Clean Development Mechanism:
Is it a tool to promote the use of Renewable Energy in South Africa?

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As the candidate's supervisor I have approved this thesis for submission.

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DECLARATION

Submitted in fulfilment of the requirements of the degree of Master of Social Science, in the Graduate Programme in Geography, University of KwaZulu-Natal, Durban, South Africa.

I declare that this dissertation is my own unaided work. All citations, references and borrowed ideas have been duly acknowledged. It is submitted for the degree of Master of Social Science in the Faculty of Humanities, Development and Social Sciences, University of KwaZulu-Natal, Durban, South Africa. None of the present work has been submitted previously, for any degree or examination in any other University.

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Abstract

Climate change, greenhouse gas emissions (GHG), and environmental pollution have all become buzzwords of our time. The awareness in recent years of the degradation of the planet by prioritising economic gain has allowed for open debate about the way the planet is being affected by development. However, there is wide consensus that development cannot be stopped or slowed down, but may be conducted in a sustainable way.

The aim of this research is to investigate the role of Clean Development Mechanism (CDM) as a tool to promote the use of renewable energy in South Africa. The Kyoto Protocol was adopted in 1997, which stipulated that developed nations of the world would take on emission reduction targets to reduce their GHG emissions by five percent below 1990 levels. These emissions will be evaluated by the CDM Executive Board at the end of 2012 and penalties are payable should countries not meet their stipulated targets. South Africa is defined as a country (under CDM) which is eligible for hosting CDM projects, and does not have emission reduction targets. This research aims to explore the barriers to the successful implementation of CDM projects in South Africa, with a particular focus on renewable energy projects.

In order to address the research problem, the theory of ecological modernisation (Mol, 1995; Hajer, 1995; Christoff, 1996) is applied to analyse the policy decisions around renewable energy, thus highlighting areas that need attention in order to make significant changes in the climate change policy decisions prevailing at the time of the study. Ecological modernisation is a policy orientated discourse which describes environmental issues in a particular manner. In the developing country context of South Africa, a case of weak ecological modernisation has been established (Christoff, 1996; Scott and Oelofse, 2005; Blowers and Pain, 1999). This is in part due to the weak participatory approach which has been adopted by government.

This study had found that South Africa has robust and progressive policies in terms of environmental management and renewable energy. However, the area in which it seems to be failing is implementation. The results of this study show that CDM is not popular in South Africa due to a host of reasons. Funding and lack of implementation of projects seem to be the key factors. Eskom's relatively low electricity price still hinders the wide spread implementation of renewable energy and energy efficiency projects.

This study concludes that CDM projects have not succeeded in South Africa due to the bureaucratic process that CDM projects need to undergo coupled with the two issues mentioned above (funding and relatively cheap electricity). This is completely different compared to its other developing country counterparts like India, China and Brazil. This study was conducted at a time when the Kyoto Protocol was nearing its end. Should the agreement not be extended, it would be a lost opportunity for South Africa in terms of gaining technology transfer from the developed world as well as much needed funding for climate change projects.

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List of Acronyms

BRIC	Brazil, India, China
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
CEF	Central Energy Fund
CER	Certified Emission Reductions
CFL	Compact Fluorescent Lightbulbs
CIPS	Chartered Institute of Purchasing and Supply
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
COP	Conference of Parties
DBSA	Development Bank of South Africa
DNA	Designated National Authority
DoE	Department of Energy
EDC	Energy Development Corporation
EIA	Environmental Impact Assessment
Gg	Gigagrams
GHG	Green House Gas
GWh	Gigawatt hour
GWP	Global Warming Potential
ICLEI	International Council for Local Environmental Initiatives
IDC	Industrial Development Corporation
IGES	Institute for Global Environmental Strategies
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IRR	Internal Rate of Return
kWh	Kilowatt hour
LTMS	Long Term Mitigation Strategy

Mtoe	Million Tonnes of Oil Equivalent
MW	Megawatt
NBI	National Business Initiative
NEEA	National Energy Efficiency Agency
NERSA	National Electricity Regulator of South Africa
NGO	Non-Governmental Organisation
NMBM	Nelson Mandela Bay Metropolitan
NORAD	Norwegian Agency for Research and Development
NPV	Net Present Value
PDD	Project Design Document
PIN	Project Idea Note
RE	Renewable Energy
REFIT	Renewable Energy Feed-In Tariff
REFSO	Renewable Energy Finance and Subsidy Office
SAAEA	South African Alternative Energy Association
SAB	South African Breweries
SALGA	South African Local Government Association
SANEDI	South African National Energy Development Institute
SWH	Solar Water Heaters
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
WSED	World Summit on Environment and Development
WWF	World Wildlife Foundation

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Chapter One

Introduction

"A revolution of society on a scale never witnessed in peacetime is needed if climate change is to be tackled successfully. The challenge is for developed nations to cut carbon emission levels by 60 to 80 percent from current levels by 2050".

(*Bjørn Stigson, President of the World Business Council for Sustainable Development* in Brand, 2010)

1.1 Profiling the climate change agenda

The projection of a cleaner, greener world has now become a need rather than a desire for future generations. Given that South Africa is seen as a window into Africa, it is essential that it leads the climate change debates that currently face the developing world. South African citizens are still grappling with the notion of global warming and greenhouse gas emissions. Gore (2007: 32) stated that, "(i)t is evident in the world around us that very dramatic climatic changes are taking place because of global warming". One of the significant responses to global warming has been the Kyoto Protocol (United Nations, 1997 in Little *et al*., 2006). The Marrakesh Accord (United Nations, 2001 in Little *et al*., 2006) led on from the Kyoto Protocol, which allowed developing countries to implement Clean Development Mechanism (CDM) projects in order to aid developed countries in meeting specific targets set under the Kyoto Protocol.

Developing countries (or non-Annex I countries) were motivated to participate in CDM by being awarded for technology transfer for projects, foreign funding and the possibility of trading carbon credits gained from the projects with developed (or Annex I) countries (Little *et al*., 2007). South Africa does not have emission reduction targets for the first commitment period of the Protocol, which runs from 2008 to 2012, and is therefore eligible to implement CDM projects.

CDM projects are defined as projects which reduce carbon dioxide (CO_2) emissions which increase global warming. These are also termed greenhouse gases (GHG) (Little *et al*., 2007). Developed or industrialised countries adopted targets for reducing carbon emissions because there was a general consensus that most of the global emissions originate from developed nations. It would be unfair to set binding targets on developing countries as they are still developing. The Kyoto Protocol was ratified in February 2005, meaning that all targets agreed upon by developed countries became binding. Targets that are not met after the commitment period in 2012 will result in countries having to pay penalties per ton of CO_2 that has not been prevented from entering the atmosphere.

This thesis is written at a time when the Kyoto Protocol is nearing the end of its regime in 2012 and the data were collected in 2010. This was at a time when project developers were still hopeful to register CDM projects in South Africa, and before a possible second commitment period. It is thus prudent to measure its results both from a local and global perspective. A great deal of literature is available on CDM (Lahti, 2006; Little *et al*., 2007; Kitzinger, 2005). This literature is focused on broad issues around CDM and the strengths and weaknesses of this mechanism. A few theorists have critiqued CDM as a mechanism which does not contribute to sustainable development in South Africa (Little *et al*., 2007; Kitzinger, 2005). This thesis will focus on both the successes and failures of CDM and will provide a perspective on where improvements can be made for a second commitment period.

1.2 Aim and objectives

The aim of this research is to critically examine Clean Development Mechanism (CDM) as a tool to promote the use of renewable energy in South Africa.

In order to achieve this aim, a number of objectives are formulated to help guide this research:

1. Analyse the policies contributing to carbon dioxide reduction.
2. Analyse the Renewable Energy Policy of South Africa which forms the framework for CDM.
3. Understand the concept of CDM in a developing country context.
4. Critically evaluate the implementation of CDM in the South African context.

The study will investigate the proposition that CDM is an economic rather than environmental tool for the global community, thus making it a case of weak ecological modernisation, i.e. a weak form of resolving the global environmental crisis through the management of the environment (Christoff, 1996).

1.3 Structure of the thesis

In order to achieve the above aim and objectives, the thesis is organised as follows:

The theoretical framework of the thesis is presented in Chapter Two. This provides a framework for the research to understand how successful CDM is in South Africa. The theory of ecological modernisation is explored, which suggests that there is a relationship between the environment and development. The degree to which the environment is taken into consideration is analysed via propositions from numerous theorists (Christoff, 1996; Hajer, 1995; Blowers and Pain, 1999). The concept of sustainable development is analysed and relevant concepts revolving around the importance of public participation are extracted and applied to the CDM process in South Africa.

The South African government, over the past decade, has been transformed to theoretically move from a technocratic government, which uses a top-down approach, to a more bottom-up locally focused government. This provides a context to investigate participatory strategies, which will interrogate the notion that public participation is intrinsically linked with public empowerment. The various types of public participation procedures are examined and different tools and

techniques used for comprehensive environmental decision-making are presented. Environmental decision-making encompasses both the physical and social environment, which means civil society's natural environment needs to be incorporated into decision-making, as well as human well-being (Pezzoli, 1997). This includes issues around poverty, unemployment and health services. The environment has not always been prioritised in environmental decision-making because economic growth was seen as being more important. However, over the last few decades, there has been a global shift in environment and development policy, and more recently environmental issues have been put on the agenda. Human and ecological well-being are intrinsically linked. As an extension of this notion, there is a concerted effort to get the community involved because, in environment and development processes, the value of indigenous and local knowledge and the need for democratic decision-making processes are critical to a sustainable form of development. The theoretical framework chapter concludes with two case studies to show how ecological modernisation may be applied in a developing country context.

Chapter Three presents the background to climate change and the CDM process. The chapter provides a brief introduction to climate change in South Africa, describing the challenges with regards to carbon emission reduction. It then reviews South Africa's energy policies in order to contextualise how climate change has been incorporated into legislation. The global context in which CDM exists and the project registration process are explained, taking into account the public participation procedures which are requested by the United Nations Framework Convention on Climate Change (UNFCCC). In order to ascertain if CDM has been successful in South Africa, there is a comparison made between CDM projects in South Africa and other developing nations such as India, China and Brazil. Since this research focuses on CDM being used as a tool to promote renewable energy in South Africa, there is an explanation of the type of CDM projects that currently exist in South Africa.

Chapter Four outlines the methodology that was adopted for the study. The methodology employed is qualitative because there was a need to assess the different viewpoints of the wide

range of stakeholders involved in the process. The different sources of data are explained i.e. primary and secondary data. The primary data sources which were used consist of interviews, and minutes of meetings. Secondary data consisted of books and journals. A system of networking and purposive or non-probability sampling was used for this study to sample the respondents. This chapter then explains the data interpretation technique that was used, thematic interpretation, which will in turn highlight how the findings for the study were derived. To this end, one needs to note that any research method used has limitations, which will be described in this chapter.

The interpretation of the findings is discussed in Chapter Five, and these are explained with the application of the relevant theoretical concepts, models and in the context of the legislation. This chapter, which will highlight the methodology, explains how the theories being used provide a framework to understand how successful CDM is in South Africa.

Ecological modernisation, as explained in Chapter Two, will highlight aspects of strong and weak ecological modernisation. Chapter Five will analyse the CDM process in South Africa and place it along a 'continuum' of strong or weak ecological modernisation (Christoff, 1996). This thesis will present, using this theoretical framework, an analysis as to the success of CDM in South Africa, as compared to its developing country counterparts. Elements of strong ecological modernisation, sustainable development principles and inclusive public participation procedures are necessary if the CDM is to succeed in South Africa.

Chapter Six concludes the thesis with a summary of the conclusions from the study, and makes recommendations to improve the uptake of CDM projects in South Africa. At the same time, the study acknowledges that, since the data collection in 2010, there has been slow progress in the CDM field in South Africa, there has been a National Climate Change Response strategy which has been put in place, and that the first commitment period for CDM projects comes to an end in 2012.

Chapter Two

Theoretical Framework

2.1 Introduction

The purpose of this chapter is to outline the theoretical framework that underpins this research.

Ecological modernisation is a theoretical framework which has been used to conceptualise the changes that are taking place in environmental policies (Spaargaren and Mol, 1992 in Mol *et al*., 2009). It is a theory that attempts to provide an understanding of the relationship between society and the environment. Oelofse *et al.,* (2006) characterise ecological modernisation as follows:

> Ecological modernisation is a modernist and technical approach that uses the language of business and science and therefore conceptualises environmental pollution as a matter of efficiency rather than a threat to the system (Huber, 1985, cited in Mol, 1995; Christoff, 1996). It assumes that economic growth and the resolution of ecological problems can be reconciled.

The theory aims to provide an understanding that the theory of ecological modernisation constructs environmental problems in a particular way, thus influencing the way environmental issues are dealt with and solutions proposed. Ecological modernisation theories emerged in the 1980s and aimed to justify environmental pollution, which had emerged as a result of industrial capitalism. These early theorists sought to find a way of rationalising the contradiction between environment and development. It must also be noted that ecological modernisation became embedded in policy processes in the developed and developing world in an applied form. This theoretical framework focuses on ecological modernisation as a theoretical construct. Since ecological modernisation may be viewed as both an analytical tool, theoretically, and practically as a tool to measure the performance of policies in a developing world, it has proven to be a useful and appropriate framework to understand environmental policy-making.

The theory of ecological modernisation can be used as a tool to analyse the current policies being established to manage the environment in the face of climate change. Clean Development Mechanism (CDM) has been criticised for not adequately contributing to sustainable development and for being a form of weak ecological modernisation rather than strong ecological modernisation (Wara, 2006). These forms of ecological modernisation are defined and reviewed in this chapter. This thesis focuses on the theoretical debate over CDM and investigates to what extent CDM contributes to the promotion of renewable energy in South Africa in a sustainable manner.

Janicke (1988 in Christoff 1996: 480), one of the early ecological modernisation theorists, proposed that ecological modernisation "is primarily seen as a strategy intended to maintain or improve market competitiveness, in which the environmental benefits of such technological change are incidental rather than a core concern for innovation and implementation". In this view, the capital gain of positive environmental change is usually prioritised over the environmental gain. Ecological modernisation proposes that the state use an economic argument to legitimise environmental pollution, and CDM provides the tool for an economic incentive which allows this to occur. Section 2.2 will review earlier notions of ecological modernisation.

Hajer (1995) applied the concept of ecological modernisation to critically understand the difference in policy decisions between the United Kingdom and the Netherlands with regards to acid rain. He provided a platform to understand how these newer environmental policies are situating themselves within the realm of 'green talk' in today's modern society (Hajer, 1995). CDM can be seen as an example of Hajer's (1995: 26) contention that ecological modernisation allows for making "environmental degradation calculable". This is therefore an appropriate theoretical framework for critically analysing CDM and the particular relationship it is proposing between society and the environment.

Hajer (1995), in his study of acid rain policy-making in the United Kingdom and Netherlands, suggests that "ecological modernisation is a discursive strategy useful by governments seeking to manage ecological dissent and to re-legitimise their social regulatory role". In South Africa, as in other developing countries, this is indeed the case, where economic and environmental policies are inter-twined. Section 2.3 will elaborate on this critical approach to ecological modernisation. This will include a discussion by Christoff (1996) where he proposes a continuum of strong and weak ecological modernisation, where 'strong' ecological modernisation includes a more democratic process of inclusiveness in decision-making around ecological issues, as opposed to 'weak' ecological modernisation which uses a 'top-down' approach in terms of environmental decision-making.

It is proposed here that policy making takes place through 'networks' of actors, including the state. These actors present their views in the form of discourses where they seek to persuade other actors of their perceptions and interests (Brown, 2009). The theory of ecological modernisation will be applied to understand how relevant policy decisions are made, and which important actors influence environmental policy making. In this way, an understanding may be reached as to the status of progressive renewable energy legislation in South Africa. The more recent conceptualisations of ecological modernisation will be elaborated upon in section 2.4.

This chapter will elaborate on the current trends in aiming to achieve 'strong' ecological modernisation. There is a distinct shift from the initial theorists (Huber, 1991 cited in Mol *et al.*, 2009; Christoff, 1996) proposing that the environment could be 'managed', to a question of to what degree the environment is being taken into account and managed in environmental policy-making.

Section 2.2 provides an overview of the early notions of ecological modernisation; section 2.3 sets out a more critical view of ecological modernisation as a theoretical framework; section 2.4

follows by evaluating current conceptualisations of the theory. The final section in this chapter concludes with a summary of ecological modernisation using case studies to illustrate how this theory is used in a developing country context.

2.2 Early views on ecological modernisation

Environmental issues have plagued the world for centuries. However, it was only during the early 1970s that society acknowledged an 'environmental crisis', where industrialisation and rapid resource depletion were viewed as being detrimental to humankind (Hajer, 1995). Early theorists viewed the environment and people as two separate entities, where the environment was seen as a resource to be exploited. After the 1970s, theorists rejected this binary view and viewed the environment and humankind as 'one', where people needed to take care of the environment, i.e. become 'stewards', if they were to benefit from it (Hajer, 1995). This section will focus on Mol *et al's*., (2009) outline of the ecological modernisation debate which evolved around ideas of environmental deterioration, sustainable development and global environmental deterioration, and how society could cope with this shift and yet continue to promote capital growth and development, providing a link between sustainable development and ecological modernisation.

Firstly, the publication of the Brundtland Report in 1987 was seen as the culmination of the debates of the 1970s, and is also where the term 'sustainable development' was coined. The World Commission on Environment and Development (1987) published this report, titled *Our Common Future*, which defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations from meeting their own needs" (Pezzoli, 1997). This definition concentrates on economic sustainability and fails to acknowledge that there is a reciprocal relationship between people and the environment (Weale, 1992 cited in Langhelle in Mol *et al*., 2009). There is a failure to acknowledge that ecological sustainability is vital even if people are not necessarily going to benefit from it. The CDM also has this economic or developmental emphasis while acknowledging that the environment needs to be preserved.

The focus on development, in early theorisations of ecological modernisation, is central in today's economy and is conceptualised as an approach which takes the environment into consideration by 'managing it'. The definition of sustainable development and ecological modernisation clearly shows that these are two different concepts which may have areas that overlap, especially in areas of including civil society in decision-making processes. Many theorists go into great detail explaining that sustainable development and ecological modernisation are two different concepts, although they do have a few similarities (Langhelle, 2000; Blowers, 1997). Blowers (1997: 245) outlines that, at best, ecological modernisation is a 'weak' expression of sustainable development. The argument here is that sustainable development incorporates social, economic and environmental issues. The sustainable development framework proposes that the environment has a right to be protected, as opposed to the ecological modernisation view, where the environment is protected because "it is in our best interests to be good custodians of environmental resources" (Langhelle, 2000, cited in Brown, 2009: 58). The latter is a very 'people-centred' approach where the environment is only protected for 'human-gain', i.e. economic reasons.

Hajer (1995) states that, when ecological modernisation was conceptualised, it was assumed that the consideration of the care for the environment would be internalised. In this way, the concept made "environmental degradation calculable" (Hajer, 1995: 26). Hajer (1995) further elaborates that, within the ecological modernisation approach, environmental protection becomes a 'positive-sum game' which means that pollution prevention is now an economic necessity resulting in less harmful environmental impacts. Governments around the world began developing more progressive legislation which forced project developers to 'manage' the environment in a positive way. Hajer (1995: 26) argues that "environmental protection thus became a management problem".

When Rio de Janeiro hosted the World Summit on Environment and Development (WSED) in 1992, environmental issues were elevated to a new level. Global awareness on climate change

and the impact that human action is having on the planet was popularised. Environmental and climate change issues were placed on the global agenda. The initial environmental issues centred on destruction of the ozone layer, but the public in general understood that humankind was having a detrimental impact on the environment. It became clear that this impact was being expressed differently in different parts of the world. Novins (2009: 1) states that:

> It is not those of us who are most responsible for the greenhouse gas (GHG) emissions that are feeling the heat; it is those of us who have the fewest resources to adapt that are most severely impacted.

The WSED issued this moral message of protecting the environment for both current and future generations and it resonated throughout the world.

During this early emergence of theories related to environment and development, there was a "consumerist turn" (Mol *et al*., 2009). Popular politician Al Gore published a documentary film called *An Inconvenient Truth* which detailed the harmful effects human activities were having on the environment. Consumers globally became aware of 'green' issues and markets moved to produce organically grown produce. These broader social movements and shifts in thinking contributed to shifts in the refinement of the theory of ecological modernisation.

Part of the theory of ecological modernisation is that greater 'efficiency' will be achieved by business and industry if cleaner and greener technology is used to produce goods. Thus, theoretically, technology is assumed to have a critical input into achieving a relationship between society and the environment, where the environment is 'managed' rather than protected in its own right. Huber (1991 in Mol *et al*., 2009) proposes that the evolution of technology will form part of these environmentally friendly practices. He explains that ecological modernisation needs greener and cleaner technologies and products to be developed, as opposed to their outdated counterparts. His argument is that the world will move towards cleaner and greener practices, especially in terms of technology, because there will be a market for it in the future. Figure 2.1 elaborates on this scale of preventing emissions through advanced technologies while at the same

time reducing and recycling in instances where pollution cannot be avoided (Huber, 1991 in Mol *et al.*, 2009).

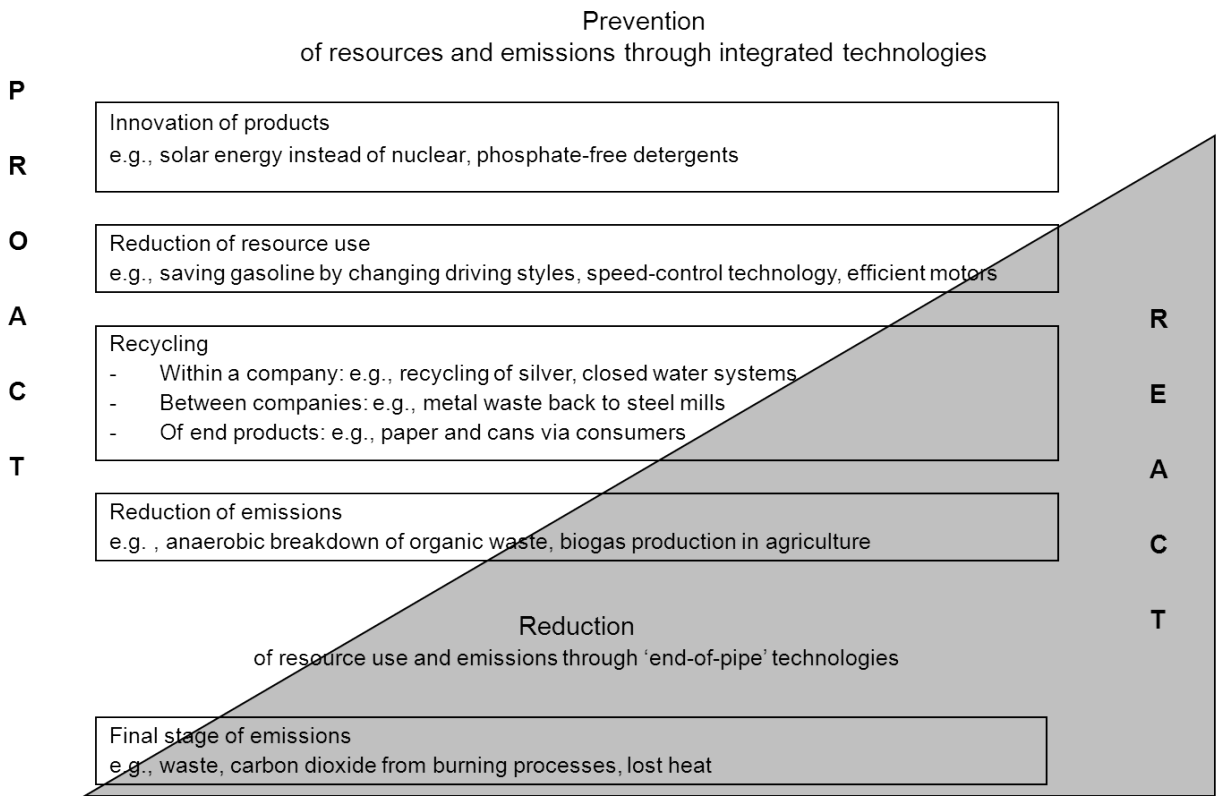


Figure 2.1 The bi-directional model of environmental technologies

(Adapted from Huber, 1991 in Mol *et al*., 2009: 49)

The left hand side of the diagram shows an area of proactive technological development where the potential for using renewable energy technologies and recycling takes place. On the right hand side there is a simultaneous growth of technologies developed as a reaction against GHG emissions, along with wastage of resources and aiming to control the pollution that has already occurred. At the same time, the illustration shows that some technologies develop proactively to prevent the earth from being polluted further – for example, when gases are harnessed from landfill sites to produce electricity. These are complementary areas of development of new technologies, all of which serve to make industrial processes more efficient, reduce cost and as a

result have less impact on the environment in terms of both resource use and reduction of environmental services.

This section outlined that early theorists viewed the theory of ecological modernisation as a panacea to all environmental issues. This was a way of integrating environment and development, and in so doing, providing an answer to the environmental crisis. In summary, ecological modernisation assumes that environmental problems and their management are internalised into the structure of capitalism.

The concept of ecological modernisation has evolved over the years. Early theorists (Huber, 1991 in Mol *et al.*, 2009; Christoff, 1996; Hajer, 1995 and Blowers and Pain, 1999) viewed ecological modernisation as a way to incorporate the environment into the developmental or industrial processes. The rationale is to include economic growth into the way the environment is managed. Although this view is now widely accepted, there are many theorists that critique the notion of ecological modernisation (Christoff, 1996). The next section will present a critique of ecological modernisation and will outline the concepts of weak and strong ecological modernisation.

2.3 A critical approach to ecological modernisation

After the initial positive enthusiasm about the concept of ecological modernisation being an idea that resolved the contradictions between economic growth and environmental protection, a large body of literature emerged suggesting that ecological modernisation did not adequately address the impact of development on the environment in a wider context (Hajer, 1996; Christoff, 1996, Oelofse *et al*., 2006).

