmon, 2009). The allocation of risk can be defined as the process to determine the extent to which each party takes responsibility for unpredictable variation in project value to define how project participants share value in each possible state of the world (Irwin, 2007). Irwin, 2007, explains the concept of risk allocation as increasing or decreasing the value of a responsible party in different possible outcomes or worlds. In other words by allocating a risk to a project participant, in worlds where the risk factor turns out badly, this party will have a decrease in the value of their interest in the project, however in worlds where this risk factor turns out well or does not eventuate their value will be increased (Irwin, 2007). This guiding principle of risk allocation is detailed below.

7.3.1. GUIDING PRINCIPLE OF RISK ALLOCATION

The context for effective risk allocation is set by the point that if any risks are unassigned, this residual risk will be the ultimate responsibility of the project company and the financiers as explained above. So in order to achieve back-to-back allocation of risk the risk allocation should follow the guiding principle for efficient and effective risk allocation, where each risk is allocated to the party best placed to manage that risk in order to maximise total project value (Delmon, 2009; Ruster, 1996; Irwin, 2007). This is a broad statement as it does not define what it means to be "best placed" to manage a particular risk. Irwin, 2007, develops this concept as he explains that the risks should be allocated amongst party participants according to their ability to influence the sensitivity of total project value to the corresponding risk factor; anticipate or respond to the risk factor; and finally to absorb the risk.

Furthermore, risks and rights must be allocated together so that the party best placed to manage a certain risk also has all the rights and abilities to make the decisions that will manage the risk in a way that benefits total project value (Irwin, 2007).

Firstly, by allocating a risk to the party with the best ability to influence that particular risk factor the party is also allocated the potential increase in value that will occur if the party influences the risk to avoid its undesirable outcome (Irwin, 2007). So the party that is best placed to influence the risk factor will be incentivised to commit its resources to improve the uncertain outcome of the risk until the point that the extra cost of improvement is as great as the extra benefit, thereby increasing total project value (Irwin, 2007). Secondly, in some cases there will be no party that is best placed to influence the risk so the risk should be allocated according to the project parties' ability to anticipate and time to respond to the risk factor (Irwin, 2007). By allocating according to these concepts the party that is best placed to most influence the sensitivity of total project value to the risk factor to the party that is capable of responding in the shortest time frame to the risk induced change firm may maximise total project value through incentivising value adding responses to encourage positive outcomes from adverse changes in risk outcomes (Irwin, 2007). Thirdly, because parties are not risk neutral and financial markets are not perfect the first two components of the guiding principle for risk allocation are not enough, in some cases, to effectively allocate risk, so a third element is included, namely, the parties' ability to absorb the risk (Irwin, 2007). When project participants are risk neutral under the context of perfect financial markets then all participants would buy and sell risk exposure based on the outcomes, but irrespective of the variability of these outcomes, until there was no difference in the ability of parties to absorb further risk and the residual risks would matter equally to all project participants (Irwin, 2007).

In reality, however, participants are risk adverse and some parties will have a greater ability to absorb risks than others based on their ability to pass risks onto other parties and the risk aversion of the ultimate risk bearers (Irwin, 2007).

In reality effective and efficient, back-to-back risk allocation according to the guiding principle does not always occur. The three components outlined by Irwin, 2007 may work in different directions in the sense that the project participant that is has the best ability to influence a particular risk may not be the party that is best placed to anticipate, respond or absorb the risk so tradeoffs must be made according to the maximising of total project value (Irwin, 2009). While the guiding principle of risk efficient and effective risk allocation creates the ideal situation of back-to-back risk allocation, in practise, this does not always occur as commercial and negotiating strength of each project participant has a greater affect on the allocation of risks amongst parties (Delmon, 2009, p. 155).

Faced with the broader policy objectives project participants will allocate risk between themselves through the rules set out under the regulatory framework which is geared to reduce uncertainty. However, in South Africa the rules of the game have not been clearly set by the policy and regulatory framework which has left a large degree of uncertainty in financiers and investor's minds. This will have the effect of increasing transaction times and the cost of capital as sources of funds take conservative views on the undefined uncertainties.

7.3.2. RISK MITIGATION INSTRUMENTS

The majority of the allocation occurs contractually through the project documentation which will define the specific risk mitigation instruments that will be used to incentivise project participants to accept risk and deliver their project inputs in a way that protects the project company and its financiers.

