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Entrepreneurship in Carbon Trading
A case study of South Africa

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The Kyoto Protocol and its implementation brought forward issues of climate change and its mitigation strategy by national measures through the creation of market mechanisms in carbon trading. The Trading of Emission certificates has become an important trade commodity worldwide and its markets have diversified. While this opportunity has created new markets for entrepreneurs and actors that range from farmers to brokers, unequal involvement in most developing countries has been noted. This has been mostly observed in those countries where entrepreneurship is often regarded as the cornerstone of economic growth and social improvement. South Africa has spearheaded other African countries in its implementation of CDM projects leading to carbon trading. Based on a case study of the current entrepreneurial representation in carbon trading in South Africa, the findings suggest that albeit a number of opportunities, the biggest challenge for entrepreneurial participation remains in the nature and processes of the CDM project implementation, the lack of a clear supportive system, limited access to financing and general ignorance of the trading opportunities. The complex nature of the CDM projects themselves limits participation due to lack of the necessary skills on the national level leading to uneven distribution of CDM projects on provincial levels. Our discussion has employed an exploratory as well as a descriptive research method to explore the existing opportunities and challenges for entrepreneurship in carbon trading in South Africa and the barriers that entrepreneurs may face in order to penetrate it.

Key words: Entrepreneurship, Carbon Trading, CDM.

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Acronym

AAUs	Assigned Amount Units
ACAD	Africa Carbon Asset Development
BEE	Black Economic Empowerment
CAN	Climate Action Network
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CO2	Carbon Dioxide
DBSA	Development Bank of Southern Africa
DEAT	Department of Environmental Affairs and Tourism
DME-	Department of Minerals and Energy
DNA	Designated National Authority
DOE	Designated Operational Entity
DoE	Department of Energy
DTI	Department of Trade and Industry
EIP	Eurostat Entrepreneurship Indicator Program
ERC	The Energy Research Center
ERCs	Emission Reduction Credits
ERs	Emission Reductions
ERU	Emission Reduction Units
ETS	Emissions Trading Scheme
EUA	European Union Allowances
FIF	Financial Innovation Fund
FNB	First National Bank
GHG	Green House Gas
GIBS	Gordon Institute of Business Science
IDC	Industrial Development Cooperation
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
LGSF	Local Government Support Fund

LoA	Letter of Approval
OECD	Organization for Economic Co-operation and Development
PDD	Project Design Document
PIN	Project Idea Note
SEDA	Small Enterprise Development Agency
SMEs	Small and Medium Enterprises
SSA	Statistics South Africa
SSN	SouthSouthNorth
TRCs	Tradable renewable certificates
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
URC	United Nations Environment Program Risoe Centre
VCS	Voluntary Carbon Standard
VCU	Voluntary Carbon Unit
VERs	Verified Emissions Reductions

1. Introduction

The First chapter serves to introduce and highlight the issues that are discussed in the paper as a whole and more importantly to indulge the reader in understanding the aims that the research seeks to achieve. Moreover, the chapter is divided into five parts, namely: the background, the problem statement, the research question, the purpose of the study, the scope of the study and finally, the paper disposition.

1.1. Background

“Becoming carbon neutral is only the beginning. The climate problem will not be solved by one company reducing its emissions to zero, and it won't be solved by one government acting alone. The climate problem will not be solved without mass participation by the general public in countries around the globe” (Rupert Murdoch, 2007).

In recent years, climate change and its impact on the environment has come at the forefront of worldwide concerns. While immediate remedies for the actual and foreseeable impacts have not been found, various alternatives to mitigate its effects have been brought forward (Capoor & Ambrosi, 2008). The initial agreement was brought together in 1997 through the Kyoto Protocol and was processed through the United Nations Framework Convention on Climate Change (UNFCCC). However, it came into more evidence around 2005, after the Montreal Protocol which had also been preceded by the Marrakesh Protocol that was held in 2001 (William et al., 2007). The ultimate goal of the protocol is to achieve collective efforts in the reduction of Greenhouse Gas (GHG) emissions. The reduction of the emissions has become a vital priority as their perilous effect has come into evidence in the form of extreme alteration of the climate around the world, causing harsh drought, rising in water sea levels, extreme cold and hot temperature to name but a few (EPA, 2010).

While the reduction of emissions of GHG has been recommended to all countries worldwide, reduction carried out by certain countries is more urgent than others. This is particularly because the GHG, which are made up of almost 60 per cent of Carbon Dioxide (CO₂) and fewer amounts of other gases such as Methane, Nitrous oxide and Fluorinated gases are generally created through human activities and more predominantly in highly industrialized nations (EPA, 2010).

Country Categories in Brief

The Kyoto Protocol classifies countries in three separate categories: Annex I, Annex II and Non-Annex Countries. Annex I is made up of all industrialized nations that are members of the Organization for Economic Co-operation and Development (OECD) and other economies in transition. Similarly, Annex II comprises OECD countries with the exception of some countries in Annex I, Countries in both categories are generally mandated to achieve a reduction of 5.2 per cent below 1990 emissions levels by the year 2012 (UNFCCC, 2008). Non-Annex countries, on the other hand, have either negligible amounts of emissions or are from developing nations and therefore need to voluntarily adopt a strategy allowing them to be more active in curbing the GHG emissions (Wara, 2006). The distinctive difference between obligations of Annex I and II countries is that the latter has the obligation to reach its target through sponsorship of projects in Non-Annex countries (UNFCCC, 2008). The list of country annexes can be found in the Appendix.

Carbon Trading Mechanisms in Brief

The mechanisms proposed in the Kyoto Protocol are namely; Carbon trading, otherwise known as Emission Trading, The Joint Implementation otherwise known as Joint Initiative (JI) and The Clean Development Mechanism (CDM). Carbon trading is the overall utilized terminology to express the transactional process applied in emission trading for both the CDM and JI mechanisms. These mechanisms could be adopted in relevance to the category within which the country has been classified in the protocol. Annex I refers to the forty countries mandated to reduce emissions by the UNFCCC. These countries are mostly industrialized countries; they are bound by the agreement with targets to reach a certain reduction level of greenhouse gas emissions by the year 2012. In the same breath Annex B countries are an added version of Annex I as they were included after the protocol was amended in 1998. Hence, countries such as Monaco and Liechtenstein are listed as Annex B and yet not as Annex I (Metz et al., 2007). Annex II countries, on the other hand, constitute twenty four countries that feature in the Annex I category but typically belonging to the OECD. They are not only mandated to reduce their emissions but also to financially assist developing countries such as those in the non-annex category in their adaptation of cleaner technologies. Lastly, Non-Annex countries refer to developing nations with non-binding targets in the protocol (ibid).

Carbon trading has progressed significantly in developed countries (Annex I Countries) through a scheme known as the Cap and Trade (UNEP, 2009). In this scheme firms can trade their allowances by capping on their emissions, the traded emissions are known as the Assigned Amount Units (AAUs). Similarly a somewhat different mechanism has been proposed to Non-Annex countries. Through the CDM, Non-Annex countries can attract investment from Annex I Countries in order to develop cleaner technology that allows the investing country in question to buy in on future credits. Additionally, they can also be awarded financial assistance in order to develop clean technology projects that allow them to offset carbon and acquire credits that they can sell on an international market (CAN, 2009). The credits are thereby measured and validated through a number of national designated authorities and international bodies. Carbon credits are thereby awarded in the form of Certified Emission Reduction Units (CERs).

The importance of the carbon trading industry has evolved with many countries' determination to reach their abatement targets but also with changing consciousness of the customers and other shareholders who constantly demand that the firm that they associate with reflect the values they believe in. For such reasons, the demand and the pool of potential carbon credit customers continue to grow consistently (Milunovich et al., 2007). While most critics have been highly skeptical of the effectiveness of these mechanisms in terms of reaching its goal of eventually slowing down the negative impacts of climate change, an equally large group of critics seem to agree on the importance of the CDM projects in boosting the economy of the largely impoverished Sub-Saharan Africa (UNFCCC, 2008). Since the agreement, the adoptions of this mechanism has been encouraged by the UNFCCC throughout Africa, but while a lot of CDM projects are coming up in South America and Asia, Africa is still lagging far behind, with few and far in between CDM projects in Kenya, South Africa and a few other African countries.

Types of CDM projects in brief

The trading of certified emission certificate is the incentive behind the development of CDM projects. For the projects to be approved as CDM, the projects are required to prove that the activities conducted have utilized approved baseline methodologies and that its emission reductions are able to be monitored and are measurable in a concrete manner (Kelly, 2008). The importance in the approval of the baseline methodologies is to ensure that issuance of

emission certificates is given to projects that actually make a clear difference whereby it can be proven that the reduction of emissions could not have occurred without the existence of the project (ibid).

The protocol identified six main greenhouse gases to be targeted for reduction through the implementation of the CDM projects. These gases are; Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydro fluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF₆) (UN, 1997).

As the mitigation of these gases can be achieved in their capture or diffusion, they can be classified in the following types of projects.

Table1: CDM project types and the targeted GHG emissions reduction

<i>Type of Greenhouses Gases</i>	<i>Type of projects</i>	<i>Example of CDM project</i>
Carbon dioxide (CO ₂) Methane (CH ₄) Nitrous oxide (N ₂ O)	Bio carbon projects & Industrial projects	Afforestation & Reforestation Land management & conservation Biogas and Animal waste management Reduction of Nitrous oxide from agricultural soils
Hydro fluorocarbons (HFCs), Perfluorocarbons (PFCs) Sulphur hexafluoride (SF ₆).	Industrial projects	Reduction in the use of the gases in Refrigeration, aerosol products and other industrial usage.

Source: Kelly, 2008.

In the establishment of a CDM project, the rules and criteria imposed on projects are decided by what is known as the Conference of the Parties, otherwise known as the COP/MOP. Through this role the COP/MOP receives recommendations from the UNFCCC's executive board on the approved methodologies as well as other considerations to be made for projects that may be approved as CDM in the future (Olivas, Gagnon-Lebrun & Figueres, 2005). The approval of CDM methodologies is an essential part the whole structure as some projects which are categorized under green technology may not necessarily be approved as CDM projects (ibid).

The criterion for the requirements on the CDM project is divided into three parts; small scale projects, large scale projects and forestry projects. The common CDM projects have a period within which they are allowed to mature before the crediting. They can either choose to be credited after a maximum of 7 years with the option to renew 2 times, and their second option is to be credited after 10 years with no option for renewal (UN, 2006). The projects that choose to be credited after 7 years therefore have a total crediting period of 21 years. The CDM projects in forestry have longer crediting periods with the option to choose renewal of 20 years which in total would give the project 60 years of crediting. Their second option is to receive a non-renewable crediting period of 30 years (UN, 2006).

1.2. Problem Statement

Having received mixed reactions initially and facing some degree of reluctance from countries such as Russia (Vogt, 2003), carbon trading has been mostly operative and successful in the Annex I and Annex II countries, which are bound by the protocol to reach certain GHG abatement targets. It could even be said that the adoption of the Cap and Trade scheme has been the catalyst in the development of carbon trading (Harris, 2007). Institutions such as the European Union Emissions Trading Scheme (EU ETS) and European Union Allowances (EUAs) has created opportunities for firms to trade in their allowances and has hence made the carbon trading industry develop considerably within countries in the European Union and its regions (ibid).

The distinction, however, between this scheme and the mechanism available in South Africa is that the carbon credits on the latter are mostly available through project-based processes, the CDM. This allows investment and sponsorship to production projects that use clean technology to offset an amount of GHG emissions and they are thereby permitted to receive emission certificates. South Africa, being one of the first countries in Sub-Saharan Africa to be a signatory to the protocol, has also gone on to become one of the first to establish CDM projects in multitude (Ehlers, 2010). This mechanism which is majorly sponsored by international organizations has been stagnant in its adoption and growth in South Africa. Many scholars have gone on to pin-point the flaws with the system; such as the complexity and irregularity in the market (Schneider, 2007). Despite its failure to fulfill its utmost purpose of mitigating effects of climate change, in the absence of any other permanent solutions, the carbon trading industry continues to strive and new roles are being created to accommodate the demands. With a clear lag in many African countries, most projects are just

starting up and others are still trying to find approval in order to acquire investments from international organizations. This factor creates a gap in the dynamics of actors in this market, hence raising the question of whether or not it is a market in which entrepreneurship is possible, especially that it has been famed to be the next big economic generator for communities in sub-Saharan Africa.

1.3. Research Question

As carbon trading is a fairly new business activity, it is naturally filled with enigma and misconceptions, hence it sparks great interest. Our research is inspired by literature that suggested that carbon trading was going to potentially provide a huge economic boost in Sub-Saharan Africa (Wara, 2006). This was even more probable in countries such as South Africa where many projects are already running. With no evidence of any substantial economic boost created by carbon trading, many questions were raised. We were primarily concerned with the reason behind the small participation on the local level and most especially the limited presence of entrepreneurs in carbon trading. Our main question is therefore:

What are the opportunities and challenges for entrepreneurship in Carbon trading in South Africa?

1.4. Scope of the Study

Although the research focuses on carbon trading and the type of business opportunities it offers to entrepreneurs, it goes in-depth on the CDM projects as it is currently the approved mechanism available to developing countries in Sub-Saharan Africa such as South Africa.

Unlike most other countries involved in carbon trading in Sub-Saharan Africa such as Kenya, South Africa's CDM projects are vastly diversified in nature, ranging from Biomass projects to Forestation in the past few years. Furthermore, South Africa, compared to other African countries, has been showing progress in the CDM projects. This may be linked to its favorable macroeconomic framework and relatively mature and stable economic environment as well as its advanced infrastructures both in the service and financial sector. This positioned South Africa in the 7th rank on the global scale of CDM project implementation (Ehlers, 2010). More importantly due to the growth of its economy and the changing dynamics of role players, there is a growing platform for entrepreneurship opportunities in general. Inclusive governmental policies such as the Black Economic Empowerment initiative (BEE) create a

platform for new entrepreneurs in communities where they formerly did not exist (FNB, 2009).

1.5. Purpose of the Study

Essentially, the research aims at providing a clear view of the current realities of carbon markets in South Africa. Furthermore, the research brings some degree of understanding of the opportunities and challenges there are for entrepreneurs to have a role in such a market. The research intends to provide a background for further studies in conceptualization on the ability for entrepreneurs to penetrate the carbon market in South Africa. We finally have recommendations on what needs to be changed in order for entrepreneurs to take full advantage of the carbon market.

1.6. Limitation

While CDM projects are one way of generating CERs which can be sold to Annex I and Annex II countries, in recent years there has been growth of what is known as Verified Emission Reductions (VERs). This type of emission reductions are sold on a voluntary basis in open markets. The way in which they are evaluated is done with independent evaluators and sold to individuals or firms. Information regarding actors in this type of market is very hard to obtain and even if obtained is very hard to measure. Therefore although our study had the intent to measure the opportunities and challenges for entrepreneurship in carbon trading, it had the limitation of focusing on only project-based mechanisms and other actors in different dimensions of the carbon trading processes such as the evaluators, brokers and verifiers.

1.7. Paper Disposition

Chapter one depicts the overall introduction of the research topic and gives a brief description of the problem background, how the focal point of the research is identified and developed. The Purpose, scope, research question and limitation which are also part of this chapter, highlight the structure of the research, what it aims to achieve as well as its boundaries. Chapter two presents a case description of the research under study. Chapter three shows the conceptual framework based on what previous researchers have discovered in relation to the study at hand. It further describes theories and the framework utilized in the analysis. Chapter four displays the methodologies utilized in the collection and analysis of the data collected. The empirical findings are presented and discussed in chapter five. A comprehensive analysis

is presented in chapter six and the final chapter concludes the research and suggests issues for further research.

2. Case Description

This chapter presents the historical overview of South African environmental policy and its progress ever since the 1990s. It also gives a quick introduction to the nature of South African entrepreneurship and its classification.

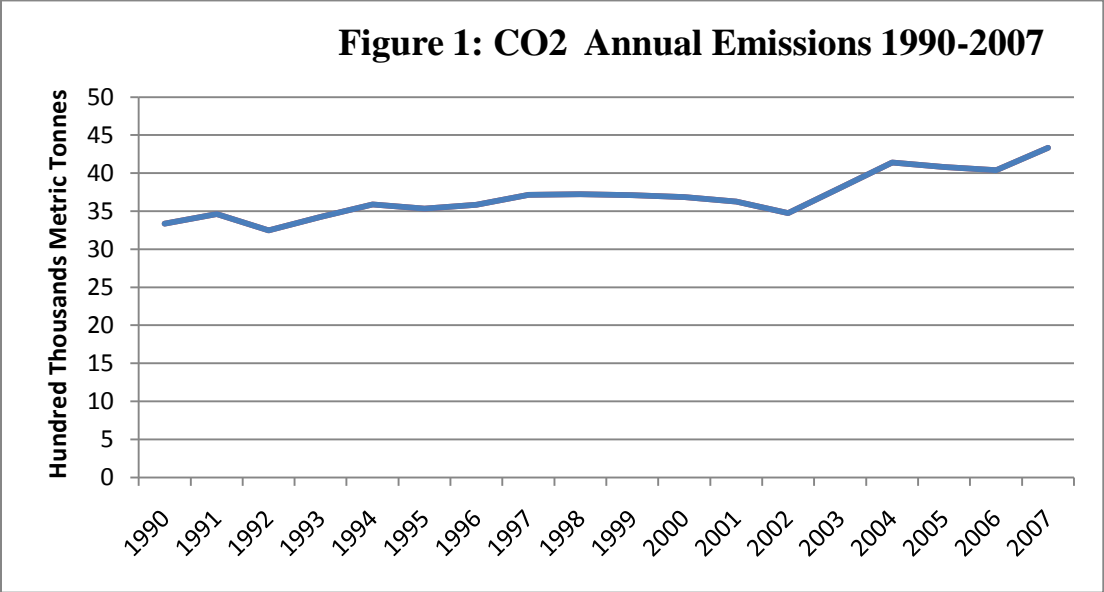
2.1. Historical Perspective

Prior to 1994, during the apartheid era, the issue of the environment was a neglected topic by successive South African governments and the country was disconnected from many international events regarding climate change and its impact on the environment (Whyte, 1995). The country's environmental policy, like all other policies in that era, remained biased and neglectful and contributed largely to widespread poverty and social inequality within the black population (SAGI, 1996). During that era with the excuse of natural resource conservation and wild life preservation, the officials took advantage of their power and grabbed indigenous land. As the essence of environment and sustainability was not regarded as a priority, then the so called environmental policy was used as a means for racial segregation towards anti-apartheid activists and the black population at large (Holomisa, 1999).