In reflecting upon the theory of ecological modernisation, social scientists began to conceptualise two forms of ecological modernisation, viz. weak and strong. Ecological modernisation, as defined in the previous section, aims to conceptualise environmental issues as 'manageable' if internalised into the economic system. Christoff (1996) has further indicated that this interpretation can be positioned along a 'continuum of ecological modernisation' from strong to weak. He proposed that strong and weak ecological modernisation are not mutually exclusive concepts and each is premised according to different sets of assumptions and criteria. According to Christoff (1996), the two types of ecological modernisation can be defined as follows:

Table 2.1 Types of ecological modernisation

Weak ecological modernisation	**Strong ecological modernisation**
Economistic	Ecological
Technological (narrow)	Institutional / systemic (broad)
Instrumental	Communicative
Technocratic / neo – corporatist / closed	Deliberative / democratic / open
National	International
Unitary (hegemonic)	Diversifying

(Christoff, 1996: 490)

The above table presents different versions of ecological modernisation, which may be described as weak (narrow) or strong (broad) subject to the "extent to which they are technological or systemic in scope or focus" (Christoff, 1996: 490). In its weak or narrow form, ecological modernisation does not take into consideration the social issues, like public participation, or the political processes that are involved in making decisions. The economic aspects are prioritised, and the social issues are bypassed. This 'economistic' approach is termed weak ecological modernisation. White's (1996) 'types' of public participation exercises, which are discussed in the next section, outline how important it is to get societal input into projects, which contributes to a form of strong ecological modernisation.

2.3.1 Weak ecological modernisation

Christoff (1996, in Gibbs, 2000, cited in Brown, 2009: 55) characterises weak ecological modernisation as:

a) Technological solutions for managing environmental problems.
b) Technocratic / corporatist styles of policy-making by scientific, economic and political elites.
c) Employed by developed nations who use ecological modernisation to consolidate their global economic advantages.
d) Imposes a single, closed-ended framework on political and economic development.

Christoff (1996) proposes that strong ecological modernisation refers to decisions that are taken with a focus on bottom-up as opposed to top-down decision-making, which means that there is a more democratic and inclusive decision-making process. Weak ecological modernisation is more top-down, expert-driven and technocentric in its approach. Cohen (2001 in Lubke, 2003) suggests that weak ecological modernisation is apolitical in nature. The market, business and science are seen as custodians for environmental responsibility, rather than the state. Because development is assumed to be apolitical, "taken for granted", weak ecological modernisation in this view is a smooth process without power struggles (Guldbrandsen and Holland, 2001: 130, in Lubke, 2003: 17). In opposition to this, the state is perceived as more political. This weak version of ecological modernisation reduces the highly politicised contradictions and tensions between development and the environment to bland economic processes. Hajer (1995 in Christoff, 1996: 482) suggests that governments may use ecological modernisation as a tool to "manage ecological dissent and to relegitimise their social regulatory role".

Christoff (1996 in Brown, 2009: 49) outlines "three broad categories of how ecological modernisation is used, namely descriptively, analytically and normatively". In this chapter, ecological modernisation is presented as an analytical term and it is applied in Chapter Five to analyse the empirical results of the study. Christoff (1996: 480) suggests that ecological modernisation is also used to "describe technological developments with environmentally beneficial outcomes". Figure 2.1 highlights the bi-directional model of environmental

technologies (Huber, 2000), which shows the variety of technological developments that are taking place, allowing for more shifts towards environmentally friendly practices, which are therefore economically, more efficient and form part of 'green business'. Here, Christoff (1996: 480) explains that ecological modernisation can be interpreted "narrowly to describe technological developments with environmentally beneficial outcomes". There is therefore a mutually beneficial relationship because industry gains by portraying an image of being cleaner and greener, and the environment is also protected. This is what he characterises as a descriptive form of 'weak ecological modernisation'. The term 'green business' has been recently coined to include the following:

1. It incorporates principles of sustainability into each of its business decisions.
2. It supplies environmentally friendly products or services that replace demand for non-green products and/or services.
3. It is greener than traditional competition.
4. It has made an enduring commitment to environmental principles in its business operations. (Cooney, 2009)

However, the argument has been that these companies are merely adopting green practices in order to gain more customers, rather than having a genuine interest in preserving the environment.

Normatively, ecological modernisation is taken and embedded in environmental policies and programmes to indicate the way in which environment and development should be related. This interpretation of ecological modernisation relates to the application of these ideas in actual policy development. In this thesis, ecological modernisation is being reviewed as a conceptual and analytical tool. The environmental policies of the developed world are couched in a weak ecological modernisation framework, and the developing countries have followed suit. However, Oelofse *et al*., (2006) show how in South Africa there has been a shift to stronger forms of ecological modernisation more recently.

Oelofse *et al*., (2009 in Mol *et al*., 2009: 484) mention that "one of the major limitations of ecological modernisation in developing countries [like South Africa] is that the assumed

conditions for this approach, such as the availability of advanced technology, capital, democracy and capacity, are not in place". This means that, although governments might have good intentions to move towards a strong ecological modernisation approach, this might not always be possible due to the insurmountable hurdles that need to be crossed in order to achieve this aim.

2.3.2 Strong ecological modernisation

Christoff (1996) points out that ecological modernisation may be viewed as a 'belief system'. The moral aspect of ecological modernisation is highlighted here, where the earth is viewed as having a right to exist. The relationship between government, its people and the environment is seen as intrinsically linked and should therefore be valued each on its own merit. The issue of people or the public is critical in moving towards strong ecological modernisation processes.

While the mandatory public participation processes that are required for any development process seem to be a shift to a stronger form of ecological modernisation, the type of participation most often remains mere 'tokenism' (Arnstein, 1969). Furthermore, the lack of capacity-building in terms of understanding and prioritising environmental issues has led to a weak form of ecological modernisation and sustainable development criteria in many countries, Crosby *et al.*, (2005 in Lahti, 2006).

It must be understood that the public cannot be stereotyped into being a single mass of people with the same or similar views or ideas; instead, the contrary is true. The public consists of a wide range of groupings based on age, gender, class, ethnicity and religion. In many cases the public needs to be persuaded into taking an active role in the environment around them. Chapter Five explores this phenomenon, which White (1996) explains as a 'dynamic', which needs to be explored in the public participation process.

2.3.3 Democratic public participation

This section will investigate a range of different literature on the levels and types of public participation that may occur. The highest level and most favoured type of participation will be intrinsically linked with ideas on democracy.

> The success of any democratic society relies on the ability of its individual members to understand, and collectively solve, the society's problems. History teaches us that whenever the power to make important human moral and ethical decisions is concentrated in the hands of a few, a diminished quality of human life cannot be far behind (Allers, 1997: 184).

It is thus imperative that public participation be recognised for its importance. However, White (1996: 6) argues that "while participation has the potential to challenge patterns of dominance, it may also be the means through which existing power relations are entrenched and reproduced". This argument can be taken further to highlight that the public needs to feel 'empowered', to have their voices heard and be comforted that their concerns will be addressed.

The dynamics of public participation have long been analysed. The 1969 *Ladder of Participation in Health Services* (Internal Save the Children Alliance, 1997 in Freeman, 2000), originally known as Arnstein's Ladder, provides a review of the different levels of participation that might occur (see Appendix A). There are essentially 10 rungs on this ladder, and each rung represents a form of participation or non-participation. The ladder is divided into three broad stages, the highest level of participation being where participation occurs between developers or appropriate authorities and the public.

The intermediate stage (pre-participation) describes participation merely as a façade where the public is consulted but is not given an equal weight in the decision-making process. The lowest stage is labelled 'non-participation' which is self-explanatory, i.e. no consideration is given to the public interests at all. Although this ladder does aim to describe in detail the different levels of

participation that can occur, it is important to note that there have been numerous criticisms to this 'ladder'.

One of the criticisms has been that the highest level, which acknowledges community involvement, requires that the community take charge. This could be disastrous because in some instances the developer or governmental organisation might decide to abandon their responsibility. Also, as mentioned earlier, the public needs to be acknowledged as a dynamic group which might not always reach consensus. This will in turn halt any action or development which needs to be implemented (Bar-on, 1997 in Freeman, 2000).

Although the dynamics of public participation have been analysed, one finds that it is very difficult to compartmentalise public participation procedures. Instead, a reinvention or a reclassification of Arnstein's ladder was needed which would succinctly explain different levels of public participation, while at the same time highlight the dynamics of public participation. This 'reworking' was provided by White (1996) who outlined four different categories, presented in Table 2.2.

Table 2.2 Types of Participation

Category	**Description**
Nominal	Legitimation and inclusion, with the main function of display
Instrumental	Government funding for infrastructure and services reduced leading to public involvement for efficiency and cost sake, in order to instrumentally achieve a local facility or service.
Representative	Public ensured a voice to provide project sustainability and support, and where people are able to express their own interests.
Transformative	Empowerment takes place, where the public have the practical experience of being involved in considering options, making decisions and taking collective action to fight injustice.

(After White 1996: 8)

White (1996) explains that 'nominal' participation can be described as being merely a façade, with participation occurring at the lowest level. For example, a person might in theory be

registered as part of a group. However, this participation is occurring at its lowest level in the sense that the individual does not attend meetings nor has an input in any way. This is completely different to the type of participation that is 'transformative'. In this instance, empowerment of public participants is used to literally transform society's advisory role and instead bring about a change. According to White (1996: 8), it "leads to greater consciousness of what makes and keeps people poor, and greater confidence in their ability to make a difference".

Participation that is described as instrumental acknowledges people as merely being 'service-providers' which means that they are not given a voice, which ultimately culminates in them having no input into the decisions made around them. Representative participation does give people a voice, but it is not transformative in nature to the extent that only representatives of organisations are included rather than everyone and so public opinion does not greatly influence the decision-making process as a whole.

Transformative public participation is the key to successful environmental decision-making. Abders (1998: 63) explains that "democratic theorists such as Pateman (1970) and Macpherson (1997) have proposed, participation is developmental: its practice can have a 'cascade' effect which both improves the participatory process itself and transforms public life more generally". Public participation has thus also been seen as a 'capacity-building' exercise, which is incorporated in White's (1996) ideas on transformative participation.

Hajer (1996: 248) argues that environmental politics are largely dominated by the discourse of ecological modernisation and encapsulate sustainable development. "Environmental protection is interpreted as a positive sum game where pollution prevention ultimately pays" (Hajer, 1995; Seippel, 2000; Berger *et al*., 2001 in Brown 2009). The distinction is made between development and the environment and, as explained above, the economic value is always prioritised over the environmental issues.

2.3.4 A critique of weak ecological modernisation

Hajer (1995) outlines that the conceptual shift to ecological modernisation can be viewed as occurring within six realms. The first realm revolves around a shift from reactive to proactive formulas for regulation. There has also been a move towards integrating environmental issues into the costs, benefits and risks of companies. The emergence of new concepts, like "the polluter pays principle, cost-benefit analysis, risk analysis and precautionary principle," became the new language used to incorporate the environment into the legislative and business environment (Hajer, 1995: 27).

The second realm involves the role of science in ecological modernisation. Initially, it was the role of the scientific community to prove environmental destruction. Now, the role of science is more a proactive one of aiding environmental policy making by "determining the levels of pollution that nature can endure" (Hajer, 1995: 27). For example, the Intergovernmental Panel on Climate Change (IPCC) provides scientific knowledge as to which climate change decisions should be globally taken. Hecht (in Novins, 2009: 8) outlines that:

> The IPCC process has been successful in both preserving integrity and forging consensus among governments and scientists. This process underscores that there is some discretion in how scientists and policy makers can communicate the significance and the need for action.

The third conceptual shift has been the reconceptualisation of nature. Nature is increasingly being conceptualised as a fragile resource. This means that preventing pollution at the outset of development makes more sense than trying to clean it up after development. Progressive policy making forces companies to 'clean up their act'. The fourth conceptual shift is from nature being viewed as a 'public good,' to it being conceptualised as a 'free good' (Brown, 2009). This is a more holistic view of the environment, and holds an understanding that nature needs to be protected in its own right.

The fifth shift in thinking centres on the idea that nature can no longer be regarded as a 'sink' for environmental pollution. Polluters need to be held accountable for their actions, thus favouring the concept that pollution prevention pays. The sixth shift "shows itself in an opening up of the existing policy-making practices and the creation of new participatory practices" (Hajer, 1995: 29). The introduction of the public into decision-making forms a basis for more inclusive decision-making. These shifts to ecological modernisation thinking will be discussed in Chapter Five in the analysis of CDM in South Africa.

This section presented a critique of ecological modernisation in the form of Christoff's (1996) concept of weak ecological modernisation. The belief that ecological modernisation was the way to manage environmental issues is understood here as being fundamentally flawed. It is proposed that the environment needs to be protected even if it does not contribute to economic growth or even if it does not benefit society. The next section will examine current trends in ecological modernisation and present a case study in the pulp and paper industry to illustrate the shift in the debate from early theorists.

2.4 Recent contributions to ecological modernisation

The theory of ecological modernisation is still useful to understand today's neo-liberal, capitalist world. This section will elaborate on the main contributions to the theory of ecological modernisation and how the theory can be used in the future. As addressed in the previous section, Christoff (1996) envisages strong ecological modernisation as being most conducive to converging environmental and state interests. He believes that the inclusion of civil society into developmental decisions through public participation will bring this to the fore. Dryzek (in Mol *et al*., 2009: 227) proposes that "strong ecological modernisation demands an informed public that reflexively and democratically addresses environmental risks". The value of public participation in striving towards strong ecological modernisation is highlighted here.

The public cannot be stereotyped into a single mass of homogenous interests and people with similar ideas. Instead, there are a wide range of social groups that exist, all differing in terms of age, class, gender, ethnicity and religion. In recent work on ecological modernisation, most assume that it is important to have an open public participation process in order to ensure that any decision taken forward benefits the public at large (Sonnenfeld and Langhelle in Mol *et al*., 2009). This ties in to Christoff's (1996) argument that democratic or deliberative decision-making procedures are at the core of strong ecological modernisation. Booher (in Hajer and Wagenaar, 2003) emphasises that stakeholders included in the policy-making process need to be diverse and independent. This will ensure that democratic decisions are made in a move towards strong ecological modernisation.

The South African government has, in its National Climate Change Response White Paper (of October 2011: 6), outlined:

> Government departments will start communicating with citizens about climate change to inform and educate them and to influence their behavioral choices. This includes setting up and maintaining early warning systems so that people can take specific actions to reduce risks to themselves, their households and property (Republic of South Africa, 2011).

There is an effort to provide an inclusive process in legislation that is being tabled for future climate change projects.

In order to evaluate the implementation of ecological modernisation, it is useful to provide an example of civil society's involvement in environmental issues. The case study that will be explored will be in the paper and pulp industry. Janicke *et al.*, (1989: 100 in Mol *et al.*, 2000: 237) suggest "that a reduction in the resource input of production will lead to a reduction in the amount of emissions and waste and also the cost of production". This 'efficiency principle' is the premise on which most industries are built and lies at the heart of a weak ecological modernisation approach.

2.5 Case studies of weak and strong ecological modernisation

This section provides an overview of some empirical case studies that are evident in the literature. In these cases, theorists have analysed policy and implementation processes in order to determine whether these are instances of strong or weak ecological modernisation.

2.5.1 Southeast Asia case study

A case study of weak ecological modernisation in the manufacturing of paper and pulp in Southeast Asia will be used to illustrate how ecological modernisation can be assessed in a South African context (Sonnenfeld, 2000). This case study shows the implementation of ecological modernisation in modern day practices. According to Sonnenfeld (2000), an important criterion for ecological modernisation is the fact that production processes should be dematerialised, i.e. there should be a more efficient use of resources. However, the opposite was found to be true. 'Supermaterialisation' of the pulp and paper production in Southeast Asia was helping facilitate dematerialisation in the North.

The definition of ecological modernisation used by Sonnenfeld (2000) focuses on "prevention, innovation and structural change towards ecologically sustainable development… It relies on clean technology, recycling and renewable resources…" (Paulus, 1986; cited in Simonis, 1989: 347; in Sonnenfeld, 2000). The term ecological modernisation is used here to describe a particular way of managing resources and business processes.

Further, Hajer (1995: 25 in Sonnenfeld, 2000) outlines that there are three basic concepts that have emerged from early work on ecological modernisation. It makes environmental degradation calculable in monetary terms; it conceptualises environmental protection as a "positive sum game"; it reconciles, in principle, economic growth and the resolution of ecological problems.

Ecological modernisation is viewed as having:

> …three immediate and two ultimate technological / material objectives: in the short term, 'waste reduction and elimination, resource recovery and reuse, and dematerialisation'; and in the long term, 'resource conservation' and 'clean production' (Sonnenfeld, 2000: 237).

The theory of ecological modernisation is used in this case to describe certain key activities that need to take place in order to ensure that, ecologically, a better environment was created.

Related to the concept of CDM, Mol (1995, in Sonnenfeld, 2000) argues that, in an ecological modernisation approach to understanding the relationship between society and the environment, there are 'material objectives' that are sought in order to 'ecologise the economy'. This means that the environment is 'taken into consideration' via numerous technological processes, e.g. improved production and engineering designs for plants. Further, environmental taxes are seen as an instrument to internalise the external costs of polluting the environment[1].

In Southeast Asia, there was an exponential economic growth in the pulp and paper industry when other regions were in an economic downturn in the early 1990s (Sonnenfeld, 2000). This provided a market for cleaner and greener technologies which were sold to the pulp and paper industry in Southeast Asia. Although there was a rapid uptake of this technology in the region, the smaller and medium sized enterprises still polluted the environment, if not to a larger extent (Sonnenfeld, 2000). NGOs such as Greenpeace focused their attention on the larger, newer industries, although it was the smaller ones that were contributing to the pollution in rivers and the atmosphere. Technological solutions such as these are a top-down, expert driven form of 'environmental management'.

[1] In South Africa, the Carbon Tax discussion paper is such an instrument which is to come into force 2013/14 (Cloete, 2012)

The argument that is made in the case study is that the implementation of ecological modernisation was supposed to encourage cleaner and greener production of pulp and paper in Southeast Asia; however NGOs and aid agencies only focused on large corporates. The other primary factor, used in the case study, preventing transformation to ecologically sound practices in the industry, is the issue of dematerialisation. In this case study, it was found by Sonnenfeld (2000) that government had given licenses for "large forest concessions at little or no cost to well-connected companies and individuals" which meant that "tremendous volume[s] of virgin fibre [was used] to maintain full production" (Sonnenfeld, 2000: 251). This created an indirect incentive to use more than less, thus going against the initial goals of using green technology to promote resource conservation.

2.5.2 South Africa case study

It is interesting to note that in the South African context, Oelofse *et al*., (2006) mention that there are examples of movements towards strong ecological modernisation principles, especially in the regulatory arena. South African policy and legislation are rich with social and environmental justice practices (Oelofse *et al*., 2006). The issue of public participation has been embedded in much of its regulatory frameworks due to its history of social injustices. This has created a platform to move towards strong ecological modernisation.

Christoff (1996: 489) proposes that "ecological modernisation focuses on the state and industry in terms which are narrowly technocratic and instrumental rather than on social processes in ways which are broadly integrative communicative and deliberative". These case studies show, by way of example in Cape Town, how the state aimed to solicit the opinion of the public by undergoing wide public participation exercises. The first project was a national indicators project which was developed by consultants for sustainable forest management. The second project entailed examining the City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) which was set up to guide environmental practices in the city.

Both projects reflected high levels of civil society participation, with the state prescribing criteria for community involvement. Forestry takes place in communally owned land in many instances, so a high degree of societal participation is critical (Oelofse *et al*., 2006). "Workshops were conducted at the national, provincial and local level to verify the desired conditions raised by stakeholders" (Oelofse *et al*., 2006). Christoff's (1996) principles of a deliberative and communicative process are highlighted here. However, he also notes that in a developing country context, issues of environmental degradation and poverty are often so large that strong ecological modernisation is difficult to achieve. In this case, the state has proven that it has the intention to move towards strong ecological modernisation principles.

These case studies reveal that ecological modernisation, via the use of green technologies, can be applied to manage the environment and reduce the impact of development on the environment, albeit in its weaker form. The adoption of cleaner technologies had proven useful as compared to older, 'dirty' technologies. Non-governmental organisations are taking their rightful place in society to guide environmental and regulatory processes. These case studies highlight some of the complexities that might arise in terms of analysing how successful CDM is in South Africa by using ecological modernisation as an evaluative tool. The next section will summarise the chapter.

2.6 Conclusion

The aim of this chapter is to present the theoretical framework for the research process that was undertaken. It provides a conceptual foundation upon which further deliberations concerning whether CDM is a form of weak or strong ecological modernisation can be based. This chapter opens by providing an understanding on the origination of the concept of ecological modernisation.

There is a discussion around the concept of ecological modernisation and sustainable development. According to Blowers (1997: 245) ecological modernisation is a 'weak' expression of sustainable development. This is due to the principles which underpin sustainable development which propose that future generations should be taken into consideration when making decisions and civil society should be included in environmental decision-making. Christoff (1996) proposes a continuum of strong and weak ecological modernisation, where 'strong' ecological modernisation includes a more democratic process of inclusiveness in decision-making around ecological issues, as opposed to 'weak' ecological modernisation which uses a 'top-down' approach in terms of environmental decision-making.

Hajer (1995) views ecological modernisation as a tool which makes 'environmental degradation calculable'. This research focuses on this notion since CDM is viewed as an economic tool to place a price on carbon emissions that have been prevented from entering the atmosphere. CDM is analysed on the continuum of weak and strong ecological modernisation, which is presented in this chapter to determine what form of ecological modernisation it represents. The next chapter presents the background to the investigation of this thesis. This background presents an understanding of the broader climate change debate that exists in South Africa together with the regulatory instruments that existed at the time of the study.

Chapter Three

Background

3.1 Introduction

The purpose of this chapter is to define and contextualise Clean Development Mechanism (CDM) in a global and South African context. This is necessary in order to answer the research question of whether or not CDM, as a tool, is promoting the use of renewable energy in South Africa. The concept of climate change is not a new concept in South Africa. Since as far back as 1990, Greenhouse Gas (GHG) data have been collected, contributing to the first national GHG inventory in South Africa, achieved in 1998 (DEAT, 2009). The first policy changes followed soon after, such as the White Paper on Energy (1998a) and the Renewable Energy White Paper, published in November, 2003. This chapter describes the pertinent climate change and renewable energy policy framework in South Africa. In South Africa, the biggest contributor to climate change is carbon dioxide emissions, via Eskom (Rumsey and King (2009).

Eskom is the state owned electricity supplier and supplies 96 percent of the country's electricity (Goswami, 2009 in Tyler, 2009). According to Rumsey and King (2009: 1064), although a developing country, South Africa is "ranked 8th in the list of top 50 countries with the highest CO_2 emitting power sectors... Eskom ranks second on the list of the world's highest CO_2 producing companies". According to Imbewu (in Tyler, 2009), over 80 percent of the power generated by Eskom is coal-based. One of the main contributing factors to the situation is South Africa's unique history of aiming to be independent from the world due to the isolation of the country during the apartheid regime. Another contributing factor is the large amount of coal reserves that South Africa hosts, and thus making it the fourth largest exporter of coal in the world (Schmidt, 2008). The energy policies at that time (1948 to 1994) focused on energy security (Winkler, 2006). Energy policies were then focused on redressing the injustices of the

previous regime; more recently, this has evolved to take environmental issues into consideration (Winkler, 2006).

South Africa is in a unique position in that it endeavours to internalise the external cost of its traditional energy generation processes, while taking due account of its fragile environment. Post-apartheid South Africa has seen a flurry of new environmental legislation being implemented, commencing with the National Environmental Management Act (Act 107 of 1998). The following extract from the legislation illustrates this point:

> Everyone has the right to have the environment protected, for the benefit of present and future generations. Through reasonable legislative and other measures that -
>
> i. prevent pollution and ecological degradation;
> ii. promote conservation; and
> iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.
> (Republic of South Africa, 1998b: 2)

Project developers needs to take heed of the legislation surrounding environmental issues before decisions are made, and society needs to be consulted. This process is intrinsically linked to the CDM which this study explores. Public participation is an important component of CDM projects, and local environmental legislation is prioritised by the United Nations Framework Convention on Climate Change (UNFCCC) which states that climate change projects need to benefit both the local and global community.

This study aims to understand CDM as a tool to promote the use of renewable energy, and therefore requires an understanding of the broader context of South Africa's environmental policies now. This chapter sets out, in section 3.2, to provide a brief context of climate change in South Africa, describing the challenges with regards to carbon emission reduction.

Section 3.3 briefly reviews South Africa's energy policies in order to contextualise how climate change has been incorporated into legislation. Due to the global context in which CDM exists, section 3.4 discusses the concept of CDM in the global context, how this mechanism functions and its implementation in developing countries. In addition, the origin of this concept is explored and its operation in the South African context is described, with a particular focus on the Designated National Authority (DNA—a government department which approves projects).

The following section will elaborate on how South Africa is tackling the climate change debate that is currently a global issue.

3.2 Climate change and energy issues in South Africa

Climate change is a global issue. This section highlights how South Africa contributes to the global challenge of climate change. It is important to first contextualise the amount of carbon emissions that are being emitted per country. Figure 3.1 provides a visual display of carbon dioxide emissions by inflating territory size in proportion to the carbon dioxide emissions in 2000.

> In 2000 there were almost 23 billion tonnes of carbon dioxide emitted worldwide. Of this, 28% came from North American territories; 0.09% came from Central African territories. Emissions of carbon dioxide vary hugely between places, due to differences in lifestyle and ways of producing energy. Whilst people living in 66 territories emitted less than 1 tonne per person in 2000; more than 10 tonnes per person were emitted by people living in the highest polluting 21 territories that year (Worldmapper, 2000).

This picture provides an illustration of the disproportion in carbon emissions that exist across the world. As explained above, the economic situation and lifestyle in the global community dictates the amount of pollution released into the atmosphere. In the South African context, per capita emissions are high due to our abundance of coal reserves.

Although energy security was the focus during the apartheid era, there was a redirection to address the imbalances of the past by providing energy security (more specifically electrification) for all. As a result, after the democratic elections of 1994, the South African government went on a massive electrification campaign which resulted in the supply of electricity being constrained. It has been estimated that over R50 billion has been lost from the loss of supply of electricity due to blackouts (NERSA, 2009). The dynamic that exists in South Africa relates to providing energy to its previously disadvantaged population, while at the same time being cognisant of the fact that, due to its practices being coal-based, it has a massive environmental deficit that needs to be filled.