In the construction phase of the project there are a variety of risk mitigation instruments that can be employed, namely: advanced payment, performance and completion bonds; contractual arrangements and associated guarantees; contingency funds and lines of credit; and private insurance; retainage, and liquidated damages (Ruster, 1996; Delmon, 2009; and Sargent and Lundy LLC, 2001).

Similarly, in the operation period of the project the risk mitigating instruments that are typical under a project financed structure are: contractual arrangements, contingency reserves, cash traps, cash sweeps, insurance, and risk compensation devices (Ruster, 1996; and Sargent and Lundy LLC, 2001). For South Africa the interviewees for the qualitative interviews were questioned as to their requirements for the inclusion of risk mitigation instruments. Eardley-Taylor, 2009 from Standard Bank explained that the bank would like to see projects packaged with the standard project finance risk mitigation instruments such as performance bonds, liquidated damages, and warranty bonds. O'Flynn, 2009, from Mainstream indicated that they require a 97% availability guarantee; 5 year warrantees that the turbines will perform as intended under the South African conditions.

7.4. CONCLUSION

Risks differ to uncertainties through a greater degree of predictability as uncertainty refers to an unstructured perception of the future where the probabilities of the different outcomes are unknown while project risks can be defined as the possibility of loss in project value associated with each uncertain, but possible, undesirable outcome where subjective probabilities have been assigned to the uncertain outcomes eventuating by project participants.

The allocation of uncertainties then becomes difficult because the actual value of the uncertainties can not be determined and the party best placed to manage, influence, anticipate and absorb becomes harder to identify. With a greater degree of uncertainty in a project financed deal the cost of capital will increase and transaction times will be drawn out. It is then the public players who need to define the policy and regulatory frameworks under which the associated uncertainties can be defined into risks, and the private project participants can then allocate these risks accordingly. This then highlights the important impact policy and regulatory entities have in determining the availability and cost of capital for project financed wind farms in South Africa.

For a project financed, utility scale wind farm in South Africa there are 14 broad risk categories, namely: country risk, political risk, credit/default risk, development risk, completion risk, environmental risk, construction risk, commissioning and performance risk, cost increase risk, production risk, resource risk, technology risk, operation risk, and finally market risk. This chapter has identified where each risk eventuates along the project's development phases and which project participant will typically be exposed to each risk, which party will be allocated each risk, and the type of financier/investor that will ultimately bear the residual risks. The identification and management of risks along the development process and who they affect is vitally important to a project finance structure as these risks have a significant impact on the key financing terms and variables that underpin the provision of project funds. One point that is common to most project financed structures is that any unallocated, or residual risks, will be borne by the SPV, and ultimately it will be the financiers and the investors to this SPV that bear these residual risks. Consequently, financiers and investors will insist that the project risks are allocated according to the guiding principle of risk allocation to achieve effective and efficient, back-to-back allocation or risk in order to maximise total project value and to minimise the SPV's risk exposure.