2.1.1. South African Environmental Policy: Development and Current Trends

In the post-apartheid regime, however, the newly appointed government challenged the existing policy and clearly set new development goals in which the issue of the environment is addressed as the backbone of sustainable economic growth in the country (Whyte, 1995). The development objectives are mainly targeted at poverty eradication and job creation. On July 31, 2002, South Africa ratified the convention, which on the one hand obliges the country to abide by the terms and conditions of the convention and on the other hand helps it get access to all the privileges that the convention comes with (UNFCCC, 2004). It is the Department of Environmental Affairs and Tourism (DEAT) that has the primary legislative power governing policies with regard to the environment. The creation of this department is guided by a constitutional decree that stipulates the right of every citizen to have access to a clean and healthy environment. South Africa developed an integrated reporting system which

is called the State of the Environment (SOE). This was done to enhance interdepartmental cooperation between different sectors and facilitate joint decisions that fulfill local and international environmental obligations. In 2004, The DEAT with the approval of the cabinet launched its first climate change response strategy which marked the country’s important step towards international climate change action (Fakier et al, 2005). The South African CO2 emissions however, have continued to rise on yearly basis. As depicted in the figure below, in the period between 1990 and 2007 there was a steady increase of the emissions with few dips where the emissions slightly decreased.



Source: MDGIs, 2010.

In its pursuit to control the CO2 emissions, South Africa is considering aligning its energy policy with GHG emissions. It intends to target sequestration of CO2 through the vision of a ‘peak, plateau and decline’ as an environmental goal. The policy has set a target to reduce the emissions by 30-40 percent over the period 2003-2050. Consequently, the policy is expected to shift South Africa’s energy-intensive economy to a sustainable and environmentally friendly path. Nevertheless, the South African government has not set any institutional policy on how to hit the target (Tyler, 2009).

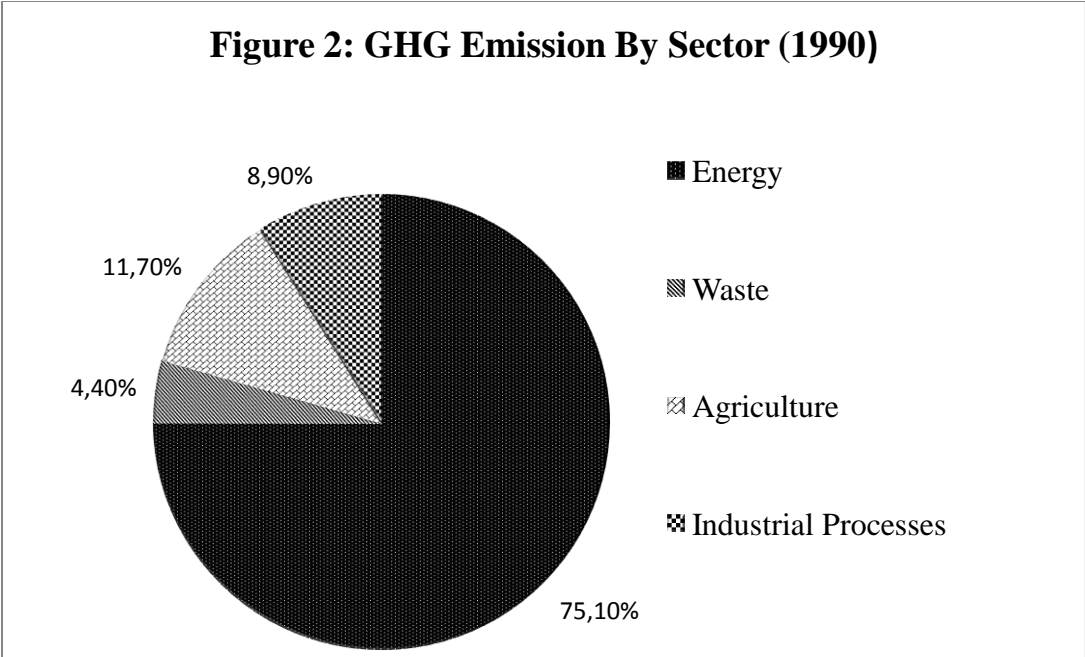
South Africa’s power generation is highly dependent on coal; the country is considered the largest GHG emitter on the whole African continent, the 8th largest in developing countries and the 19th in the world (DoE, 2009). In its endeavor to move towards a low carbon society, South Africa has been working on implementing projects that are targeted at mitigating GHG

emissions by adopting clean technologies. After identifying that the greatest carbon reduction potential lies in the energy sector, the South African government has set a target of 12 per cent reduction in energy efficiency to be achieved until 2015.

2.1.2. GHG Emission by Sector

In 2000, UNFCCC reported that South Africa had different sectors that could take advantage of the mitigation opportunities. These sectors included agriculture, transport, industrial and mining and electricity (DoE, 2009). As the energy sector is the backbone of the South African economy, the country is able to deliver cheap electric power compared to the international standard (UNFCCC, 2007). However, most of its power generation is from nonrenewable sources such as coal.

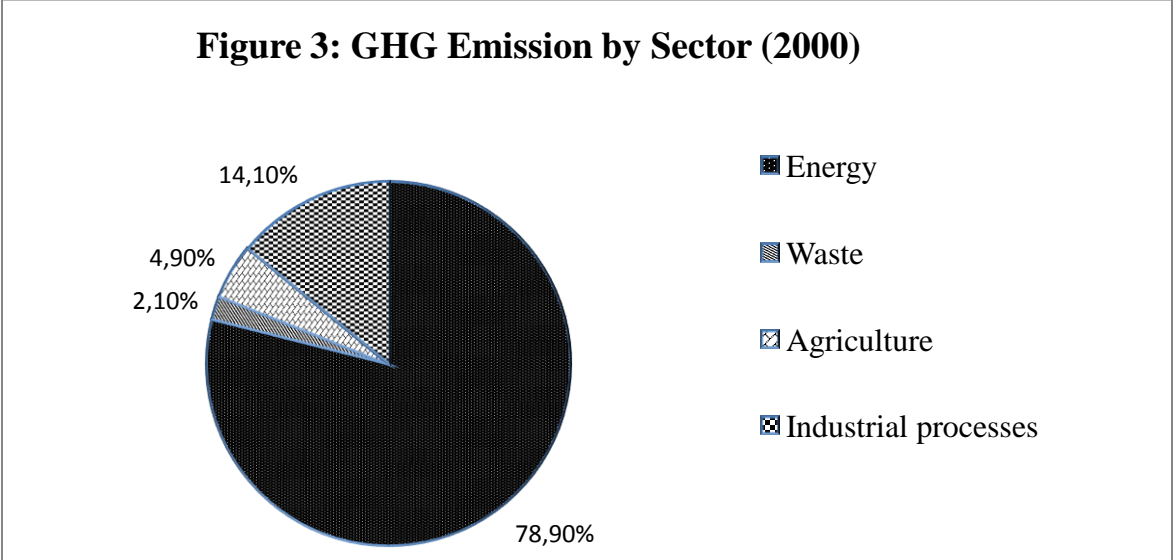
A retrospective look at the trend of emissions by sectors in the 2000s indicates that although other sectors were moderate emitters, the energy sector was the largest emitter and accounted for more than 75 per cent of all emissions.



Source: DoE, 2009.

The high GHG emissions contributed by the energy sector were due to its reliance on non-renewable energy source such as coal which emits huge amounts of carbon dioxide. The agricultural and waste sectors were also moderately high contributors through their emissions of gases such as Methane (CH₄) and Nitrous Oxide (NO₂).

As can be seen in the picture below, in the early 2000s however, the trend significantly changed. Sectors such as agriculture and waste decreased their GHG emissions by close to 7 and 2 per cent respectively. Emissions in the energy and industrial sectors continued to increase instead.



Source: DoE, 2009.

The continuous increase in the GHG emissions in the energy sector was associated with the growth in production and increase in industries. As the Apartheid era came to an end South Africa’s trade became more liberalized and hence the need to be more competitive increased.

2.2. Diversification of Entrepreneurship in South Africa

The overall estimation of the South African population is around 50 million. The population is however highly diversified with different origins, culture, religion and language. According to the Statistics South Africa, (2010), the population is classified into four categories based on their geographical distribution. These categories are made up of; the Black, Indian, White as well as the Colored population. This makes the country one of the most diversified in the world, which earned it the name: the rainbow nation (SSA, 2010).

There are huge differences amongst South African entrepreneurs based on their demographic groups. The White and Indian entrepreneurs are of a higher proportion than the Black and Coloreds (Enslin-Payne, 2010). To empower the disadvantaged groups, the government launched the Black Economic Empowerment program so as to balance out the inequalities manifested among entrepreneurs (DTI, 2007). However, since entrepreneurial activities in

South Africa are often considered as a means of social interaction rather than something that can stimulate economic growth, the overall local entrepreneurship involvement has been distinctively small (Enslin-Payne, 2010).

2.2.1. Entrepreneurship in South Africa

Similarly to many SMEs in Africa, entrepreneurship in South Africa is mostly family-based and often operated by people from the same family, regions, clan or ethnicity (Khavu, Brutton, & Wood, 2009). The nature of this entrepreneurship also influences the way in which they operate as they depend highly on the family ties and type of relationship they have with their suppliers and other business partners (Steier, Chua & Chirsman, 2009). Another rather grim reality of South African entrepreneurship is the fact that the nature of their deep-rooted family links tends to influence them to work illegally and remain unregistered. This is due, however, to the fact that the legal and political institution of the country has not set the appropriate institutional framework in which the entrepreneurs can evolve (Falkena, et al., 2001).

The lack of the appropriate institution contributes highly to the bureaucratic nature of company registration, which is a cumbersome and lengthy process. It forces most entrepreneurs to operate while unregistered. Thus, success in an entrepreneurship is often limited to a few people who are somehow more closely linked to the producers or the customers (Khavu, Brutton, & Wood, 2009).

Furthermore, the lack of respect and recognition towards entrepreneurs is discouraging; hence they are often forced to involve themselves in the informal sector. This sector accounts for 29 per cent of the country's GDP. Regardless of the efforts made by various shareholders to bolster entrepreneurship in the country, the levels of entry and participation are still low (GIBS, 2009). In relevance to FNB (2011) statistics, the overall entrepreneurial activity of 2008 accounted for 7.8 per cent of the economy. The recent economic crisis has also highly affected the sector and led to a further deterioration of 2 per cent.

2.2.2. Entrepreneurial Opportunities in the Carbon Trading Market

The move towards a low carbon economy has the potential to bring investment opportunities for entrepreneurs in the energy sector, particularly in the renewable energy technologies (Martens et al., 2001). The opportunity could solve capacity barriers which has been one of

the biggest hurdles facing entrepreneurs from taking part in the carbon trading market (Fernandez, Hinojosa, & Miranda, 2010). Unlike investment in non-renewable energy, renewable energy employs technologies such as afforestation that has the potential to provide some opportunities for unskilled and semi-skilled workers through cooperative training offered by project sponsors. Therefore, the investment in renewable energy has the prospect to increase local entrepreneurial involvement as well as create employment opportunities (Winker, Marquard, & Meagan, 2010).

3. Conceptual Framework

In this section we aim to identify and describe key concepts of our research and explain them in their length and breadth. This is done as the first step in the exploration of the concepts and how they are interlinked. In this Chapter, the focus starts with a detailed view of carbon trading then it explores the mechanisms utilized in carbon trading. The second part presents an entrepreneurship framework that is used to understand factors that influence entrepreneurship. This part further highlights components of the framework as well as the type of entrepreneurship that exists in carbon trading

3.1. Carbon Trading Mechanisms

Since its inception at the Kyoto protocol, the term carbon trading has been utilized to describe the trading of offset credits of GHG. This term was adopted due to the fact that CO₂ is a principal constituent of GHG and is therefore more present in the emissions, consequently playing a major role in climate change (Harris 2007). While the mechanisms were created to encourage participation and give countries the first push towards achieving the targeted levels of emissions reduction, they have had varied reactions and success in different countries. They have been established successfully in most developed nations and rather poorly in developing countries.

Previous research which has been largely based on the economic concept of the profitability and sustainability of such mechanisms has done little to shed more light on the real prospects of this industry and more importantly on the role that entrepreneurs can play in such a market (Yamin, 2005). The goal of carbon trading is to ensure that reductions are achieved at a lower price and are thereby sustainable. However, the unequal proportion of pollution per

region has led to a situation where some major polluting countries are bound by the agreement to reduce their GHG emissions to a certain level while being able to continue their industrial polluting activities. They are then able to replace these emissions through the acquisition of credits from CDM projects in developing countries (Huettner et al., 2010).

This scenario, although criticized, is often regarded as a unique opportunity on both the international and the national level as it is able to create new job opportunities (Martens et al., 2001). It was thought of as a preliminary step into the incorporation of cost of environmental services into the economy in order to eventually achieve the evolution of a green economy (Pizer et al., 2006). This market based approach therefore ascertains the use of monetary value as an economic incentive for all participating parties in the reduction of their emissions (ibid). Having the tool to tap into this opportunity, the parties involved can thereby trade using a mechanism that pertains to their country category.

The Kyoto Protocol has introduced three flexible trading mechanisms to help parties meet their obligations and achieve their emission reduction commitments in a more cost-efficient manner. These mechanisms are discussed in detail below.

3.1.1. Compliance-Based Carbon Trading

As defined in the Kyoto Protocol, Carbon Trading is a mechanism that enables countries with non-binding agreements to trade units with countries with reduction obligations that have been unable to meet their targets. In the same manner, firms are able to trade such units to other firms that have surpassed their limits. This is done under a strategy known as Cap and Trade (UNFCCC, 2008). This mechanism is specific to countries in category Annex I and Annex II. Since most of these countries are obliged to abide by their targets which should be achieved within a limited time period, they have boosted the growth of a regulated emissions market. The market, although overseen by the UNFCCC which regulates and adapts all the mechanisms, is nonetheless controlled under the EU ETS. The UNFCCC remains the authority to decide the type of GHG that should be targeted for reduction, the sectors of the industry where they are emitted from and the specific targets for each country as well as the period within which each country should accomplish its goal (Yamin, 2005).

3.1.2 Clean Development Mechanism Projects

The CDM is particularly created for countries that are Non-Annex countries. This mechanism interlinks highly industrialized countries within the Annex I category by promoting that such

countries invest in clean development projects in developing nations and thereby the projects are able to gain an emissions certificate which the investing country can use in exchange for its huge carbon emissions or which can be traded on the international market (Schneider, 2007). Since these projects are developed in countries where there are no emission reduction targets, the measurements and the authorization of a certificate for emission reduction is much stricter (Gwina, 2010). As these projects are usually purposefully created in order to adopt clean technology in a given sector of the industry, a lot more capital may be used both for implementation and also in measuring the amount that was offset. Hence, the price of the emission certificates may be higher than that of the credit traded in the Cap and Trade scheme (Williams et al., 2007).

In this same context there exist other forms of trading developed by Voluntary Markets, whereby firms which are not bound by any regulations may decide to develop clean production processes that allow for the reduction of carbon emissions (Capoor & Ambrosi, 2007). Since these are based on a voluntary basis, there are no specific regulations existing from the onset of the development of the project and therefore the emissions valuating institutions may make it harder to certify the emission reductions. This method is, however gaining popularity after independent verifiers started to emerge (Milunovich et al., 2007; Capoor & Ambrosi, 2007).

3.1.3 Joint Implementation/ Joint Initiatives

In the same tradition as the other mechanisms, the JI involves the trading of emission reductions. In this mechanism, however, the transaction which very much resembles the arrangement in the CDM projects is instead done between two Annex I countries. One Annex I country through an invitation to another Annex I country can invest in an emission reduction project and through that gain what is known as Emission Reduction Units (ERUs). Unlike the previous two mechanisms, the regulation of the JI was stipulated in the Marrakesh accord in 2001 (Yamin, 2005). For a country to be eligible to host a JI project, they should be able to show a sound and clear system of tracking the investment and regular checking up to see whether it's achieving its goal (Karousakis, 2006).

The carbon trading mechanisms, although essentially market instruments, still have a limited structure. The researcher Wara (2006) points out their weaknesses in achieving either of their goals. The researcher reckons that the price at which the emission certificates are sold is much

higher in comparison to the effort made to achieve them. However, scholars such as Harris (2007) are quick to argue that the price paid by the developed countries is nothing in comparison to the impacts of climate change that will be suffered by communities in the developing world.

3.2. Entrepreneurship

Although defined on numerous occasions, there has been no single uniformly accepted definition of what entrepreneurship means (Hanusch & Pyka, 2007: 147). Different scholars view their definitions from different perspectives, hence different literatures (ibid.)