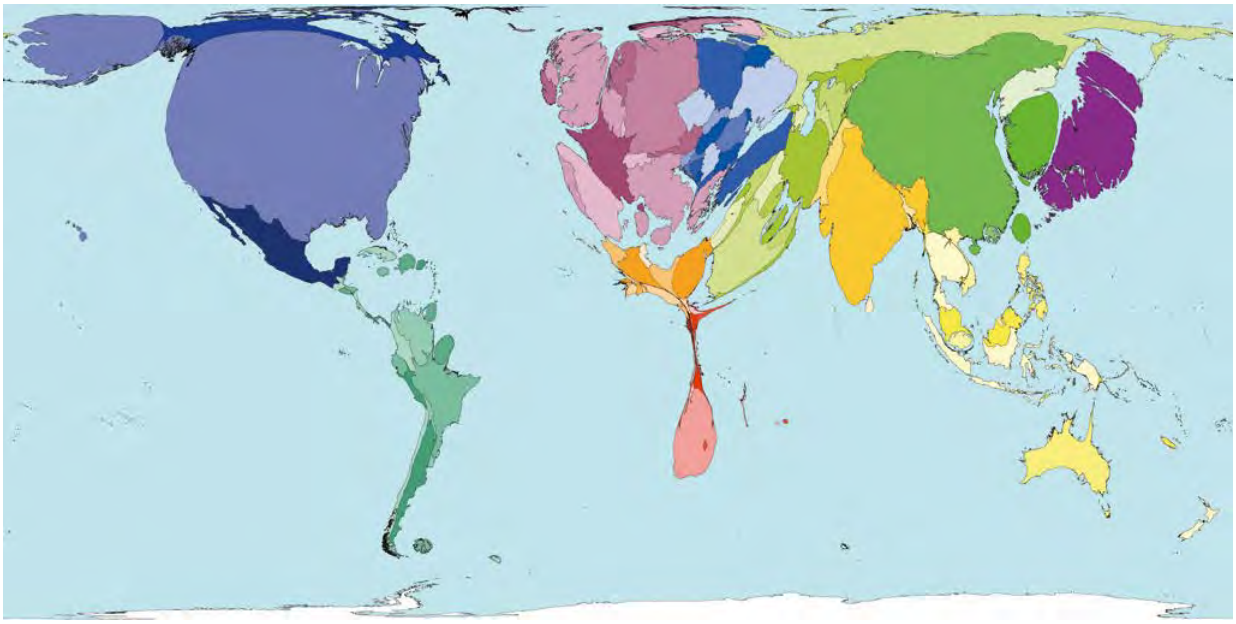


Figure 3.1 Territory size shows the proportion of carbon dioxide emissions in 2000 from each country (Worldmapper, 2000)

The relevant government departments have made strides to meet the needs of the people, while understanding that we live in a 'global village' and thus need to abide by international protocol. In South Africa, climate change issues are directly linked to energy usage due to the majority of our electricity being produced by burning coal. Understandably climate change issues have

topped the agenda in recent years. According to Heilfrich (2009: 1), "over the next 50 years an estimated 200 million people will be displaced by rising sea levels, 15 to 40 percent of Earth's species will face extinction, and malaria deaths will increase due to expansion of the tropics". Climate change is a topic that the South African government now takes very seriously and it "wants to cut CO_2 emissions by 34 percent over the next decade but has little room to make fast changes with major employers among top polluters and its cash-strapped power sector almost fully reliant on coal" (Roelf, 2011: 1). The challenge of meeting the South African government's promise to its people for a better quality life, poverty alleviation, and job creation, and the need to abide by climate change protocols, remains a conundrum on which this study aims to shed some light.

The issue of moving towards a 'green' or 'low-carbon economy' is the new terminology or language that is used globally, to encourage green practices. Bipath (2011: 24) mentions that, "the transition to a low-carbon economy is globally recognised as a competitive and development priority, but with the understanding that this will require far-reaching changes in technology, finance, policy and societal behavior". In order to ensure that South Africa moves towards a low-carbon economy, it would need assistance in meeting its current priorities. One of the concepts that the National Treasury Ministry is investigating is that of carbon taxes.

The National Treasury published a discussion document in December 2010 to raise the issue of carbon taxes. Carbon taxes are financial instruments which are used to internalise the external costs of pollution. Companies are taxed according to the amount of carbon emissions that they release into the atmosphere. The National Treasury has proposed an initial tax of R75 per ton of CO_2, and projected increases of up to R200 per ton of CO_2. It is believed that this will bring out the necessary behavioural change to move towards a low carbon economy (Republic of South Africa, 2010).

This thesis investigates the complexities of developing energy policies in South Africa with a focus on CDM. The impacts of these policies on the CDM are considered, and its resultant failures and successes are considered in section 3.4. It is therefore necessary to analyse the legislative environment that exists for CDM in South Africa.

3.2.1 The White Paper on Renewable Energy (2003)

In 1998, the White Paper on Energy was published in order to present a forecast on the future of energy in South Africa. It was a comprehensive document which included issues about using clean coal technologies and renewable energy. However, it did not set out specific targets to measure these objectives. In 2003, the Department of Minerals and Energy released a White Paper on Renewable Energy which set out the long-term goal of including 10 000 GWh (gigawatt hours) of renewable energy into the grid by 2013 (Republic of South Africa, 2003b). The paper elaborates as follows:

> The Government's medium-term (10-year) target is:
>
> *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilized for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW). This is equivalent to replacing two (2x 660 MW) units of Eskom's combined coal fired power stations.*
>
> This is in addition to the estimated existing (in 2000) renewable energy contribution of 115 278 GWh/annum (mainly from fuelwood and waste) (Republic of South Africa, 2003b: ix).

The White paper aims to encourage investment in the renewable energy sector in South Africa. It highlights the need to abide by sustainable development principles, as described in section 3.2. An enabling environment needed to be created both financially and legally in terms of providing once-off finance for capital-intensive projects like wind and solar energy projects. The Department of Energy has created a Renewable Energy Finance and Subsidy Office (REFSO) which has disseminated over R14,5 million in subsidies from 2006 for renewable energy projects (Modise, pers. comm., 19/11/2011).

The REFSO is one of the initiatives that government undertook to aid renewable energy projects in becoming commercially viable. The project office has since closed due to the National Energy Regulator of South Africa's Renewable Energy Feed-in Tariff (NERSA's REFIT) programme being launched. The REFIT is "a mechanism to promote the deployment of renewable energy that places an obligation on specific entities to purchase the output from qualifying renewable energy generators at pre-determined prices" (NERSA, 2009: 5). The standard tariff electricity price in 2009 was averaging 25.24c per kilowatt-hour (kWh), and NERSA was proposing that Eskom purchase electricity from private producers of electricity at the following rates:

Table 3.1 REFIT Phase 1 Tariffs – 2009

Technology	**REFIT in R/kWh**
Wind	1.25
Small Hydro	0.94
Landfill gas	0.90
Concentrated Solar	2.10

(Adapted from NERSA, 2009)

Understandably, since the renewable energy market was not developed yet, these prices did not stimulate the renewable energy market. In March 2011, NERSA then announced a decrease in these tariffs amounting to between 7.3 percent and 41 percent lower on certain technologies (CIPS, 2011). This is a contributing factor as to why there has been very little competition with Eskom in South Africa. Eskom continues to dominate the electricity market even though it has asked for a 35-45 percent increase in electricity prices over the coming years (Lana, 2010).

According to Lana (2010):

> …in February 2010 the National Energy Regulator of South Africa (NERSA) approved lower increases:
>
> - 24.8 percent for 2010/11 financial year, which will bring the average Eskom electricity price to 41.31c per kWh;
> - 25.8 percent for 2011/12, bringing the average Eskom electricity price 51.68 c per kWh; and
> - 25.9 percent in 2012/13, making the average Eskom electricity price 65.06c per kWh.

The increase in price starts bringing the renewable energy prices on par with coal-based electricity prices in future years at the proposed tariff structure. The mass implementation of renewable energy technologies is still lacking to a large degree.

It is now 2013, and there has been very little development in the renewable energy sector. The White Paper has also been commented on by a number of critics:

> The White Paper analyses the viability and application of the various renewable energy sources in South Africa, such as wind, solar, biomass, wood, begasses[2], and hydro, but strangely does not discuss these options in terms of their savings in CO_2 emissions and the environmental impacts flowing from these renewable energy resources (Rumsey and King, 2009:1064).

The CO_2 savings from renewable energy projects will aid South Africa in meeting its target of developing an environment that is protected for present and future generations, as indicated in the Constitution of South Africa.

A preliminary analysis of the Renewable Energy Policy in South Africa indicates that there are numerous environmental decision-making processes that need to be examined. Environmental decision-making includes decisions that are made for both the physical and social environment. The term 'environmental decision-making' is used to ensure that issues around poverty, unemployment and health services are taken into consideration. The South African government aims to ensure inclusivity of these issues by developing sustainable development criteria for all CDM projects, which is explained in section 3.2.3. The renewable energy target, which has been elaborated upon earlier in this section, positions South Africa strategically to receive investment under the CDM space.

The target of 10 000 GWh of renewable energy contribution to final energy demand by 2013 is ambitious, but encouraging, in terms of South Africa's vision to move towards a climate friendly approach to meeting its energy needs. However, although the legislation is adequate,

[2] The fibre that is left over from sugarcane stalks after the juice has been squeezed out.

implementation of its policy is lacking. The public and private sector are working together to bridge this gap. This thesis focuses on CDM as a mechanism which will close the gap between policy and practice because CDM encourages investment in the renewable energy sector, which this thesis aims to promote. The implementation of renewable energy technologies needs both political will and adequate funding in order for it to deliver the types of results that are needed to place South Africa as a forerunner in mitigating global carbon emissions (Little *et al.*, 2007).

Renewable energy is energy that is harnessed from renewable sources, like wind and solar, as opposed to non-renewable energy resources like coal and oil. Understandably, renewable energy projects need large amounts of capital investment. A case in point is wind and small scale hydro projects. Although the REFSO funding is available, there was a natural realisation, from a government perspective, that, due to the historically cheap price of electricity in South Africa, citizens did not use energy efficiently.

The South African government has also produced a further document entitled the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE). This document has undergone wide consultation in June 2010 and sets out targets for SA's energy mix from 2010 to 2030 (IRP, 2011). Some of proposals are as follows: "a nuclear fleet of 9,6 GW; 6,3 GW of coal; 11,4 GW of renewables; and 11,0 GW of other generation sources" (Republic of South Africa, 2011b). Although this does seem ambitious, government has committed to review this proposal every two years with wide spread consultation in order to ensure that realistic targets are set for the country.

This chapter opens with explaining that in January 2008, South Africa felt the first effects of electricity supply constraints. The government then decided that one of the 'low hanging fruits' to ensure security of supply would be to develop a strategy to conserve energy.

3.2.2 The National Energy Efficiency Strategy

The National Energy Efficiency Strategy was released in March 2005 and reviewed in October 2009. The objective of the strategy is to encourage energy efficiency in both the private and public sector. One of the messages that the strategy outlines:

> Energy efficiency improvements will be achieved largely via enabling instruments and interventions. These will include inter alia economic and legislative means, efficiency labels and performance standards, energy management activities and energy audits, as well as the promotion of efficient practices (Republic of South Africa, 2005: ii).

The need for adequate appliance labeling and performance measures within all sectors of industry and residential users of energy is growing.

The target of the strategy is to reduce the energy used by large industry 12 percent by 2015 (Republic of South Africa, 2005). The National Energy Efficiency Accord was signed by 12 large businesses with the aim of reducing their CO_2 emissions. (See Appendix B for a copy of the accord). This has been a largely successful exercise because it has led to other energy efficiency programmes. Energy intensive users have committed to reducing their carbon emissions (Bredenkamp pers. comm., 10/06/2010). This programme has been a catalyst in introducing large energy-intensive industries in South Africa to the concept of disclosing their carbon emissions.

The National Business Initiative (NBI), an independent company which provides a voice for business, has spearheaded a programme called the Carbon Disclosure Programme which aims to allow businesses to disclose and make commitments to mitigate their carbon emissions. Numerous discussions and dialogues have emerged over the years around this issue; for example, businesses worldwide are asked to report on direct and indirect emissions that their companies produce. Direct emissions are emissions from electricity that a company uses and indirect are emissions not directly used by the business. An example is when employees use flights or other transport for business purposes. Companies are now asked to internalise these external costs.

In 2009, at a Vision 2050 workshop held for businesses, it was stated that the critical pathway to sustainability by 2050:

> …would occur over the next four decades, given the current economic, environmental and social challenges we face ... is informed by the interplay of four elements: people and values; governance; economy; and resources, energy and environment (Gewer, 2009: 18).

This initiative aims to get businesses to think about their carbon emissions and try to reduce them in the future.

In addition to the energy efficiency drives that the government has been spearheading, there have been a few progressive announcements regarding South Africa's response to climate change via the National Climate Change Response Strategy. This strategy was developed by the Department of Environmental Affairs and will be described in the following section.

3.2.3 The National Climate Change Response Strategy

The Department of Environmental Affairs and Tourism drew up the National Climate Change Strategy in September 2004a. This document outlined the need for an infrastructure to be set up for the inclusion of CDM in South Africa. This means that the procedure for South Africa to be included in the CDM process was now identified. A secretariat and steering committee was now being set up for CDM projects to be evaluated. This was successfully implemented and it was agreed that the authorising body for CDM, termed the Designated National Authority (DNA), would be based at the Department of Energy.

The strategy pointed out the need for sustainable development procedures to be outlined in CDM documentation, and the need for a climate change response from South Africa to be inclusive of the social issues which are prevalent in South Africa, e.g. job creation. The strategy revealed that it would adhere to the South African Constitution which affords all citizens an environmental right (section 2.4), and therefore will include:

> …stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic[3] interference with the climate system; and [would] encompass the social, environmental and economic dimensions of development (Republic of South Africa, 1995: iii).

The strategy has since been revised, and the National Climate Change Response White Paper was published in October 2011. This comprehensive paper presents a plan for moving towards a low-carbon economy. The two main objectives of this paper are to:

- Effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity.
- Make a fair contribution to the global effort to stabilise greenhouse gas (GHG) concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner (Republic of South Africa, 2011a).

This paper provides a comprehensive overview of the challenge of climate change faced globally, but acknowledges that climate change is a cross-generational issue. The action or lack of action that will be taken today will be felt for many generations to come (Republic of South Africa, 2011a). It is in this spirit that the South African government adheres to international protocol around climate change issues, one of which is to establish a Designated National Authority (DNA). The next section will outline the operations of the DNA.

3.2.4 The Designated National Authority (DNA)

The function of the DNA is to ensure that all potential and viable projects are registered with the national government. The key objective of the country specific DNA role is to ensure the environmental and sustainability criteria of that country are met. The sustainability criteria

[3]Emissions that are caused by human activity.

outlined by the host country, meaning the country in which the project will be implemented, needs to be adhered to. (See Appendix C outlining the sustainable development criteria of South Africa.)

The procedure to get a project approved entails notifying the DNA by first submitting a Project Idea Note (PIN), as described in Figure 3.2. (Appendix D outlines the template for the PIN). This is a form which indicates the type of project that the project developer intends on developing. This document provides a brief synopsis of the project, and the possible emission reductions are calculated. The DNA will then submit a Letter of No Objection for the project, should the project meet the relevant criteria.

The next step, as highlighted in Figure 3.2 is to draw up a Project Design Document (PDD). (See Appendix E for PDD template). This document "contains information on the project activity, the approved baseline methodology applied to the project activity, and the approved monitoring methodology applied to the project" (IGES, 2011: 6). This document is usually completed by a CDM consultant, which makes the process expensive (Lahti, pers. comm., 15/03/2009). A consultant is usually employed at this stage because the technical aspects of the project need to be highlighted (including proving additionality of the project), and an annual monitoring plan needs to be developed. Chapter Five will discuss the issue of using consultants to guide the project developer, which usually leads to excessive costs borne by the project developer, and thus hinders the project from being registered as a CDM project. Furthermore, the PDD is only allowed to be submitted once an Environmental Impact Assessment has been completed on the project. The Letter of No Objection, together with the PDD, will then be submitted to the United Nations Framework Convention on Climate Change (UNFCCC). The objective of the UNFCCC is to stabilise greenhouse gas emissions that are emitted by human activity.

The following section will highlight how the CDM concept was established and how South Africa became a signatory to the Kyoto Protocol.

3.3 The origin of the CDM concept

The Kyoto Protocol was ratified by the South African government in August, 1997 (RSA, 2011). In 1998, all the major countries of the world gathered again in Kyoto, Japan to discuss climate

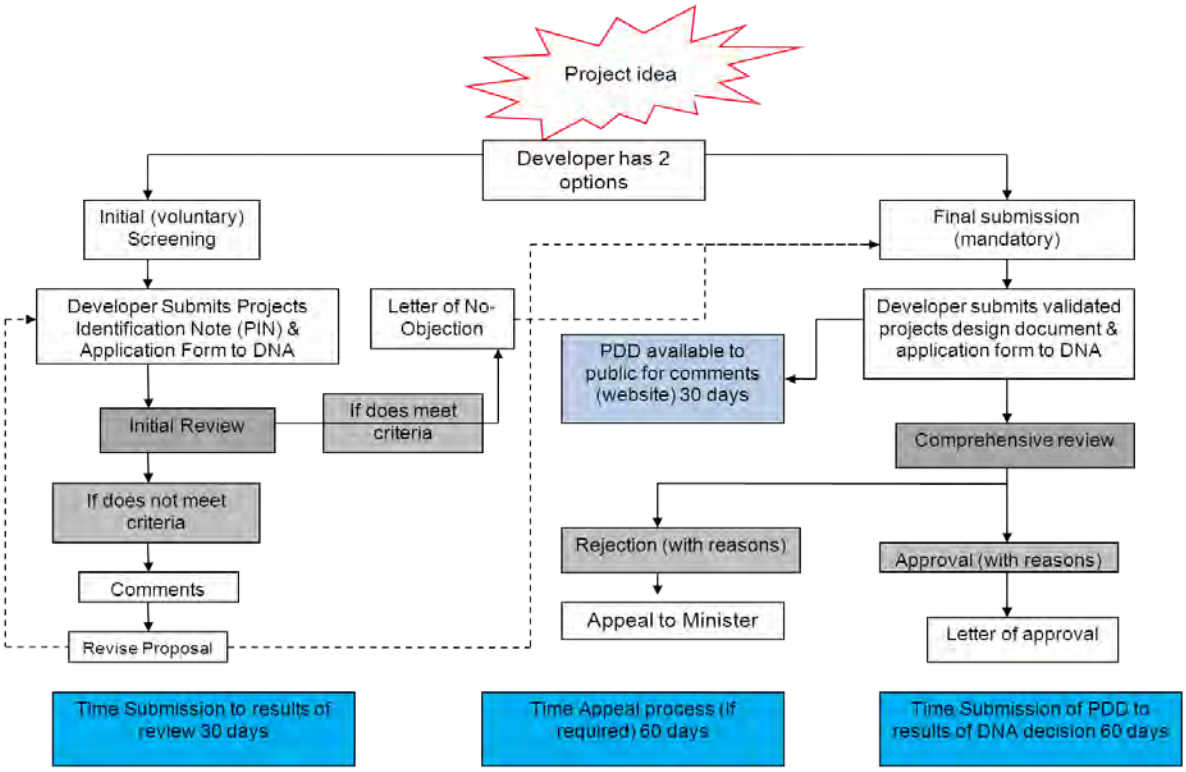


Figure 3.2 The Designated National Authority approval process (Adapted from DNA, 2010)

change issues and a possible way forward. The Intergovernmental Panel on Climate Change (IPCC) was formed, which is a scientific body providing assessments on climate change issues to the UNFCCC. The concept of a CDM was then coined in order to describe a process whereby developed countries would pay – defined below, for climate friendly projects being implemented

in developing countries. The basic idea was to encourage green practices around the world so that global carbon emissions could be reduced. The UNFCCC (2012)[4] defines the process as follows:

> The Clean Development Mechanism (CDM), defined in Article 12 of the Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO_2, which can be counted towards meeting Kyoto targets.

The rationale for CDM was to create a platform for countries around the world to reduce greenhouse gas emissions and contribute to sustainable development in the host country, i.e. the country in which the project is being implemented. Typical examples of these types of projects are wind, solar and small-scale hydro projects.

CDM projects reduce the gaseous emissions of carbon dioxide (CO_2) that increase global warming – the so-called greenhouse gases (GHG). Projects need to comply with a number of criteria under the Marrakech Accord, such as contributing to sustainable development and passing additionality tests, before they can be registered with the UNFCCC as a CDM project.

According to Little *et al*., (2007):

> Following the Kyoto Protocol was the Marrakech Accord (United Nations, 2001) which allowed developing countries to implement Clean Development Mechanism (CDM) projects in order to assist developed countries to meet their targets set under the Protocol. To motivate non-Annex I countries (or developing countries) to participate in the CDM they are awarded technology transfer for the projects, foreign funding for the projects and the possibility of trading the carbon credits gained from the projects with Annex I countries.

The Kyoto Protocol classified South Africa as a non-Annex I country and it is therefore eligible to implement CDM projects, whereas developed countries (or those listed in Annex I of the protocol) are not eligible for CDM projects and have to meet their stipulated carbon emission

[4] www.unfccc.int

targets by other mechanisms such as emission reductions within their country. The rules for CDM were finalised in terms of the Marrakech Accord (United Nations, 2001 in Little, 2006), and came into effect in February 2005 when the Kyoto Protocol was ratified.

The following sections will elaborate on the CDM process in order to illustrate the complexities involved in registering a CDM Project. CDM "allows entities from Annex I (developed) Parties to develop emission-reducing projects in non-Annex I (developing) countries, and generate tradable credits corresponding to the volume of emission reductions achieved by that project" (CDM rulebook, 2011). This mechanism facilitates a monetary exchange between countries to implement projects which will prevent CO_2 emissions from entering the atmosphere.

3.3.1 How the CDM concept works

The first critical concept that needs to be understood in terms of CDM is that of 'additionality'. According to the CDM rulebook, "A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity" (CDM Rulebook, 2011). Additionality is the requirement that, after the project is implemented, the GHG emissions are lower than if the project did not occur, i.e. if it were 'business-as-usual' you would have had more emissions of pollutants into the atmosphere.

CDM uses a wide range of methodologies, which are technical calculations. The methods vary according to the type of project that is developed. The current level of GHG emissions or the 'business-as-usual' scenario is calculated theoretically (using the methodology). A further calculation is then done to express the emissions that will be emitted in the project scenario, as illustrated in Figure 3.3.

This means that if the proposed CDM project did not take place, the project developer would need to outline what quantity of GHG would have been emitted. For example, in energy efficiency projects, if Solar Water Heaters (SWH) were not introduced, the 'business-as-usual' or baseline scenario would have been to use conventional electric geysers which would have brought about a certain level of GHG emissions. The term baseline scenario means the current level of greenhouse gas emissions. When SWH are introduced, there will be a reduction in the emissions that would have entered the atmosphere. This reduction is termed 'additionality'. The figure below describes this discrepancy in the current and project emission scenario.

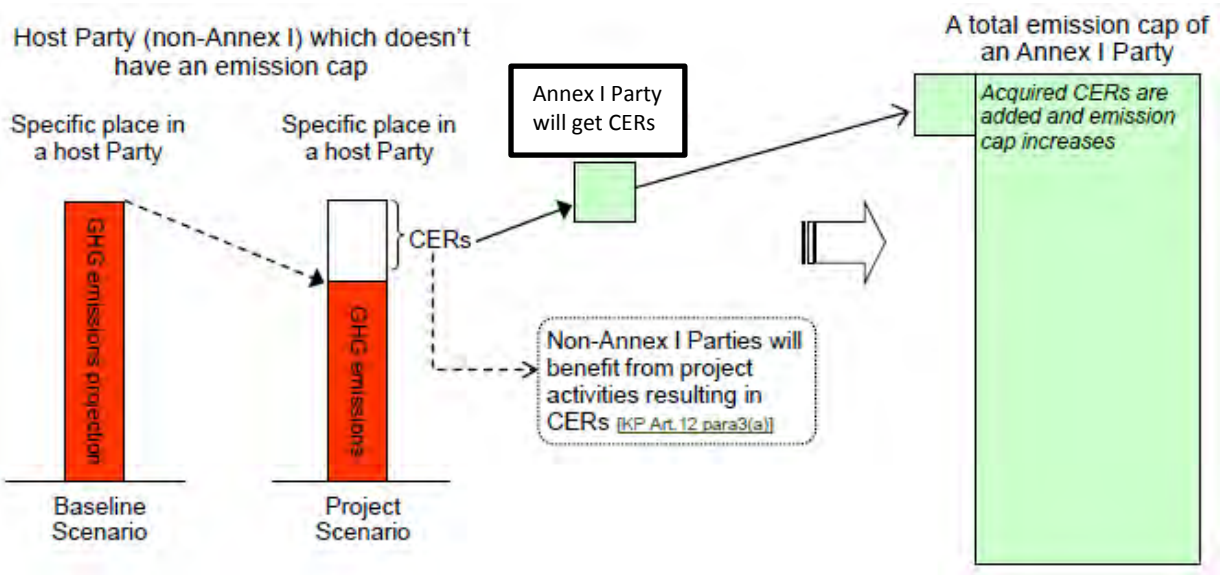


Figure 3.3 Illustration of the baseline and project scenario (IGES, 2011)

The methodology, developed by the project developer, needs to be approved by the Methodological Panel of the UNFCCC. This process is excluded if the methodology exists already. After the methodology is developed, all other similar projects using the same methodology can adopt it since it is freely available. In South Africa, the methodology developed for a specific project will use data from Eskom, which is the majority supplier of electricity, and it will calculate the level of carbon emissions that will be emitted into the atmosphere without a CDM project intervention. It will then calculate the amount of emissions from the SWH in this

instance. The difference in carbon emissions from the existing situation to the project scenario is termed 'additionality'. Additionality is further translated into tonnes of carbon dioxide prevented from entering the atmosphere, and the project developer is issued a certified emission reduction (CER) certificate for every tonne of CO_2 that has been prevented from entering the atmosphere.

There are different types of additionality arguments that can be made for projects. In their most simplistic form, these are:

1) *Identification of alternatives to the project.* The project developer needs to demonstrate that they have adequately investigated alternatives for the project.
2) *Investment Analysis.* The project needs to be presented together with all the necessary financial models in order to show that if it were not for Carbon Credits[5], this project would not go ahead. The Internal Rate of Return[6](IRR) needs to be significantly lower than the current IRR a company would expect from a project that it would invest in.

---

[5]Carbon Credits are verified emission reduction certificates which are issued by an accredited body to indicate that a project is CDM compliant.

[6]The discount rate often used in investment projects makes the net present value (NPV) of all cash flows from a particular project equal to zero. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project. As such, IRR can be used to rank several prospective projects a firm is considering. Assuming all other factors are equal among the various projects, the project with the highest IRR would probably be considered the best and undertaken first (Investopedia ULC, 2011).

Net Present Value (NPV) - The difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyze the profitability of an investment or project. NPV analysis is sensitive to the reliability of future cash inflows that an investment or project will yield (Investopedia ULC, 2011).