CHAPTER 8

AVAILABILITY AND COST OF WIND POWER PROJECT FUNDING IN SOUTH AFRICA

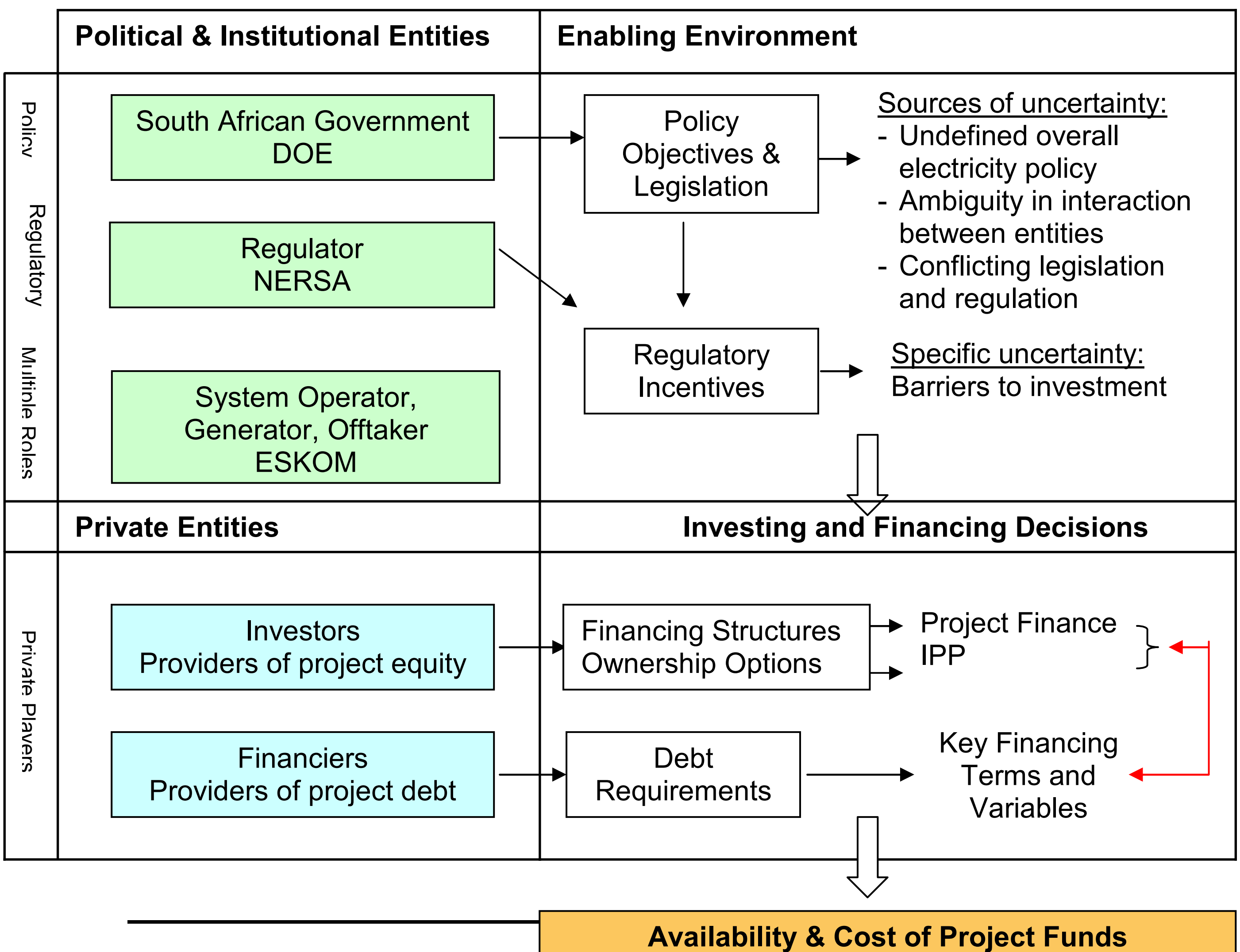
“Banks are looking for measurable risks and for risk mitigation measures and not the absence of risk.”
(Jérôme Guillet, Dexia Bank, as quoted by Sejersen, 2010)

The thesis has examined the way in which investors and financiers set the availability and cost of their project funds in response to the enabling environment in the wind power sector in South Africa. Risks differ to uncertainty through a greater degree of predictability and it is the gaps in this enabling environment that serve to create uncertainty. With limited predictability financiers and investors will make the decision to reduce the availability and take a conservative view on the cost of project funding. Investors and financiers make decisions around whether to invest, ownership options, and finance structures which are based off the degree of perceived uncertainty in the enabling environment. Once these decisions have been made they will communicate the nature of this investment through their set of key financing terms and variables.

In South Africa there are a series of broader points of uncertainties in the enabling environment: the lack of an overall guiding policy for the electricity sector; the ambiguous interaction between the policy, legislative and regulatory entities; and the conflicting set of legislation and regulations passed by these entities. Under these broad areas of uncertainty there are a host of more specific uncertainties that stand as barriers to investment for potential IPP's. Faced with these uncertainties in the South African enabling environment, many investors and financiers have taken the decision to invest with a tendency towards an IPP ownership option, through a project finance structure. However, the actual nature of this commitment, in terms of the set of key financing terms and variables, will be based off the distinction of the uncertainties going forward. Figure 5, below illustrates the process explained above.

Figure 5: IPP Response - Financing and Investment Decisions

Source: Compiled from primary research



8.1. KEY RESEARCH QUESTIONS: CONCLUSIONS

The specific conclusions of the thesis will be outlined under the key research questions presented in Chapter 1.

What are the policy objectives and the associated Regulatory Framework that pertains to the development of a wind power market in South Africa?