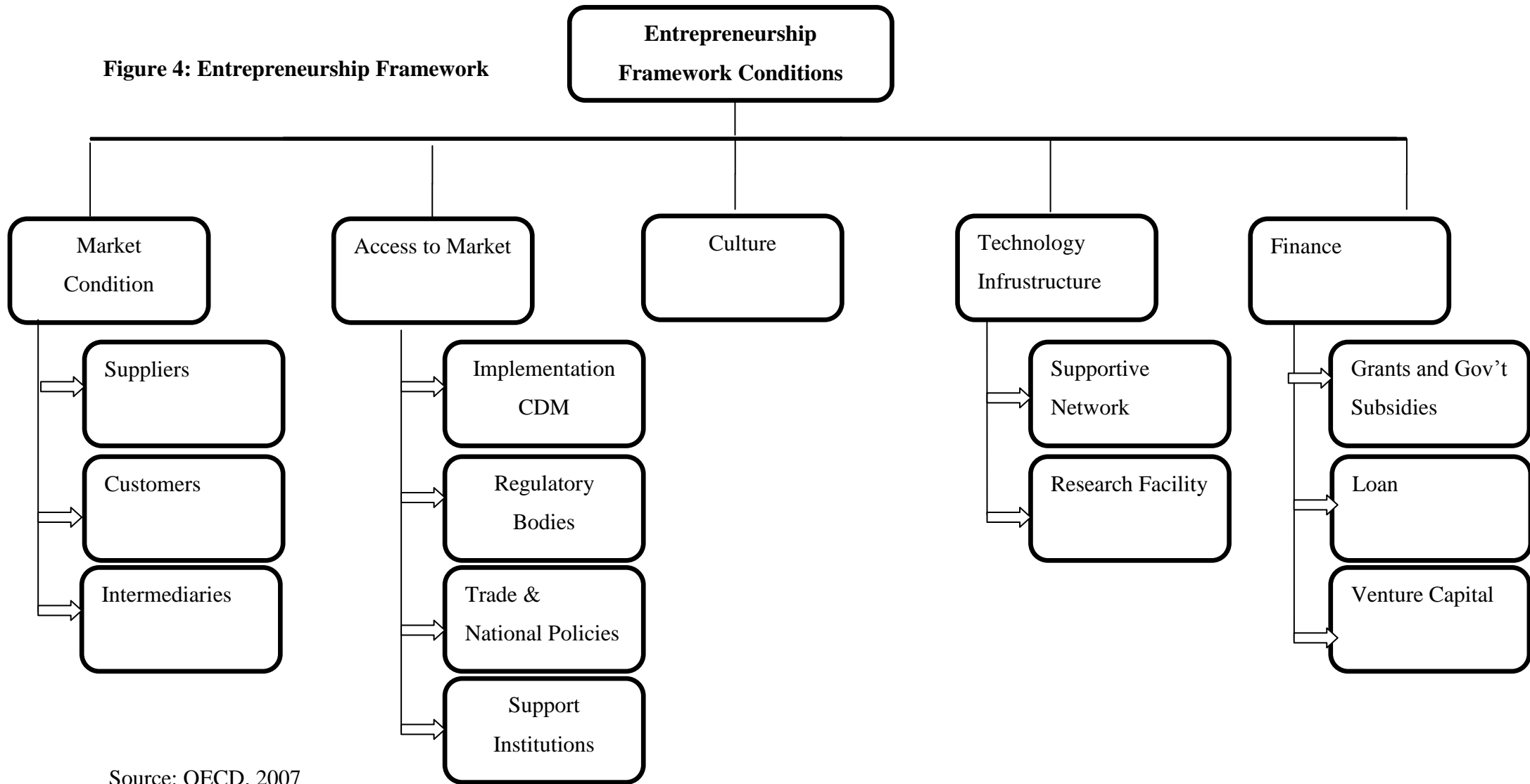
According to Schumpeter (1934), entrepreneurship is characterized by the ability to innovate through the fulfillment of a combination of activities such as the creation of new ventures, new products, a new organization and new markets whilst contributing to economic growth through demand raised by such an innovation. In the same breath, Morris (1998) emphasizes that an entrepreneur is a person that is able to create value in things by utilizing his resources in a unique way and thereby harvest opportunities from his environment. While both researchers state what characterizes the entrepreneur, researchers such as Baumol (1990) argue that pre-conditions such as the economic, political and legal aspects of a country influence the level at which entrepreneurship takes place. As the majority of early scholars emphasize the importance of the environment within which the entrepreneur can emerge, it becomes relevant to focus on the indicators or pre-conditions that are linked to entrepreneurship possibility in any given geographical location or market.

Previous research projects in the study of entrepreneurship, such as the one carried out by the OECD Entrepreneurship indicators project have utilized early theories and practical examples to develop a framework of entrepreneurship determinants. These determinants although usually employed to measure entrepreneurship from a more general and wider perspective, have relevancy in this research. This is because the variables stipulated aid in understanding the environment and thereby identifying its challenges and opportunities. In the context of entrepreneurship in carbon trading, each variable is utilized to assess the entrepreneurship environment in South Africa so as to determine the barriers and opportunities that the current environment may have towards carbon trading. The original framework listed variables such as Market Conditions, Access to Market, Culture,

Technology Infrastructure, Finance and Macro-Economic Environment as prime determinants of entrepreneurship (OECD, 2007).

The entrepreneurship determinants, although adopted, have been developed further to accommodate the particular need of the study and to cover an in-depth assessment of carbon trading on an entrepreneurial level. New variables have been identified under each prime determinant as illustrated in the figure below.

Figure 4: Entrepreneurship Framework



Source: OECD, 2007

3.2.1. Market Conditions

Market conditions refer to the nature and characteristic of a market. It can also refer to the conditions that a new product may be introduced into. In market conditions, we intend to identify the intensity of the competitiveness and the potentiality of market growth in carbon trading

As any trade commodity, the carbon trading industry strives due to the dynamism of its supply and demand paradigm. However, the unique nature of this trading scenario is that it is not a tangible commodity and can only become tradable after being valued through certain structured processes. This scenario is both regarded as a plus as it allows structured processes to create responsible trading but at the same time it is regarded as a challenge as the authorizing institutions have more control over the market and who can enter it (UNEP, 2009).

With the setting of the emission reduction targets per country, the most industrialized countries which are pressured to meet their targets lead the way in the creation of the markets. The earliest traded emission credits were traded within the EU countries under a supervised and agreed valuation process (Huettner et al., 2010). In this perspective, the countries in Eastern Europe were the first to benefit from this market as they could sell credits in case they could prove that they had managed to emit at a much lower level than their targets. As it was a tedious and long process for some countries to reform their mechanism in order to adopt the new environmentally friendly methods, many countries have continued to underperform (Kossov & Ambrosi, 2010). Demand for CERs is difficult to assume except by estimating the number of countries that have not yet reached their targets. It can also be estimated through the observation of emerging trading markets in the US, Europe and Asia (Harris, 2007)

3.2.1.1. Customers

Today's business owners and corporations continue to find tools that make them more attractive to their customers through their ability to perceive and be in cohesion with the values of their stakeholders (Grove et al., 1996; Pickett-Baker & Ozaki, 2008). This has brought about the birth of green marketing. The concept of green marketing entails that businesses design their activities and products towards the satisfaction of the clients who in turn demand that such activities have minimal negative impact on the environment (Polonsky, 1994). As the climate change issue became a hot topic over the last few years, various

stakeholders have been trying to partake in activities that help in the reduction of carbon emissions but more importantly in making choices that preserve the environment (Pickett-Baker & Ozaki, 2008).

The largest size of customers has been mainly from Europe and Japan and the firms involved in buying the credits have ranged from airlines to insurances to technology firms to pharmaceuticals and to even sports events. An example of such buyers are airlines such as British Airways, Air France, KLM, Japan airlines and the SAS group who provide an opportunity for customers to calculate their carbon footprint per travel and buy their carbon offsets (ATAG, 2011).

Their desire to purchase the credits is influenced by the need to gain the upper hand on competitors (Pizer et al., 2006). After such a purchase, the company is able to market this information to their customers or even offer it as a service for customers who wish to pay the extra price in order to ensure that greenhouse gases have been reduced in the process (ibid)

From a wider perspective, countries in Annex I and Annex II have clear targets to reach until 2012. Moreover, they are also required to reach these targets through investments in projects in Non-annex countries. They are therefore the natural prime customers for CERs as they are mandated to do so.

3.2.1.2. Suppliers

At an initial phase the trading was predominantly seen in firm allowance trading in most Annex I and Annex II category countries (Capoor & Ambrosi, 2007). The trading took place in a scheme known as Cap and Trade and it was authorized through the European Union Allowances (EUA) and the EU ETS. Under this scheme, the company can curb its emissions, then trade its saved allowances to another party that has exceeded their allowance (Yami, 2006).

Unlike their counter parts in Europe, the US and other OECD countries, countries within the Non-Annex category were obliged to apply the concept of trading by largely implementing projects from scratch, hence the efforts needed were enormous and it took considerable time before they got really involved in the trading. Moreover, the evaluation processes for CDM projects took a little longer as in most cases the authorizing and evaluating institutions had to be created as they were previously non-existent (Kossov & Ambrosi, 2010). Some non-

annexed countries which are relatively large and have better economies, such as China, have been able to take advantage of the opportunity and have been involved in the trading (ibid).

3.2.1.3. Intermediaries

While trading is the principal task, its significant growth has largely relied on the number of other intermediate services that occur between the supplier and the customer (Boehmer-Christiansen, 2003). The role of an investor is a particularly significant one since it gives an opportunity for raising the capital investment and gains the rights of future carbon credits through the transfer of rights. There have been a good number of banks involved in the investment of CDM projects and they have therefore contributed largely to the growth of such projects in different regions in the world. In the same breath, carbon trading is characterized by numerous processes of authorization and legitimization, hence the role of lawyers, auditors and project developers is fundamental to the market (Kossoy & Ambrosi, 2010).

According to Pizer (2006), a business that increases its market orientation increases its market performance. Thus, carbon trading thrives through the service of brokers who are able to sell and buy carbon credits and allowances in carbon markets all over the world (ibid). Other service providers such as technical support are highly vital as the CDM processes require intensive knowledge in scientific methodologies of emission measurement or capture.

3.2.2. Access to Markets

Access to markets is an important aspect when studying the challenges and opportunities that an entrepreneur may have in Carbon trading, although controlled through numerous structures such as state policies and industry specific regulations and other exclusion practices such as trade tariffs. Market access can be defined as the ability to access a market, maintain and gain some degree of control of the external relationship (Ribot & Peluso, 2003: 166).

In order for the entrepreneur to thrive, there is need for secure legal rights so that the entrepreneur invests time and efforts with a clear prospect on a rewarding outcome. Moreover, there is need for incentives that can often come in the form of favorable taxation laws as well as appropriate financial services. It is important therefore to assess the international as well as the local legal framework that are presented to the entrepreneur in order for him/her to gain access to the market (Kamel, 2007).

3.2.2.1. International Legal Framework

With the establishment of binding agreements on emission reduction obligations at the Kyoto Protocol, the trading of quantified emission reduction became legally binding. Under the public international law the reductions must be achieved by countries under Annex I within the agreed time frame between 2008 and 2012 (Curnow & Hodes, 2009).

For the entrepreneur or project developer in a country such as South Africa, CDM is the proposed mechanism within which they can get access to the carbon trading market (UNFCCC, 2009). This is because the project has to be hosted in a Non-Annex country and the government in that country has to fulfill certain requirements such as being a party to the UNFCCC and the Kyoto protocol, being able to create an appropriate national authority to evaluate and approve such projects (DNA) and develop domestic project approval criteria (Curnow & Hodes, 2009).

Apart from setting the rules, the UNFCCC has the obligation to set supportive institutions for the establishment of the CDM project process. The executive board as set by the UNFCCC is responsible for the evaluation and the validation of the Designated Operational Entities (DOE). These institutions, on the other hand, are the technical support structure that evaluates the eligibility of the project on a technical level by practically measuring the emission reductions performance and providing proof before they can be sold onto the market (Fenhann & Hinostroza, 2011). It should be noted that this is an important role that entrepreneurs with the right technical capabilities can undertake in carbon trading, especially when the project is established within an area of easy access.

3.2.2.2. Domestic Legal Framework

With the UNFCCC as the overall governing and guiding body, host countries are left to draw the guiding criteria for CDM projects based on the country's own environmental policies. Through the establishment of the DNA which can work either as a department of the ministry, a ministerial committee or a completely new independent institution, project implementers are able to start the process of accessing the market (Curnow & Hodes, 2009). In addition to ensuring that the projects they approve involve activities that reduce carbon emissions, the guiding principle for most DNA departments mirrors the objectives of the country in general such as contribution to economic growth, creation of jobs, creation of opportunity for knowledge and technology transfer as well as attaining sustainable development.

The other most important factor in the domestic legal framework is the legality of ownership of the emission reductions (Hodes & Kamel, 2007). In a way to avoid such risks, especially given the fact that the commodity under question is intangible, the DNA has also the responsibility to issue a paper known as the Letter of Approval (LoA). This letter states that the government of the host country owns all GHG emission reductions generated by CDM projects implemented in that country and through the LoA the rights and title of the emission reductions are transferred to the project owner or participant. The LoA can therefore be issued when it has been verified by both the DOE and the DNA that the emission reductions have indeed been achieved (Curnow & Hodes, 2009). The project owner can at that time use the letter as proof before any transaction. He/she can then sell the rights and title of the emission reductions to any given buyer.

3.2.3. Culture

Although often regarded as the maverick, the entrepreneur operates in a context bounded by rationality shaped by customs, networks, norms and cultural beliefs (Hechavarria & Reynolds, 2009). According to Hofstede (1991), culture is the distinguishing factor between one group of people and another. It is defined by the collective programming of the mind and therefore influences the way they interact, the things they regard as proper and how they perceive themselves (Abzari & Safari, 2006). This very programming will often influence the way in which entrepreneurship is perceived and may therefore determine the way in which people within such cultures try to achieve it or interact with other entrepreneurs (ibid)

Hofstede constructed certain dimensions within which national cultures around the world could be measured. The cultural indicators are namely Power Distance, Individualism/Collectivism, Masculinity/Femininity, Uncertainty Avoidance and Long-Term Orientation. Although these indicators have often been criticized for focusing on culture on a national level and having no consideration for the distinctive cultural difference in the different regions and ethnic or racial groups within that country, it should be said that they are good foundation for further understanding of the opportunities and challenges the entrepreneur may face as the national culture will influence the type of policies and regulations that a country puts in place and the values that it gives importance (Abzari & Safari, 2006).

Another important aspect of culture in regard to entrepreneurship is its influence on individual motivation. The values that people assign to the activities they undertake and the incentives that aspire them to achieve certain things are significantly influenced by their culture.

Mc Gehee & Kim (2004) argue that the motivation for entrepreneurs to undertake certain activities is either guided by their formal rationality such as that of satisfying a need or achieving profits or the substantive rationality which is guided by a sense of morality or inspiration from the society. The former is the common motivation for entrepreneurship in carbon trading

3.2.4. Technology Infrastructure

Technology infrastructure as defined by Tassef (1991) embodies the technical know-how in an industry; it's the scientific and engineering knowledge available within a country. This knowledge comes in the form of experts, specialized institutions and availability of technologies as well as technical information. The development of technology infrastructure is achieved through close collaboration of research institutions with the government and the private sector. Moreover, creation of forums and opportunity for exchange adds to the prospects of innovation and entrepreneurship (ibid)

In terms of the presence of technology infrastructures in carbon trading, there has been significant evolution in the study and development of green technology, hence the technology infrastructures have increased over the years. Today some of the technologies such as wind power, solar energy and geothermal energy are subjects in their own entity. Research in such subjects is carried out by numerous institutions around the world and experts have grown in numbers (NEPAD-OECD, 2009). Likewise, carbon trading has recently also become a subject of wide interest and many experts in the subject have emerged. This has been enabled largely through different programs created by the UNFCCC, the UNEP, the World Bank and other multilateral organizations that encourage collaboration and exchange of knowledge within countries that implement CDM projects. Despite estimated strong collaborations between the international and the national body of experts with the local communities, it remains unclear as to the extent of this collaboration and how much information is made available to the local potential entrepreneurs in order for them to tap into the opportunity of carbon trading.

3.2.5. Finance

Access to finance is both regarded as a determinant for the creation of entrepreneurship and the survival of the enterprise itself (World Bank, 2008). The wealth divide between the have and have-nots can often be a decisive factor as to whether an individual is able to tap into a promising opportunity or not. The access to finance largely includes access to networks that can provide investment into the entrepreneur's project or the existence of institutions that are able to supply the credit to finance the project. In an empirical study by the World Bank (2008) it is highlighted that the lack of information and transactional cost imposed by financial markets as well as lack of collateral and credit history by the entrepreneur contribute to the high barriers to access finance.

Access to finance for entrepreneurs is often through ways such as investment ventures, bank loans, own capital or business angels (NEPAD-OECD, 2009). The amount of finance availed however is also relevant to the type of project that the entrepreneur may be wishing to undertake and the stage at which the project is at may determine which form of finance they access (De Bettignies & Brander, 2007). Since carbon trading brings into perspective a number of actors, the type of entrepreneurship that can be undertaken will vary largely in size and nature. It should be noted however that whether it is for project developers or evaluators, large amounts of capital may be needed especially at the project implementation level. Projects developed often depend highly on their potential to meet demand for CERs and thereby the common creditors or loan institutions may see the projects as a huge risk (UNEP, 2007). The most common ways for projects to access finance therefore are mainly the following ways.

3.2.5.1. Grants and Project Sponsors

Due to a growing trend towards achieving renewable energy and sustainable development, many governments have been very proponent to projects that aim to achieve clean technology and other social benefits such as poverty reduction, job creation and technology improvement in the same breath (Kiss, Castro & Newcombe, 2002). In most cases governments are only able to offer seed money for small start-up projects to particular minority groups or for projects implemented in certain areas of concern. The grants often come in form of small financial packages, subsidies and consultative support (UNEP, 2007). Most of the money forwarded to project developers is accessed through international funding organizations that in turn fund supportive local government bodies (Kiss, Castro & Newcombe, 2002).

Apart from governmental grants, there are various other grant givers that offer financial aid. Such grantors may target a specific project in a specific region and may have a limited amount of money to offer to the project. Project sponsors, on the other hand, are the typical type of investment that most project developers look forward to. They are mostly international firms that may have an emission reduction target and sponsor the project with the intention of buying future emission credits that the project will produce (NEPAD-OECD, 2009). Project sponsors however are mostly available when the project has been verified and accepted, therefore the project developers may need to target other sources of finance before they reach the stage of being accepted (ibid).