Discount Rate - The interest rate used in discounted cash flow analysis to determine the present value of future cash flows. The discount rate takes into account the time value of money (the idea that money available now is worth more than the same amount of money available in the future because it could be earning interest) and the risk or uncertainty of the anticipated future cash flows (which might be less than expected) (Investopedia ULC, 2011).

3) *Barrier Analysis.* There needs to be a demonstration that the project faces a significant barrier from being implemented, i.e. the technology does not exist in that country to deliver such a project, e.g. a gas engine for a landfill gas project. The project cost is thus accelerated because the technology will need to be imported in order for the project to occur.
4) *Common Practice Analysis.* The country in which the proposed project is due to be implemented will need to be evaluated. Additionality may be argued in support of the fact that the project that the developer is proposing has not been implemented before in the particular country, e.g. a commercially viable wind farm in South Africa or a Solar Thermal Plant (Lahti, pers. comm. 15/03/2009).

The UNFCCC has developed a 'process flow chart' to aid developers in asking relevant questions in order to analyse whether their project is additional, as elaborated upon above. Figure 3.4 provides guidance to project developers to evaluate if the project is additional (CDM Executive Board, 2008).

The IPCC labeled CO_2 as a reference gas. The Kyoto Protocol made a decision on how CO_2 emissions were going to be quantified. It was understood that all greenhouse gases do not have the same potency with regards to damaging the environment. The GHGs were calculated in relation to the CO_2 equivalent. The UNFCCC (2012) indicates that there needs to be a conversion factor, so that we can measure 'apples and oranges'. The concept of Global Warming Potential (GWP) was coined, which refers to the:

> Conversion factor from physical units to CO_2 equivalent is the GWP of the corresponding GHG. If X Gg of CH_4 is to be expressed in terms of CO_2 equivalent, then it is multiplied by 21, which is GWP of CH_4 over 100 years timescale (UNFCCC, 2012)[7].

This means that carbon credits can be accessed almost 23 900 times more if projects are reducing sulphur hexafluoride, by example. In South Africa, many project developers have embarked on developing landfill gas projects due to the project yielding a potential of 21 times

[7] www.unfccc.int

more carbon credits than ordinary renewable energy projects, thus it proves to be more lucrative than other CDM projects, as described in Table 3.2.

Greenhouse gases are weighted according to the amount of global warming they are likely to cause in the atmosphere. The UNFCCC thus governs exactly how this process will work. Further to this, it is important to note that the registration process requires project documentation to be written up in order to outline the project concept. The next section will elaborate on the UNFCCC process.

Table 3.2 GHG reference gases used in CDM projects

Greenhouse Gas	**Chemical formula**	**Weight in CO_2e**	**Typically emitted by**
Carbon Dioxide	CO_2	1	Energy production and/or usage, burning coal/wood/gas/biomass, combusting petrol/diesel/HFO, feeding boilers
Methane	CH_4	21	Uncapped landfill sites, coal mining, agricultural activities
Nitrous Oxide	N_2O	310	Adipic acid plants, nitric acid plants
Hydro Fluro Carbons	HFC's	140-11700	Refrigerants, air-conditioning, plastic thermal insulation
Perfluorocarbons	CF 4/6	6500-9200	Semi-conductor manufacture, refrigerants
Sulphur hexafluoride	SF_6	23900	Magnesium smelters, electrical insulation like switchgear, semi-conductor manufacture

(Adapted from van den Berg, 2006)

3.3.2 UNFCCC process flow

Once the process of additionality is determined, the project developer draws up relevant project documentation to be submitted describing the project. As described in section 3.2.3, the first document drawn up is the PIN, which is a high-level document which gives a broad outline of the project. This document is submitted to the DNA. The DNA then approves the document and submits a Letter of No Objection to the project developer. The next stage is then to draw up a Project Design Document (PDD) which contains detailed information about the project.

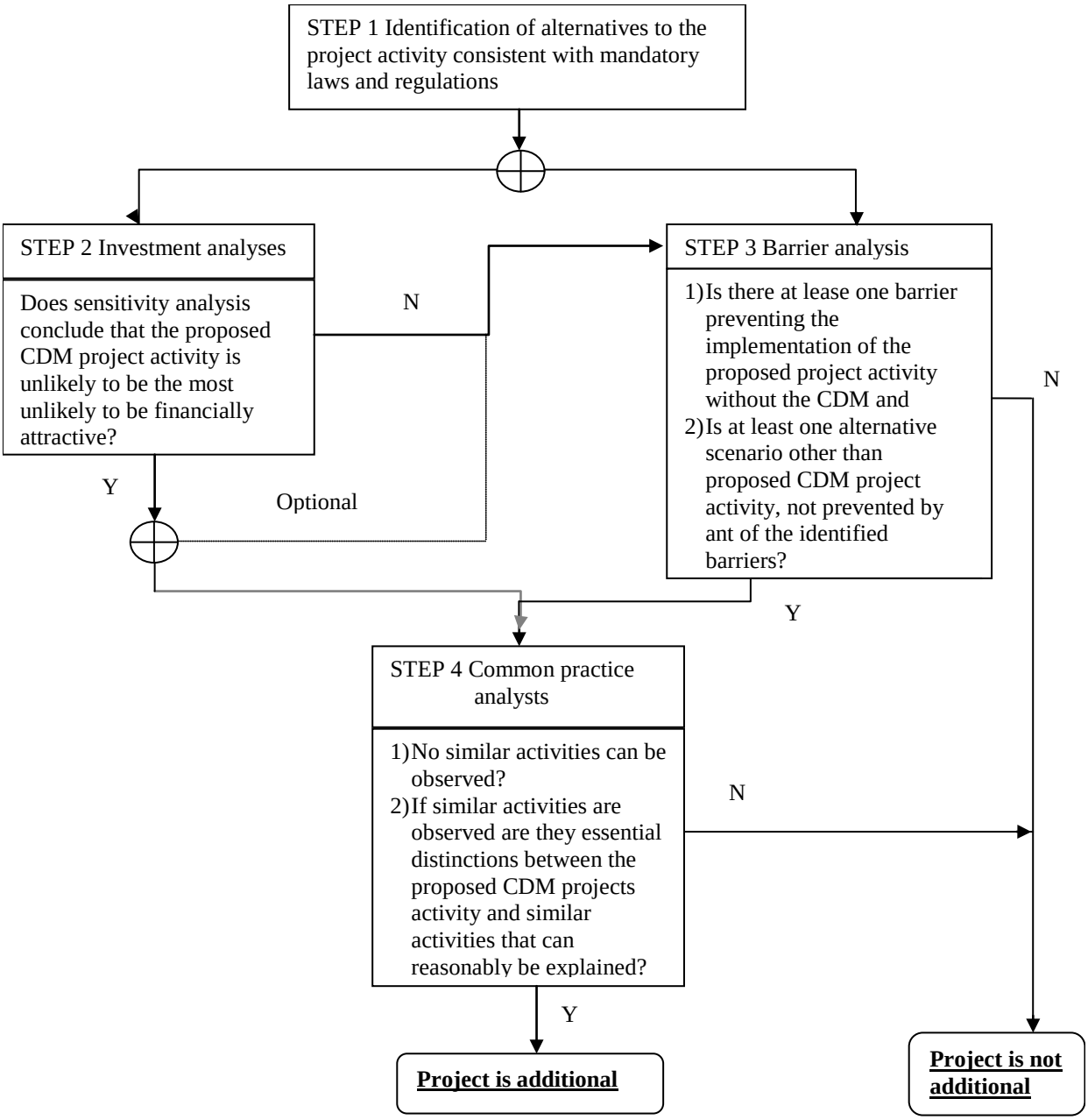


Figure 3.4 Flow chart indicating the process to identify if a project is additional (UNFCCC, 2012)[8]

[8] www.unfccc.int

The process flow chart is outlined below in Figure 3.5, but for the purposes of this thesis the details of each stage will not be elaborated upon as is does not contribute to the objectives of the thesis.

TIME FRAME	STEP	DNA	PROJECT DEVELOPER	DOE	CDM EB
1-2 months	**1**	Pre-screening	PROJECT IDEA PROJECT IDEA NOTE		
4 months	**2**	APPROVED	PROJECT DESIGN DOCUMENT		
	3			VALIDATION	
6 months	**4**				REGISTRATION
1 month (after 1 year of project operation)	**5**		MONITORING REPORT		
4 months	**6**			VALIDATION	
4 months	**7**				ISSUANCE OF CER'S

Figure 3.5 Theoretical CDM project cycle (Badu, 2011)

Figure 3.5 outlines the process that a project developer needs to go through if he or she would like his or her project approved by the UNFCCC. Steps five to seven are undertaken annually post project implementation. The indicative timeframes clearly outlines ambition by the UNFCCC to have the project analysed and registered as soon as possible, however, due to a number of factors, projects are often delayed. According to Badu (2011), a CDM project may take 12 to 18 months to register with the CDM Executive Board. The reasons for the delays will be explained in

Chapter Five, but link to bureaucratic procedures which exist at the UNFCCC. Finally, once the project is registered, the project developer is issued with a carbon credit or certified emission reduction (CER) certificate which is an independently verified certificate indicating that emissions have been prevented from entering the atmosphere.

Emissions trading is a platform that was set up to ensure that all carbon credits that are generated from the emission reduction projects are utilised effectively. The entity, with a legal obligation to reduce or limit its emissions (as defined by the Kyoto Protocol), is allowed to buy CERs to meet its obligations as agreed in the Kyoto Protocol. The next section outlines South Africa's response to CDM.

3.4 Clean Development Mechanism and South Africa

CDM has not been very successful in South Africa, especially when compared to its developing country counterparts like India, China and Brazil. South Africa is viewed as a favourable country to host CDM projects, yet it still struggles to submit successful projects to the UNFCCC (Badu, 2011). In May 2011 there were 200 projects submitted to the DNA, 163 PINs and 37 PDDs. Only 20 PDDs have been registered by the CDM Executive Board as CDM projects (6 issued with CERs), and 17 are at different stages of the project cycle (Rambau, 2011, e-mail). This is in stark comparison to other developing countries engaging in the CDM process, as illustrated in Figure 3.6.

Figure 3.6 clearly outlines the discrepancy in getting projects registered in South Africa compared to India, China and Brazil. The map indicates that there are a large number of small scale projects in India and large scale projects in China, with a mix of projects in Brazil. According to Bradsher (2009):

> China now uses more coal than the United States, Europe and Japan combined, making it the world's largest emitter of gases that are warming the planet. … China has emerged in the past two years as the world's leading builder of more efficient, less polluting coal power plants, mastering the technology and driving down the cost.

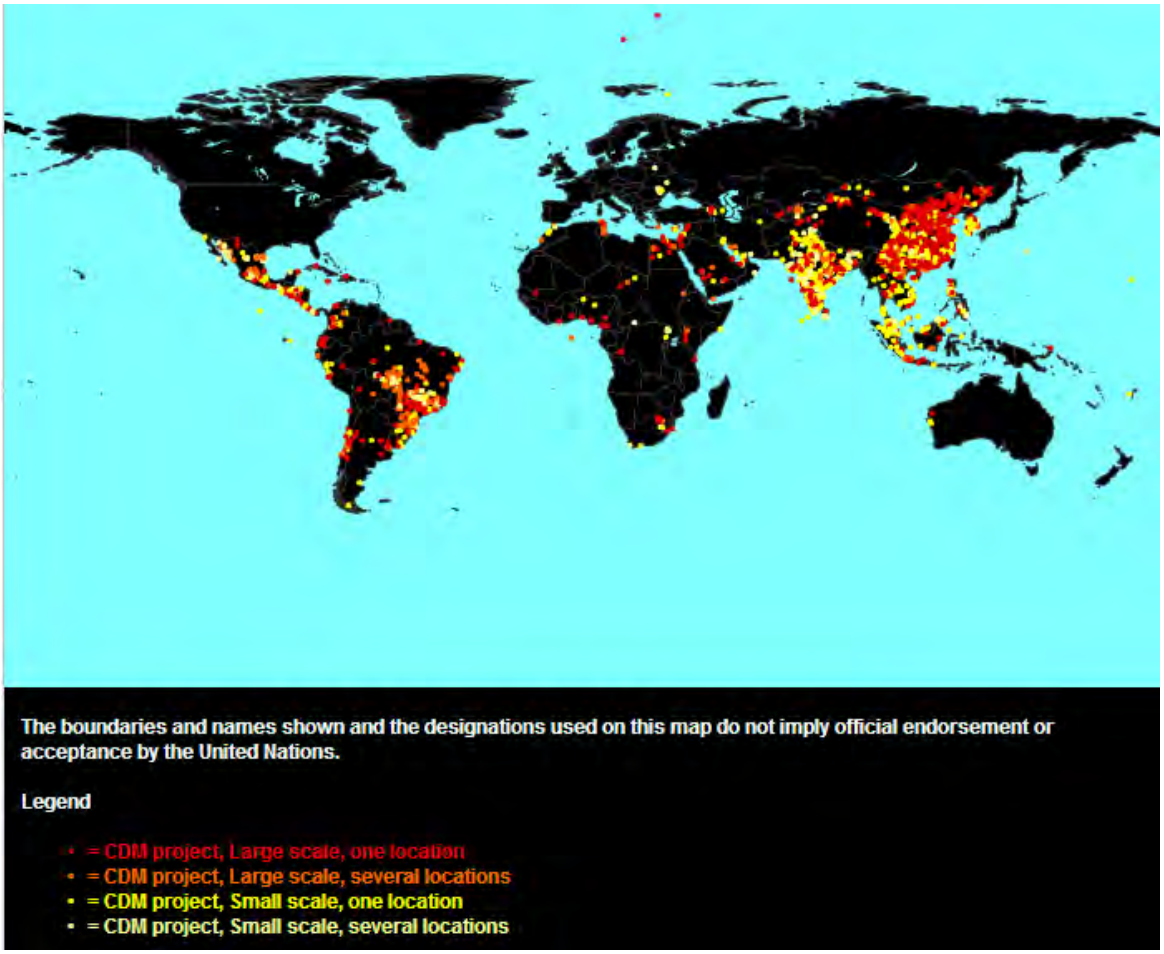


Figure 3.6 CDM projects map (UNFCCC, 2012)[9]

Furthermore, China has taken advantage of the CDM process to such an extent that about 35 percent of the global CDM projects are developed in China (Gemmer and Jiang, 2008). In South Africa, the first successful CDM project implemented was the Kuyasa Low Cost Urban Housing

[9] www.unfccc.int

Energy Project, in Khayelisha in Cape Town, in August 2005 (UNFCCC, 2012). This energy efficient project entailed the installation of SWH, ceiling insulation, and compact fluorescent light bulbs (CFLs) in Reconstruction and Development Programme (RDP) houses. The project reduces 6 580 metric tonnes CO_2 equivalent per annum (UNFCCC, 2012)[10]. The next section will summarise this chapter.

3.5 Conclusion

This chapter has outlined the CDM process both from an international and local perspective. Although the CDM process is tedious, if it is followed meticulously, a project developer will be able to get a CDM project registered with the United Nations Framework on Climate Change Convention. However, due to high costs and long waiting periods at each stage in the process, project developers are shying away from the CDM process.

This chapter provides the reader with an idea of the context in which projects need to be developed and registered in order to receive funding from developed countries. Section 3.2 describes the legislative context against which the issue of CDM fits. There is also a detailed description of the CDM process and the relevant approval bodies that need to be taken into consideration.

The chapter concludes with describing a comparison between South Africa and other developing nations like India, China and Brazil. South Africa has a long way to go in order to take full advantage of the CDM benefits that currently exist. Chapter Five will elaborate on some of the issues that have been raised in this chapter. This chapter provides the reader with an idea of the context in which climate change and energy issues are situated in South Africa.

[10] www.unfccc.int

The next chapter will provide the framework for the methodology which was undertaken to compile this research. It will provide a methodological framework for understanding the CDM process in South Africa, in terms of whether renewable energy technologies are being promoted in the country.

Chapter Four

Methodology

4.1 Introduction

The purpose of this chapter is to outline the methodology that determines the techniques used to generate and understand the primary data. The chapter therefore outlines the methodological approach adopted in order to achieve the research objectives. It also critically reflects on issues of positionality that shaped the research process.

Kitchin and Tate (2000: 1) define research, according to human geography, as "the process of trying to gain a better understanding of the relationships between humans, space, place and the environment". In other words, the researcher aspires to study and explain a particular phenomenon or relationship. A qualitative research methodology was used for this study. It was considered appropriate due to the nature of the study, which requires the views of stakeholders in order to ascertain whether or not Clean Development Mechanism (CDM) is being used successfully to promote the use of renewable energy in South Africa.

This research focuses specifically on the government and the private sector's views about the issue of renewable energy. This is critical, because at any given time, both entities need to be working towards a common goal, i.e. introducing alternative forms of energy into South Africa's energy mix. The aim of this research is to critically examine CDM as a tool to promote the use of renewable energy in South Africa. The objectives of the study are:

a) To analyse the policies contributing to carbon dioxide reduction.
b) To analyse South Africa's Renewable Energy Policy, which forms the framework for CDM.
c) To understand the concept of CDM in a developing country context.
d) To critically evaluate the implementation of CDM in the South African context.

This chapter outlines the research methodology, and explains why the research method chosen is most suitable. An outline of how the data was collected is presented, together with the different sources of data that were used.

Section 4.2 discusses the nature of the data collected. The data is described in terms of data sources, oral and documentary evidence in section 4.2.1. The primary data collection method applied, in-depth interviews, is outlined in section 4.2.2. A description of the collection of documents and texts follow, in section 4.2.3, including the sampling methods used: purposive and snowballing. (See Appendix F for Interview Guideline.) A thematic analysis was employed for the interpretation of the data, and this is described in section 4.3. The chapter concludes by presenting the limitations to the study.

The researcher was employed for a period of two years (2009 and 2010) to study the concept of CDM by the Norwegian Agency for Research and Development (NORAD) and CEF (Central Energy Fund, a South African state-owned entity), which assisted in providing access to, and gaining the trust of, both private and public sector stakeholders in the carbon business.

4.2 Data Collection

The two broad categories of data that were collected for this research are primary and secondary data. Primary data can be described as data that is collected by the researcher first-hand i.e. it has not been analysed by anyone but the researcher. There is no prior interpretation on the data collected (Cloke *et al*., 2004). Primary data sources for this study are minutes of meetings, in-depth interviews, government reports and legislation, and newspaper articles. Secondary data are any data that have already been analysed such as books, journal articles and conference presentations.

4.2.1 Primary data

In this thesis, in-depth interviews played a primary role in understanding South Africa's climate change objectives from a wide range of perspectives. One respondent remarked that this was a good technique as it forced one to think about issues that one is dealing with on a daily basis.

The primary data are derived from:

1. Interviews with stakeholders:
    a. Carbon business developers.
    b. Government entities.
    c. Municipality officials involved in the carbon sector.
    d. Renewable energy investment companies.
    e. Academics.
    f. Non-governmental organisations.
2. Documentary data:
    a. The national legislation of the Republic of South Africa.
    b. Global Climate Change Negotiation Reports.
    c. Minutes of meetings of the United Nations Framework Convention on Climate Change (UNFCCC).
    d. Government reports.
    e. Media reports.

4.2.1.1 Sources of Primary Data

The renewable energy policy framework is the main source of primary documentary data. Documents related to this framework were referenced from a wide range of sources:

a) Relevant energy legislation following the Renewable Energy White Paper of 2003 was gathered and analysed. Draft legislation and strategies were also collected in order to give a holistic understanding of CDM in relation to renewable energy policy.

b) Respondents were asked for documentary data which added to their argument during the interview. Furthermore, they were asked for reports and studies which they felt could add to the objectives of the study. One government official e-mailed copies of reports which she felt might help in gaining an understanding into the government process of approving CDM projects (DNA official, 19/04/2010).
c) Minutes of meetings were also used, sourced from relevant government departments, although this was limited as some documents were classified 'confidential'. The researcher was able to view minutes of meetings pertaining to implementation of renewable energy projects by being employed by NORAD, however these minutes could not be copied.
d) Speeches and key note addresses by Minister Van Schalkwyk (former Minister of Environmental Affairs and Tourism), and Minster Praveen Gordhan on carbon tax issues also formed a valuable source of information.
e) Brochures were collected from conferences as well as government departments which aimed to educate the public on renewable energy and CDM, for example, CDM in the Mining sector, CDM in the Agricultural sector and CDM in the Forestry sector (DoE, 2011).
f) Media Reports were gathered on an ad hoc basis from national newspapers, as well as from website repositories and archives. Press releases from the National Treasury provided useful information on the issue of carbon taxes in South Africa.

4.2.1.2 Interview schedule

The interview guidelines designed for the sixteen interviews were divided into four sections. Firstly, the participants were asked to provide a general overview of their employment position and what role they play in the carbon industry. Kitchin and Tate (2005: 215) describe an interview as "a complex social interaction in which you are trying to learn about a person's experiences or thoughts on a specific topic". It is thus important to contextualise the person in understanding what industry they work in, and what they understand about the basic concept of CDM.

The second part of the interviews discussed the policy schedule around renewable energy in South Africa. This aided the researcher in understanding to what extent both public and private sector stakeholders understand the policy regime in which they work. One of the objectives of this thesis is to analyse the Renewable Energy Policy of South Africa, which forms the framework for CDM. If respondents showed a lack of understanding for some of the main policies, they were asked probing questions by the researcher to gauge how well they understand the renewable energy policy frameworks.

There is a stereotyped view that is prevalent in the media that "the South African Government was giving serious attention to climate change and the public was generally very aware of the problems attached to the phenomenon" (Dardagan, 2010: 46). The researcher thus saw it important to test this statement. Cooper and Schindler (2001) state that, "information about past events is often available only through questioning of people who remember the events," which was important because the researcher found that many respondents who were involved in developing the energy policies had left the employment of the Department of Energy, and had to be traced via a process of questioning fellow employees that still remain at the Department of Energy. Seeing that the Renewable Energy Policy had already been developed, the interviewing process proved invaluable for the establishment of an understanding of the policy environment in which renewable energy projects were being developed.

The third section of the interview guideline provides a set of questions which probe the current CDM portfolio that the stakeholders were involved in, i.e. project developers, government, academics and parastatals. In order to understand why CDM projects have not been popular in South Africa and Africa, the researcher asked specific questions on possible reasons for the delays in getting projects registered with the UNFCCC and earning carbon credits. Questions around risks for project developers were also posed, and both government and private entities gave perspectives.

The last part of the interview guidelines presented general questions about the respondents' view on the future of CDM and the energy sector in South Africa. In this section, the researcher used Christoff's (1996) table of ecological modernisation (see Chapter Two) to elicit responses in order to analyse whether they felt CDM fitted in the realm of strong or weak ecological modernisation.

All interviews were recorded and transcribed, and the researcher took notes at all interviews so that important words or points that were mentioned could be elaborated upon where necessary. It was therefore important to "listen to the responses and act accordingly, recording the responses without upsetting the conversational flow, and giving support without introducing bias" (Oppenheim, 1992 in Kitchin and Tate, 2005: 215).

4.2.2 Secondary data

Journal articles were sourced via the University of KwaZulu-Natal library archives, as well as online. Books were searched from library sources relating to topics around climate change, CDM, renewable energy, and energy efficiency. A focus was also placed on developing countries involved in the CDM field, like India, China and Brazil.

Secondary data was derived from:

a. Journal Articles.
b. Books.
c. Websites.
d. Conference papers.

4.3 Sampling

Due to the nature of the qualitative, interpretive research method employed (i.e. intensive, in-depth questioning) it was not necessary to interview a large number of people. The interviewees were therefore not representative of the entire population, but gave an understanding of how they felt from their point of view. Sixteen interviews were conducted using open-ended interview guidelines. These were then transcribed into text. Sayer (1992: 223) explains, when conducting "a less formal, less standardised and more interactive kind of interview, the researcher has a better chance of learning from the respondents". Although structured interviews were used, the researcher allowed respondent's to elaborate on points that they felt were relevant.

4.3.1 Purposive sampling

Non-probability, purposive sampling was used. The researcher reviewed the focus areas in which CDM operated (i.e. private and public sector), as well as academic institutions which would add value in understanding how CDM functions in South Africa. Private companies, investors in the CDM field, municipality officials, academics and parastatal stakeholders were then chosen, as a means of purposive sampling.

> Purposive sampling allows us to choose a case because it illustrates some feature or process in which we are interested. However, this does not provide a simple approval to any case we happen to choose. Rather, purposive sampling demands that we think critically about the parameters of the population we are studying and choose our sample case carefully on this basis (Silverman, 2005: 129).

The sample group was chosen according to the stakeholder's involvement in the CDM sector and they were contacted to gain insight into their view on how successfully CDM was performing in South Africa. The sample group also proved useful in guiding the researcher towards other stakeholders that might be able to add value to the research. This process is termed snowball sampling.

4.3.2 Snowball Sampling

Snowball sampling is a process whereby "the sample emerges through a process of reference from one person to the next" (Denscombe, 2007). This technique was useful due to the limited number of people in South Africa who are knowledgeable about CDM. This process aided the researcher in identifying the 16 respondents that were chosen to be interviewed for this research.

A combination of digitally recording interviews and note-taking was adopted in order to ensure that important phrases were captured, and this built upon the researcher's understanding of the issues that existed pertaining to the research topic. Where points mentioned were unclear, the researcher asked for the answers to be elaborated upon, thus contributing to the research objective. See Table 4.1 for a description of the 16 respondents selected from a range of stakeholder groups and the date on which they were interviewed.

Table 4.1 Interviews conducted with sixteen respondents (March-May 2010)

Stakeholder Group	Organisation	Date
Parastatal	South African National Energy Development Institute (SANEDI)	25 March 2010
	Energy Development Corporation (EDC)	14 May 2010
	National Energy Efficiency Agency (NEEA)	23 March 2010
	Eskom	11 May 2010
	Industrial Development Corporation (IDC)	14 May 2010
	Pure Carbon	6 May 2010
	Sasol	21 May 2010
	Greenstream Network	14 May 2010
	Imbewu Legal Consultants	5 May 2010
Local authority	Nelson Mandela Bay Municipality (NMBM)	19 April 2010
	eThekwini Municipality	31 March 2010
Other affiliate groups	United Nations Development Programme (UNDP)	19 April 2010
	World Wildlife Foundation (WWF)	13 May 2010
	University of Cape Town (Academic)	20 April 2010
Government officials	Department of Energy, Designated National Authority (DNA)	19 April 2010
	Development Bank of South Africa (DBSA)	11 May 2010

4.4 Data Analysis

All interviews were recorded with a voice-recording device. Each interviewee was asked whether he or she would mind if the researcher taped the conversation. Half the interviews were transcribed and then the data was lost via a computer malfunction. It was then decided that the digital recordings would be carefully listened to again, and copious notes were taken, since transcribing again would take too much time. It was found that, due to the complex nature and terms used by respondents, a one hour interview took about six to nine hours to fully transcribe. (Kitchin and Tate, 2000). Eight of the sixteen interviews were fully transcribed. The researcher used the field notes for the remaining interviews. The data was analysed via a process of thematic interpretation. 'Recurring patterns' were identified and selected as thematic categories from the literature and primary data that was analysed (Kitchin and Tate, 2000). Data was described, analysed and then categorised, which allowed for an emergence of common themes. Dey (1993, cited in Kitchin and Tate, 2000) states that a connection or relationship is formed between the different themes or categories that are developed. This is constructive because clear linkages emerge which can be analysed. These connections were explored in the interpretation of the data. The 'omelette' approach, as described by Dey (1993 in Kitchin and Tate, 2000), proved useful, as it describes the interpretation of qualitative data by using the 'omelette analogy'. They suggest that just as you need to break up an egg, so to should you break up your data. Then, just as you need to beat up an egg to make an omelette, so too should you beat or mix the pieces of data together to create the end product, which is the omelette. Dey (1993 in Kitchin and Tate, 2000) suggests that one should describe, classify and then interconnect the data.