There has been a series of steps taken to establish an enabling environment however they have lacked the implementation mechanisms to make them a reality. There were two white papers that are relevant to the electricity sector that set out targets with very little context under which these targets could be achieved. The reform process under the 1998 White Paper on the Energy Policy was abandoned in 2004 while the 2003 White Paper on Renewable Energy set the Renewable Energy target of 10,000 GWh by 2013 which set a weak policy objective to drive legislation and regulation. The target did cause some political momentum as it was the justification NERSA used to pass the favourable REFIT tariff. This tariff was somewhat undermined by the DOE with the August regulations that served to put a cap on the REFIT and restrict it to a tender process. Added to the above contexts is South Africa's recent , conditional, commitment to the UNFCCC in terms of the Copenhagen Accord; South Africa is committed to a 34% deviation below the ‘business as usual' CO_2 and GHG emissions growth trajectory by 2020, and a 42% deviation below the ‘business as usual' trajectory by 2025.

The policy, legislation and regulation in the electricity have caused some political momentum that has attracted the attention of private investment. However, the lack of an overall guiding policy for the electricity sector; the ambiguous interaction between the policy, legislative and regulatory entities; and the conflicting set of legislation and regulations passed by these entities have served to create uncertainty to investors and financiers.

What gaps exist in the enabling environment for wind power projects in South Africa?

This question essentially addresses the how the gaps in the enabling framework create uncertainties for investors. Under the broader uncertainties explained in the previous question there are more specific barriers that were communicated in the exploratory interviews. The purpose of the thesis was not to delineate an exhaustive set of these barriers but rather to highlight some of the more pertinent barriers with respect to project financing and describe how financiers and investors will react to the degree of uncertainty in these barriers. The outstanding uncertainties that came out of the analysis are particularly focused within the policy, regulatory enabling environment:

- A clear counter party needs to be identified as an independent system and market operator (ISMO) separate from ESKOM;
- The responsibilities and mandate of the offtaker must be set;
- A workable set of project documentation needs to be put in place to access the REFIT such as the Power Purchase Agreement (PPA), Standardised Direct Agreement, Transmission Connection Agreement (TCA), and Transmission Use of System Agreement (TUOSA);
- The transparent grid connection process needs to be set;
- The transparent and defined IPP selection process, with a clear set of selection criteria needs to be documented and nominated implementing parties need to honour this bidding process.

What is the predominant financing structure and ownership option for utility scale wind power plants globally and in South Africa?

For the development of a utility scale wind power plant there are three main financing structures: government financing, corporate financing, and project financing, which are commonly matched to three common ownership options of: nonutility generator (NUG), investor owned utility (IOU) and public utility ownership (PUO). Traditionally project financing under a NUG or IOU ownership option has been used to develop wind power projects globally especially in the early stages of a wind market's development due to high inherent uncertainties in a new, undefined market. The research revealed that this will be no different in South Africa with a focus on project finance structure and a private IPP ownership option. This is at least relevant for early stages of the market when uncertainties are high with the possibility of corporate financing as the market develops and uncertainties are worked into a defined set of risks founded in past practise. The preference for project finance is due to the non- or limited recourse debt that is offered by banks under this structure so that sponsor's balance sheets are protected by the high level of perceived project risks with a particular relevance to regulatory risk. An IPP ownership option is essentially the only vehicle open to private developers as the South African electricity sector is heavily regulated with Eskom as the dominant utility.

Who are the financiers and investors that have chosen to invest in response to the signals in the enabling environment?

A typical project financed, utility-scale wind farm project goes through seven identifiable project development phases namely: pre-feasibility; feasibility analysis; financing and project documentation; contracting and planning; construction; operation and maintenance; and repowering *or* decommissioning.

Over these phase different combinations of debt and equity are used with varying risk exposure to fund the development and operation process. Four broad ranges of equity funders exist: strategic investors, institutional investors, equity investors and CDM buyers, while debt providers can be broken down into commercial banks, institutional investors and development finance institutions (DFIs).

In South Africa there is an overwhelming support from the private players that have moved their focus into the wind energy market in South Africa. The financiers and investors interviewed in the exploratory interviews explained that if the environment is right then the funding will flow easily into the project. This highlights the pressing need for an enabling environment founded on strong policy signals with defined roles and responsibilities. Under this framework all major risks can be appropriately identified, assessed, mitigated and allocated to facilitate the provision of this debt.

There are four, possibly five, domestic commercial banks that have openly commented that they want to finance wind power projects South Africa and there are a host of private investors and developers that are in the process of developing portfolios of potential wind power plant sites and building up their local operations. More specifically the strategic investors that are likely to develop large portfolios will be:

- Macquarie Capital and Old Mutual through their cooperation called African Clean Energy Developments;
- Investec and GDF Suez;
- Mainstream Renewable Power;
- RES;
- With smaller developers pursuing individual projects such as the Electrawinds, Watt Energy with Tsitsikamma Community Wind Farm, and the Central Energy Fund with Nelson Mandela Bay.