3.2.5.2. Bank Loans and Special Loans

Loans of any magnitude often carry a lot of risk and require significant evidence of repayment before an entrepreneur is able to access it. Bank loans are particularly stringent as they not only carry numerous demands before being forwarded but also carry heavy interests on the capital they offer. The loan given through the bank is very competitive and therefore there should be substantial proof that the repayment of the loan will be equivalent to the opportunity cost of the fund (De Bettignies & Brander, 2007). In the case of CDM projects it becomes even more difficult as the projects are still widely unknown and unclear to many people (Humphreys, Sokona & Thomas, 1998).

Moreover, because of the use of innovative technology and the need to offset large amounts of emissions in order to sell CERs at a profit, CDM projects require large amounts of capital from the construction stage to the point of sale (Kamel, 2007). With the growing knowledge of the potential of carbon markets, however, a few banks around the world have started special services that cater specifically to investing in CDM projects, managing CERS and monitoring the carbon market. This was mainly started by the World Bank when it introduced the Prototype Carbon Fund. Essentially this was more of a consultative aid whereby the World Bank would be involved with the project developers from the time of structuring the proposal up to the point of sale (World Bank, 2008). Other banks such as the Citbank, Wells Fargo and Standard Bank lend the money to project developers with extra risk and interest implied.

3.2.5.3. Venture Capital Funds and Business Angels

The importance of venture capital has grown over the years as successful businesses which were formerly small entrepreneurs grew from such investments (Berger & Udell, 1998). The growth in popularity of choosing venture capital amongst entrepreneurs stems from the fact that venture capitalists are able to invest large sums of capital and also offer other expert managerial consultations regarding their investments (Amit, Brander & Zott, 1999). In CDM projects, their importance becomes even more evident as their criteria for investing in a potential project is a lot less demanding than any other source of finance. They can both offer a risk assessment and invest in a more technical evaluation of the project in a way that a project developer may not be able to do. The ultimate risk, however, is that the capabilities of the managers of the venture capital may over shadow the project owner eventually (Amit, Brander & Zott, 1999).

While Venture capital funding is generally good for the project, there are some projects that may not be of great interest to venture capitalists especially if they do not show potential of longevity or long-term large returns. Such projects may therefore find more access through business angels. Like the venture capitalists, business angels are wealthy individuals who invest in projects that show great potential for high returns. They also offer networking opportunities, mentoring and some degree of business support to the project that they have invested in (Sørheim, 2005).

4. Research Methodology

In this section we discuss the type of methodologies adopted for the research and the reason why they are deemed appropriate. We further go into detail over the method utilized at different stages. The section is divided into five parts: the research approach, research design, data collection method, criticism on the selection of the secondary data, as well as the validity of the data. The section is finalized with an explanation on how the research is analyzed.

4.1. Research Approaches

The chosen research approach dictates that both descriptive and exploratory methods work best for this study. A descriptive approach involves observation and description of the data collected without so much as trying to manipulate it in any way (Barbbie, 2010). The method

is used while explaining the current realities of carbon markets in South Africa. An exploratory design is an appropriate method if the study has to use some degree of quantifiable evidence to measure to what extent the acquired data is relevant (Panneerselvam, 2004; Wrenn, Robert, & Loudon, 2007). The exploratory method is adopted in the study as we aim to explore a phenomenon without any explicit expectations. Furthermore, the research seeks to identify the challenges and opportunities in carbon trading without any assumption of what they may be.

4.2. Research Design

On the whole, the research will be carried out as a case study as it has the potential to enhance the general understanding of a complex research problem. According to Newmann and Benz (1998), such a study is carried out over an extended period of time in order to investigate phenomena. However, in this research the study utilizes embedded cases to explore the matter. Ghauri and Gronhaug (2005) argue that the method is appropriate if there is no sufficient existing theory and hence the study is open enough to bring answers and understanding to the stated research question. Moreover, Yin (2003:6-8) recommends adopting the method if the study is aimed at conducting an in-depth investigation of a single individual, group, or event in real life context. Yin further stated that a case study is appropriate if the study incorporates multiple cases.

4.3. Data Collection Method

As a research topic entrepreneurship is often researched through the use of qualitative data as such a method reflects the dynamism and complexity of the subject from a holistic perspective. Qualitative research method is often linked to the behavioral study of a phenomenon and entails understanding a phenomenon through observation of the subject and understanding the underlying relationships. (Neergaard & Ulhoi, 2007) The research therefore intends to collect important data regarding the nature of entrepreneurship in carbon trading and its processes through the use of various sources of literature and also from reports and documentation collected by observatory parties involved in carbon trading and CDM projects such as the UNEP, the UNFCCC, the Intergovernmental Panel on Climate Change (IPCC) and other national resources such as the DEAT as well as the DOE.

The quantitative method which is often utilized to provide verifiable and tangible data due to its scientific approach to the collection of data and analysis (Muijs, 2004), is used in order to

assess the number of CDM projects implemented within South Africa and also to assess the type of projects these are. The numerical representation of CDM projects will be collected through a database provided by the UNFCCC as well as the national project authorizing office. Database services provide an incredible amount of information which is sufficient enough to have the necessary background knowledge of the research topic (Macqueen, 1998; Guffey, 2009).

Moreover, the research largely uses a secondary data collection method called documentary secondary data. According to Saunders, Lewis, & Thornhill, (2009,: 258), documentary secondary data includes not only written correspondence documents, minutes of meetings, reports to shareholders, administrative and public records, but also books, journals and other academic articles. Data regarding the implementation of CDM projects and other mechanisms is generally available through market reports as well as industrial reports which therefore make the use of documentary secondary data relevant.

4.4. Validity

According to Whittemore, Chase & Mandle (2001), there are primary and secondary criteria used to evaluate the validity of qualitative research. The primary criteria include the following: Credibility to establish whether the data reflects reality: Authenticity to reflect that data was not collected from only one particular source, Criticality to demonstrate the critical position of the researcher and Integrity to show that the research is consistent and does not contradict itself.

Secondary criteria, on the other hand, include Explicitness which should demonstrate the use of methodological decisions and interpretations, Vividness which portrays clear understandable interpretation of the data, and Thoroughness that represents findings that address the research question and finally, Congruence to show that all the data collected fit appropriately (Whittemore, Chase &Mandle, 2001).

In the collection of data as well as its analysis, appropriate methodologies are utilized to insure that the data is valid in terms of credibility; the use of different data sources ensures its authenticity and thoroughness. The use of secondary quantitative data also ensures that the data is critically measured to see its relation with the qualitative data. In order to measure entrepreneurship in carbon trading an in-depth analysis of entrepreneurship itself is made based on an established framework developed by OECD. On that basis, we analyze the

challenges and opportunities against every indicator thoroughly. Therefore, we are convinced that the measurement approach we have applied is appropriate and hence the study accomplishes its validity.

4.5. Data Analysis

To analyze our data, we utilized the triangulation method whereby a combination of both the quantitative data and qualitative data is analyzed and through this method, we are able to understand the underlying relationship of the variables collected in both qualitative and quantitative methods. The triangulation method of analysis is appropriate for this research particularly since the topic is explorative and the researchers reckon that if only one methodology is utilized, some important factors may be missed out, hence the combination of both methods is used in order for them to validate one another (Lu & Sexton, 2009).

5. Empirical Findings

An assessment of South African entrepreneurship determinants is carried out in this chapter. An in-depth description of how these determinants are linked to carbon trading is presented and discussed.

5.1. Market Conditions

Like other countries in the category of Non-Annex countries under the Kyoto protocol, any sort of carbon transaction in South Africa can occur primarily through CDM projects (DOE, 2011). This mechanism thereby entails that the majority of actors in carbon trading are either suppliers, customers or intermediaries. The competitiveness and the conditions within which carbon trading is done in South Africa are mainly influenced by these three sorts of actors.

5.1.1. Suppliers

The suppliers can either be the project developers themselves or some other secondary institution that may deal with selling the emission reductions on both primary and secondary markets. In South Africa they vary largely in terms of the nature of CDM projects they undertake and their own characteristics as approved sellers (CDMbazaar, 2011)

While there is a considerable number of projects that were found to be following the prescribed processes of CDM projects, the study focused on the projects that had undergone the whole process of registration and verification and already had become certified sellers of CERs. It should be noted that companies which act as the intermediate sellers of CERs, such as financial institutions, are categorized under intermediaries. The nature of the suppliers and the type of CDM projects they are involved in are illustrated in the following table.

Table 2: CDM Projects with Certified Issuance of CERs

<i>Project owner</i>	<i>Type of project</i>	<i>Aim of the project</i>	<i>Estimated Carbon emission reductions (Tonnes)</i>	<i>Stage of project growth</i>	<i>Project Lifecycle (Years)</i>	<i>Operating country</i>
Omnia Fertilizer Ltd	NO2 reduction	Reduction of emissions of Nitrous Oxide from Nitric Acid Production	576 000	Issued with CERs Project Verified	21	South Africa and southern Africa regions
Ecosecurities South Africa (Pty) Ltd	Energy Efficiency	Industrial energy efficiency project that will reduce the electricity consumption in the production of silicon manganese.	83 000	Issued CERs have been verified and are registered,	10	South Africa
Sasol Nitro Oxide Division	NO2 reductions	Reduction of Nitrous oxide from Nitric Acid productions at their operation plants	610000	Registered and verified and issued with CERs	10	South Africa
Corobrick	Fuel Switch	The project entails the conversion from coal to natural gas as thermal fuel used in clay brick baking kilns	19 000	Registered and verified Issued with CERs	10	South Africa

Source: DoE, 2011.

As can be seen from the table, the companies and projects stipulated vary in terms of projects they have undertaken and the estimated GHG reductions they are supposed to achieve. But an important common denominator between them is the fact that all these projects have been introduced within existing operational plants. They also all bear the similarity of adopting a new technology within an operational production process. The variation of their estimated lifespan is an important factor as it is used to provide assurance to customers on the long-term supply of CERs.

5.1.2. Customers

As mentioned previously, the lack of any form of carbon emission reduction target in South Africa entails that any form of customer is either international or purchasing on a voluntary basis. It makes it close to impossible to identify the independent customer within South Africa. However, there exists another form of purchase which involves the earlier prescribed suppliers as customers.

- **Primary & Secondary Markets**

The nature of CDM projects involves a number of activities that often result in the project achieving a multitude of carbon emission reductions. With knowledge of this reality most companies are open to pursuing the many activities instead of just one. Those companies that are involved with dealing in primary markets are completely involved in a specific CDM project and may supply first transaction of certified emission reductions either as a volume of the whole project or as a combination of primary market (CDM update, 2010).

Additionally, secondary markets involve companies that purchase CERs from other CDM projects that they are not necessarily fully affiliated to. In this type of market the supplier becomes a sort of customer to other project developers. This market is often preferred by investors as it carries less risk since most of the risk is carried by the project developer and the owners of Primary Market CERs (CDM update, 2010).

5.1.3. Intermediaries

In carbon trading, these are often referred to as service providers. Their role ranges from providing technological support to administrative, marketing and financial support (Kelly & Jordan, 2004). Although not before mentioned in the Kyoto protocol or even in the structure of the CDM, they are a crucial part of carbon trading. In South Africa, there exist a number of such service providers. Their services differ and the sectors of technology that they specialize

in also vary. Due to the nature of supportive services they provide to CDM project developers, they are able to be recognized by the UNFCCC as DOE as long as they can show the ability to assess and validate CDM project proposals (DoE, 2011). Their role can be expansive and inexhaustible since it continues to grow with the growth of carbon trading. In order to assess such service providers; a compilation was made with a criterion to single out companies that have been documented as having experience in carbon trading and those that have services linked to projects that have been accomplished or are currently being accomplished through CERs gathered from a share of a project (CDM update, 2010).

Table 3: Service Providers

<i>Name of company</i>	<i>Country of origin</i>	<i>Sectors of Specialization</i>	<i>Operating country</i>	<i>Service provided</i>	<i>Approved DOE</i>
Ozone	South Africa	•Afforestation and Reforestation •Agriculture •Biogas •Biomass Energy •Cement •Coal Bed/Mine Methane •Energy Distribution & Efficiency (Households, Industry, Own Generation, Service, Supply) •Fossil Fuel Switch •Fugitive, PFCs & HFCs •Geothermal •Hydro Power Landfill Gas •N20 •Solar, Tidal & Wind Power •Transport	Australia, United Kingdom South Africa	Management of carbon security portfolios & trading on international market through their software known as THE CARBONDESK	No
Promethium Carbon	South Africa	•Afforestation and Reforestation •Agriculture •Biogas •Biomass Energy •Cement •Coal Bed/Mine Methane •Energy Distribution & Efficiency (Households, Industry, Own Generation, Service, Supply) •Fossil Fuel Switch •Fugitive •Geothermal •Hydro Power •Landfill gas • N20 •Solar & Wind Power •Transport	South Africa	Administrative, legal, technical and market support to CDM projects	Yes
<i>Name of Company</i>	<i>Country of origin</i>	<i>Sectors of specialization</i>	<i>Operating country</i>	<i>Services provided</i>	<i>Approved DOE?</i>

Lima Green Strategies	South Africa	•Agriculture Energy distribution & Efficiency (Households, Industry, Own Generation, Service, Supply) •Fossil Fuel Switch •Hydro Power •Solar & Wind Power •Transport	South Africa, Lesotho	Green technology & Carbon Market Consultancy	No
AGAMA Energy (Pty) Ltd	South Africa	•Agriculture •Biogas •Biomass Energy •Energy Distribution & Efficiency (Households, Industry, Own Generation, Service, Supply) •Fossil Fuel Switch •Hydro power •Landfill Gas •N20 •Solar & Wind Power	South Africa	Technical Support and Project Evaluation	Yes
Advent Green	South Africa	• Biogas •Biomass Energy •Energy Distribution & Efficiency (Households, Industry, Own Generation, Service, Supply) •Fossil Fuel Switch •Hydro Power •Landfill Gas •N20 •Solar & Wind Power	South Africa & SADC Countries	Technical Solutions and Carbon Market Services	Yes
CDM Africa Climate Solutions	South Africa	•Afforestation and Reforestation •Agriculture •Biogas •Biomass Energy •Cement •Coal Bed/Mine Methane •Energy Distribution & Efficiency (Households, Industry, Own Generation, Service, Supply) •Fossil Fuel Switch •Fugitive & HFCs •Geothermal •Hydro Power •Landfill Gas •N20 •Solar, Tidal & Wind Power •Transport	All of Africa	Administrative, legal, technical and market support to CDM projects	No

Source: CDM Bazaar, 2011.

5.2. Market Access

The South African government has been discussing with different sectors concerning the implementation of CDM development as a weapon to fight against global climate change in general and GHG emission reduction specifically. To that end, different efforts have been on track to formulate institutional frameworks that promote CDM projects in the country (UNIDO, 2005).

5.2.1 Implementation of Trading Mechanisms

South Africa's CDM projects are classified in to primary as well secondary sectors. The primary sectors encompass the energy industry, energy demand, manufacturing, chemical industries as well as waste handling and disposal (DoE, 2009). Initially, the CDM projects targeted the chemical industry for the highest GHG emission reduction. However, once the projects in that industry are all taken up, an enormous potential is identified in the energy sector. Hence, energy efficiency investments and fuel substitution are becoming vibrant opportunities nowadays (DoE, 2011). Due to the country's dependency on coal, it remains slow in adopting high technologies required for implementing the clean technology mechanisms for energy efficiency. Hence, lack of skills remains one of the biggest challenges and a major inhibitor for the exploitation of current opportunities in the energy sector (Winkler & Van Es, 2007).

So far, as the table below depicts, 200 project pipelines have submitted to the DNA, whereby 163 projects are in the Project Idea Note¹ (PIN) and 37 are in the Project Design Document² (PDD) stages (DoE, 2011). The table illustrates that the sectors that attract top investment are those in renewable energy, followed by energy efficiency, then co-generation, fuel switch and finally, waste management. Moreover, the same sequence goes for the highest expected GHG emission reduction.

¹ According to DoE (2009), PIN refers to the conceptualization stage of the CDM project idea

² PDD refers to the document that provides more detail of the CDM after the stage of PIN. It represents the approval stage of the project.

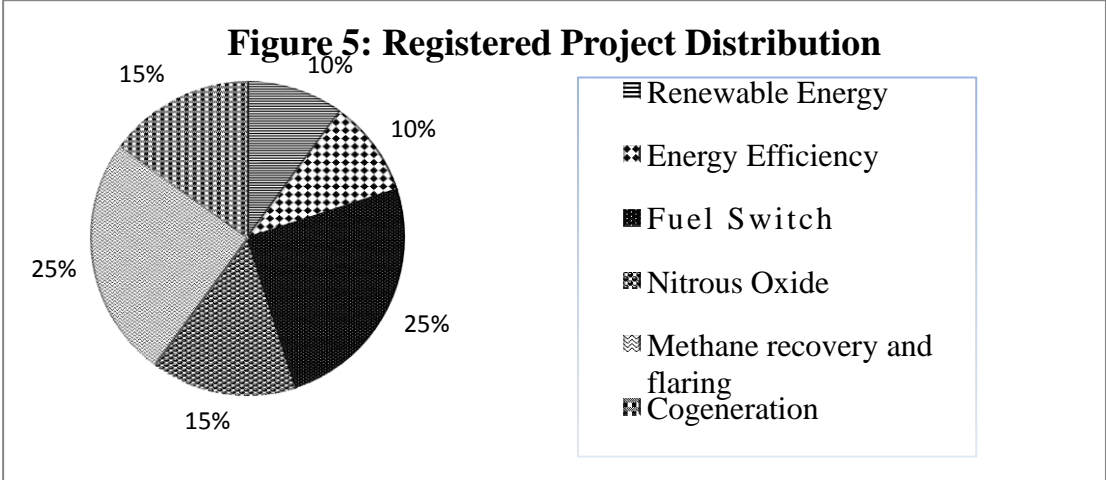
Table 4: CDM Project Distribution (both PDD & PIN)

<i>Project Types</i>	<i>No. of Projects</i>	<i>Estimated GHG Emission Reductions (%)</i>
Renewable Energy	70	35
Energy Efficiency	32	16
Co-generation	23	11
Bio-Fuel Production	5	3
Industrial Processes	6	3
Fuel Switch	23	11
Methane Recovery & Flaring	14	7
Nitrous Oxide	4	2
Waste Management	20	10
Transport	3	2

Source: DoE, 2011.