This procedure was efficient in identifying themes as a wide range of stakeholders were consulted with their different opinions listed, described and then thematically linked; themes were then interconnected. The interconnection also proved useful as it allowed the researcher to understand where the 'blockages' in the CDM process lie.

Interestingly, data interpretation has proved to be an iterative process, which means that interpretation took the form of analysing, going back to the data, and reanalysing. The process entailed describing, classifying data into themes, and interconnecting the data. Dey (1993 in Kitchin and Tate, 2000) describes this process via Figure 4.1. This interpretive process ensures that relevant themes emerge which encapsulate the main discourses among the stakeholders.

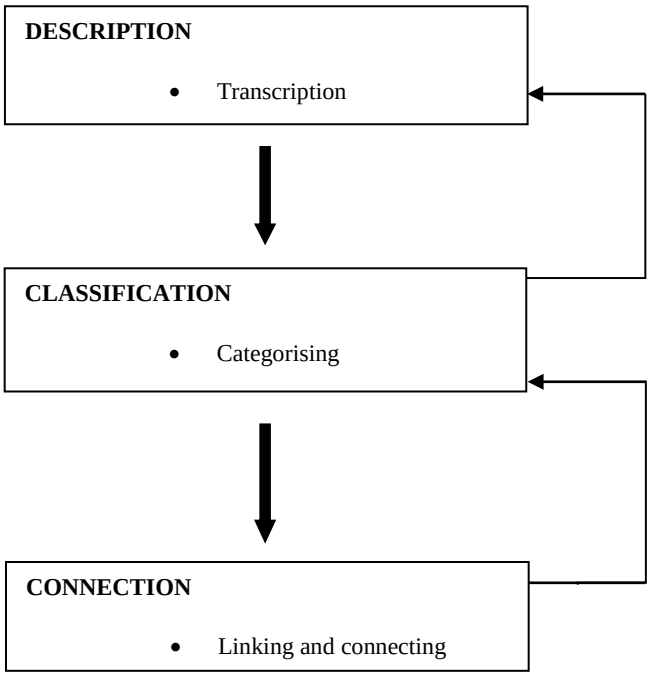


Figure 4.1. Description, classification and connection of data (Dey, cited in Kitchin & Tate, 2000: 235)

The initial stage of data description affords the researcher the platform to transcribe data directly from interviews that are carried out. Annotation involves writing notes on the side of the transcribed material, thus assisting to bring out ideas from what is being transcribed. Annotating allows the researcher to 'internalise' and think carefully about what is being transcribed. These notes are then referred to later, as Dey (1993 in Kitchin and Tate, 2000) points out above, to be interrogated as the data was being described.

4.5 Limitations of the study

All studies in all disciplines have limitations. The first limitation experienced by the researcher was that of 'neutrality'. Cloke *et al*., (2004: 364 in Dray, 2009) state "human geographical research can never be viewed as 'value free' " and should be viewed rather as a social process. The researcher found that working in the field of carbon development meant that ideas related to the field of CDM were deeply embedded in the mind of the researcher through the use of these ideas in practice. My 'positionality' meant that there needed to be a critical reflection at each stage of the research process (Kitchin and Tate, 2000). Kitchin and Tate (2000: 215) highlight the issue of neutrality as follows:

> …you must also try to balance the establishment and maintenance of a rapport with the interviewee, so that a trusting relationship is developed, while maintaining a neutral position about the topic under discussion so that you can be objective in your analysis. You should be aware that the adoption of neutrality depends upon your position as a researcher.

The issue of neutrality was vital for the researcher as she worked in the same field as most respondents. As a researcher with about ten years of experience in the energy and climate change sector, and an environmental management qualification, the area under research is well-known. It was therefore important to carefully listen to the views of the respondents and shy away from imposing my preconceptions about the sector.

The researcher took her possible subjectivity relating to the subject very seriously and ensured that the results of the study were not influenced by her prior knowledge of the research topic. One of the key ways of ensuring neutrality was her extensive use of direct quotations and the fact that all interviews were recorded.

A further limitation is the fact that a relatively small sample was chosen to be interviewed although representation was not aimed at. For example, only two municipal officials were interviewed although most large municipalities in South Africa are engaging in energy efficiency and renewable energy programmes. However, the researcher felt that the municipalities that were

chosen to be interviewed have shown keen interest in the sector and are fairly active in the energy field. The municipality respondents were carefully chosen for advancement in the renewable energy and energy efficiency fields, so although not representative of all municipalities, it was clear that the municipalities chosen had been fairly involved in the climate change field.

A fair amount of reading and understanding of the theoretical framework surrounding the research was completed prior to the data collection exercise. The different concepts related to ecological modernisation, which is the theoretical framework applied in this study, was not understood by most respondents, and had to be explained. An evident limitation is the fact that respondents might not have fully grasped the terms, and therefore the response surrounding Christoff's (1996) distinctions on weak and strong ecological modernisation was limited.

Interview sessions were limited to short periods of time due to interviewees being busy in their daily work activities. In some instances, respondents were interviewed during conference breaks or before boarding a flight, which meant that the time pressure dictated how much the respondent could elaborate on certain topics. The researcher tried to maximise the time allocated as much as possible and also gave each interview respondent her contact details, so that they could respond later on if something came to mind. Interestingly, a few respondents did reply later on via e-mail with reports that they might have forgotten to mention during the interview. In spite of these limitations, the researcher was confident that all avenues were covered ensuring sound data were collected and collated.

4.6 Conclusion

This chapter provides a detailed outline of the methodological process that was undertaken. The reflective methodology and the topical nature of the issue being discussed (i.e. renewable energy and climate change) meant that a wide range of sources of both primary and secondary data could

be analysed. It was imperative to tease out primary data which would answer the aim and objectives of the study. The data collection and analysis processes were shaped by the broad methodological approach which was chosen for this research, namely a qualitative approach.

This chapter opens with discussing primary and secondary data sources. Kitchin and Tate (2000) define primary data sources as data which has been generated by the researcher. These include using documentary sources like newspaper articles, policy documents, reports and one-on-one interviews. The interviews, which were open-ended and semi-structured, were conducted with a wide range of stakeholders. These ranged from the public sector (including national and local government or municipal officials) to private sector (which comprised consultants involved in developing CDM projects), as well as project developers and investors in the CDM field. Non-governmental organisations and academics were also consulted in order to ascertain some of the barriers that they perceived in the renewable energy sector in South Africa.

Data that was generated by someone other than the researcher is defined as secondary data according to Kitchin and Tate (2000). This research has relied on secondary data for most of the information concerning the literature review, which includes ideas about ecological modernisation. The large amount of literature that has been published about climate change and energy issues has aided this research to present the 'landscape' in which CDM exists in South Africa.

Section 4.3 then discusses sampling. Purposive sampling was chosen as a research technique for this study, which is a method which targets particular people to be interviewed in order to ascertain responses from the group which they represent. The researcher found that, due to the technical nature of CDM, there were a limited number of people that were knowledgeable about CDM and the barriers and success factors influencing its implementation in South Africa. The

interviews then evolved into a process of snowball sampling, where the targeted group referred the researcher to other individuals that might aid the research (Kitchin and Tate, 2000).

Most in-depth interviews were transcribed, and the methodology used for the data analysis of this research comprised a thematic approach. This meant that recurring themes were identified during the interview process and the interconnections or relationships between these themes were presented (Dey, 1993 cited in Kitchin and Tate, 2000). These themes provide the basis of the results upon which the recommendations for this study are made.

The final section explores the limitations of this study. Seeing that the study required personal opinions about CDM and how it was functioning in South Africa, the respondents indicated that there were a number of barriers which needed to be overcome in order to gain a true reflection of the success or failure of CDM in South Africa. The researcher was also employed in the CDM field at the time of the study and therefore needed to ensure neutrality. This position in which the researcher was placed meant that she had to undergo critical reflection throughout the research process (Kitchin and Tate, 2000). This was achieved by constantly reflecting on the data collected and critically analysing whether her opinions were being filtered through the data analysis section of this research.

Chapter Five

Clean Development Mechanism as a tool to promote the use of renewable energy in South Africa

5.1 Introduction

The aim of this study is to critically examine Clean Development Mechanism (CDM) as a tool to promote the use of renewable energy in South Africa with a particular focus on the policy decisions that have been made in this sector.

In order to achieve this aim, this chapter will focus on addressing the four objectives of this study, which have been outlined in chapter one. The type of policy decisions that have been made will be outlined and the nature of the projects that have been registered through the South African Designated National Authority will be analysed. The success or failure of CDM in South Africa will be presented and interpreted via the primary data gathered in the research process. The interpretation is undertaken by applying the conceptual framework and drawing from the legal context for CDM.

The CDM field is perceived as a highly 'technical' field and therefore the concept is difficult to understand. The stakeholders that have been purposively sampled for this study have an intimate knowledge about CDM, together with the processes and issues that surround it. Chapter Three highlighted the context of CDM in South Africa, and outlined that the majority of stakeholders in the CDM sector are government officials, private CDM project developers and civil society at large, all of whom were included in the public participation processes.

CDM was established in order to globally catalyse 'climate friendly' projects. Developing nations were given the opportunity to gain funding and technical expertise to fast track CDM projects by developed nations who had emission reduction targets to meet under the Kyoto Protocol. However, evidence in this research shows that CDM is not successful in South Africa as compared to other developing nations like India, China and Brazil (see section 2.4). In order to ascertain the barriers that exist and possible solutions to these barriers, it was important in this study to interview a wide range of people who have been involved in the CDM process.

The qualitative data from this study is presented in themes, in the form of direct quotations or paraphrased statements from the narratives collected from government officials, private project developers and other stakeholders. A profile of the respondents interviewed is presented in Chapter four in order to understand the background of the group chosen to be interviewed. The themes are as follows:

- The landscape of South African policies pertaining to Carbon dioxide reduction
- An analysis of the Renewable Energy White Paper of November 2003
- CDM in a developing country context
- An analysis of the success of CDM in South Africa
- CDM: a case of weak ecological modernisation

This chapter presents a set of themes: Section 5.2 presents the theme which describes how respondents have understood the landscape of South African policies pertaining to carbon dioxide reduction. This theme focuses on the perception, by relevant stakeholders, of how progressive South Africa's energy and environmental policies are. The following section, 5.3, then presents an analysis of the Renewable Energy White Paper of November 2003. The public participation process and hurdles to implementation of this policy is critically discussed. The different tools and techniques for public participation in environmental decision-making used in the CDM process are analysed since democratic governance is a characteristic of a stronger form of ecological modernisation.

Section 5.4 presents the theme of CDM in a developing country context. This section aims to tease out why CDM is successful in other developing countries, like India, China and Brazil. The data gathered presents an overview of some of the focus areas that South Africa could capitalise on. The following section, 5.5 then critically analyses the success of CDM in South Africa. The concept of the 'green or low-carbon economy' is also presented and options are analysed as to how realistic this 'dream of a green economy' is for South Africa.

The theoretical framework of ecological modernisation (Mol *et al*., 2009) and public participation (White, 1996 and Arnstein, 1969) will be applied in order to determine whether CDM implementation is a form of weak or strong ecological modernisation. Table 3.1, which describes the characteristics of weak and strong ecological modernisation, will be the main point of departure in the final section, section 5.6 (Christoff, 1996). It is important to understand why CDM has not had a favourable response from the public, even though government has provided a conducive environment for registration of projects (Respondent from IDC, 14/05/2010; Respondent from DBSA, 11/05/2010). The following section, section 5.2, presents the theme related to South African policies concerning carbon dioxide reduction.

5.2. 'We have some of the best policies in the world'

Chapter Two of this thesis presents a background on the South African policy landscape in terms of energy and environmental policies that aim to protect the environment in which we live, as well as reduce the negative impacts on the environment. The main energy policies that have been formulated in the country are the Renewable Energy White Paper of 2003 and the National Climate Change Response Green Paper of 2012. This study has found that most of the respondents view South Africa's policy framework as being very progressive. This is exemplified in the following statement by a senior government official at the Department of Environmental Affairs, Lukey (in Morrison, 23/01/2009):

> Cabinet has said that South Africa must decarbonise its economy, which is a positive indication of its commitment to lowering the country's carbon emissions and also a stronger statement than many governments around the world have made.

Civil society and private stakeholders agree that as a developing nation, the South African government has ensured that its policy processes are robust. The following sub-themes provide evidence of this view, but also that there is a lack of implementation of these progressive policies.

5.2.1 South Africa's progressive policy landscape

Oelofse *et al.*, (in Mol *et al.*, 2009: 482) propose that South Africa's environmental laws and policies "are now among the best in the world". However, although adequate legislation is available, the crucial point is implementation. If laws are not implementable, the purpose of the policies and laws is defeated. Most respondents agreed that the South African policy environment was conducive to allowing carbon dioxide reduction in South Africa.

This research has found that "the [Renewable Energy] policy has got good intentions" (Pure Carbon respondent, 06/05/2010). However, a coal-based electricity sector plagues South Africa's intentions to reduce its carbon emissions significantly. The government's Long Term Mitigation Scenario study (LTMS) was released in 2009 and predicts:

> …that, South Africa's emissions, if left unchecked, would quadruple by 2050 from a 2003 base of 440 million tons. But the introduction of an escalating carbon tax would have the effect of cutting emissions by more than 600 million tons by 2050 – twice the reduction of any other intervention, the study found (Salgado, 2009).

The South African government states that it is taking the issue of its carbon emissions very seriously and is aiming to encourage the public and private sector to reduce carbon emissions (Lukey in Morrison, 2009). However, the issue of carbon taxes remains contentious.

This data below is presented to show the progressive policy landscape.

1) The REFIT is one mechanism to promote carbon dioxide reduction (by incentivising the private sector to produce renewable energy).
2) Carbon tax is another contentious mechanism which forms part of the policy as an instrument to change the behaviour of industry.

The renewable energy feed-in tariff (REFIT) is a case in point. REFIT is the proposed tariff set by the National Energy Regulator of South Africa for Eskom to pay, should they wish to buy renewable energy from an independent power producer (IPP). The respondent from IDC (14/05/2010) commented that the REFIT is based on international best practice:

> On the assumption that they [government] get REFIT right, all the players that I have spoken to rank this [South Africa] as the number one environment in the world, that puts us ahead of Spain, Argentina, Britain, so … Firstly, the intention of the law and where it's going to go, is outstanding, it really is. Two, it is showing to the world that South Africa is very much committed to green energy. It is a major thing to have the legislation saying that you can do this [buy renewable energy from independent power producers] because in other countries it is a major problem (IDC respondent, 14/05/2010).

This respondent felt that the current legislative landscape for renewable energy penetration was ideal for project developers. The majority of respondents interviewed held a similar view. The subsequent reduction in the REFIT tariffs (March 2011) has left the renewable energy project developers disappointed and nervous about the future of the renewable energy market (SAAES, 2011). In South Africa, renewable energy projects are at the fledgling stage and therefore investors need the financial incentive from the REFIT to fund projects. There was an outcry in March 2011 when the REFIT tariffs (as explained in Chapter Three) were lowered after the original tariffs were first published in 2009:

> [The tariff structure changed] because of a differing inflationary and exchange rate outlook, as well as falling technology costs. The proposed cuts apply to projects over one megawatt, as small-scale installations have yet to come into the regulatory and funding net (SAAES, 2011).

This 'change of heart' by the National Electricity Regulator of South Africa (NERSA) showed a lack of confidence in getting the renewable energy market started in South Africa (SAEES, 2011). The state is often viewed as being political in nature, as noted by Worthington, a World Wildlife Foundation manager (pers. comm., 01/08/2011) who comments that "government has no appreciation for the merits of policy and regulatory consistency". His argument focuses on the market inconsistency that has been created by the state in reducing the tariffs. Christoff (1996)

outlines that government needs to create a policy and regulatory framework to protect the environment and create a complementary relationship between the market and the state.

Hajer's (2004) notion of 'institutional ambiguity' is important here. "'Institutional ambiguity' is defined as the lack of power and capacity of institutions, particularly the state, to deliver policy outcomes" (Hajer, 2004 cited in Oelofse *et al.*, 2006: 485). The state is not managing conflict around the institutional mechanisms to promote renewable energy through its hesitancy and unpredictability about REFIT. Hajer (1995, in Christoff, 1996: 482) suggests that "governments seek to manage ecological dissent and to re-legitimise their social regulatory role". This means that the state tries to manage the environment by publishing these proposed tariffs, suggesting that they are taking the environment into consideration. However, in the lead up to the publishing of the tariffs, there was a lot of speculation regarding how high or low the tariffs would be. At least three of the respondents agreed that they were presently surprised with the tariff structure. The difficulty though, is getting Eskom to pay those tariffs to an IPP, which has not been achieved as yet. The state, via the National Treasury, is also trying to change the behavior of large industries towards their carbon emissions by introducing a carbon tax.

When the National Treasury department published its paper on the carbon tax, in December 2010, there was much public debate (Britz, pers. comm., 16/05/2011). The carbon tax issue is still under debate, with many corporate companies still believing that carbon taxes could hamper growth in the business sector (Spanig, pers. comm., 19/05/2011). Naidoo (in Momberg, 2009) "stressed that the introduction of a carbon tax must be carefully managed, as there was a temptation for big business to filter the cost down to the consumer". (See Appendix G for full article). South Africa is in a unique position where it proposes to have progressive environmental legislation, but it has to look at the implications for the consumer of any change in policy[11].

[11] Section 5.5 details some of the dynamics that government needs to deal with in order to ensure that it has progressive policies, while meeting the demands of its people.

Hajer and Wagenaar (2003) label this approach as an 'implementation deficit' where policy decisions are often left at the stage of promulgation and not followed though. Oelofse *et al.,* (in Mol *et al.*, 2009:25) note that this "is particularly problematic in developing countries and is recognised as being a major obstacle to the achievement of sustainability in South Africa". There is acknowledgement that the South African government is becoming more "environmentally friendly" (EDC respondent, 14/05/2012) however, much more needs to be done, if we are to achieve tangible results in reducing climate change.

In 2009, the Minister of Environmental Affairs and Tourism, Minister van Schalkwyk mentioned at a high-level seminar in Washington with regard to emerging strategies for international climate change and investment policy, that: "State-led regulation will play a key role, complimented by getting the economic incentive and investment structure right and increasing long-term research and development spending" (van Schalkwyk, 2009). This means that government has come a long way in achieving sound policies but has not followed through in terms of implementation.

Ten of the 16 respondents agreed that South Africa's policies in terms of energy are some of the best in the world. The Eskom respondent (11/05/2010) claimed that the government had created "an enabling environment for implementation" of renewable energy technologies. The Pure Carbon respondent (06/05/2010) mentioned that part of the problem might be that energy policies did not "mesh" with other policies that government was promulgating and thus caused an issue in terms of implementation of the policy.

An analysis of the energy policies in South Africa show that the government has started on its journey to provide a sound legislative landscape for improving its carbon footprint[12]. However, although adequate legislation is available, the crucial point is implementation. If energy and

[12] The amount of Greenhouse Gas (GHG) emissions emitted

environmental laws are not implementable, the purpose is defeated. The sub-theme of the lack of implementation of policies will now be presented.

5.2.2 Lack of implementation of policies

The South African government has made a concerted effort to bridge the gap between policy processes and implementation (Respondent from DBSA, 11/05/2010). This has been done via the introduction of instruments mentioned above like REFIT and carbon tax proposals. However, most respondents conceded that not enough is being done to ensure that policies are implemented effectively. The respondent from IDC (14/05/2010) explained that policy is forced into a "knee jerk" reaction in some instances. This means that it is reactive rather than proactive.

The danger with this form of policy implementation is that it leads to confusion in the market (IDC respondent, 14/05/2010). Policies need to have clear goals and an enabling environment needs to be created in order to implement these policies (Eskom respondent, 11/05/2010). Respondents gave the example of the White Paper on Energy of 1998. The academic respondent (20/04/2010) stated that the White Paper on Energy of 1998 did not have clear targets, and therefore needed to be redrafted. The White Paper was redrafted and the Renewable Energy White Paper of November 2003 was published. Most respondents agreed that that the target of producing 10 000 GWh of renewable energy by 2013 will not be met (for example, the respondent from Pure Carbon, 06/05/2010; respondent from IDC, 14/05/2010). Section 5.3 will detail the reactions regarding this target. Government officials believe that we are on track to meet this target.

Another issue highlighted by respondents is the lack of institutional capacity within government to implement policies (Respondent from EDC, 14/05/2010; respondent from DBSA, 11/05/2010). The lack of capacity in the various responsible institutions leads in turn to time delays in

implementing projects. The respondent from DBSA (11/05/2010) explained that it could take up to three years to get all the necessary approvals before you get a project "up and running". The respondent from EDC (14/05/2010) added that it was specifically the Environmental Impact Assessment (EIA) process which is hindering implementation because it takes up to a year to get the necessary environmental approvals. In the face of much public criticism of the delays in environmental approval processes of renewable energy projects, the DNA remains defensive of their processes. The DNA (government) official (19/04/2010) therefore maintained that her department strictly adheres to all deadlines and projects are not held up through these mandatory environmental processes. She further explained that implementation of procedures was outlined in a document titled the 'Project Approval Procedure for the DNA', which is a publicly available document which the DNA uses to manage CDM authorisation[13]. The Department of Environmental Affairs manages the EIA process[14], and the DNA maintains that they do not have an influence over their processes since it is a different sphere of government (DNA official, 19/04/2010). There appeared to be a measurement of 'lack of institutional capacity' in terms of the delays in implementation processes.

In response to the critique of lack of implementation of policies by the private sector, the Department of Energy has recently taken the bold step in approving the production of renewable energy by 28 independent power producers from 2014 to 2016 (Pressly, 08/12/2011). Although this is a step in the right direction, most respondents at the time of the study felt that 'access to the grid' is a major hindering factor in getting renewables into the energy mix. In this case the lack of implementation relates to the delays in giving approval for IPPs to go ahead and develop renewable energy projects and ultimately to produce renewable energy. The next section will discuss this hurdle in detail.

[13] See Appendix I for 'Project Approval Procedure for the DNA'

[14] a legal requirement by the South African government when a development is to be undertaken which will impact on the environment.

Although South Africa has been globally acknowledged for having progressive environmental and energy policies, the lack of proper procedures to implement these policies has been an area of contention. Oelofse *et al*., (2006) interpret institutional ambiguity as a challenge or an opportunity to find creative ways of implementing policy decisions. This research has found that the state is making a concerted effort to implement policies, but a lack of urgency in creating an enabling environment for renewable energy is harming the energy sector.

This section has outlined the renewable energy policy environment that exists in South Africa and the perceptions around the policies and instruments to aid policy implementation. It found that South Africa has an internationally comparable legislative landscape with regard to renewable energy. However, the lack of a sound enabling environment has meant that government is still struggling with moving away from a coal based economy. The next section will focus on the Renewable Energy White Paper of November 2003b, outlining how it was formulated, the targets that are set out in the policy and the hurdles for renewable energy implementation in South Africa.

5.3. The Renewable Energy White Paper of November 2003

This section presents the results and analysis pertaining to the formulation of the Renewable Energy White Paper (Republic of South Africa, 2003) and the implementation of the renewable energy target of 10 000 GWh of renewable energy to be supplied by 2013. Respondents' views and documentary data revealed three main themes concerning the lack of renewable energy uptake in South Africa. These are:

1. The public consultation process carried out to develop the Renewable Energy Policy.
2. The target of 10 000 GWh of renewable energy to be provided by 2013.
3. Hurdles that restrict the penetration of renewable energy technologies.

The first theme revolves around the way the policy was formulated, i.e. the public participation procedure that was adopted. This study will analyse respondents' understandings of this process. This is important because if the renewable energy policy did not have public 'buy-in', it would be difficult to implement. Furthermore, the type of public participation employed in the formation of the renewable energy policy is analysed according to the typologies of public participation procedures developed by White (1996) and Arnstein (1969).

The second theme focuses on the target of 10 000 GWh of renewable energy to be provided by 2013. The evidence shows that the target, in terms of how it was set and who was involved in setting it, emerged as a primary theme in addressing the issue of why renewable energy is not flourishing in South Africa. The third theme in this section is the hurdles that restrict the penetration of renewable energy technologies in South Africa into the energy market.

5.3.1 'Public consultation is fundamental'

In its efforts to redress the past injustices suffered by the majority of the South African citizens, government has seen the need to prioritise energy security for all of its citizens in the context of climate change. In doing so, the government has introduced policies to promote the use of renewable energy (see section 2.2). However, members of the government, private sector and civil society alike question the success of this venture. The main focus in this theme is to understand the type of public participation procedures that have taken place in South Africa with regards to the renewable energy and climate change policies that have been promulgated. This will contribute to the understanding of the policy environment in which CDM exists via interpreting the understandings and views of key stakeholders in the renewable energy sector.

The respondents generally agree that the Renewable Energy policy of November 2003 has undergone a wide consultation process, although there was still room for improvement in terms of

having a more inclusive process. The respondent from Eskom (11/05/2010) explained: [the public participation for the Renewable Energy White Paper] was done in a consultative way, but I think we would have probably benefited more from more consultation". The SANEDI representative (25/03/2010) mentioned that the stakeholder consultation "involved both government departments as well as the private sector, and of course the general public as well, so there was significant amount of just general stakeholder consultation". The UNDP representative (mentioned that "there were some workshops, but it was not as extensive as the White Paper on Energy," meaning that the Renewable Energy White Paper had not undergone adequate public participation.