Many of these smaller developers will rely on the expensive and low return pioneering work done by the larger strategic investors so will only invest at a later stage. These investors will be active throughout the development process with all of them focusing on development and the majority looking to operate the wind farm but with limited ownership in the operational phase of the project. The four, possibly five domestic commercial banks will be: Standard Bank, FNB, Nedbank and ABSA, while Investec is unlikely to finance. Finally, the DFIs, namely the World Bank, AFD, AFDB, IDC and DBSA, will all play an important role in facilitating pre-investment finance and technical assistance to move the projects from identification of the need for the project to financial close. Most importantly the DFIs, and their ability to absorb a higher degree of sovereign/political risk, will make these institutions crucial for the market through filling the gaps where private finance will be too risk adverse. This is especially relevant to longer debt maturity periods where private finance will stop at 8 to 10 years while DFIs can extend past those loan tenures.

There has been an overwhelming response to the REFIT from the private finance community however whether they will invest and the nature of this investment will be in response to the level of clarity in the enabling environment.

What project uncertainties and risks stand out in the market financiers/investors to the South African wind energy market?

For a general project financed, utility scale wind farm there are 14 broad risk categories, namely: country risk, political risk, credit/default risk, development risk, completion risk, environmental risk, construction risk, commissioning and performance risk, cost increase risk, production risk, resource risk, technology risk, operation risk, and finally market risk. In the early development phases risks' potential impact are more severe as there is more uncertainty in these risks.

This is why in South Africa it is so important to limit this uncertainty in setting the right enabling environment. These risks have a significant impact on the key financing terms and variables as any unallocated, or residual risks, will be borne by the SPV, and ultimately it will be the financiers and the investors to this SPV that bear these residual risks. Consequently, financiers and investors will insist that the project risks are allocated according to the guiding principle of risk allocation to achieve effective and efficient, back-to-back allocation or risk in order to maximise total project value and to minimise the SPV's risk exposure.

South Africa has limited experience in wind power and there are a large degree of broader uncertainties in the enabling environment as defined above. So many of these risks remain as uncertainties as investors and financiers have insufficient information to define them into predictable risks. These uncertain project risks will serve to reduce to availability and cost of project funds in the sector.

What are the ranges of key financing variables for project financing utility scale wind farms in South Africa?

The ranges of key financing terms and variables were compiled from the 10 qualitative exploratory interviews, representative of South African financiers and investors. These ranges are represented in Table 22, and were generally within and below the ranges as stipulated in the literature review.

Table 22: General ranges of the key financing terms and variables from the qualitative interviews compared to those from the literature

KEY FINANCING VARIABLE	EXPLANATION	TOLERANCE	
		Literature	Exploratory Interviews
Capital Structure	Debt to equity Ratio	50/50 – 90/10	60/40 – 80/20
Debt Interest Rate	Interest Rate	8.5% – 14.90%	12% – 14%
Debt Maturity	Length of the Loan, years	10 – 15 yrs	8 – 15 yrs (refinance)
Debt Amortisation	Debt payment schedule	Mortgage-style Repayment	Sculpted and Mortgage
Debt Service Coverage Ratios	Minimum acceptable value for the DSCR	1.35 – 1.60	1.2 – 1.4
Equity Return	Return on Equity (ROE), Internal Rate of Return (IRR)	16% to 20% USD IRR	ZAR: 18% - 20% Dollar: 11% - 25%
Payback Period (Equity)	Number of years	-	12 years

Source: Compiled from primary research

How does this range reflect the perceived level of uncertainty financiers/investors see in the South African wind energy market?

The ranges determined from the South African interviews were generally in line with the ranges as stipulated in the literature however they tended towards the more risk-adverse end of this spectrum, i.e. stricter and more costly. How this conclusion reflects perceived uncertainty, or risks, can be answered through the consideration of two elements. Firstly, the key financing terms and variables reflect the perceived level of uncertainty and risks that a specific financiers or investors sees in the enabling environment of the project. Secondly, that there is an important distinction between uncertainty and risk: Risk differs to uncertainty through a greater degree of predictability as the different outcomes of a risk can be identified and managed.