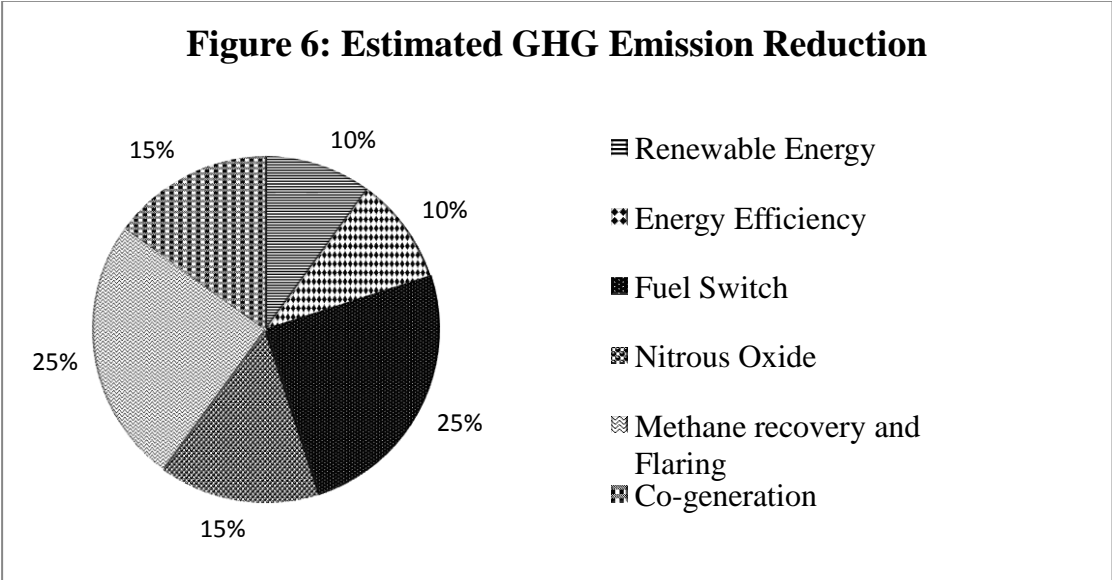
Albeit large numbers of CDM projects are in the pipeline, only a limited number have passed the registration and approval stage. These projects are represented in the figure below according to the industry sector they belong in.

As the figure below illustrates, there is generally a saturation of projects in methane recovery and flaring as well as fuel switch. The popularity of methane projects is generally due to their ability to generate large revenues as well as their relatively easier way of implementation (DoE, 2009).



Source: DoE, 2011.

With an estimation of the potential number of registration approvals and the type of projects that register the most, projects in methane recovery as well as fuel switch are expected to achieve the highest percentage of emission reductions. The forms of projects in these sectors are highly varied and offer a number of ways to be implemented. e.g. landfill gas projects, biomass waste as source of fuel and waste product management (DoE, 2009)



Source: DoE, 2011.

5.2.2 Regulatory Bodies

In South Africa, the DNA works under the supervision of the Department of Minerals and Energy (DME). The CDM project approval procedures developed by DNA oblige every project to pass through the different stages of the approval process in order to earn CERs (See appendix).The DNA reviews whether the project is in tune with other national policies and after private considerations, it posts the PDD for public feedback. Public responses are considered by DNA during the approval process. Projects that promote benefits for local communities and create local manufacturing capacity are likely to be favorably received (DOE, 2010)

The DOE which is also an authority in this process has the responsibility to monitor the project proposal and verify whether the implemented projects have met the targeted international requirements. Prior to validation, the DOE makes the PDD publicly available for 30 days so that the documents will be accessed by the international parties and stakeholders, they further assure quality control. The final validation decision is made after consideration of the comments received from the public (Ehlers, 2010).

5.2.3. Trade and National Policies

Even though the South African economy has shown a substantial recovery between 1994 & 2008, the impact on unemployment and emission reduction was inadequate. Therefore it became high time for the government to restructure the economy so as to make sure that their economic policy follows a sustainable path. As a result a new policy titled New Growth Path (NGP) was launched in 2010 (DTI, 2011). The policy targets employment creation and has identified potential in different sectors like manufacturing, mining, agriculture and tourism (ibid). Up to 2020, they have set a target to reduce unemployment by 10 per cent through the creation of employment opportunities for 5 million citizens (SAGI, 2011).

Furthermore, the government released an industrial policy called Industrial Policy Action Plan (IPAP2) which aims at creating green and energy efficient industries. This growth plan underlines capacity building as an important way forward and it further stipulates growth potential and opportunity to create an economy in sectors such as transport, energy, construction, manufacturing, agriculture and forestry (MEIBC, 2010).

5.2.4. Support Institutions

South Africa has different support institutions that facilitate carbon development in the country. To mention a few: UNEP and the UNEP Risoe Center (URC). Those institutions promote and coordinate environmental activities to facilitate the move towards a green economy by cooperating with local institutions. South Africa is actively involved in UNEP activities via the South African Permanent Mission to the UNEP in Nairobi (DFA, 2006). In 2010, the UNEP partnered with South Africa's Standard Bank and the German government's International Climate Initiative to develop a new carbon project ACAD. The ACAD provides grants to projects which follow the green development path. The companies that have been awarded financial and technical assistance thus far are International Ferro-Metal Cogeneration Facility and the Clay Brick Energy Efficiency. The former aims at generating clean power out of waste gas. The project is expected to mitigate an estimated 200,000 tonnes of GHG off the environment yearly (URC, 2010). The latter project is an efficient brick manufacturing operation which intends to curb energy consumption as well as GHG emissions by 33% (DBSA, 2010).

5.3 Culture

5.3.1. Entrepreneurship Culture in South Africa

Culture has a big influence in shaping any country's entrepreneurial setting. In order to impact economic development in the country, its entrepreneurial culture has to be fostered with positive perception and confidence (Herrington & Kew, 2009).

The stagnant nature in the development of entrepreneurship culture in South Africa is linked to a number of reasons. Studies by Herrington, Kew & Kew (2009) showed that entrepreneurship has been slow to develop as there is no cooperation between entrepreneurs, they are often not willing to share the skills acquired through experience. Moreover, Dolles & Babo (2003) identified that the usual underlying motivation for starting an enterprise for most South Africans is linked to unemployment; this is more true for the Black South Africans.

Dolles & Babo (2003) further pointed out that when entrepreneurship is motivated by the lack of employment, there is often no objective or plan for the growth of the company, which may then explain the limited growth of entrepreneurship. In terms of carbon trading, entrepreneurship motivated by unemployment with little or no future plans may not be suitable since the nature of project development in CDM entails long investments, proper planning and lengthy processes.

Moreover, in the research made by Dolles & Babo (2003) characteristics such as reservedness and little patience were observed in the South African entrepreneur. Various ethnic groups were more inclined to be absorbed in certain functions rather than others; an example is the fact that while the colored entrepreneur was likely to be more involved in the production, the black and white entrepreneurs were more likely to be involved in marketing and planning respectively. This factor may be a leading indicator of the potential ethnic distribution in carbon trading and the type of role they may play.

Another important aspect of the South African entrepreneurship culture is the stigma associated with failure in new ventures. The society tends to be less tolerant of business failures. This has resulted in continuous reluctance for entrepreneurship initiatives (GIBS, 2009). Lastly, limited resources and financial constraints are a big contributor to the lack of diversification in the entrepreneur clusters. The economic minorities such as Black South

African males and women in general are often reliant on personal or family funds in order to start a business (DTI, 2005).

5.3.2. Populations Groups

In South Africa, population-wise it is the blacks who make up the largest percentage which accounts for 79.4 per cent of the whole South African population. While the white, colored and Indian groups' accounts for only 8.8 per cent, 2.6 per cent, and 9.2 per cent respectively.

Table 5: Entrepreneurship participation by Ethnic groups

<i>Population Groups</i>	<i>Entrepreneurial activity (%)*</i>	<i>% to overall South African Population**</i>	<i>Ratio of Entrepreneurship to population</i>
Black African.	64.5	79.4	0.8
Colored	10.5	8.8	1.2
Indian	7	2.6	2.7
White	18	9.2	1.9

*Source: Herrington, Kew & Kew, 2009, ** SSA, 2010.

As we can see from the above table, entrepreneurship participation varies largely between the different ethnic groups. While the Black South Africans seem to be the majority participants in entrepreneurship, their participation ratio in comparison to their population ratio shows that they in fact make up the smallest number of entrepreneurs. With a ratio of 1.2, the colored are the second least frequent participants in entrepreneurship, followed by whites and Indians respectively. Apart from the other cultural aspects discussed earlier on entrepreneurship culture hindrances, this difference in participation may be explained by; firstly, the legacy of the apartheid system which favored the whites and therefore gave them opportunities for better education and complete access to the economy. This gave them an unparalleled advantage over the other ethnic groups as their business acumen and networks were strengthened. The Indians, on the other hand, have had the added advantage of working within their own social groups and growing considerable business networks in areas where they represent a big percentage of the population e.g.: Durban. Moreover, apartheid was not nearly as harsh on them as it was on the blacks and the colored population which afforded them more access to education (Herrington, Kew & Kew, 2009).

Despite the low ratio of entrepreneurship participation amongst the black population, it should be noted that this is by far a big improvement as the apartheid era did not allow them any

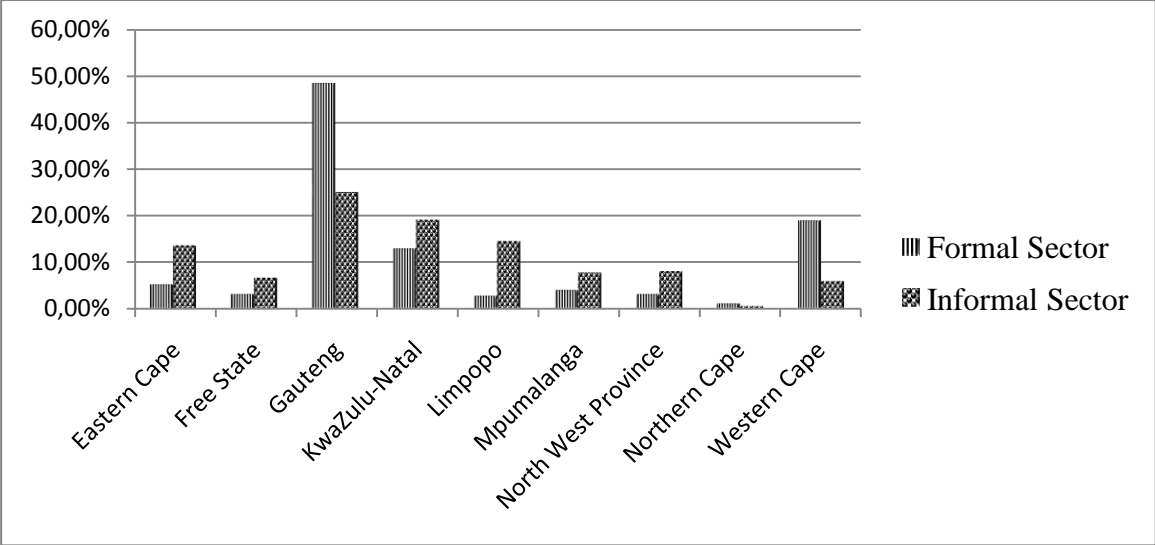
form of sustainable economic participation. Their current increase in entrepreneurship initiatives has predominantly been influenced by governmental policies that require companies which cooperate with governmental institutions to have black partners (Dolles & Babo, 2003). In respect to carbon trading, this may particularly be a situation of great opportunity as CDM projects require close cooperation with the government, hence giving an occasion for the black South Africans to partner with project owners or developers.

While current governmental policies provide some degree of advantage for the black South Africans to penetrate carbon trading through partnership, their white and Indian counterparts still remain with the advantage of having better financial possibilities, with the whites controlling a major share of the financial market (Dolles & Babo, 2003). It therefore gives them the option to freely enter into carbon trading as service providers such as banks, brokers, evaluators or other forms of intermediaries.

Although historical dispositions of ethnic groups play a major role in giving more advantage to one group over another in South Africa, characteristics of the natural environment in which an individual resides also influences the opportunities that he/she might have in entrepreneurship. Since the end of the apartheid era, the provincial distribution of small and medium enterprises is highly diversified and some provinces seem relatively more entrepreneurial than others (DTI, 2008).

In the graph below, SMEs in the informal and formal sector are shown in accordance with the provinces they are identified in.

Figure 7: Provincial distribution of SMEs in business sectors



Source: Herrington, Kew & Kew: 2009.

An overall look at the graph suggests that the Gauteng province dominates the rank with close to 50 per cent of SMEs in the formal sector and close to 30 per cent in the informal sector. It is closely followed by Kwazulu Natal then the Western Cape. In spite of the overall rankings, the difference in the sectors that each province represents suggests that some provinces such as the Western Cape have a well-developed formal sector while it is surpassed by Limpopo in the informal sector. The informal sector continues to grow in some areas with a less economically advantaged population due to avoidance of paying the administratively required value added tax (VAT).

The indication of such differences may imply which areas carbon trading is likely to flourish in since the availability of enterprises in the formal sector also suggests developed infrastructures and supportive networks. According to a report by DTI (2008) financial intermediaries as well as business services are the main partakers in the formal sector while SMEs in the informal sector are dominated by wholesale and retail trade industry. The former therefore provide abundant opportunities for the several activities that carbon trading has to offer.

5.4. Technological Infrastructure

One of South Africa’s endowments is its advancement in technological infrastructures in terms of technical capabilities and development. This is a factor that has helped it advance considerably ahead of other Sub-Saharan countries in the establishment of appropriate

structures for the implementation of CDM projects and other forms of renewable technologies (CTF, 2009). The development of most regions in South Africa ensures that the technological advancement is largely widespread and opportunities to tap into carbon trading abound. The presence of these technological infrastructures was observed mainly through two forms:

5.4.1. Supportive Networks

South Africa has been an energy-intensive country for the past few decades; its energy intensity is widespread in a number of operational sectors such as the mining industry, chemical industry and energy production (DoE, 2002). Seeing that these sectors are the largest contributors of GHG emissions, it offers a unique opportunity for South African entrepreneurs to create cleaner technologies that can be applied in those sectors. Although the implementation of the CDM project was relatively slow at the beginning, considerable change has been observed in recent years. This has been associated with the government initiatives that enable networks that enhance the use of renewable energy on a local level (Camco & TIPS, 2010).

The government has continuously engaged with supportive international networks such as the Renewable Energy and Energy efficiency Partnership (REEEP). This network interacts with the various stakeholders to encourage investment and partnership with local project developers (Camco & TIPS, 2010). Moreover, it works very closely with the government to identify areas of concern and provide the proper guidance. The REEEP-SA which is hosted by the South African National energy Research Institute, also creates a forum for experts and other companies within the energy networks to exchange ideas and come up with solutions

On an international level there are other networks such as the newly-established network known as the Africa Carbon Asset Development (ACAD) facility, this institute intends to create links between project developers, investors, buyers and intermediaries from different parts of Africa so that they may share experiences and knowledge on the implementation of CDM projects (UNEP, 2010).

5.4.2. Research Facilities

The Energy Research Center (ERC) and the Environment as well as the Environment research Unit both based in Cape Town are academic institutions that are vested in environmental as well as renewable energy research. Through the publications made by both these institutions and forums carried out by researchers in them, there has been significant advancement in

understanding the potential of carbon trading for the South African economy. Moreover, the various experts found in these institutions provide consultative services to project developers and owners (Brick & Visser, 2009).

The Energy research Institute (ERI) is another research institution that has been instrumental in providing guidelines for CDM implementation in South Africa; it has also published structural policy recommendations for the application of clean technologies. Additionally, it is highly involved in providing occasions for capacity building in CDM (UNIDO, 2003). Apart from the ones stipulated there are continuous government arranged forums in which local leaders are involved in order to understand the possibilities and potential of renewable energy and the implementation of CDM.

5.5. Finance

In South Africa, the average cost of the least costly CDM project is estimated at 400 thousand Rand \approx 30098 EURO (1EUR = 13.29ZAR Est. 31st Dec 2008) and this is only estimated after the proposition phase. The most expensive CDM project, on the other hand, is the Nitrous Oxide reduction project which is estimated at 4Million Rands \approx 300978 EURO (1EUR = 13.29ZAR Est. 31st Dec 2008) (DoE, 2009; OANDA, 2008). Such elevated amounts can therefore only be accessed through a number of available institutions

5.5.1. Grants and Governmental Subsidies

In the process of encouraging the adaptation of renewable energy in different sectors of the economy the South African government has continued to create incentives and means to encourage people towards taking up such endeavors. In 2008 the government with the aid from international organizations created a special bureau that is part of the energy department to help monitor CDM projects and gives them impetus to continue. This special office known as the Renewable Energy Finance and Subsidy Office (REFSO) is responsible for the support of renewable energy project developers by providing them with advice on renewable energy finance and managing their subsidies (DoE, 2009)

This office therefore provides incentives and information on requirements for renewable energy projects, criteria and resources on alternative finance. Renewable energy projects proposed have to go through an evaluation by the Renewable Energy Subsidy Governance Committee which may then decide to award the project a subsidy contract (DoE, 2009).

Unlike other forms of finance, the REFSO is able to award subsidy contract to small projects which may not necessarily offset GHG emissions on a large scale.