However, a respondent from an environmental NGO alluded to there being:

> Two sides to that [the consultation to draw up the Renewable Energy White paper], there is the official process and then there is one that goes on which is not advertised, so for example, I understand that from anecdotal accounts that the Renewable Energy target was largely set by consultants said to be working for the World Bank and what they figured could be funded through Clean Development Mechanism. Now clearly they got it wrong because Clean Development Mechanism finance is not helping us much to reach that target (WWF representative, 13/05/2010).

This is a clear indication that there is a lack of trust between the civil society and the government in terms of transparency in the way the policy was derived through public participation procedures. Another respondent further added that "it [the Renewable Energy White Paper] was not work-shopped enough with the public" (EDC representative, 14/05/2010).

It is important to understand how inclusive the process of public participation has been in the formulation of renewable energy policy. If these policies did not undergo an inclusive process, there is a danger that the implementation of projects emerging under this policy might fail (Imbewu representative, 05/05/2010). The next section will tease out the different types of public participation exercises that have taken place during the development of the Renewable Energy Policy. The Department of Energy is viewed as "trying to benchmark current policies with international policies" (DNA representative, 19/04/2010), rather than creating a South African

solution. This can be interpreted as the application of imposing policies from the developed world context onto a developing world context. In terms of the theory of ecological modernisation, this can be assessed as enforcing a weak form of ecological modernisation because of the neglect of brown issues in the policy (Oelofse *et al*., 2006). Public Participation processes are a way of including representation from all sectors of society if they are framed in a democratic manner (Dryzek, 1997).

It is important to undertake an extensive public participation exercise in order to get 'buy-in' from the public if policies are to be implemented successfully (Fell and Sadler, 1999). However, it is impossible to consult with each member of the public in South Africa to assess his or her opinion. The Department of Minerals and Energy (now called the Department of Energy since 2009) went through a public participation process in 2002 in order to solicit responses regarding setting a renewable energy target for South Africa (UNDP representative, 19/04/2010). The type of public participation that has been undertaken thus far is analysed below. Evidence shows that there have been elements of different types of public participation in the formulation of the renewable energy policy.

In order to determine the type of public participation process that has been undertaken thus far in the renewable energy and climate change arena, White's (1996) typology of four types of participation that might occur is applied (See Table 2.2.) These types range from the least democratic to the most democratic process, namely from Nominal, to Instrumental, to Representative and to Transformative. White (1996) acknowledges that public participation is a dynamic process which means that any project or process could have a mix of the four different types of participation; one should note that this could change many times during the process.

White (1996) describes 'nominal participation' as participation which takes place mainly for the function of 'display'. This means that the public is not really involved in a meaningful way but

are engaged for display, to show that a public participation 'process' has been undertaken. The Renewable Energy Policy public participation process has been interpreted by a respondent as being done "for the sake of doing it". The EDC representative (14/05/2010) commented, "It was more a process of saying, OK, we will do this for the sake of doing it, but they already knew what they wanted to do… if we are going to have these democratic processes, it needs to be done in a transparent way".

An academic researcher (20/04/2010) further commented that "there could have been more, but yes there was consultation". Here he agrees that the public participation did take place but is hesitant about the quality of the participation. It is also evident that respondents perceived that Eskom was in charge of the process (Representative from NMBM, 19/04/2010). The eThekweni Municipality representative indicated that he did not think that the Renewable Energy White Paper underwent a consultative process, he said "I do not think so," when asked if the process was consultative. This concurs with the statement from the NMBM Municipality representative (19/04/2010), "There has traditionally always been an argument as to what level and where Eskom rules … it was common to hear that it was done by Eskom, and Eskom consultants".

Thus, according to some respondents, the participation was unsatisfactory but most agree that at least it did take place, so it cannot be termed 'nominal' (White, 1996). Respondents agreed that their voices had been heard by government officials, and they felt satisfied that the public participation process was inclusive.

'*Instrumental* participation' is described as public involvement for efficiency, in order to make a decision (White, 1996: 8). The Renewable Energy White Paper formulation is a case in point. The WWF respondent (13/05/2010) explained that the targets that have been set and the Renewable Energy Policy itself were drawn up by consultants hired by the World Bank. The entire policy process therefore "serves the efficiency interests of outside funders" (White, 1996:

145) and "participation is seen as a cost" (White, 1996: 145). The respondent from NMBM (19/04/2010) outlined that the "whole process was driven by Eskom. Nobody was really interested and too involved, and too concerned about our energy". The funders, in this case the World Bank, wanted to aid the South African government in drawing up the Renewable Energy White Paper, and the public participation process was conducted only in order to satisfy the requirements of informing the public about the White Paper.

The public participation process that was undertaken by government was merely a means to get the renewable energy market started. However, one of the respondents noted that the project developers are not given a competitive price for the electricity that they produce, therefore the renewable energy market will not take off (Respondent from IDC, 14/05/2010; respondent from EDC, 14/05/2010). Chapter Three highlighted some of the complexities around the REFIT tariff, the most important being the reduction in the REFIT tariff in March 2011, amounting to between 7.3 percent and 41 percent lower on certain technologies (CIPS, 2011). This show of including the public in discussions, and then retracting on promises made, shows a sense of instrumental participation because the public is merely involved at a superficial level. This is similar to the tokenism or manipulation type of public participation proposed by Arnstein (1969) in her 'ladder of participation' (See Appendix A). This study has concluded that the type of participation that has taken place with regards to developing the White Paper on Renewable Energy may be termed 'instrumental' according to the definition presented by White (1996).

White (1996) explains representative participation as an exercise where the public is ensured a voice to provide project sustainability and support, and where people are able to express their own interests and be represented in the process of decision-making. As mentioned, there are varying opinions on how the renewable energy public participation process for the formulation for the Renewable Energy White Paper is viewed, and whether the respondents feel that the process was representative.

One interviewee, commenting on the way that the renewable energy policy was formulated, explains: "South Africa is very proactive in terms of being seen as having good corporate citizens … it is South Africa following suit with international countries" (EDC respondent, 14/05/2010). Most respondents agreed that the government did go out on a broad public participation process by holding meetings, workshops and facilitating working groups (EDC respondent, 14/05/2010). However, although there was a comprehensive process that was adopted, most respondents agreed that "more could have been done" (UNDP respondent, 19/05/2010).

Therefore, the public participation process that was adopted by the government to draw up the Renewable Energy White Paper (2003) cannot be termed representative because, although it ensured that the public could voice their opinions (White, 1996), this was done to a limited degree and the public's voice did not get represented in the final decision-making. This is summed up in the NMBM's (19/04/2010) statement that:

> When the White Paper was drawn up, there was definitely no consultation process and I would guess it has something acceptable by Eskom … just to say that there is something going on in the country, that's my guess… once again that's speculation and not something [which I have] background knowledge to.

The highest level of public participation can be described as transformative public participation when the public is actively involved in decisions made about the environment around them. White (1996: 8) singles out the notion of empowerment, and notes that when civil society takes "collective action to fight injustice, [this] is itself transformative". The issue of energy generation in South Africa has historically been an area of a 'lack of power' on the part of civil society due the domination of the state in the apartheid regime where all decision-making was top-down. Eskom, being a parastatal, has long held a monopoly in the electricity sector which has continued since 1994 (WWF representative, 13/05/2010).

According to White (1996: 146) the idea of participation as *empowerment* is the "practical experience of being involved in considering options, making decisions, and taking collective action to fight injustice is itself transformative". In the context of the Renewable Energy Policy White Paper, the public participation procedure cannot be termed transformative because only a selected number of individuals were given the chance to liaise with government in setting the target of 10 000 GWh of electricity to come from renewable energy resources by 2013 (IDC respondent, 14/05/2010). Thus it can be concluded that 'empowerment' did not take place in the decision-making process. It was highlighted that in South Africa:

> We have a monopoly or duopoly[15], Eskom and Sasol have such a powerful [presence in South Africa]… they dominate our energy economy, so it's difficult for new entrants to enter the market … Eskom is needing to give access to the grid to people that would be competitive to them. There is a problem there (Academic respondent, 20/10/2010).

This statement clearly shows the lack of empowerment in making decisions related to South Africa's energy mix, due to fact that most of the "power", in terms of making decisions, lies with Eskom. The public feels disempowered due to the institutional arrangements that exist in South Africa's electricity sector.

Evidence shows that the type of public participation process that was undertaken in the process of drawing up the Renewable Energy White Paper can be termed 'instrumental' because government acknowledged the public's concerns and allowed them to voice their opinions with regards to the renewable energy target, but was merely a case of 'ticking the boxes'. It did not reach the level of being transformative because people still felt disempowered in terms of changing the electricity infrastructure, where Eskom holds a monopoly.

It is important to understand how these policies were formulated and how the public was involved. If there was an adequate public participation process, there will be buy-in in terms of

[15]Monopoly occurs when there is only one supplier in the market. Duopoly occurs when there are only two suppliers, and oligopoly is when there are only a few suppliers in the market.

meeting the targets set out in these policies. Evidence shows that different respondents hold varying views on the target revealing that there is not a complete buy-in. The 10 000 GWh target is viewed as both ambitious and conservative (Academic respondent, 20/04/2010; DBSA representative, 11/05/2010; Eskom representative, 11/05/2010).

The NMBM representative (19/04/2010) states that "the targets are low and easily achievable". The government official (19/05/2010) concurred; when asked if the targets were achievable, she said, "I would love to think so, because feasibility studies were done before these policies could be promulgated". "I think the target is low, because we are coming off a very low base," said the academic respondent (20/04/2010). The DBSA representative (11/05/2010) said, "I think it is fine; it is realistic; it is not too small". This clearly shows that respondents believe that the target is achievable yet there are still barriers to implementation.

The primary barrier in the wide scale implementation of renewable energy is viewed by another respondent as the lack of institutional capacity (Imbewu respondent, 05/05/2010). In aiming to understand the 'type' of participation that has been undertaken in the consultation process to develop the Renewable Energy White paper, it has been found to be 'instrumental' in nature.

Arnstein's ladder (1969, Appendix A) proposes an eight-rung ladder of participation where the height of the rung is equated to the public's power in making decisions at the planning level (see Appendix A). The lowest rung (termed manipulation or therapy) indicates little or no consideration of the public's viewpoint in decision-making with the highest rung (termed citizen control or delegated power) of total public involvement. In the case of the public participation for the renewable energy policy, the type of participation can be classified as tokenism (or consultation and informing) according to this typology. This type of participation is only possible if a sincere gesture is made by the government to give the public a fair chance in putting their points of view forward.

In relation to the public participation process that has occurred for the renewable energy policy paper, public participation may be labeled to have reached the third and fourth rung which requires informing and consultation by the state. This means that the public is invited to participate, but at a superficial level, thus termed tokenism. They might be invited to the consultation process, but their opinions are not fully taken into consideration. This study solicited responses from respondents by asking them about how the Renewable Energy policy was formulated and whether it was done in a consultative way[16].

Government officials and members of the public agreed that the general public participation process was satisfactory (representative of DNA, 15/04/2010; representative of Eskom, 11/05/2010; IDC respondent, 14/05/2010; EDC respondent, 14/05/2010). Only a few suggested that, although there was a public participation process, government was making all the decisions.

> The policy process in the 1990s were much more participatory and rigorous and I think that there was a pretty sound process to produce the 1998 [Renewable Energy] White Paper except that there are so many contradictions or tensions within it that it can be interpreted in many ways … There has been a movement to a much more autocratic approach to setting policy and particularly to implementation (WWF representative, 13/05/2010).

This shows that some participants felt that they were merely being invited to participate, but they were not given the 'power' they required to make meaningful contributions to the policy-making process.

This section has highlighted the type of public participation procedures that have been involved in the Renewable Energy White Paper formulation and participants' understandings of the type of participation process that took place in the development of the Renewable Energy White Paper. The evidence suggests that the main stakeholders were included but not given much power in decision-making with Eskom remaining the main actor in determining policy. The type of public participation that has taken place may be seen as 'instrumental,' according to White (1996),

[16] This is reflected in question seven and eight of the questionnaire (Appendix F).

because the public was involved, but to a limited degree (for efficiency sake). These stakeholders play an important role in the renewable energy sector, and if renewable energy is to be implemented successfully, there is a need to have an inclusive public participation exercise. The next section will analyse the 10 000 GWh target that has been set in the Renewable Energy White Paper. This theme was mentioned by most respondents as an important feature in the policy.

5.3.2 Is 10 000 GWh enough?

This section sets out to show the views of respondents regarding the specific target for renewable energy that was included in the White Paper. The Department of Energy defines the target for renewable energy production as follows:

> To put the 10 000GWh 2013 target into perspective, this would be equivalent to electrifying approximately two million households having an annual electricity consumption of 5 000 kWh. Put another way, the 10 000 GWh target is equivalent to about 5 percent of the present electricity generation in South Africa. This is equivalent to replacing two (2 x 660MW) units of Eskom's combined coal-fired power stations (Republic of South Africa, 2003).

The target of 10 000 GWh of electricity to come from renewable energy resources was considered as a 'stake in the ground', since a definite target did not exist before this policy was released (Singh, pers. comm., 2004). The majority of respondents agreed that setting a target was a positive start; however, there were varying opinions on how the target was formulated. Most respondents agreed that the target was not achievable without an 'enabling environment', but government officials believe that South Africa is on track to meet the target objectives (DNA representative, 15/04/2010; Modise, pers. comm., 19/11/2011).

Most respondents agreed that the target is a fairly modest one. The respondent from EDC (14/05/2010) explained that the target translates to four percent of Eskom's current output, while government states that it is five percent, as indicated in the above quotation. The WWF respondent (13/05/2010) alluded to trust issues where government commissioned consultants to draw up the target. WWF does not trust the government because they feel that the government is

not being transparent about the way in which these targets were set. There is a suspicion that the target was set to monetise 'quick-wins', i.e. projects that will be able to be implemented within a short period of time (NMBM, 19/04/2010). This evidence shows that there is skepticism about how the policy was set between the private and NGO sector.

However, government officials interviewed perceived the target to be inclusive of public opinion (Modise, pers. comm., 19/11/2011). Modise (pers. comm., 19/11/2011) justified this by explaining that the government had set up the Renewable Finance Subsidy Office (REFSO) in order to stimulate activity in the renewable energy sector. Modise (pers. comm., 19/11/2011) explains that REFSO was established in August 2006 with a focus on providing a 'once off' capital subsidy for renewable energy projects. R14, 5 million was to be distributed over a three year period. Renewable energy projects are capital intensive (Singh, pers. comm., 02/03/2006). A single wind energy project could cost millions in investment, so the R14, 5 million did not really create an enabling environment for these projects, according to the UNDP representative (19/04/2010). Project developers have alluded to issues of trust when dealing with the renewable energy market. Private sector respondents believed that the state wanted to "cause confusion in the market" (IDC respondent, 14/05/2010). This research has found that the majority of respondents felt that Eskom still dominated the energy market and therefore the attempts made by the government to 'kick-start' the renewable energy market were half-hearted.

Hajer (1995: 11) outlines the issues of trust as follows:

> Hard decision-making on global environmental problems requires an almost unprecedented degree of trust in experts and in our political elites at the same time as this trust is continually undermined by scientific controversies and political indecision.

This statement by Hajer highlights the importance of trust in making decisions by 'political elites', or the state. The evidence shows that the government did not engender trust because the private sector felt that not enough was being done by the government to show that they were serious about getting the renewable energy market started in South Africa. A case in point is the

R14, 5 million that was set up for renewable energy project financing. Appendix H shows that the cost of erecting a single wind turbine could be as much as R15 to R17 million per megawatt (McKensie, 2011–See Appendix H for full article). This is for a single project, so project developers and NGOs alike feel that the government is not making enough of an effort to get renewable energy started in South Africa.

The relationship between the state and its citizens is very important. Trust and accountability for decisions taken emerged as sub-themes to the issue of developing the 10 000 GWh target. Cock (1995 in Scott and Oelofse, 1999) explains that stakeholders need to be accountable for the decisions that they make. The respondent from UNDP (19/04/2010) explains that the setting of the target provides a benchmark that keeps people accountable to the notion that 'something needs to be done'.

However, not much had happened in the renewable energy industry at the time of the study. A government official from the DNA (19/04/2010) explained that part of the problem in not achieving the target; it is the lack of co-ordination between the government and the private sector.

There was consensus in the responses from both from government officials (at the Department of Energy) and private sector role players that South Africa will not meet the renewable energy target. The high ranking official, Minister Peters, who recently announced the introduction of independent power producers in the market, feels that the target is still achievable (BuaNews, 2012. See section 5.2). An international expert in the CDM field said that, from her perspective,

> There is currently nothing really running in South Africa [in terms of renewable energy projects]… there are a lot of projects in the pipeline, and I believe in 5 years' time South Africa will be in a much greener space (Greenstream, 14/05/2010).

The 'lack of achievement' of the target is an indication that there is not much growth in the renewable energy sector.

It can therefore be concluded that the target that has been set in the Renewable Energy White Paper of 2003 was set with limited public consultation. The public still feels that they were not included because the World Bank was involved. The government has come up with a policy paper indicating a renewable energy target, but there is a lack of trust amongst the main stakeholders i.e. government and the private sector. The lack of trust between the government and the private sector is evident because the government states that private developers can reach the target with their production of renewable energy but has not created an enabling environment for this to be achieved in terms of giving project developers access to the grid.

This research aims to identify further hurdles to the implementation of renewable energy, as indicated by the respondents interviewed. These 'hurdles' will form part of the analysis of whether or not CDM has stimulated renewable energy projects in South Africa. The next section will outline these obstacles to the large scale implementation of renewable energy in South Africa.

5.4 Hurdles for large scale implementation of renewable energy in South Africa

The researcher, positioned within the energy sector, is often asked: 'We have an abundance of solar energy – why don't we have large scale solar water heating in South Africa?' This is a valid point, and this section aims to answer this question. Naidoo (in Momberg, 2009) summarises the issues as follows:

> Though the cost of moving to the use of renewables is still prohibitive, policy changes, innovation and economies of scale will assist in making the move to the use of, for example, solar energy in households [being]more cost-effective.

This view is echoed through most of the respondents' views.

Through the thematic analysis, additional issues were identified which seem to be stifling renewable energy projects in South Africa. These include access to the grid, and Eskom being the

player and referee, i.e. Eskom investing in renewable energy projects (like the Solar Park project in Upington) (Naidoo, pers. comm., 30/03/2011). Further, there is the issue of the lack of capital for renewable energy projects (DBSA respondent, 11/05/2010). The EDC respondent (14/05/2010) mentions that there is also a lack of political will for renewable energy projects. This section will now elaborate on these issues discussing why renewable energy still remains a market for the few.

a) *Access to the grid*[17]. Renewable energy can be divided into grid and non-grid projects. Grid projects are projects which feed energy into the national energy grid, e.g. wind, solar photovoltaic, hydro and landfill gas projects. These projects need access to Eskom's grid if the project developer wishes to sell power. The issue is the price at which Eskom is willing to buy this electricity from the independent power producer. Eskom generates electricity at a low price, because it generates the electricity from coal, as explained in Chapter Two. Eskom then proposes to buy the electricity at the same price at which it produces power, which is too low for a renewable energy project developer to make a profit (Naidoo, pers. comm., 30/03/2011). The renewable energy project then, does not achieve 'financial closure' i.e. the project is not financially viable. This is the most contentious issue raised among most respondents (e.g. academic respondent, 20/04/2010; EDC respondent, 14/05/2010).

Non-grid projects are projects which may operate without necessarily being connected to Eskom's grid. Solar water heaters and biogas projects are good examples. However, here again South Africa has not seen a wide scale implementation of solar water heaters (Singh, pers. comm., 14/10/2008). The reason for this is the high upfront capital cost of a solar water heater as opposed to a conventional electric geyser. One solar water heating manufacturer mentioned that they are happy to serve a 'niche market' and keep the price of solar water heaters high (SWH distributor, pers. comm., 07/03/2007). Eskom tried to stimulate this market by launching a R2 billion solar water heating programme where

[17] refers to the matrix of electrical transmission and distribution system (Eskom, 2012).

consumers are given a discounted price on their solar water heaters. This programme has not yet been successful because the cost of a solar water heater is still too high (Schaffler, 2009).

b) *Eskom as player and referee*. The majority of the respondents interviewed pointed to the fact that South Africa was in a unique position in terms of its energy situation. Energy blackouts were experienced in South Africa in April 2008 (see Chapter One). Eskom then went on a massive energy efficiency campaign coupled with its focus on renewable energy via the solar water heating campaign mentioned above. Crompton (pers. comm., 03/08/2009) explains that Eskom needs to sell electricity, yet they are promoting energy efficiency – this is not a normal scenario. The NMBM official (19/04/2010) explains:

> There is a relationship between Eskom and the government [where Eskom is seen] as the 'big brother' driving the generation model… electricity is becoming something really punishable in the future and would lead to a lot of damage to the environment.

This means that although Eskom is seen as promoting renewable energy and energy efficiency, it still has a core business to sell electricity which is why the wider public is skeptical when Eskom embarks on energy efficiency and renewable energy projects.

The WWF respondent (13/05/2010) explains that we need 'energy efficiency on steroids', if we are going to make it work in South Africa. Likewise, eThekweni Municipality buys electricity and sells it to its residents. The eThekweni respondent (31/03/2010) explained that municipalities derive an income from the sale of electricity in South Africa, so if they promote the mass implementation of solar water heaters, they will be losing out on an important revenue stream. This situation has proven to remain a large hurdle in the implementation of renewable energy technologies in South Africa. However, renewable energy is only one focus area to reduce emissions. Another important area in terms of reduction of emissions is energy efficiency.

Yawitch (23/11/2011) summarises the situation as follows:

> Particularly in the industrial sector in South Africa since 2008, there has been a huge amount of investment in energy efficiency and when we look into it to reduce greenhouse

> gas emissions; the low-hanging fruit are already gone simply because of the rise in the electricity price, and the energy crisis.

The 'rise in the electricity price' has still not bridged the gap to make renewable energy projects viable in South Africa. Huber's (1985, cited in Mol, 1995, cited in Mol *et al*., 2009) conceptualisation of ecological modernisation is useful here as it explains "environmental pollution reduction being a matter of efficiency, rather than a threat to the system" and similarly, the low cost of coal-fired electricity is also a matter of efficiency, and as such prevents a more environmentally friendly form of energy production. This means that the environment is not protected in its own right, but rather it is neglected in order to meet Eskom's own needs of not having black-outs in the future.

Eskom and the government believe that the 'low hanging fruit' is energy efficiency. There is a focus on being more efficient in the use of energy rather than shift to renewable energy. This means that there is no shift to using clean technology to produce electricity in the first place, demonstrating a case of weak ecological modernisation in the renewable energy sector.

c) *The lack of capital*: The lack of capital for renewable energy technologies has also proven to be a hurdle for project developers:

> By definition the [renewable energy technologies] are expensive, and often they are not viable, for example, we get guys coming in here saying that we heard Eskom has a crisis and we would like to build a wind or solar plant. We [the project developer] would like to sell the electricity to SAB for R4 – why would SAB buy that electricity for R4 when they can get it for 36 cents? (IDC representative, 14/05/2010).

As explained earlier, a lack of accessing the grid via a power purchase agreement between private producers and government, coupled with the large upfront costs of renewable energy equipment, means that renewable energy projects will not 'take off' (DBSA respondent, 11/05/2010). This theme permeated throughout the interview process. The Eskom respondent (11/05/2010) also

agreed that renewable energy production will not become established in South Africa if an enabling environment is not created.

The IDC respondent (14/05/2010) explains that the renewable energy 'game' is not a game for small guys, meaning that it will remain an exclusive club which services a niche market. An example would be the solar water heating market where distributors of solar water heaters would prefer to sell highly priced solar water heaters to a few people rather than conduct a mass roll-out (SWH distributor, pers. comm., 07/03/2007). The reason for this is because they can get high profits from a selected clientele, rather than sell to a lower income market with smaller profits. According to Christoff's (1996) continuum of weak and strong ecological modernisation, this process of selling solar water heaters, may be described as a 'closed' process which benefits a few, thus will be termed a form of weak ecological modernisation.

The following two themes focus on the Clean Development Mechanism (CDM) both in a developing country context and as a tool to promote the use of renewable energy in South Africa. Section 5.4 compares CDM as a mechanism for funding renewable energy in South Africa with its other developing country counterparts such as India, China and Brazil.

5.5 Clean Development Mechanism (CDM) in a developing country context

Two sub-themes were identified in the data that form part of this theme. The sub-themes that evolved were centred on the lack of stringent processes in China, India and Brazil pertaining to environmental policy processes and their relaxed sustainable development criteria. These two sub-themes recurred through the interviews with both private project developers and consultants, although government officials did not agree.

5.5.1 'In China, anything goes'

One of the main reasons why developing countries signed up to the Kyoto Protocol is because they were promised, according to the protocol, technology transfer from developed countries, as well as foreign funding and the possibility to trade the carbon credits gained from projects implemented in their respective countries. These credits may be traded with developed countries for meeting Certified Emission Reduction (CER) targets which they have agreed to (in the Kyoto Protocol) via renewable energy and energy efficiency projects. Clean Development Mechanism is the instrument for encouraging projects which reduce carbon dioxide (CO_2) emissions which increase global warming. As described by Peake (cited in Blowers and Hinchliffe, 2003: 223), "CDM is about balancing the greenhouse gas books by counting emissions reductions achieved through overseas projects [in the developing world] specifically designed to reduce emissions and support sustainable development".

Project developers that were interviewed concurred that India, China and Brazil took advantage of the CDM concept when it was first introduced and are now reaping the benefits (Eskom respondent, 11/05/2010; UNDP, 19/04/2010). This research has found that the main factor creating the success of CDM projects in other developing nations was related to the high risk appetite enjoyed by project developers in these countries. This means that government and project developers in India, China and Brazil saw the opportunity of gaining revenue from developed countries and worked together to ensure that projects went through the CDM Executive Board approval process without delay.

Within South Africa, the previously identified hurdles for renewable energy implementation have created a situation where project developers view CDM as a 'cherry on top' of their project, i.e. they focus on overcoming the constraints facing the renewable energy project while developing the CDM dimension in parallel. If the CDM process becomes too complicated, they abandon it (DBSA respondent, 11/05/2010).

To illustrate how far ahead other developing nations are compared to South Africa, the table below shows the results of a UNEP (2006) study on renewable energy projects that have been registered.

Table 5.1 Comparison of projects registered with the UNFCCC

Country	Number of Wind CDM Project	Number of Biomass CDM Projects	Number of Hydro CDM projects	Number of Solar CDM projects
China	1005	130	1168	65
India	661	371	187	41
Brazil	56	76	103	Not mentioned
South Africa	12	5	Not mentioned	2

(Adapted from UNEP, 2006)

The NEEA representative (23/03/2010) explained that "most people see CDM as a bonus, not an integral part of their project". This is why in South Africa there are a small number of projects in comparison to India, China and Brazil (Table 5.2). Table 5.2 illustrates the number of projects that have been registered in BRIC countries.