From the perspective of the first element one would conclude that while financiers are willing to extend a higher portion of funds in the capital structure they will offer this debt on stricter terms and at a higher cost of debt which reflects their high perception of uncertainty and risks in the South African wind energy project finance arena. This is true for equity investors too who require a higher minimum ROE than those published internationally. However, this result must be viewed with some caution as if we analyse the outcome with the second element in mind, the distinction between risk and uncertainty, we can see that presently too many uncertainties exist in the market for funders to communicate an accurate and tailored set of key financing terms and variables for the South Africa utility scale wind power plant development. So these ranges will be skewed towards the stricter end of the spectrum to take into account the large variation in outcomes due to uncertainty rather than predictable risks. This outcome of an apparent stricter set of key financing variables and the lower risk appetite must also be reviewed in the context of the global limited liquidity and overall tighter risk tolerances under the global financial crisis. The literature reviewed is predominantly before the advent of the financial crisis, whereas the qualitative exploratory interviews were conducted well into this crisis.

In the presence of a higher degree of uncertainty investors and financiers will set a stricter set of key financing terms and variables. The ranges expressed in the exploratory interviews tended towards the restrictive end of the spectrum which was in response to the high degree of perceived uncertainty in the enabling environment.

What is the impact of uncertainty on the availability and cost of project funds?

The literature defines the distinction between *uncertainty* and *risk*, where uncertainty refers to an unstructured perception of the future where the probabilities of the different outcomes are unknown, whereas risk is used to explain the situation where the alternative outcomes have been specified and probabilities have been assigned to them (Venetsanos et al., 2002; and Nevitt and Fabozzi, 2000, as cited in Irwin, 2007). So under this definition risks differ from uncertainty through a greater degree of predictability. Risks will interact with the key financing variables in the sense that a project with a high degree of perceived risks will result in shorter investment horizons, increased equity requirements, reduced debt maturity, and larger debt and equity risk premiums. This will affect the amount, timing and availability of funds for project finance. The investment and financing decisions that private players will make in response to steps taken in the enabling environment are:

- Manipulating the availability of their funds (i.e. to invest or not, how much to invest or loan);
- Choosing an ownership option and financing structure
- Setting the cost of their funds
- Determining the set of requirements and covenants under which they will make their funds available
- Setting their key financing terms and variables

Investors and financiers will choose to divert funds away from uncertain or risky markets and if they do choose to invest their funds will be limited, offered with stricter terms and at a higher cost. In South Africa it is the gaps in the regulatory framework which have the direct result of creating uncertainty and increasing the level of perceived regulatory risk in the South African wind power sector.

So the inaction from the public players on defining the set of barriers will have the result of limiting the availability and cost of funding; increasing the overall cost to IPP's in supplying energy through more costly debt; and thereby eroding investor returns.

8.2. CONCLUSION

There is an overall positive attitude towards investment and financing IPP project financed wind power projects in South Africa however due to the high degree of perceived uncertainties in the enabling environment the availability and cost of project funds will be restrictive until the policy, legislative and regulatory framework defines these uncertainties. The broad set of uncertainties revolve around: the lack of a common and transparent understanding due to the missing overall policy objectives for the electricity sector; the confusing set of legislation and regulation that do not detail the clarity as to how these policy objectives will be met; and the overall dominance Eskom due to its multiple and somewhat conflicting roles in the electricity sector. These broader uncertainties form the context for the specific barriers to an investor and financier friendly environment which cover the undefined project documentation such as the PPA, the grid connection process and how the selection criteria will apply.

Investors and financiers respond to uncertainty through the manipulation of their key financing terms and variables. It is these vehicles that set the amount, terms, requirements and costs or returns that financiers and investors require to invest when exposed to a certain level of uncertainty or risks. The key financing terms and variables will be changed along a spectrum of favourable to restrictive in the presence of a higher degree of perceived uncertainties and risks. This movement has the effect of either protecting the financier or investor through a greater restriction on the amount of funds they invest or through increasing the value they receive for taking on a higher degree of uncertainties and risk.

Risks differ to uncertainty through a greater degree of predictability so the variation in value of uncertainties can be expected to be larger than that of risks. So the key financing variables are expected to be more restrictive in a market with more uncertainty than that of a market with more predictable risks. This is the case in the ranges expressed by the exploratory interviews for South Africa, which were generally closer to the restrictive end of the spectrum when compared to the ranges sourced from the literature.

So there is sufficient commitment and capacity in the financing landscape for IPP, project financed wind power projects in South Africa. This is characterised by readily available funding which is communicated by the overwhelming interest from potential financiers and investors. However, the project specific cost and terms on which these funds will be extended are largely undefined as there is no first project and insufficient certainty in the enabling environment.

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