While some financial assistance, maybe from the government, other forms of grants have come from other international aid organizations that target projects implemented in special areas of concern or particular municipalities. Such organizations are the likes of Small Grant Program (SGP), which generally awards grants not exceeding fifty thousand US Dollars to community based projects (GEF, 2006). The funds awarded by this organization are open to different sectors ranging from community sensitization on renewable energy to project development of a biogas project (ibid). Their criterion for the selection of a project grant is based on other social benefits such as the creation of work, the transfer of knowledge or poverty alleviation. However, The Global Environment Fund is able to grant larger sums of money of more than two million US Dollars to municipalities who can thereby allocate it to project developers in the area.

Through the annual financial support offered by the EU, the South African government has also been able to create other financial facilities to enhance economic empowerment on a local level (Patterson, 2008). These facilities, however, have been targeted towards three specific regions, namely, Kwazulu Natal, the Eastern Cape as well as Limpopo. Through a scheme known as the Thina Sinako, entrepreneurs from the different municipalities are able to access funds in three categories, firstly they are able to access it through their municipalities with The Local Government Support Fund (LGSF) then also through The Local Competitiveness Fund (LCF) which helps dynamic role players in the community to tap into provincially identified opportunities while creating sustainable employment in the community (Patterson, 2008). These funds are particularly in alignment with the provincial industrial development strategy and target entrepreneurs in the Eastern Cape. Last but not least, is the fund created specially to encourage innovation on a local level. This fund known as the Financial Innovation Fund (FIF) is created firstly to support partnership SMEs linked with groups already sponsored by the LCF. Secondly, the FIF also funds financial services on a local level, in order to bring diversity and innovation to the financial market (ibid).

5.5.2. Bank loans & Special Loans

In a bid to engage financial institutions in its work towards the mitigation of negative impacts of climate change through the application of strategies to reduce GHG emissions, the UNEP

Finance initiative has formed what is known as The Climate Change Working Group (CCWG) which was created to specifically erase bias and uncertainty associated with CDM projects and other climate change initiatives. Its members consist of various financial institutions from all around the world (UNEPFinance, 2011). They are as follows

Table 6: National and International banks involved in carbon trading

<i>Africa</i>	<i>Asia</i>	<i>Europe</i>	<i>USA</i>
<ul style="list-style-type: none"> •Access Bank (Nigeria) •Eco bank (Ghana) •Development Bank of Southern Africa (South Africa) 	<ul style="list-style-type: none"> •IL&FS (India) •Japan Bank for International Cooperation 	<ul style="list-style-type: none"> •Allianz, MunichRe ,Deutsche Bank & KfW (Germany) •Aviva, HSBC & Standard Chartered (UK) •CarbonRe & Societe Generale (France) •La Compagnie Benjamin de Rothschild (Switzerland) SwissRe & UBS (Switzerland) •Fortis & ING (Netherlands) 	<ul style="list-style-type: none"> •Merrill Lynch Bank of America •Calvert (USA) •World Management •Chartis International

Source: UNEPFinance, 2011.

These Financial institutions have in turn created various climate change packages that are open to project developers either through services such as loans, risk management or selling the certificate on the international market (Kamel, 2007). It should be noted that these banks are not exclusively limited to their areas of location but rather work simultaneously in other countries in which they have branches such as South Africa.

In South Africa, The Development Bank of Southern Africa (DBSA) is a signatory of the carbon finance agreement with the World Bank and is therefore able to provide financial assistance to project developers in form of loans as well as provide some kind of guidance in the management of the funds (DBSA, 2007). Likewise, Standard Bank also offers specialized packages for climate change projects. The loans offered, however, often come with the option to have the bank also invest in future CERs generated by the project (CTF, 2009).

In the last decade, The World Bank introduced a service known as the Prototype Carbon Fund. This service was the first step in providing long-term huge loans to projects in CDM and other Renewable energy projects. The World Bank, as well as other funds such as Annex I and Annex II specialized Fund facilities, provide a certain amount of investment towards the first steps in project initiation. They are often able to fund a certain percentage of the funds utilized in the registration and verification processes of the project. The German bank KfW, for example, exclusively offers flexible loans of up to 50 per cent of the total sum of the loan provided during the documentation processing on a long-term basis at a relatively low interest (Kamel, 2007).

5.5.3. Venture Capital

Developing countries like South Africa need venture capital to inject finance to new business entrants. However, regardless of the high demand for finance by entrepreneurs and SMEs, the number of venture capital investors remains negligible. Two distinctive venture capital firms exist, namely; the National Empowerment Fund and Business Partners. Apart from those two, there are only a handful of venture capital firms that provide assistance for new ventures. In the former type of venture capital, the historically disadvantaged part of the society becomes the optimal beneficiaries (DTI, 2006). Both institutions are involved in providing financial as well as non-financial support to SMEs. However, the National Empowerment Fund is limited to supporting businesses that are owned by black entrepreneurs whereas Business Partners finances SMEs in the formal sector (National Empowerment Fund, 2010).

The availability of venture capital firms that support CDM investment is of a negligible number. SouthSouthNorth (SSN) is a non-profit organization that is highly involved in financing investments that increase sustainable energy consumption, i.e. energy efficiency and renewable energy. SSN targets and assists small CDM projects. Moreover, it also targets the lower segments of the society which is exposed to the severe effects of climate change (SSN, 2006). As part of its project financing plan, SSN with the cooperation of the DEAT, the South African government as well as South African Export Development Fund (SAEDF) has funded two CDM projects: the Kuyasa Low-Cost Urban Housing Energy Upgrade and Bellville Landfill Gas Recovery and Use projects (ibid). These projects are aimed at reducing energy cost in households. Other than financial support, SSN undertakes technical assistance to facilitate the transfer of technology to community members (Kuyasa, 2009).

The insufficient involvement of venture capitalists as well as business angels in carbon trading could be explained by the fact that, firstly, the investors themselves don't have full knowledge as well as experience about clean technologies. Furthermore, the traditional belief of the South African financiers who often relate size with profitability influences them to associate small projects with risk (Foster-Pedley & Hetzog, 2006).

Table 7: Venture Capital investments in CDM projects

<i>Venture Capital</i>	<i>Place of Operation</i>	<i>Type of Project</i>	<i>Name of the Project</i>	<i>Aim of the Project</i>	<i>Estimated CO2 Reduction (Tonnes)</i>	<i>Project Life Cycle (Years)</i>	<i>Standard</i>
SouthSouthNorth	Khayelitsha Cape Town	Energy Efficiency	Kuyasa CDM Pilot Project	<ul style="list-style-type: none"> Solar Water Heaters, insulated ceilings and energy efficient lighting Methane Recovery and avoidance Thermal energy to generate steam and other energy services. 	364742	21	Gold Standard
	Bellville, Capetown	Renewable Energy	Bellville Landfill Gas Recovery and Use projects		945000	10	Not yet reached

Source: SSN, 2006

6. Analysis and Recommendation for the Industry

This chapter presents an analysis of the findings with a recommendation for the industry.

The development of financial mechanisms for the mitigation of carbon emissions in recent years has led to the creation of a new commodity which in turn generated a string of new service sectors with numerous actors. Amongst the mechanisms proposed in the Kyoto protocol, the CDM was the trading mechanism proposed to South Africa.

With earlier estimations of huge growth and development of carbon trading in South Africa due to its developed economic status, South Africa continued to spearhead other Sub-Saharan Africa countries in its penetration of carbon trading. Nonetheless, this was by far an inferior level of participation given the capabilities that South Africa is endowed with.

Mindful of the nature of carbon trading and especially since the implementation of CDM projects is a new concept largely based on innovative ideas and technologies associated with renewable energy, the role of the entrepreneur is immediately recognized as they tend to be the mavericks. Their risk-taking behavior often results in the growth of new industries and services.

While entrepreneurship creates competition, innovation and general growth in the economy, research is still being developed today to determine the types of factors that influence the birth of entrepreneurs in different environments. The recognition of such an atmosphere is a first step in identifying the reason behind the huge disparities between those who participate in new lucrative businesses and those who don't.

In the analysis of this study, an entrepreneurship framework developed by the OECD was adopted and developed to include many different variables that may pose as challenges or opportunities for entrepreneurship. The findings were then tabulated in a format where each one was evaluated with regard to its influence on the potential for entrepreneurship in carbon trading in South Africa. Challenges and opportunities are clearly identified and recommendations for the alleviation of the barriers and challenges are suggested as can be seen in the elaborate table below.

Table 8: Entrepreneurship challenges and opportunities in carbon trading

<i>Indicator</i>	<i>Variables</i>	<i>Opportunity</i>	<i>Challenges</i>	<i>Recommendation</i>
Market Conditions	Project owners and developers	<ul style="list-style-type: none"> The lack of limitation on project description allows for innovation in project development and ease to access the market as long as the project can prove achievable GHG reductions. 	<ul style="list-style-type: none"> There is limited opportunity for owners of projects with small GHG reductions. The required capital from the point of project initiation to project implementation limits the number of entrepreneurs who can access the market. 	<ul style="list-style-type: none"> Diversification in the profile of Project owners and developers should be encouraged in order to hasten innovation.
	Primary Customers & Secondary Customers	<ul style="list-style-type: none"> Primary and secondary markets provide flexibility and diversity for customers to also resell at a profit. 	<ul style="list-style-type: none"> The maturity of other CDM markets such as those in China, Vietnam and India makes the pool of customers a lot smaller. 	<ul style="list-style-type: none"> The government should create funding incentives for entrepreneurship amongst local intermediaries in order to encourage competitiveness.
	Intermediaries	<ul style="list-style-type: none"> The growth and spread of the carbon markets brings prospects for new services and a multitude of possibilities for brokers, financial, technical and administrative services. 	<ul style="list-style-type: none"> Lack of developed networks limits local intermediaries and enhances international intermediaries 	<ul style="list-style-type: none"> A more proactive approach towards customers should be put in place such as promotional Eco-tourism to ensure that the international community is aware of local capabilities

<i>Indicator</i>	<i>Variables</i>	<i>Opportunities</i>	<i>Challenges</i>	<i>Recommendations</i>
Market Access	implementation of trading mechanisms	<ul style="list-style-type: none"> • Potential for Job Creation due to the new investment opportunities. • Creation of databases that serves as a leeway to connect project developers with experts • Launching policies that hasten Sustainable development paths in order to create clean environment and hence healthy society. • The inflow of financial assistance to new business entrants by cooperating with local institutions to foster green development growth. 	<ul style="list-style-type: none"> • The transaction cost as well as the lack of the necessary skills to implement high technologies required for CDMs projects. • Lengthy, complex and bureaucratic procedures by DNA resulting in slow penetration in the market • lack of consistency in available CDM related legal documents • Novelty of most support institutions such as ACAD limits their capabilities. 	<ul style="list-style-type: none"> • Intensive capacity training to unlock the technical barrier. • Creation of incentives and opportunity for smaller sustainable CDM projects • Registration and verification processes should be adapted to local capabilities. • National facilitators should be provided on different levels of the process to curb the cost of the initial stages and encourage entry. • Thorough education regarding CDM structure should be provided at no extra costs to enhance the creation of local supportive institutions.
	Regulatory bodies			
	Trade & national policies			
	Supportive Institutions			

<i>Indicator</i>	<i>Variables</i>	<i>Opportunities</i>	<i>Challenges</i>	<i>Recommendation</i>
Culture	Culture of entrepreneurship	<ul style="list-style-type: none"> • Pushes the overall economic growth up ward and reduces the unemployment rate in the country. • Globalization and open trading has influenced a culture of competitiveness on the regional and local level 	<ul style="list-style-type: none"> • Fear of failure limits entrepreneurial spirits. • Lack of collaboration amongst entrepreneurs inhibits overall entrepreneurial development in the country. • Inadequate transfer of information regarding CDM on a local level has led to wrong and negative connotations about the CDM 	<ul style="list-style-type: none"> • To raise the awareness of the population and reduce the negative perception that the people have, there should be a continuous and aggressive campaign concerning CDM and its benefits. • Government policies should incorporate motivational factors to encourage new entrepreneurs to be proactive in the future. • To enhance the culture of clean technology the government should encourage small GHG reduction projects
Technological Infrastructures	Supportive Network	<ul style="list-style-type: none"> • Continuous increase in supportive networks especially on a local level. • Growth in research on renewable energy creating platform for innovation • Diversification of expertise and the type of knowledge and capabilities in supportive networks may aid in new skills development on grass root levels 	<ul style="list-style-type: none"> • Lack of clear associative national information linking renewable energy and CDMs • Dispersion of research clusters creating opportunities in some areas more than others • Technology infrastructures such as research units are more accessible to academics located nearby (eg: Cape Town) 	<ul style="list-style-type: none"> • Creation of educational programs for project developers on a local level through continuous collaboration with international experts • Creation of informative centers on a municipal level to ensure proper knowledge transfer • Establishment of a mobile CDM committee to assess technology barriers in different municipalities.
	Research Facilities			

Indicator	Variables	Opportunity	Challenges	Recommendations
Finance	Government subsidies and Multilateral sponsors	<ul style="list-style-type: none"> • Financial assistance as well as consultation as a motivational factor. • Availability of Grants and subsidies targeted at entrepreneurs in sectors of national interest such as renewable energy • Availability of large loans through packages such as Carbon Finance and other multilateral institutions • Venture capital targeted at minority groups facilitates entrepreneurship in small scale projects in poor communities 	<ul style="list-style-type: none"> • Limited access between finance institutions and potential project developers on a local level • National pre-determined areas of interest (Eastern cape, Kwazulu-Natal) creates access barriers for other potential entrepreneurs • General bias on small scale CDM projects limits their access to investment especially amongst private investors 	<ul style="list-style-type: none"> • Need for specialized national finance schemes for small scale CDM Projects. • Formation of a bilateral forum between buyers and suppliers in order to formulate better financing mechanisms • A more open national approach towards investment in other areas that may have previously been disregarded
	Loans			
	Capital Ventures			

7. Conclusion and Implications for Further Study

This chapter concludes the findings of the study and suggests issues that should be researched further.

While the idea of this research was being developed, many early researches were consulted. One of the most distinctive features amongst the literature referred was its concentration on technicalities involved in the implementation of the mechanisms, the generalization of the natural benefits of carbon trading without clear analysis of transactional cost and potential benefits. Studies conducted by researches such as Kamel (2007), Curnow & Hodes (2009), Yamin (2005) & Harris (2007) have done a great deal in advancing the understanding of how the Kyoto Protocol mechanisms should be implemented and the types of challenges that may be foreseen in their implementation. However, the lack of focus on the profile of the potential actors leaves a wide gap in the understanding of how the industry can be developed. There is a vivid shortage in literature addressing issues such as skills requirements for entry into carbon trading and inadequate research on capital requirement at the various stages of project implementation.

With this in mind, we pursued to explore and discover the part of carbon trading that we regarded to be the most important. We reckoned that if carbon trading was something that could potentially boost an economy, it was vital to understand the people who would be involved in it and their chances of being successful. To discover our target actors, we reflected on research by scholars such as Schumpeter (1941) who identified entrepreneurs as the main contributors to economic growth through their initiatives in novel industries and products.

The assessment of entrepreneurship challenges and opportunities through a framework highlighting aspects such as market conditions, market access, culture, technology infrastructure and finance guided the research towards issues that were both unique to carbon trading and South Africa itself.

In the course of this research, we discovered that even though it has been several years since the signing of the Kyoto agreements, carbon trading and its mechanisms are still a foreign term in many countries and South Africa is no exception. The protocol which was created to allow industrialized countries to curb their GHG emissions through investment in clean

technology projects in developing countries has had a slow but steady effect on entrepreneurs in South Africa.

The structure within which the protocol's mechanism of CDM was introduced and adopted into South Africa has been one of the contributors to the slowness in the growth of the number of participants in carbon trading. This factor is closely seconded by the overall sophistication in the nature of the projects which generally implies huge capital investments in order to be implemented. The lack of information about the mechanisms themselves and how they are utilized or even how investment can be acquired for them continues to affect the number and the dynamics of the entrepreneurs who are able to access the carbon trading market. The issues that come with CDM implementations have been highlighted in other case studies such as the one carried out by Jindal, Swallow & Kerr (2008) on forestry projects taking place in various countries in Africa. Some of the issues highlighted were the danger posed by project ownership by big cooperation which would completely exclude local initiatives and continue to add to poverty rather than enhance the economy.

While those hindrances are related to carbon trading itself, the typical South African entrepreneur faces other challenges that may be more complex to solve. Deeply rooted challenges such as networks and the economic capabilities of the different ethnic profiles are still a telling factor on the amount of opportunities that may be available to one person over another. The legacy of the apartheid era still affects the types of entrepreneurships that different ethnic groups are skilled enough to partake in or have the sufficient capital to start. A majority of the black South Africans dominate the informal sector while their white and Indian counterparts occupy most of the formal sector; this situation in itself is a challenge to entrepreneurs in the informal sector as it limits their integration into the formal sector and thereby makes carbon trading an inaccessible market.

An increase in favorable governmental policies that encourage entrepreneurship and competitiveness through small grants and subsidies is a great opportunity in the development of entrepreneurship culture. This, however, can be slightly criticized as those policies have so far been limited to specific areas of national interest. Inability to access any form of resource has also generally contributed to reluctance in entrepreneurship initiatives as most commercial banks in South Africa are not engaged in carbon finance and are skeptical of its capability to

generate profit. Venture capitalists and investment angels have thus increased as bank loans have become harder to access.

Service providers or intermediaries have had easier penetration into carbon trading as no lengthy procedures and endorsement are required of them. Unlike project developers, they have to compete with other international intermediaries on the national market in the provision of their services as brokers, financial service providers or technical support.

Carbon trading also remains with its natural flaws which may explain continuous skepticism of its durability. Most projects take at least a year to be approved and another seven to ten years to realize their first batch of CERs. This may be a discouraging factor to new entrepreneurs in carbon trading since the mandate for the protocol is limited to the year 2012. Lastly, the price of CERs has been a point of concern for many investors in CDM projects since it fluctuates considerably and is dependent on the market.