Table 5.2 CDM project data in a selection of the developing nations.

Country	Number of Projects submitted	Number of projects registered
China	3118	1683
India	1823	745
Brazil	390	198
South Africa	58	20

(Adapted from UNEP, 2011)

There is a distinct difference in the way other developing countries or 'economies in transition' have tackled CDM. This sub-theme on the CDM projects in other developing countries shows an accelerated growth in CDM projects in these countries and was commented on in most interviews. Table 5.1 shows that China has dominated the wind energy market, while India has focused on smaller more localised projects (Sasol representative, 21/05/2010). Hydro and solar projects have also made a significant contribution in the CDM field. According to Dechezleprêtre *et. al*. (2009) 75% of the projects can be found in Brazil, China, India and Mexico.

5.5.2 CDM sustainable development criteria

A second sub-theme emerged in the discussions with respondents about South Africa's sustainable development criteria (See Appendix C). In the South African context, CDM applications are rated according to sustainable development criteria. The criteria focus on economic, social and environmental issues which need to be addressed in order to get approval from the South African Designated National Authority (DNA). The Sasol representative (21/05/2010) explained as follows:

> If you compare the criteria set by our own DNA [South Africa] to China, in all honesty, anything goes in China. We have had significant debates about the scrutiny of the DNA on the sustainability [sustainable development criteria] to the point that there was a concept of 'sustainable development neutral'. Some projects had weak sustainable development criteria or it was rated zero. We argued that the moment you get money into the country, it is a positive.

This statement illustrates the way South Africa rates sustainable development as compared to other countries. The social, economic and environmental criteria for acceptance of a project force project developers to look beyond the pure economic gains of the project, and focus on other core issues that plague South Africa, like job creation. The DNA has ensured that its citizens are prioritised, in terms of meeting their social and economic needs as well as ensuring project feasibility. This compares favourably with other countries, such as China. Rock (in Mol *et al.*, 2009: 430) outlines that in China "there is concern regarding industrial pollution … growth is not being driven by sustainable development. Something more basic is at stake. The high human health costs of high-speed urban – industrialised growth can no longer be ignored". This means that development is prioritised in China instead of the environment.

According to Boyd *et al* (2009) "(t)he difficulty of defining 'sustainable development' and the process of defining criteria by individual non-Annex 1 governments has meant that sustainable development concerns have been marginalised in some countries". Most respondents agreed that in South Africa where there are strong sustainable development criteria which means that social, environmental and economic aspects of projects are upheld (EDC representative, 14/05/2010; Greenstream respondent, 14/05/2010). The DBSA respondent (11/05/2010) further supported this

argument by saying that the criteria place South Africa in a strong position globally, i.e. CDM projects that are developed in South Africa and in Africa, in general, will fetch a high price for the carbon credits because these projects are designed to have positive social impacts.

The next section will focus on the aim of this thesis which is to investigate CDM a tool to promote the use of renewable energy in South Africa.

5.6 CDM as a tool to promote renewable energy in South Africa

South Africa provides an environment conducive to hosting CDM projects (Little *et al*., 2007). However, the process of implementation of CDM projects is delayed compared to India, China and Brazil. As of 21 July 2011, there are:

> 219 CDM projects submitted to the DNA – 181 Project Idea Notes (PINs) and 38 Project Design Documents (PDDs). Out of 38 PDDs, 20 have been registered by the CDM Executive Board as CDM projects (7 Issued with CERs (Certified Emission Reductions)), and 18 are at different stages of the project cycle – DNA approval, validation stage and/or request for review. The projects submitted to the DNA for initial review and approval cover the following types, bio-fuels, energy efficiency, waste management, cogeneration, fuel switching and hydro-power, and cover sectors like manufacturing, mining, agriculture, energy, waste management, housing, transport and residential (Rambau, 2011, e-mail).

The most important factor highlighted by both government and private sector stakeholders with regard to projects not being implemented at the rate of the BRIC countries has been the issue of finance. Generally, the evidence shows that the 'carrot', i.e. the profits, are not worth the effort! The NMBM respondent (19/04/2010) explained that CDM seems to account for between only eight to twelve percent of the renewable energy project cost, and in most cases the current tariff or output of that project is three to four times more than what the current costings are, so CDM plays a very small role in what the overall project financing of a renewable energy or energy efficiency project. This means that in South Africa, there is more effort going into the CDM process than the 'gain' in terms of revenue that you would receive. In China, part of the value is brought in by the sheer number of projects that are approved by the CDM Executive Board (Sasol Representative, 21/05/2010).

The respondent from Greenstream (14/05/2010) outlined that CDM potentially could aid South Africa from an 'image' point of view. She believes that renewable energy projects have been 'booming' in Non-annex 1 countries in the last three years due to CDM revenue and that CDM revenue could bring in about 10 to 20% of the revenue of the projects. This evidence shows that there are different understandings in terms of the amount of potential finance available from CDM funding.

This study has found that from the respondent's views, the revenue stream promised by CDM does not warrant the effort. The background chapter illustrated the complicated process to get a project registered (section 3.3.2). South African project developers feel that there are too many hurdles to get a project registered with the United Nations Framework Convention on Climate Change (Pure Carbon representative, 06/05/2010).

The respondents were asked for their views on four of the main obstacles for CDM project implementation viz., CDM uncertainty post 2012; transaction costs to get projects approved; the time taken to get a project registered; and the additionality issue (Appendix F). These questions, in addition to the sub-theme of the 'green economy' which also emerged, stimulated much discussion around why project developers were not making the effort to get projects registered. A detailed analysis of the responses received will now be presented.

5.6.1 CDM uncertainty- post 2012

In 2012, a review will be conducted by the UNFCCC into the emission reduction targets that developed nations have set for themselves. If these targets have not been met, penalties will need to be paid by these countries. Furthermore, the Kyoto Protocol details targets, policies and procedures that need to be abided by until 2012 and is silent about what happens about climate change in general after this crediting period. This has created some uncertainty in the CDM market (NMBM respondent, 19/04/2010). CDM projects will continue to receive credits after

2012, but the contentious issue is whether countries will agree on binding targets after 2012. The representative from Greenstream (14/05/2010) noted that the European Union has sent out a directive that they will take on binding targets post 2012.

The situation becomes complicated when Annex 1 and Non-Annex 1 countries are evaluated. In 1990, China was still a developing country, but in recent years it has grown exponentially. Harrington (pers. comm., 20/12/2011) explains that because of this China is now being pushed to accept binding targets and it refuses to do so, i.e. China does not want targets to cut its GHG emissions. This is causing tensions within the UNFCCC negotiations for another tranche of targets. The Greenstream respondent (14/05/2010) explains that China will obviously have more emissions because they have one of the highest populations in the world. She elaborates as follows:

> Emission reduction targets are not strong enough … emission reduction measures in China are necessary, but we also need to understand that China has one billion people, one fifth of the population lives there so they will obviously emit [more emissions] than other parts of the world (Greenstream representative, 14/05/2010).

With regards to target setting, most theorists (Langhelle and Rasmussen, 1997 in Mol *et al.*, 2009) explain that there will always be 'winners' and 'losers' in these situations. If China were to take on mandatory targets, it would then lose the revenue it is currently getting as a developing country in terms of CDM revenue. There will then be no incentive to continue with a clean technology path. The Greenstream respondent (14/05/2010) explains that it would be 'fairer' if emission reduction targets are calculated per capita or related to the population size.

Shue (1993, in Mol *et al.*, 2009: 409) raises four distributional issues which are pertinent to this discussion:

1. What is fair allocation of the costs of preventing the global warming that is still avoidable?

2. What is fair allocation of the costs of coping with the social consequences of the global warming that will not in fact be avoided?
3. What background allocation of wealth would allow international bargaining (about issues such as 1 and 2) to be a fair process?
4. What is a fair allocation of emissions of greenhouse gases (over the long-term and during the transition to the long-term allocation)?

The Kyoto Protocol has addressed only the high level issue of allocating emission reduction targets till 2012. The points highlighted in the literature review (Chapter Two) allude to issues around sustainable development and questions how targets should be set in the future. Ultimately, it will be governments of the representative countries that will make the decisions on binding targets. Renewable energy is a strategy to reduce GHG emissions so these uncertainties about emission targets would spill over into renewable energy strategies and implementation processes, and then into the implementation of CDM. Since the state, or a group of states, in the end would make an expert driven and autocratic decision in this matter (WWF respondent, 13/05/2010), this decision-making process would be classified as what Christoff's (1996) terms 'weak ecological modernisation'. This study has found that CDM uncertainty, post 2012, plays a role in determining investment, in the long term, in CDM projects.

5.6.2 Transaction costs

This study shows that renewable energy projects are capital intensive. In order to register a CDM project, project developers need to pay consultants (in most cases) in order to register the project. The issue of transaction costs also plays a major role in making the decision (from a project developer perspective) to register a CDM project. The consultants that were interviewed explained that transaction costs were a 'serious problem' (Pure Carbon representative, 6/05/2010) and that transaction costs have "killed small project activities" (Greenstream representative, 14//05/2010). The representative from IDC (14/05/2010) did not agree with this argument stating that if the project was a viable CDM project, the transaction costs would be absorbed within the project costs.

This approach concurs with Hajer's (1995) views of CDM being purely a 'market mechanism' where a price can be placed on the environment. Ecological modernisation is the conceptual and applied framework which proposes that environmental issues can be incorporated into the current capitalist system by 'managing them'. Most respondents agreed that CDM was a market mechanism (Greenstream representative, 14/05/2010; Eskom representative, 11/05/2010). This means that it is a mechanism which provides for 'payment' for developers not to pollute the environment (Hajer, 1995). As a tool, CDM is used globally to encourage sustainable, environmentally friendly practices, but due to the 'bureaucratic' procedure of getting a project registered, project developers in South Africa often abandon developing a project for CDM revenue.

5.6.3 Time delay for registration

The EDC respondent (14/05/2010) explained that the procedure to get a project registered was too tedious. The IDC representative (14/05/2010) said that there were rumours that the UNFCCC was understaffed and that could be a contributing factor as to why projects take such a long time to get registered. If the project is delayed in operation, the project loses potential revenue while it waits to get registered. The argument here is that project developers are not prepared to put in additional time and financing for a revenue stream that could be less than 10% of their project costs (NMBM representative, 19/04/2010).

The following graph (Figure 5.1) shows the time delays that project developers are experiencing globally.

Figure 5.1 shows that it took up to 281 days, i.e. over nine months to get a project registered in December 2009, although the graph in Figure 5.1 shows that the time delays decreased to less than two months by October 2010. It must also be remembered that the project has already gone

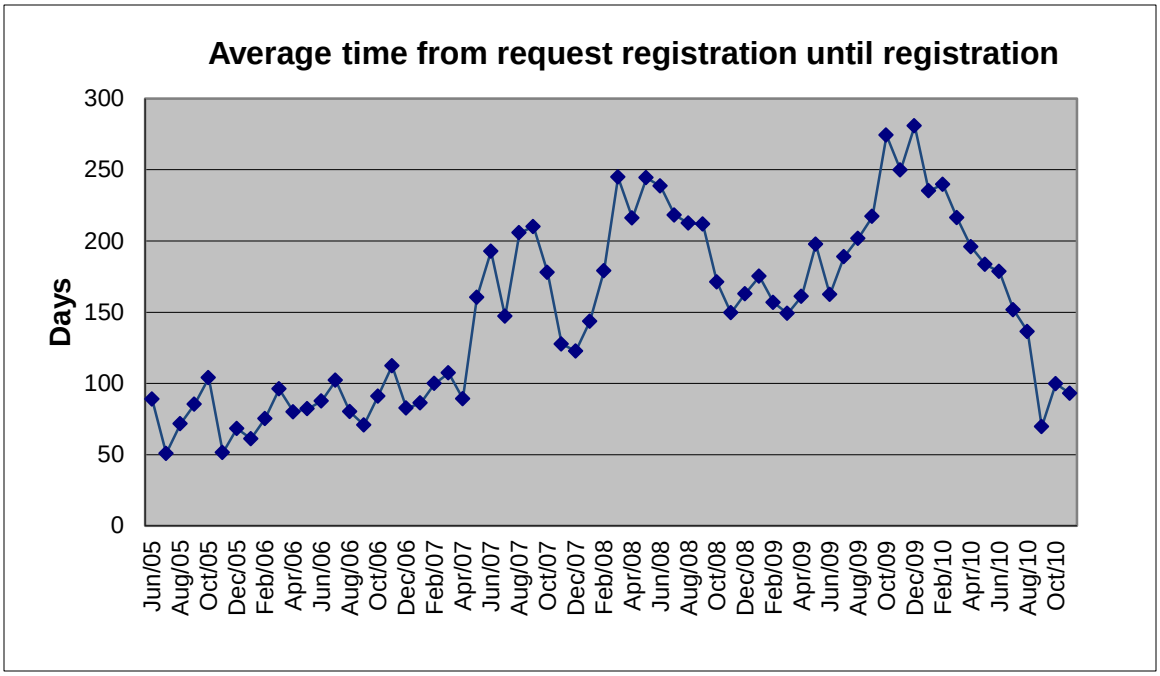


Figure 5.1 Average time from request of registration until registration (UNEP, 2006)

through a number of different processes by this time (see Chapter Three):

> Given the time left remaining before the end of the first compliance period (till 2012) and the time and money necessary to prepare and shepherd a CDM project through the registration process, such a supply [of a number of CDM projects] is unlikely to appear (Wara, 2006: 42).

The project developers interviewed agreed that it could take up to a year to register a CDM project, and this was prohibitive for them in terms of managing a project portfolio. This study has found that the time delay in getting projects registered hindered the large scale implementation of CDM projects in South Africa. The final issue and the most contentious subject is that of additionality.

5.6.4 Additionality

The additionality issue remains highly controversial because project developers need to prove that if they did not have the CDM revenue they would not have undertaken the project (under investment analysis) (See Chapter Three). The internal rate of return for the project needs to be low in order to receive approval for a CDM project. According to the IDC representative (14/05/2010), there are "creative ways" of proving additionality. This has led to project

developers realising that a consultant needs to be employed in order to make the 'argument' that the project is additional (Greenstream representative, 14/05/2010).

This reflects the approach of weak ecological modernisation where some type of 'manipulation' of the UNFCCC system is carried out in order to receive revenue for projects. The WWF respondent (13/05/2010) explains that the concept is fine, but the proving of 'something that does not exist' becomes complicated. The concept of additionality is therefore not robust enough and it can be concluded that the issue of additionality will continue to plague CDM due to its complex nature. The requirement to show additionality will also serve as a 'gatekeeper' for the smaller businesses or the layman to engage with the CDM process, and CDM projects will thus remain an 'exclusive club' for consultants to make exorbitant amounts of money from charging for specialised services in terms of arguing for a project to be CDM viable i.e. they need to prove that should the project developer not receive CDM funding, the project would not occur.

At the November 2011, COP 17 climate change negotiations, a representative from the Asian Development Bank exclaimed that CDM is the icing on the cake and not the cake itself! This summarises the larger issue: if renewable energy and energy efficiency projects are truly envisaged as projects for the 'greater good', the UNFCCC should not make the process so complicated (Britz, pers. comm., 16/05/2011). Most respondents interviewed agreed that the process should have the necessary checks and balances in order to prevent fraud (DBSA respondent, 11/05/2010) by project developers claiming that they would reduce more carbon dioxide emissions than what is practically possible. The need for an independent validator is therefore justified and adds time and cost to the project. The next sub-theme that has emerged is that of the green or low-carbon economy.

5.6.5 The Green Economy

From the theme of CDM as a tool to promote the use of renewable energy in South Africa, much discussion emerged on the green economy. Respondents suggested that South Africa was in a unique position to transition to a low carbon or green economy. Naidoo's (in Momberg, 2009) opinion is as follows:

> Moving to a low-carbon economy is not only the right thing to do, but also an opportunity for economic growth. However, success depends on everyone working together. The government has a responsibility to introduce a low-carbon policy in a workable manner with proper support systems, programmes and incentives to ensure it does not become a burden on citizens.

The issue in South Africa is that our climate change programmes need to take cognisance of its citizens. The subject of poverty alleviation and job creation tops our national agenda. Van Schalkwyk (in Business Report, 2008:7) outlined that:

> The South African government as a whole understands that the country's new competitive advantage will lie in becoming world leaders in climate-friendly technology. It seeks first-mover advantage and understands the challenge of re-orientating domestic strategy in a future global economy that will be constrained in terms of carbon

The state understands that in order to meet its internal goals it needs to marry global climate change issues with developmental goals that it has set for itself. The sub-theme of the green economy surfaced in many respondents' views as to how South Africa can move forward in the climate change debate. A broad consensus emerged around the potential to produce 'green jobs', like building wind turbines and solar water heaters, but the critical point made was that it was imperative to ensure that these jobs are sustainable (IDC, 14/05/2010).

Winkler (2006: 87) makes an important statement:

> Obviously, South Africa's economy will not be able to develop without its abundant, easily mined and low-cost coal. But we have to include the environmental equation, which means, apart from addressing short-term environmental problems, there has to be serious planning for a long-term transition to include renewable energy sources with fewer negative externalities.

However, this transition can only be made if there is a will from government and private sector alike to change. The concept of the green economy is a favourable one, because South Africa is tackling the issue of unemployment. This should be done in a sustainable manner, ensuring that the jobs that are created are in the renewable energy field (Bipath, 2011).

A national study by Agama Energy conducted in 2003 found that a total of 1,204,692 direct and indirect jobs could be created by 2020 in the renewable energy field. Table 5.3 shows the jobs created.

Table 5.3 Summary of gross direct and indirect jobs from renewable sources in 2020

Technology	Direct Jobs	Indirect Jobs	Total Jobs
Solar thermal	8,288	24,864	33,152
Solar PV	2,475	7,425	9,900
Wind	22,400	67,200	89,600
Biomass	1,308	3,924	5,232
Landfill	1,902	5,706	7,608
RET' Subtotal	**36,373**	**109,119**	**145,492**
Biogas	1,150	2,850	4,000
SWH	118,400	236,800	355,200
Biofuels	350,000	350,000	700,000
Other RE Subtotal	**469,550**	**589,650**	**1,059,200**
TOTAL	505,923	698,769	1,204,692

(Agama Energy, 2003: x)

This study has found that there will be significantly more jobs created in the renewable energy sector than the current, 'business as usual' scenario of creating electricity from coal. This is reiterated by Cosatu (a trade union in South Africa):

> Cosatu general secretary Zwelinzima Vavi said given the 25 percent unemployment rate the 300 000 jobs target [in the biofuels sector] "may look very small… but it gives you a starting base (from which) you can launch all your other initiatives to green the economy… Green jobs are the solution to the challenge we are facing. The train is turning slowly in the right direction" (Pressly, 2011).

This research has found that a green economy is possible if issues like poverty alleviation and job creation are addressed as well. The next section will provide a discussion of CDM as a form of weak ecological modernisation.

5.7 CDM: a case of weak ecological modernisation

The research provides insights into the CDM process, and provides an understanding as to why CDM has not been successful in South Africa. By analysing the process, knowledge has been obtained about the CDM process in South Africa, which is still a relatively new concept. The Imbewu representative (05/05/2010) stated that CDM is not a 'big river of money', and therefore needs to be approached cautiously. This section presents a critical discussion that will clarify the conceptual contribution of this thesis and reflect on the theory of ecological modernisation which has been applied to this research. This section concludes by proposing CDM as being a form of weak ecological modernisation, as explained by Christoff (1996).

According to Oelofse *et al.,* (2006) environmental management in South Africa is generally framed within a weak ecological modernisation approach, and the notion of strong ecological modernisation is used more in theory in the South African context, and has only begun to be applied. In analysing the renewable energy policy processes (section 5.3); this study finds that policy processes in South Africa exhibit a 'weak' form of ecological modernisation. In terms of the public participation processes that have been undertaken, it has found that government did strive for an inclusive and communicative process, however, the general public are still skeptical about the resultant White Paper on Renewable Energy of November 2003 (WWF representative, 13/05/2010). Hajer's (1995: 30) notion that ecological modernisation is "the most credible way of 'talking green' in spheres of environmental policy-making" is important here. The state in South Africa has tried to be participatory and create more deliberative processes in its renewable energy policy-making procedures, but this has not been done successfully.

The concept of CDM has also been described as 'market mechanism' or 'financial instrument' (Greenstream respondent, 14/05/2010 and Eskom respondent, 11/05/2010 respectively). Hajer (1995: 25) outlines that there are three important concepts that have emerged from early work on ecological modernisation: it is important to be able to calculate the costs of environmental

degradation in order to manage development process; that environmental management is a "positive sum game"; and that economic growth and the resolution of ecological problems can, in principle, be reconciled.

CDM is framed by the concepts outlined above, where it is assumed that the environment is a 'taken for granted good', and a price can be placed on the environment and that CDM can contribute to balancing economic development and environmental protection. These assumptions fall into Christoff's (1996) notion of weak ecological modernisation. The next section will now present a conclusion of the results chapter.

5.8 Conclusion

This thesis investigates CDM as tool to promote the use of renewable energy in South Africa. This chapter opened with analysing the policies that currently exist in the energy and environmental space. It revealed that the Renewable Energy Policy White Paper of November 2003 reflects that government has theoretically tried to move towards strong ecological modernisation processes.

Section 5.2 outlined that South Africa's environmental policy processes are robust and globally competitive. The crucial element is implementation of these policies, which is absent. In South Africa, there is widespread use of consultants in developing policies. The next section, 5.3 then focuses on the Renewable Energy policy of South Africa. The process that was undertaken to develop the Policy was analysed. The public participation process was investigated by applying White's (1996) and Arnstein's (1969) ladder of participation. This study has found that the Renewable Energy Policy public participation process may be termed as purely *instrumental*. The public participation process that was undertaken by government was merely a 'means' to get the renewable energy market started. In relation to Arnstein's (1969) ladder of participation, the empirical evidence shows that the public participation process that has occurred in relation to the renewable energy policy paper, may be assessed as having reached the third and fourth rungs (the

rungs of Informing and Consultation) which ensures consultation, without empowerment. This level may also be termed tokenism.

The sub-theme of analysing the 10 000 GWh target was then presented and it has been found that there is widespread consensus that the target is conservative, yet will not be achievable in South Africa. The main hurdles to implementation for renewable energy penetration, was then analysed. The issue of Eskom holding a monopoly in the renewable energy market has surfaced as a key sub-theme. Until an 'enabling environment' is created where REFIT tariffs are acceptable to project developers, renewable energy will not be commercially viable in South Africa. The lack of capital and political will to get projects started also surfaced as key issues.

Section 5.4 analyses CDM in a developing country context. The issue of developing nations drawing up their own sustainable development criteria came up as a sub-theme. It has been established that South Africa has sound sustainable development criteria. A comparison was then presented between South Africa, India, China and Brazil. The results show that China is excelling in the wind project sector while India is leading the biomass sector. South Africa has only 20 projects registered out of the 3682 registered globally (UNEP, 2011). It can therefore be concluded that South Africa is lagging behind in terms of registering projects.

The analysis then focuses on CDM in the South African context (section 5.5), where hurdles are identified. The most important hurdles that are preventing the uptake of CDM in South Africa is CDM uncertainty post 2012, the large transaction costs, the time delay in getting projects registered and the additionality argument which forces project developers to use consultants, due to the complex nature of getting CDM projects registered. The matter of the green or low carbon economy is then presented, and it has been concluded that South Africa has its own developmental goals which it needs to meet like job creation and poverty alleviation, coupled with the issue of climate change.

The final section concludes with labelling the CDM process as autocratic, relying on experts and being a market mechanism. It can therefore be termed a case of weak ecological modernisation. The next chapter will now conclude this thesis and provide recommendations on a way forward.

Chapter Six

Conclusion and Recommendations

In South Africa, we are faced with numerous challenges, socially, economically and environmentally. In order to address all of these challenges, the government has to ensure that it maintains a balance between the needs of its people and its global obligations. One of the world's major challenges is climate change. South Africa has a coal-based economy because of its historical abundance of coal. James (2011) notes that Eskom declared, in March 2011, that it emitted 230,3 million metric tons of carbon dioxide which equates to 45 percent of South Africa's total emissions. The South African government acknowledges that it needs to make a difference in terms of climate change, and one of the ways to do this is to internalise the external cost of electricity (Winkler, 2006). The external emissions produced by Eskom need to be slowed. The electricity price in South Africa is still not cost competitive when compared to renewable energy, which is one of the reasons why South Africa does not have an abundance of renewable energy and energy efficiency technologies. The broad aim of this study is to critically examine Clean Development Mechanism (CDM) as a tool to promote the use of renewable energy in South Africa.

CDM is a mechanism which was developed in 1997 via the Kyoto Protocol. There was a global consensus that carbon dioxide emissions needed to be reduced, and since pollution prevention in one part of the world will aid the global community, a mechanism was developed to share the responsibility of reducing global carbon emissions. The theory behind CDM is that developed countries can invest in renewable energy or energy efficiency projects in developing countries. If direct investment is not possible, they have the option to buy carbon credits which are credits generated from a renewable energy or energy efficient project.

In order to satisfy the aim of this study, the following objectives were identified:

a) Analyse the policies contributing to carbon dioxide reduction.
b) Analyse the Renewable Energy Policy of South Africa, which forms the framework for CDM.
c) Understand the concept of CDM in a developing country context.
d) Critically evaluate the implementation of CDM in the South African context.

The purpose of this chapter will be, firstly, to outline a summary of the research process. Thereafter a comprehensive summary of the data analysis will be presented. Recommendations will be made based on the findings of the study.

Chapter Two constitutes the literature review, which outlines the theoretical literature in order to understand the concept of ecological modernisation, and whether CDM is a form of weak or strong ecological modernisation (Christoff, 1996; Hajer, 1995; Blowers and Pain; 1999). Ecological modernisation is a theoretical framework which is being used to conceptualise the changes that are taking place in environmental policies (Spaargaren and Mol, 1992 in Mol *et al*., 2009). This theory aims to provide an understanding of the relationship between society and the environment. The theory of ecological modernisation is used to analyse the current policies being established to manage the environment in the face of climate change.

There is a discussion by Christoff (1996) in Chapter Two where he proposes a continuum of strong and weak ecological modernisation, wherein 'strong' ecological modernisation includes a more democratic process of inclusiveness for decision-making around ecological issues, as opposed to 'weak' ecological modernisation which uses a 'top-down' approach in terms of environmental decision-making. Clean Development Mechanism (CDM) has been criticised for not adequately contributing to sustainable development and for being a form of weak ecological modernisation rather than a strong one (Wara, 2006). The difference between strong and weak

ecological modernisation is detailed in Table 2.1, where the weak or a narrow form of ecological modernisation is described as not taking into consideration the social issues, like public participation, in environmental decision-making. It is seen as a top-down approach. Strong ecological modernisation is described as being a communicative, deliberative and a bottom-up process, thus taking ecological issues into consideration.