The research, although focusing on entrepreneurship in carbon trading in South Africa, can be used as a point of reference in further studies. Many of the studies carried out earlier have engulfed the implementation of CDMs in various African countries as one big issue rather than assessing the particulars of that specific country of concern. We therefore hope that this study will aid future researches in avoiding the mistake of assessing such issues of carbon trading and particularly CDM implementation on a generalized basis.

The framework utilized has been a vital instrument in the exploration of entrepreneurship in carbon trading in South Africa. It is therefore our suggestion that the variables used should be tested in other industries or on another country to examine how those variables contribute to the level of entrepreneurship in that particular country or industry.

Lastly, although the research was conducted in a holistic way, it could not exhaust all other external factors that may be affecting entrepreneurship in carbon trading in South Africa. However, the recommendations provided should be an indication of the adaptable solutions and issues to consider for other countries planning on implementing CDM projects.

8. Appendix

Table 9: Annex I Countries

Australia	Hungary	Romania
Austria	Iceland	Russian Federation
Belarus	Ireland	Slovakia
Belgium	Italy	Slovenia
Bulgaria	Japan	Spain
Canada	Latvia	Sweden
Croatia	Liechtenstein	Switzerland
Czech Republic	Lithuania	Turkey
Denmark	Luxemburg	Ukraine
European Union Community	Monaco	United Kingdom of Great Britain and North Ireland
Estonia	Netherlands	United States of America
Finland	New Zealand	
France	Norway	
Germany	Poland	
Greece	Portugal	

Source: UNFCCC, 2010.

Table 10: Annex II Countries

Australia	Germany	New Zealand
Austria	Greece	Norway
Belgium	Iceland	Portugal
Canada	Ireland	Spain
Denmark	Italy	Sweden
European Economic Community	Japan	Switzerland
Finland	Luxembourg	United Kingdom of Britain and Northern Ireland
France	Netherlands	United States of America

Source: UNFCCC, 2010.

Table 11: Non Annex Countries

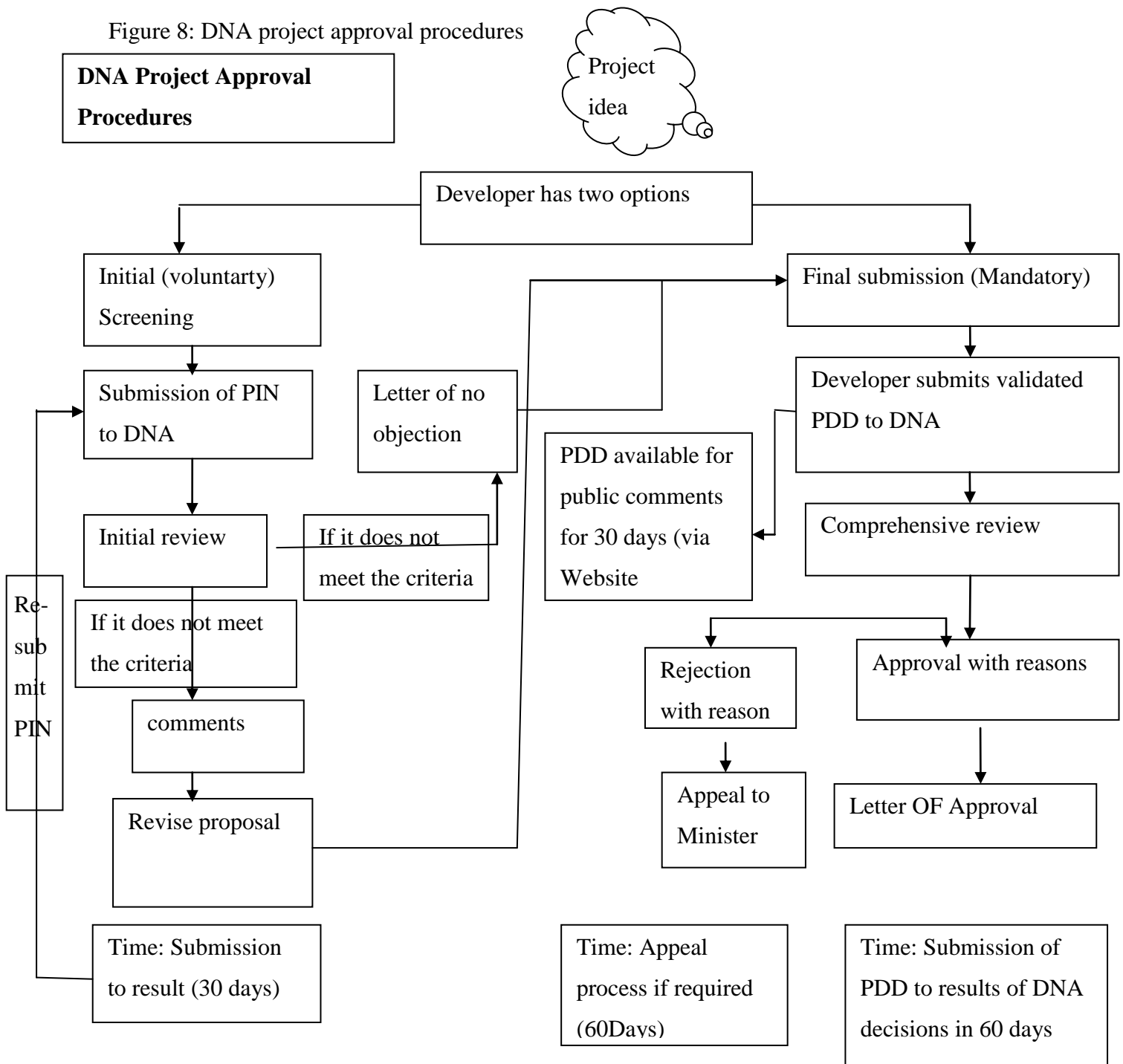
Afghanistan	Georgia	Panama
Albania	Ghana	Papua New- Guinea

Algeria	Grenada	Paraguay
Angola	Guatemala	Peru
Antigua & Barbuda	Guinea	Philippines
Argentina	Guinea-Bissau	Qatar
Armenia	Guyana	Republic of Korea
Azerbaijan	Haiti	Republic of Moldova
Bahamas	Honduras	Rwanda
Bahrain	Islamic Republic of Iran	Saint Kitts and Nevis
Bangladesh	Iraq	Saint Lucia
Barbados	India	Saint Vincent & the Grenadines
Belize	Indonesia	Samoa
Benin	Israel	Sanmarino
Bhutan	Jamaica	Sao Tome Principe
Bolivia	Jordan	Saudi Arabia
Bosnia & Herzegovina	Kazakhstan	Senegal
Botswana	Kenya	Serbia
Brazil	Kiribati	Seychelles
Brunei Darussalam	Kuwait	Sierra Leone
Burkina Faso	Kyrgyzstan	Singapore
Burundi	Lao People's Democratic Republic	Solomon Islands
Cambodia	Lebanon	Somalia
Cameroon	Lesotho	South Africa
Cape Verde	Liberia	Sri Lanka
Central African Republic	Libyan Arab Jamahiriya	Sudan
Chad	Madagascar	Suriname
Chile	Malawi	Swaziland
China	Malaysia	Syrian Arab Republic
Colombia	Maldives	Tajikistan
Comoros	Mali	Thailand
Congo	Marshall Islands	The former Yugoslav Republic of Macedonia
Cook Islands	Mauritania	Timor-Leste
Costa Rica	Mauritius	Togo

Cuba	Mexico	Tonga
Cyprus	Federated state of Micronesia	Trinidad & Tobago
Cote D'Ivoire	Mongolia	Tunisia
Democratic People's Republic of Korea	Montenegro	Turkmenistan
Democratic Republic of the Congo	Morocco	Tuvalu
Djibouti	Mozambique	Uganda
Dominica	Myanmar	United Arab Emirates
Dominican Republic	Namibia	United Republic of Tanzania
Ecuador	Nauru	Uruguay
Egypt	Nepal	Uzbekistan
El Salvador	Nicaragua	Vanuatu
Equatorial Guinea	Niger	Bolivarian Republic of Venezuela
Eritrea	Nigeria	Viet Nam
Ethiopia	Niue	Yemen
Fiji	Oman	Zambia
Gabon	Pakistan	Zimbabwe
Gambia	Palau	

Source: UNFCCC, 2010.

Figure 8: DNA project approval procedures



Source: Matoane & Gilder, 2005.

9. References

- Abzari, M., & Safari, A. 2006. *The Role of Culture on Entrepreneurship Development: Case Study*. Iran International Journal of Knowledge, Culture and Change Management, 9(4):135-154.
- Air Transport Action Group. 2011. *Environmental Initiaves: Airlines and Offsetting Schemes*. <http://www.enviro.aero/Airlinesandoffsettingschemes.aspx> Accessed 11th April 2011.
- Amit, R., Brander, J.A. & Zott, C.1998. Why do Venture Capital Firms Exist?: Theory and Canadian Evidence, *Journal of Business Venturing* 13 November: 441-548.
- Barbbie, E. 2010. *The practice of social research*. Belmont: Wadsworth.
- Baumol, W.J.1990. Entrepreneurship: Productive, Unproductive and Destructive. *Journal of Political Economy*, 98(5):893-921.
- Berger, A. N. & Udell, G. F. 1998. The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle, *Journal of Banking and Finance*.
- Boehmer-Christiansen, S. 2003. Science, Equity and the War against Carbon, *Science, Technology, & Human Values*, 28(1):73-79.
- Brick, K & Visser, M. 2009. *Green Certificate Trading*. Energy research center. Cape Town http://www.erc.uct.ac.za/Research/publications/09Brick-Visser_Green_certificate_trading.pdf Accessed 15th May 2011.
- Camco & TIPS. 2010. *Climate Change: Risks and Opportunities for the South African Economy: Case Study Renewable Energy and the Draft IRP 2010*. http://www.climateriskandopportunity.co.za/%5Cdownloads%5CClimate_Risks_&_Opps_IRP_Case_Study_201012.pdf Accessed 10 May 2011.
- Capoor, K. & Ambrosi, P. 2007. *State and Trends of the Carbon Market 2007*. http://wbcarbonfinance.org/docs/Carbon_Trends_2007- FINAL_- May_2.pdf Accessed 4th March 2010.

CDM Bazaar, 2011. *Service Providers*.

http://www.cdmbazaar.net/overview?listing_type=serviceprovider&sort=originCountry&s=520 Accessed 21st April 2011.

CDM Update. 2010. Carbon Credit Corner: Emissions Trading Fundamentals.

<http://www.cdmupdate.com/pascer.asp#top> Accessed 15th May 2011.

Clean Technology Fund. 2009. *Draft Clean Technology Fund plan for South Africa*.

<http://www.environment.gov.za/HotIssues/2009/CTF>

InvestmentPlan/cleantechnologyfund.pdf Accessed 4th May 2011.

Climate Action Network. 2007. *CDM Position Paper for COP13/ COPMOP3,*

Bali. [www.climatenetwork.org/climate-changebasics/by-meeting/cop-13-bali-december-](http://www.climatenetwork.org/climate-changebasics/by-meeting/cop-13-bali-december-2007/071207CANDCDMPositionPaperFinal.pdf)

[2007/071207CANDCDMPositionPaperFinal.pdf](http://www.climatenetwork.org/climate-changebasics/by-meeting/cop-13-bali-december-2007/071207CANDCDMPositionPaperFinal.pdf) Accessed 2nd March 2011.

Curnow, P. & Hodes, G. 2009. *Implementing CDM Projects: Guidebook to Host Country Legal Issues*. Denmark. UNEP Risoe Centre.

De Bettignies, J & Brander, A. 2007. Financing Entrepreneurship: Bank Finance Versus Venture Capital, *Journal of Business Venturing*, 22nd November: 808-832.

Department of Energy. 2002. *Capacity Building in Energy Efficiency and Renewable Energy: Baseline Study*.

<http://www.energy.gov.za/EEE/Projects/Energy%20Efficiency%20Baseline%20Study/Main%20Report.pdf> Accessed 12th May 2011.

Department of Energy. 2009. CDM Status Review 2009: South Africa.

<http://www.energy.gov.za/files/esources/kyoto/CDM.pdf> Accessed 10th May 2011.

Department of Energy. 2010. *Designated National Authority: Roles and Responsibilities*.

http://www.energy.gov.za/files/esources/kyoto/kyoto_frame.html Accessed 28th April 2011.

Department of Energy. 2011. *South Africa CDM Portfolio*.

<http://www.energy.gov.za/files/esources/kyoto/South%20Africa's%20CDM%20project%20portfolio%20up%20to%2028%20January%202011.pdf> Accessed May 13th 2011.

Department of Environmental Affairs & Trade. 2009. *Green House Gas Inventory: South Africa 1990-2000*. <http://www.pmg.org.za/files/docs/090812greenhouseinventory.pdf> Accessed 29th March 2011.

Department of Foreign Affairs. 2006. *United Nations Environmental Program: History and Present Status*. <http://www.dfa.gov.za/foreign/Multilateral/inter/unep.htm> Accessed 11th May 2011.

Department of Trade and Industry. 2005. *South African Women Entrepreneurs: A burgeoning Force in our Economy*. <http://www.thedti.gov.za/sawen/SAWENreport2.pdf> Accessed 28th April 2011.

Department of Trade & Industry. 2006. National Empowerment Fund. <http://www.trevenna.net/thedti/nef.htm> Accessed 20th May 2011.

Department of Trade & Industry. 2007. *Government Gazette Staatskoerant*. <http://www.dti.gov.za/bee/beecharter/gazetteno610.pdf> Accessed 31st March 2011.

Department of Trade & Industry. 2008. *Annual Review of Small Business In South Africa 2005-2007*. http://www.economic.gov.za/publications/Annual_Review.pdf Accessed 19th May 2011.

Department of Trade and Industry. 2011. *Industrial Action Plan 2011/12-2013/14: Economic sectors and Employment Cluster*. <http://www.thedti.gov.za/DownloadFileAction?id=561> Accessed 14th May 2011.

Development Bank of South Africa. 2007. *Products and Services*. [http://www.dbsa.org/\(S\(tqetdx45e0m5ft45uqlyxdvy\)\)/ProductsServices/pages/fiancier.aspx](http://www.dbsa.org/(S(tqetdx45e0m5ft45uqlyxdvy))/ProductsServices/pages/fiancier.aspx): Accessed 15th May 2011.

Development Bank of Southern Africa. 2010. *Green Economy & Carbon Market Growth Crucial for Africa's Development*. [http://www.dbsa.org/\(S\(fvx1hba3djgec3uqfrfxtu2h\)\)/News/LatestNews/Pages/AfricanBankers.aspx](http://www.dbsa.org/(S(fvx1hba3djgec3uqfrfxtu2h))/News/LatestNews/Pages/AfricanBankers.aspx) Accessed 15th May 2011.

Dolles, H. & Babo, M. 2003. *The Development of Entrepreneurship in Transitional Economies: The Perspective of Chinese and South African Entrepreneurs*, Working Paper 03/1, German Institute for Japanese Studies.

Ehlers, C.2010. *CDM Market Brief*. KFW Bank Group, Germany Trade and Investment <http://www.gtai.de/DE/Content/SharedDocs/Anlagen/PDF/CDM/cdm-markt-suedafrika-english,templateId=raw,property=publicationFile.pdf/cdm-markt-suedafrika-english?show=true> Accessed 21st December 2010.

Enslin-Payne, S. 2010. *Funding for Black Economic Empowerment*. [http://www.gibs.co.za/default.aspx?oid=81&stepid=2843&pid=63&ctl00_ContentPlaceHolder1_ctrlMainPortletContainer=itemid*376037\\$stepid*2842\\$idddef*920\\$idlangver*919\\$idlayout*919\\$idmode*2747\\$languagid*1\\$previousitemid*376037\\$ignoreloadedcontrols*True](http://www.gibs.co.za/default.aspx?oid=81&stepid=2843&pid=63&ctl00_ContentPlaceHolder1_ctrlMainPortletContainer=itemid*376037$stepid*2842$idddef*920$idlangver*919$idlayout*919$idmode*2747$languagid*1$previousitemid*376037$ignoreloadedcontrols*True) Accessed 31st March 2011.

Environmental Protection Agency. 2010. *Climate Change Science*. <http://www.epa.gov/climatechange/science/index.html> Accessed 4th March 2011.

Epp, B. 2009. *Kuyasa - South Africa's first Clean Development Mechanism project*. <http://www.solarthermalworld.org/node/526> Accessed 16th May 2011.

Fakier, S., Stephens, A., Tholin, J., & Kapelus, P. 2005. *Background Research Paper: Environmental Governance South Africa Environment Outlook*. http://soer.deat.gov.za/dm_documents/Environmental_Governance_-_Background_Paper_WU45Q.pdf Accessed 10th February 2011.

Falkena, H., Abedian, I., Blotnitz, M.V., Coovadia, C., Davel, G., Madungandabe, J., Masilela, E., & Rees, S. 2001. *SMES' Access to Finance in South Africa: A Supply Side Regulatory Review*. <http://www.treasury.gov.za/publications/other/Access%20to%20Finance%20in%20South%20Africa%20-%20A%20Supply-Side%20Regulatory%20Review.pdf> Accessed 2nd March 2011.

Fenhann, J., & Hinostroza, M. 2011. *The ACP-MEAs CDM Program: CDM Information and Guide book*. Roskilde. UNEP Risø Centre.

http://www.acpcd4cdm.org/media/280433/cdm_informationguidebook.pdf Accessed 22nd April 2011.

Fernandez, C.M., Hinojosa, C., & Miranda, G. 2010. *Greening Jobs and Skills: Labour Market Implications of Addressing Climate Change*. OECD.

First National Bank. 2009. *State of Entrepreneurship in South Africa. The Entrepreneurial Dialogue Sandton: Global Entrepreneurship Week (GEW):1-19.*
<http://www.gibs.co.za/SiteResources/documents/The%20Entrepreneurial%20Dialogues%20-%20State%20of%20Entrepreneurship%20in%20South%20Africa.pdf> Accessed 22 February 2011.

Foster-Pedley, J., Hetzog, H. 2006. Financing Strategies for Growth in the Renewable Energy Industry in South Africa, *Journal of Energy in Southern Africa*, 17(4): 57-64.

Ghauri, P., & Gronhaug K. 2005. *Research Methods in Business Studies: A Practical Guide*. 3rd ed., FT Prentice Hall.

Global Environment Facility. 2006. *SGP at a glance*.
<http://sgp.undp.org/index.cfm?module=ActiveWeb&page=WebPage&s>AboutSGP> Accessed 13th May 2011.

Gordon Institute of Business Science. 2009. State of Entrepreneurship in Sout Africa. *The Entrepreneurial Dialogue*. Sandton: Global Entrepreneurship Week (GEW):1-19.

Grove S.J., Fisk, R.P., Pickett, G.M. & Kangun, N. 1996. Going green in the Service Sector: Social Responsibility Issues, Implications and Implementation, *European Journal of Marketing*, 30 (5):58- 61.

Guffey, M. E. 2009. *Essentials of Business Communication*. 8th ed., USA: Library of Congress.

Gwina, S. 2010. *Carbon Credits: the Future of Infrastructure Development*.
http://www.deneysreitz.co.za/images/news/Carbon_Credits_201003.pdf Accessed 5th March 2011.

Hanusch, H. & Pyka, A. 2007. *Elgar Companion to Neo-Schumpeterian Economic*. Edward Elgar Publishing Ltd., Cheltenham.

Harris, E. 2007. Voluntary Offsets Carbon Market: An Analysis of Market Characteristics and Opportunities for Development. London: *International Institute for Environment and Development*.

Hechavarria, D.M. & Reynolds, P. 2009. Cultural norms & business start-ups: the impact of national values on opportunity and necessity entrepreneurs, *International Entrepreneurship and Management Journal*, 5(4), 417-437.

Herrington, M., Kew, J. & Kew, P. 2009. *Tracking Entrepreneurship in South Africa: A Global Entrepreneurship Monitor Perspective*, 1-174

Hodes, G., & Kamel, S. 2007. *Equal Exchange: Determining a Fair Price for Carbon, Perspectives Series 2007*. Roskilde .UNEP Risø Centre.

<http://www.cd4cdm.org/Publications/Perspectives/FairPriceCarbon.pdf> Accessed 22nd April 2011.

Hofstede, G. 1991. *Cultures and Organizations*. Berkshire, McGraw-Hill Book Company. Europe.

Holomisa, B.H. 1999. *Human Settlements: Healing Past Scars*.

<http://www.unep.org/ourplanet/imgversn/81/holomisa.html> Accessed 30th March 2011.

Huettner, M., Freibauer, A., Haug, C., & Cantner, U. 2010. Regaining Momentum for International Climate Policy Beyond Copenhagen, *Carbon Balance and Management*. 5(1):1-7.

Humphreys, S., Sokona, Y., Thomas, J.P. 1998. *Equity in the CDM: ENDA TM*. Dakar.

International Finance Corporation, 2011. *Mining*.

<http://www.ifc.org/ifcext/coc.nsf/content/Mining> Accessed 24th April 2011.

Jindal, R., Swallow, B. & Kerr, J. 2008. Forestry-based carbon sequestration projects in Africa: Potential benefits and challenges *Natural Resources Forum* 32:116–130
http://www.katoombagroup.org/documents/cds/uganda_2011/PES%20in%20ESA/Forestry-

[based%20carbon%20sequestration%20projects%20in%20Africa.PDF](#) Accessed 31st May 2011.

Kamel, S. 2007. *Guidebook to Financing CDM Projects*. Roskilde. UNEP Risø Centre
<http://www.cd4cdm.org/Publications/FinanceCDMprojectsGuidebook.pdf> Accessed 28th April 2011.

Karousakis, K. 2006. *Joint Implementation: Current Issues and Emerging Challenges*. Organization for Economic Co-operation and Development.

Kaufmann, P.J., & Dant, R.P. 1999. Franchising and the Domain of Entrepreneurship Research., *Journal of Business Venturing*, 14 (1):5-16.

Kelly, L. & Jordan, J. 2004. *The Prototype Carbon Fund: Addressing Challenges of Globalization: An Independent Evaluation of the World Bank's Approach to Global Programs*.

[http://lnweb90.worldbank.org/oed/oeddoclib.nsf/a7a8a58cc87a6e2885256f1900755ae2/0e908333fedb369485256f690069ccd5/\\$FILE/gppp_carbon_wp.pdf](http://lnweb90.worldbank.org/oed/oeddoclib.nsf/a7a8a58cc87a6e2885256f1900755ae2/0e908333fedb369485256f690069ccd5/$FILE/gppp_carbon_wp.pdf) Accessed 16th May 2011.

Kelly, R. 2008. *The CDM: Concept, Terminology and Project Types*. UNDP.
<http://www.undp.org/climatechange/carbon-finance/Docs/Ethiopia/Presentation%20%20-%20The%20CDM%20-%20project-types,%20concepts%20&%20terminology.pdf> Accessed 19th May 2011

Khavu, S., Brutton, G., & Wood, E. 2009. Informal Family Business In Africa, *Entrepreneurship Theory and Practice*, 33(6):1219-1238.

Kiss, A., Castro, G. & Newcombe, K. 2002. The role of Multilateral Institutions. *Philosophical Transaction Royal Society* (1797):1641-1652

Kossoy, A. & Ambrosi, P. 2010. *State and Trends of the Carbon Market 2010*. The World Bank.

http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_of_the_Carbon_Market_2010_low_res.pdf Accessed 20th March 2011.

Kuyasa. 2009. *South African Export Development Fund*.

<http://www.kuyasacdm.co.za/vision.php> Accessed 17th May 2011.

Lu, S.L. & Sexton, M. 2009. *Innovation in Small Professional Practices in the Built Environment*. Blackwell Publishing Ltd. UK.

Macqueen, C. 1998. *Getting Ahead in Tertiary Study: A practical Guide for Business, Social Science and Arts Students*. University of New South Wales Press Ltd.

Martens, J.W, De Lange, T., Cloin, J., Szewczuk, S., Morris, R. & Zak, J. 2001. *Accelerating Market Penetration of Renewable Energy Technologies in South Africa*.
<http://www.ecn.nl/docs/library/report/2001/c01052.pdf> Accessed 20th March 2011.

Matooane, L. & Gilder, A. 2005. *South Africa's Designated National Authority for Clean Development Mechanism*.

http://www.unido.org/fileadmin/import/45438_Leluma_Matooane.pdf Accessed 27th April 2011.

Mc Gehee, N.G. & Kim, K. 2004. Motivation for Agri-Tourism Entrepreneurship, *Journal of Travel Research*, 43 (2): 161-170.

Metal and Engineering Industries Bargaining Council. 2010. *Mr Nimrod Zalk Industrial Development Division*.

http://www.meibc.co.za/images/upload/IPAP_Presentation_MEIBC15March2010.pdf
Accessed 14th May 2011.

Millennium Development Goals Indicators. 2010. *Carbon Dioxide between 1990-2007 in Ten Thousand Metric Tons*.

<http://millenniumindicators.un.org/unsd/mdg/SeriesDetail.aspx?srid=749&crid=710> Accessed 31st March 2011.

Metz, B., Davidson, O., Bosch, P., & Meyer, L. 2007. *Climate Change: Mitigation of climate change*. Cambridge, Cambridge university press.

Milunovich, G., Stegman, A. & Cotton, D. 2007. *A Review of Carbon Trading Theory and Practice*. Department of Economics. Macquarie University. Sydney, Australia.

- Morris, M. H. 1998. *Entrepreneurial intensity: Sustainable advantages for individuals, organizations, and societies*. Westport, CT: Quorum Books.
- Muijs, D. 2004. *Doing Quantitative Research in Education With SPSS*. London: Sage Publication Ltd.
- Murdoch, R. 2007. *Energy Initiative*. Hudson Theater, New York City. http://www.newscorp.com/energy/full_speech.html. Accessed 15th April 2011.
- National Empowerment Fund. 2010. Make your vision reality. <http://www.nefcorp.co.za/> Accessed 20th May 2010.
- Neergaard, H., & Ulhøi, J. 2007. *Handbook of Qualitative Research Methods in Entrepreneurship*. Cheltenham: Edward Elgar Publishing Limited.
- Newmann, I. & Benz, C.R. 1998. *Qualitative-Quantitative Research Methodology: Exploring the Interactive Continuum*. USA, Library of Congress.
- New Partnership for African Development-Organization for Economic Cooperation and Development. 2009. Boosting Africa's Energy Sector through Carbon Finance. *Ministerial Meeting and Expert Roundtables: NEPAD-OECD Africa Investment Initiative*.1-24 <http://www.oecd.org/dataoecd/45/23/43966892.pdf> Accessed 14th May 2011.
- Olivas, H., Gagnon-le Brun, F., & Figueres, C, 2005. *Navigating the COP/MOP*. http://figueresonline.com/publications/Navigating_COPMOP.pdf Accessed 19th May 2011
- OANDA. 2008. *Currency Converter*. <http://www.oanda.com/currency/converter/> Accessed 22th May 2011.
- Organization for Economic Cooperation & Development. 2007. OECD Entrepreneurship Indicators Project: Overview. [http://www.ifc.org/ifcext/sme.nsf/AttachmentsByTitle/Entrepreneurship_Davis/\\$FILE/Davis.pdf](http://www.ifc.org/ifcext/sme.nsf/AttachmentsByTitle/Entrepreneurship_Davis/$FILE/Davis.pdf) Accessed 15th May 2011.
- Panneerselvam, R. 2004. *Research Methodology*. 2nd ed. New Delhi: Prentice-Hall Private Limited.

- Patterson, C. 2008. *Country Report: Local Economic Development in South Africa*. GTZ. http://www2.gtz.de/wbf/4tDx9kw63gma/Country_Report_LED_in_South_Africa.pdf
Accessed 15 May 2011
- Pickett-Baker, J & Ozaki, R. 2008. Pro-environmental Products: Marketing Influence on Consumer Purchase Decision, *Journal of Consumer Marketing*, 25(5):281-284.
- Pizer, W, Burtraw, D., Harrington, W., Newell, R., & Sanchirico, J. 2006. Modeling Economy Wide vs. Sectoral Climate Policies, *The Energy Journal*, 27(3):136-137.
- Polonsky, M. 1994. An introduction to Green Marketing, *Electronic Green Journal*, 1(2):1-10.
- Ribot, J.C. & Peluso, N. L. 2003. *A Theory of Access: Rural Sociology*, 68(2): 166.
- Saunders, M., Lewis, P. & Thornhill, A. 2009. *Research Methods for Business Students*. 5th ed. UK, Pearson Education Ltd.
- Schneider, L. 2007. *Is the CDM Fulfilling its Environmental and Sustainable Development Objectives?: An Evaluation of the CDM and Options for Improvements*. Institute for Applied Ecology. WWF Report.
- Schumpeter, J. A. 1934. *The theory of economic development*. Cambridge, MA: Harvard University Press.
- South African Government Information. 1996. *Green Paper on South African Environmental Policy*. <http://www.info.gov.za/greenpapers/1996/environmental.htm> Accessed 21st April 2011.
- South African Government Information. 2011. *Outlook for the Economy: South Africa*. <http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=17364&tid=30933>
Accessed 15th May 2011.
- SouthSouthNorth. 2006. *Project Portfolio and Reports*. http://www.southsouthnorth.org/default.asp?/country_home.asp?country_id=5 Accessed 19th May 2011.

Sørheim, R. 2005. Business angels as facilitators for further finance: an exploratory study, *Journal of Small Business and Enterprise Development*, 12(2):178-191.

State of Environment. 2007. *Green House Emissions by Sector*.

<http://soer.deat.gov.za/172.html> Accessed 30th March 2011.

Steier, L.P., Chua, J.H. & Chirsman, J.J. 2009. Embeddedness Perspective of Economic Action within Family Firms, *Entrepreneurship Theory and Practice*, 33(6):1157-1167.

Statistics South Africa, 2010. *Mid-Year Population Estimates*.

<http://www.statssa.gov.za/publications/P0302/P03022010.pdf> Accessed 26th April 2010.

Tassey, G.1991. The functions of Technology Infrastructure in a Competitive Economy, *Research Policy* 20 (4):345-361.

Tyler, E. 2009. *Aligning South African Energy and Climate Change Mitigation Policy*. Energy Research Centre. University of Cape Town.

http://www.erc.uct.ac.za/Research/publications/09Tyler_Policy_alignment.pdf Accessed 29th March 2011.

United Nation. 1997. *Kyoto Protocol to the United Nation Framework Convention on Climate Change*. <http://www.un.org/millennium/law/xxvii-23.htm> Accessed 19th April 2011.

United Nations. 2006. *Conference of the Parties Serving As the Meeting of the Parties To The Kyoto Protocol*. <http://unfccc.int/resource/docs/2006/cmp2/eng/10a01.pdf> Accessed 18th May 2011.

United Nations Environmental Program. 2009. *Annual Report: Seizing the Green Opportunity*. <http://www.unep.org/publications/ebooks/annual-report09/Content.aspx?id=ID0EQAAC> Accessed 2nd March 2011.

United Nations Environment Program, 2010. *Projects Selected for New Facility to Boost African Carbon Market: Standard Bank and UNEP collaborate on the Africa Carbon Asset Development (ACAD) Facility*. <http://unepri.org/ACAD/ACADPressRelease.pdf> Accessed 15th May 2011.

UNEPFinance. 2011. *Climate Change: Working Group*.

http://www.unepfi.org/work_streams/climate_change/working_group/index.html Accessed 16th May 2011.

United Nations Environment Program Risoe Center. 2010. *African Carbon Asset Development facility*. <http://uneprisoe.org/ACAD/index.htm> Accessed 10 May 2011.

United Nations Framework Convention on Climate Change. 2000. *South Africa: Initial National Communication under the UNFCCC*.

<http://unfccc.int/resource/docs/natc/zafnc01.pdf> Accessed 27th March 2011.

United Nations Framework Convention on Climate Change. 2004. *A National Climate Change Response Strategy for South Africa*.

http://unfccc.int/files/meetings/seminar/application/pdf/sem_sup3_south_africa.pdf Accessed 24th March 2011.

United Nations Framework Convention on Climate Change. 2007. *South Africa's Climate Change Technology Needs Assessment: Synthesis Report*.

<http://unfccc.int/tclear/pdf/TNA/South%20Africa/South%20Africa.pdf> Accessed 31st March 2011.

United Nations Framework Convention on Climate Change. 2008. *Kyoto Protocol Reference Manual: On Accounting of Emission and Assigned Amounts*.

http://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf Accessed 20th February 2011.

United Nations Framework Convention on Climate Change. 2009. *Inclusion of CCS under CDM: Comments by South African Centre for Carbon Capture and Storage*.

http://cdm.unfccc.int/about/ccs/docs/ccs_sa.pdf Accessed 20th May 2011.

United Nations Framework Convention on Climate Change. 2010. *Full Text of the Convention*. http://unfccc.int/essential_background/convention/background/items/1348.php Accessed 25th March 2011.

United Nations Industrial Development Organization. 2003. *Clean Development Mechanism: Investor Guide: South Africa*.

http://www.unido.org/fileadmin/user_media/Publications/Pub_free/CDM_investor_guide_South_Africa_annex_3.pdf Accessed 15th May 2011.

United Nations Industrial Development Organization. 2005. *CDM Capacity Building Programme for Francophone African Countries*.

http://www.unido.org/fileadmin/import/47586_CDM_Africa_UNIDOv3.pdf Accessed 20th May 2011.

Van Dij, T.A. 1983. Discourse Analysis: Its Development and Application to the Structure of News, *Journal of Communication*, 33(2):20-43.

Vogt, C. 2003. Russia's Reluctance to Ratify Kyoto: An Economic Analysis, *Intereconomics*, 38(6): 346-349.

Wara, M. 2006. *Measuring the Clean Development Mechanism's Performance and Potential. Program on Energy and Sustainable Development*. Stanford University.

Whittemore, R., Chase S. K. & Mandle, C. L. 2001. Pearls, Pith, and Provocation. *Qualitative Health Research*. 11(4):522-537

Whyte, A.V. 1995. Building a New South Africa: Environment, Reconstruction and Development. *International Development Research centre (4)*, Canada, Ontario.

Williams, C.A., Hanan, N.P., Neff, C.J., Scholes, J.R., Berry, A.J., Denning, S.A., & Baker, D.F. 2007. Africa and the global carbon cycle, *Carbon balance and Management*, 2(3):9-10.

William, Z.G., & Barry, B.J. 2009. *Essentials of Marketing Research*. 9th ed. USA: Library of Congress.

Winkler, H. & Es Van D. 2007. Energy efficiency and the CDM in South Africa: constraints and opportunities, *Journal of Energy in Southern Africa*, 18(1), 29-38.

Winker, H., Marquard, A., & Meagan, J. 2010. *Putting Price on Carbon: Economic Instruments to Mitigate Climate Change in South Africa and Other Developing Countries*.

Cape Town: Energy Research Center.

http://www.erc.uct.ac.za/Research/publications/10Winkler-et-al_ERC_Conference_Proceedings.pdf Accessed 25th March 2011.

World Bank. 2008. *Finance for All: Policies and Pitfalls in Expanding*.
http://siteresources.worldbank.org/INTFINFORALL/Resources/4099583-1194373512632/FFA_book.pdf Accessed 15th May 2011.

Wrenn, B.E., Robert, S., & Loudon, D. 2007. *Marketing Research: Text and Cases*. 2nd ed.
NY: Haworth Press, Inc.

Yin, R.K. 2003. *Applications of Case Study Research*. 2nd ed., (34), Sage Publications, Inc.

Yamin, F. 2005. *Climate Change and Carbon Markets: A Handbook of Emission Reduction Mechanisms*. Earth scan, London, UK: 210-216.