The literature draws attention to what constitutes strong and weak ecological modernisation, and there is a particular focus on public participation procedures from White (1996) and Arnstein (1969). This literature has helped the researcher to better understand the level of participation that took place in drawing up the White Paper on Renewable Energy (2003), since democratic inclusion of the public's views can be attributed to moving towards strong ecological modernisation principles. White's (1996) *transformative* participation is the most desired type of public participation, because through this process the community is empowered to make decisions about the environment around them. This is equated to *citizen control* and *partnership* described by Arnstein (1969), which ensures sound environmental decision-making.

The literature review presented early views on ecological modernisation and then provided a critique of the theory. Recent contributions were also highlighted (Mol and Sonnenfeld, 2000; Oelofse *et al*., 1996) together with two case studies applying the theory. The first case study describes the case of the pulp and paper industry of Southeast Asia, illustrating a case of weak ecological modernisation. The second case study uses the national forestry policy and the environmental policy-making project in Cape Town to detail how strong ecological modernisation principles are being adhered to by the South African government in terms of wide public consultation. However, due to the issues of institutional capacity and lack of adequate funding, there is still room for improvement.

The third chapter of this study presents a background into the policy framework that exists in South Africa with regards to renewable energy and climate change. The concept of CDM and how it functions both globally and locally is then described. The issue of climate change is also discussed, with reference to current trends in the policy framework around climate change in South Africa. The CDM process is described at the local and international level, together with the relevant flow charts, for project approval. These flow charts show that the process is both bureaucratic and time consuming due to the international protocols that need to be met in order to get a CDM project registered with the CDM Executive Board. This is a prerequisite for a project developer to sell carbon credits from his or her project. The current status of registered projects is also highlighted in order to illustrate that South Africa is lagging behind in terms of registering projects. In May 2011, 200 projects were submitted to the DNA (Rambau, 2011, e-mail). Only 20 of the projects were registered with the UNFCCC, as compared to China, India and Brazil that had 1683, 745 and 198 projects registered, respectively (see Table 5.2). This study investigates the possible causes of such a large discrepancy in the number of projects registered, in Chapter Five.

This project adopts a qualitative approach to explore the barriers for CDM implementation in South Africa. A sample of sixteen public, private and non-governmental respondents was selected using non-probability sampling (Kitchen and Tate, 2000). Face-to-face interviews were then conducted with each respondent and recorded with a voice-recording device. A thematic analysis was then conducted and key themes were identified from the data collected, which fed into the results of the study. Documentary data were also collected relating to South African legislation, minutes of meetings, conference presentations and media reports. This data provided a basis on which respondents' views were tested.

The thematic analysis uncovered the evidence into the following themes:

- 'the policy landscape in South Africa',

- ‘the Renewable Energy White Paper (2003)’,
- ‘hurdles for the large scale implementation of renewable energy’,
- ‘CDM in a developing country context’,
- ‘CDM as a tool to promote the use of renewable energy in South Africa’ and
- ‘CDM as a case of weak ecological modernisation’.

The results showed that South Africa has very progressive environmental and renewable energy policies; however, there is a lack of implementation of these policies, which has resulted in the delay of the widespread uptake of renewable energy in South Africa. It was also found that the public participation process that had taken place leading up to the development of the Renewable Energy White Paper (2003) was unsatisfactory.

White’s (1996) public participation process is described in detail, together with Arnstein’s (1969) Ladder of Participation, and was used to understand the level of public participation in the policy making processes. This study has found that *instrumental* participation (White, 1996) has taken place due to the superficial nature of the public participation exercise. This is equated to Arnstein’s (1969) description of *tokenism* according to this typology, where the public is not empowered in terms of the environmental decision-making process. The evidence shows that the respondents felt that more could have been done in terms of the public consultation procedure indicating a weak form of ecological modernisation.

The hurdles for the large scale implementation of renewable energy projects are then discussed, with a particular focus on the cheap price of electricity supplied by Eskom. An argument is then made as to why CDM is succeeding in India, China and Brazil, and not South Africa. The two key factors are the relatively low electricity prices and the stringent (compared to India, China and Brazil) sustainable development criteria (see Appendix C) that the South African government has developed. The reason for the low electricity price is that Eskom does not internalise the external cost of producing electricity from coal. Furthermore, the government has developed its sustainable development criteria in accordance with addressing the social issues that face the

country, such as job creation. The state aims to marry the social, environmental and economic issues that face the country.

This discussion then leads onto the barriers preventing the large scale implementation of CDM projects in South Africa. These barriers are CDM uncertainty post-2012, high transaction costs to get projects registered, the time delay for registration of projects by the CDM Executive Board, and the issues that consultants face in making the additionality argument in their applications. An interesting sub-theme emerges from the evidence where a number of respondents raise the issue that renewable energy industry is very much part of the green economy in South Africa. If South Africa is able to introduce clean technology into the economy, it will create sustainable employment for its citizens while reaping the benefits of positive impacts on the environment.

The evidence produced by the research and the analysis of the data using the framework of ecological modernisation, both reveal CDM as a case of weak ecological modernisation. This is due to the relatively weak public participation procedures (instrumental type of public participation), the fact that CDM is viewed as a purely economic instrument rather than a tool to promote renewable energy, as well as the lack of true concern for the environment by the government. Respondents felt that the environment was not prioritised, and was merely being 'traded' for pure economic gain. The respondent from Greenstream (14/05/2010) argued that CDM is a market mechanism. This is in line with Hajer's (1995) critique that environmental issues, according to the theory of ecological modernisation, are a commodity which can be efficiently 'managed' and governments view environmental degradation as 'calculable'.

Recommendations

Recommendations based on the evidence are provided here. Firstly, an enabling environment should be created for Independent Power Producers (IPP) to produce electricity in order to catalyse the large scale implementation of renewable energy. They should be given a chance to feed into the grid. It is understood that Eskom has invested over the years in the grid

infrastructure, so a compromise should be reached between independent power producers and Eskom.

Secondly, Eskom should undergo an exercise to try to internalise the external cost of electricity. This will then allow one to compare 'apples with apples'. Diversity in South Africa's electricity mix will allow the supply of electricity to be secure, while at the same time impacting positively on the environment. Thirdly, there should also be more political will in terms of getting CDM projects through the UNFCCC process. There are lessons that could be learned from China where government and private sector have worked together to manage projects.

At the time of the completion of this study, there had not been a second commitment period. The first commitment period of the Kyoto Protocol, which runs from 2008 to 2012, will now be examined by the CDM Executive Board. Developed countries that have not met targets that were agreed upon when the Kyoto Protocol was signed in 1997 will now have to pay penalties for every ton of carbon that they have not saved in terms of purchasing certified emission reductions (CERs) or carbon credits.

This study will prove valuable for the development of future mechanisms to reduce GHG emissions. This thesis has focused on the policy framework that underpins climate change in South Africa. There are still a number of research areas that may be developed following this study. It is recommended that research be investigated in the following areas:

- The impact of carbon taxes on the future of South African business.
- South African industry response to financing renewable energy projects in light of increased electricity prices from Eskom in recent years.
- Energy efficiency as a vehicle for driving climate change projects and the dynamics of having Eskom drive such a programme.
- A focused study on the areas in which South Africa can learn from its developing country counterparts in terms of accelerated implementation of climate change projects.

- Research into strong ecological modernisation principles, which may be adopted by policy makers in order to provide a more democratic, open process in terms of environmental decision-making.

References

1. Personal Communication

Bredenkamp, B.: Chief Operating Officer, National Energy Efficiency Agency, 10/06/2010.

Britz, D.: Principal Specialist for Energy, ArcelorMittal South Africa, 16/05/2011.

Crompton, R.: Deputy Director General, Department of Minerals and Energy Director, 3/08/2009.

Harrington, S.: Senior Specialist, Sasol, 20/12/2011.

Lahti, L.: Programme Manager, NORAD, 15/03/2009.

Modise, D.: Deputy Director, Department of Energy, 18/11/2011.

Rambau, T.: Deputy Director, Department of Energy, 21/07/2011. Email correspondence.

Singh, R.: Director, Department of Minerals and Energy, 2004, 02/03/2006 and 14/10/2008.

Solar Water Heating Distributor: 7/03/2007.

Spanig, S.: General Manager, Environment, ArcelorMittal South Africa, 19/05/2011.

Yawitch, J.: National Business Initiative CEO, 23/11/2011.

2. Brochures

Department of Energy (DoE). 2011. *CDM in the Mining sector brochure*. Government Printer, Pretoria.

Department of Energy (DoE). 2011. *CDM in the Agricultural sector brochure*. Government Printer, Pretoria.

Department of Energy (DoE). 2011. *CDM in the Forestry sector brochure*. Government Printer, Pretoria.

3. Interview Respondents

Department of Energy, Designated National Authority (DNA): Interviewed on 19/04/2010.

Development Bank of South Africa (DBSA): Interviewed on 11/05/2010.

Energy Development Corporation (EDC): Interviewed on 14/05/2010.

Eskom: Interviewed on 11/05/2010.

eThekwini Municipality: Interviewed on 31/03/2010.

Greenstream Network: Interviewed on 14/05/2010.

Imbewu Legal Consultants: Interviewed on 05/05/2010.

Industrial Development Corporation (IDC): Interviewed on 14/05/2010.

National Energy Efficiency Agency (NEEA): Interviewed on 23/03/2010.

Nelson Mandela Bay Municipality (NMBM): Interviewed on 19/04/2010.

Pure Carbon: Interviewed on 06/05/2010.

Sasol: Interviewed on 21/05/2010.

South African National Energy Development Institute (SANEDI): Interviewed on 25/03/2010.

United Nations Development Programme (UNDP): Interviewed on 19/04/2010.

University of Cape Town (Academic): Interviewed on 20/04/2010.

World Wildlife Foundation (WWF): Interviewed on 13/05/2010.

4. Secondary Data Sources

Abders, R. 1998. Learning Democratic Practice: Distributing government resources through popular participation in Porte Alegre, Brazil, in Douglass, M and Friedmann, J (eds) *Cities for Citizens*, Wiley, London.

Agama Energy. 2003. *Employment potential of Renewable Energy in South Africa*. Agama Energy, Constantia.

Allers, N. 1997. *1001 Activities in Environmental Education*, Sigma Press, Kameleon Publishers, Pretoria.

Arnstein, Sherry R. 1969. '*A Ladder of Citizen Participation*' in Journal of the American Planning Association , Vol. 35, No. 4, July, pp. 216-224,

Badu, R. 2011. *Clean Development Mechanism Course*. 21 July 2011. Energy Cybernetics.

Bipath, M. 2011. Presentation on *South African National Climate Change Response White Paper* http://uneprisoe.org/20Anniversary/ClimateChangeResponseSouthAfrica-Bipath.pdf (Last accessed on 25/11/2011)

Blowers, A. 1997. Environmental Policy: Ecological Modernisation or the Risk Society? *Urban Studies*, 34 (5-6), pp. 845-871.

Blowers, A. and Pain, K. 1999. The Unsustainable City? In Pile, S., Brook, C., and Mooney, G. (eds.), *Unruly Cities? Order / Disorder*, Routledge, London. Chapter 6.

Blowers, A. and Hinchcliffe, S. 2003. *Environmental Responses*, Wiley, London

Boyd, E.; Hultman, N.; Timmons Roberts, J.; Corbeva, E.; Cole, J.; Bozmoski, A.; Ebeling, J.; Tippman, R.; Mann, P.; Brown, K. and Liverman, D.M. 2009. Reforming the CDM for sustainable development: learned and policy futures. *Environmental Science and Policy* 12. pp. 820-831.

Bradsher, K. 2009. *China Outpaces U.S. in Cleaner Coal-Fired Plants*. The New York Times, -freewebs.com.

Brand, K. 2010. *Challenges for municipalities in determining & implementing strategies for climate change adaptation and mitigation*. Presentation at the ICLEI conference, 28/01/2010.

Brown, F. 2009. *Participatory forest management (PFM) discourse in South Africa: ecological modernisation in the developing world*, Unpublished PhD Thesis, University of KwaZulu-Natal, Durban.

BuaNews, 23/05/2012. *Independent Power Producers chosen*. http://www.southafrica.info/business/economy/infrastructure/ippbidders-230512.htm. (Last accessed 20/06/2012)

Business Report, 5/12/2008. *State poised to step in mandatory approach*. p.7.

Carbon Disclosure Project. 2012, https://www.cdproject.net/en-US/Pages/HomePage.aspx. (Last accessed 18/06/2012).

CDM Executive Board. 2008. Methodological Tool "*Tool for the demonstration and assessment of additionality.*" (Version 5.2) http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf. (Last accessed 16/11/2011).

CDM Rulebook. 2011. www.cdmrulebook.org. (Last accessed 22/06/2011).

Chartered Institute of Purchasing and Supply (CIPS). 2011. *Nersa moves to cut Refit tariffs just as SA promises to boost renewables*. http://conferences.cips.org/en-za/aboutcips/News/Nersa-moves-to-cut-Refit-tariffs-just-as-SA-promises-to-boost-renewables/. (Last accessed 23/11/2011).

Christoff, P. 1996. Ecological Modernization, Ecological Modernities. *Environmental Politics*. Vol.5 (3), pp. 476-500.

Cloke, P., Cook, I., Crang, P., Goodwin, M., Painter, J. and Philo, C. 2004. *Practising Human Geography*, Sage, London.

Cloete, B. 2012. "*Carbon Tax discussion Forum*" Presentation at Imbewu Sustainability Legal Specialists office, 29 March 2012.

Cooney, S. 2009. "*Build A Green Small Business. Profitable ways to become an ecopreneur*." New York : McGraw-Hill.

Cooper, D. R. and Schindler, P. S. 2001. *Business Research Methods*, Irwin / Mcgraw-Hill, Singapore.

Copley, G. 2009. *Shifts in environmental policy making discourses: The management of the St Lucia estuary mouth*. Unpublished Master's Thesis, University of KwaZulu-Natal, Durban.

Dardagan, G. 2010. *The Heat is on*. UKZN Touch, Issue 1. 2010.

Dechezleprêtre, A.; Glachant, M.; Ménière, Y. 2009. "Technology transfer by CDM projects: A comparison of Brazil, China, India and Mexico", *Energy Policy*, 37(2): 703-711.

Denscombe, M. 2007. *The good research guide*. Open University Press, England

Department of Environmental Affairs and Tourism (DEAT). 2009. *Greenhouse Gas Inventory South Africa: 1990-2000*. Pretoria. http://www.pmg.org.za/files/docs/090812greenhouseinventory.pdf (Last accessed 12/11/2011).

Designated National Authority (DNA). 2010. Presentation to the Development Bank of South Africa, 10/05/2010.

Dray, A. 2009. *The Politics of the Privitisation of Public Space: The subsistence fishers of Durban, KwaZulu-Natal*. Unpublished Master's Thesis, University of KwaZulu-Natal, Durban.

Dryzek, J. 1997. *The Politics of the Earth: Environmental Discourses*, Oxford University Press, Oxford.

Eskom. 2012. *Distribution charges (DUoS) electricity pricing definitions (standard) use of system policy* http://www.eskom.co.za/content/ElectrPricDefbroch07v1.pdf?Src=Item+2255 (Last accessed 13/06/2012).

Fell, A. and Sadler, B. 1999. Public Involvement in Environmental Assessment and Management – A Preview of IEA Guidelines on Good Practice in *The Magazine of IEAM* Ltd, June 1999.

Freeman, S. 2000. *The Role of Capacity Building in the Public Participation Process: the case of landfill siting in the Durban Metropolitan Area*. Unpublished Master's Thesis. University of KwaZulu-Natal, Durban.

Gemmer, M. and Jiang, T. 2008. *BMU CDM-JI Initiative Country Study*. China of the Service CDM Unit China. Eschborn, Germany http://gemmeronline.de/resources/CDM-CountryStudyChina.pdf (Last accessed 19/06/2012).

Gewer, A. 2009. Vision 2050 – A South African Perspective. *25° in Africa*, Volume 4, No.3, Business Print Centre.

Gore, A. 2007. *An Inconvenient truth, the crisis of global warming*. Great Britain, Butler and Tanner, Frome.

Hajer, M.A. 1995. *The Politics of Environmental Discourse: Ecological Modernisation and the policy process*. Oxford University Press, Oxford.

Hajer, M.A. 1996. Ecological modernisation as cultural politics, in: Lash, S., Szerszynski, B and Wynne, B. (eds.), *Risk, Environment and Modernity: Towards a New Ecology*, Sage Publications, London. pp. 246-268

Hajer, M.A. and Wagenaar, H. 2003. *Deliberative Policy Analysis: Understanding Governance in the Network Society*, Cambridge University Press, Cambridge.

Hajer, M.A. 2004. *Three dimensions of deliberate policy analysis: the case of rebuilding ground zero*. Paper presented at the Annual Meeting of the American Political Science Association, Chicago, 2-4 September 2004.

Heilfrich, K. 2009 *Massive Threats of Climate Change*. Citizen Newspaper (second edition). 06/01/2009, p.7.

Huber, J. 2000. *Towards Industrial Ecology: Sustainable Development as a Concept of Ecological Modernisation*, Journal of Environmental Policy and Planning, 2, pp. 269-285.

IGES. 2011. *CDM in charts*, Institute for Global Environmental Strategies (IGES). CDM course held in July 2011.

Investopedia ULC. 2011. http://www.investopedia.com/terms/i/irr.asp#ixzz1dTa13vM9. (Last accessed 12/11/2011).

James, A. 2011. *SA leads the way in moves to clean the environment*. Business Day. 7 December 2011, p.18.

Kitchen, R. and Tate, N.J. 2000. *Conducting Research in Human Geography: Theory, Methodology and Practice,* Prentice Hall, Harlow, England.

Kitzinger, X. 2005. *Renewable Energies in South Africa – strategy of CDM to meet the target by 2012*. Unpublished diploma thesis, University of Munich, Germany.

Lahti, L. 2006. *Sustainable Development Aspect in the Clean Development Mechanism.* Unpublished Thesis, Turku University of Applied Sciences.

Lana. 2010. *Electricity price hike in South Africa* http://www.southafricaweb.co.za/article/electricity-price-hike-south-africa. (Last accessed 23/11/2011).

Langhelle, O. 2000. Why ecological modernization and sustainable development should not be conflated. *Journal of Environmental Policy and Planning*. pp.: 303-322.

Little, G. 2006. *Accelerating the Implementation of the Clean Development Mechanism in South African Industry*. Unpublished Master of Business Administration Thesis. Gordon Institute of Business Science, University of Pretoria.

Little, G., Maxwell, T. and Sutherland, M. 2006. *Accelerating the Implementation of the Clean Development Mechanism in South Africa*. Gordon Institute of Business Science, University of Pretoria. SAJEMS NS 10 Volume 4.

Lubke, V. 2003. *Environmental Discourse in the eThekweni Municipality: The eThekweni Catchments Project*. Unpublished Thesis, University of KwaZulu-Natal, Durban.

McKensie, J. 2011. *Blowing Hot: SA firm starts manufacturing first wind motor blade*. Engineering News. 9 December 2011. p.10.

Mol, A. 1995. *The refinement of production: Ecological Modernisation Theory and the Chemical Industry*, Van Arkel, Utrecht.

Mol, A. 2000. The environmental movement in an era of ecological modernization. *Geoforum*, 31, pp. 45-56.

Mol, A., Sonnenfeld, D. and Spaargaren, G. 2009. *The Ecological Modernisation Reader*. Routledge, London and New York.

Momberg, E. 2009. SA to get tough on climate. *Sunday Independent*. 11 January 2009. p. 8.

Moodley, M. 2007. Climate-risk disclosure becoming a business imperative. *Creamer's Media's Mining Weekly online*.

Morden, C. and Hemraj, S. 2011. *Reducing Greenhouse Gas Emissions Pricing Carbon – The Carbon Tax Option*. National Treasury.

Morrison, L. 2009. Behaviour Change needed to reduce SA's greenhouse gas emissions. *Engineering News*. 23 January 2009, pp. 36-38.

NERSA. 2009. *Renewable Energy Feed-in tariff Phase 2 consultation document*. http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/REFIT%20Phase%20II%20150709.pdf ; (Last accessed 23/11/2011).

Novins, L. ed. 2009. Sustainable Development Law and Policy, *Exploring how today's development affects future generations around the globe*. Vol IX, Issue 2. American University, Washington College of Law.

Oelofse, C., Scott, D., Houghton, J. and Oelofse, G. 2006. Shifts within Ecological Modernisation in South Africa: Deliberation, Innovation and Institutional Opportunities, *Local Environments* 11(1), pp. 61-78.

Pezzoli, K. 1997. Sustainable Development: A transdisciplinary overview of the literature, *Journal of Environmental Planning and Management*, 40 (5), pp. 549-574.

Pressly, D. 2011. Government reaches green accord with labour, business. *Business Report* (Star). 18 November 2011, p.17.

Republic of South Africa. 1995. *Constitution of the Republic of South Africa*, Act 108 of 1995. Government Printer, Pretoria.

Republic of South Africa. 1998a. *White Paper on Energy Policy*. Government Printer, Pretoria. http://www.info.gov.za/whitepapers/1998/energywp98.htm. (Last accessed 25/22/2011).

Republic of South Africa. 1998b. *National Environmental Management Act*, Act 100 of 1998. Government Printer, Pretoria.

Republic of South Africa. 2003. *White Paper on Renewable Energy of November 2003.* Government Printer, Pretoria.

Republic of South Africa. 2004a. *NCI: Change Response Strategy of September 2004*. Government Printer, Pretoria.

Republic of South Africa. 2004b. *Sustainable Development Criteria*. Government Printer, Pretoria.

Republic of South Africa. 2004c. *CDM DNA Application form, Project Idea Note*. Government Printer, Pretoria.

Republic of South Africa. 2005. *National Energy Efficiency Strategy,* Notice 908 of 2009. Government Printer, Pretoria.

Republic of South Africa. 2006. *National Energy Efficiency Accord*. Government Printer, Pretoria.

Republic of South Africa. 2010. *National Treasury*. http://www.treasury.gov.za/public%20comments/Discussion%20Paper%20Carbon%20Taxes%2081210.pdf. (Last accessed 15/10/2011).

Republic of South Africa. 2011a. *National Climate Change Response White Paper* http://www.environment.gov.za/PolLeg/WhitePapers/national_climatechange_response_whitepaper.pdf (Last accessed 25/11/2011).

Republic of South Africa. 2011b. *Integrated Resource Plan for Electricity 2012 – 2030* http://www.energy.gov.za/IRP/irp%20files/IRP2010_2030_Final_Report_20110325.pdf (Last accessed 05/03/2013)

Republic of South Africa. *Reducing Greenhouse Gas emissions: the Carbon Tax option*. December 2010. http://www.treasury.gov.za/public%20comments/Discussion%20Paper%20Carbon%20Taxes%2081210.pdf. (Last accessed 25/11/2011).

Roelf, W. 2011. *South Africa aims for CO_2 cuts of 34 percent in decade*. Reuters. http://www.reuters.com/article/2011/11/08/idUSL6E7M817S20111108. (Last accessed 13/11/2011).

Rumsey, A.B. and King, N.D. 2009. '*Climate Change: Adaptation, and Mitigation; Threats and Oppourtunities*' pp.1063-1072.

Salgado, S. 2009. *Business Report*. http://www.busrep.co.za/general/print_article.php?fArticleId=4815140&fSectionId=5. (Last accessed 01/29/2009).

Sayer, A. 1992. *Method in Social Science: A Realistic Approach*. Routledge, New York.

Schaffler, J. 2009. *UNDP/GEF Solar Water Heaters (SWHs) for Urban Housing in South Africa*. Unpublished research report, CEF (Pty) Ltd, Johannesburg.

Schmidt, S. 2008. *Coal deposits of South Africa - the future of coalmining in South Africa*. http://www.geo.tu-freiberg.de/oberseminar/os07_08/stephan_Schmidt.pdf.

Scott, D. and Oelofse, C. 1999. *The Location of Regional Landfills on the Lower North Coast, KwaZulu-Natal: A Social Probe of the Mandeni and Kwadakuza Landfill Windows*, Department of Geographical and Environmental Science, University of Natal, Durban, unpublished report.

Seippel, O. 2000. Ecological Modernisation as a Theoretical Device: Strengths and Weaknesses, *Journal of Environmental Policy and Planning*, 2, pp. 287-302.

Silverman, D. 2005. *Doing qualitative research: a practical handbook*. University of Houston James J. Scheurich Education, Texas A&M University.

Sonnenfeld, D. A. 2000. 'Developing countries', *Environmental Politics*, 9:1, pp. 235-256.

South African Alternative Energy Association (SAAEA). 2011. *Renewable tariff cuts… refit South Africa*. http://saaea.blogspot.com/2011/03/renewable-tariff-cutsrefit-south-africa.html. (Last accessed 19/06/2012).

Tyler, E. 2009. *Aligning South African energy and climate change mitigation policy*. University of Cape Town. Energy research centre. http://www.erc.uct.ac.za/Research/publications/09Tyler_Policy_alignment.pdf. (Last accessed 13/11/2011).

UNFCCC. 2006. http://www.unfccc.int. *Home page*. (Last accessed 21/06/2012).

UNFCCC. 2008. Methodological Tool. *Tool for the Demonstration and assessment of additionality*. Version 05.2. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf. (Last accessed 19/07/2011).

UNFCCC. 2012. http://www.unfccc.int. *Home page*. (Last accessed 21/06/2012).

United Nations Environmental Programme. 2006. http://www.cdmpipeline.org/overview.htm. (Last accessed 19/06/2012).

United Nations Environmental Programme. 2011. http://www.cdmpipeline.org/overview.htm. (Last accessed 19/06/2012).

Van den Berg, J. 2006. Clean Development Mechanism – *Using "Carbon Credits" to generate and unlock additional value through the clean development mechanism*. Study Guide. International Quality and Productivity Centre, Sandton, Johannesburg.

Van Schalkwyk, M. 2009. Keynote address at a high level seminar and discussion on "*Emerging Strategies for International Climate and Investment Policy*". Washington D.C.

Wara, M. 2006. *Measuring the Clean Development Mechanism's Performance and Potential*. Working Paper no. 56. Stanford University.

White, S.C. 1996. Depoliticising development: the uses and abuses of participation, *Development in Practice*, 6(1), p. 6-15.

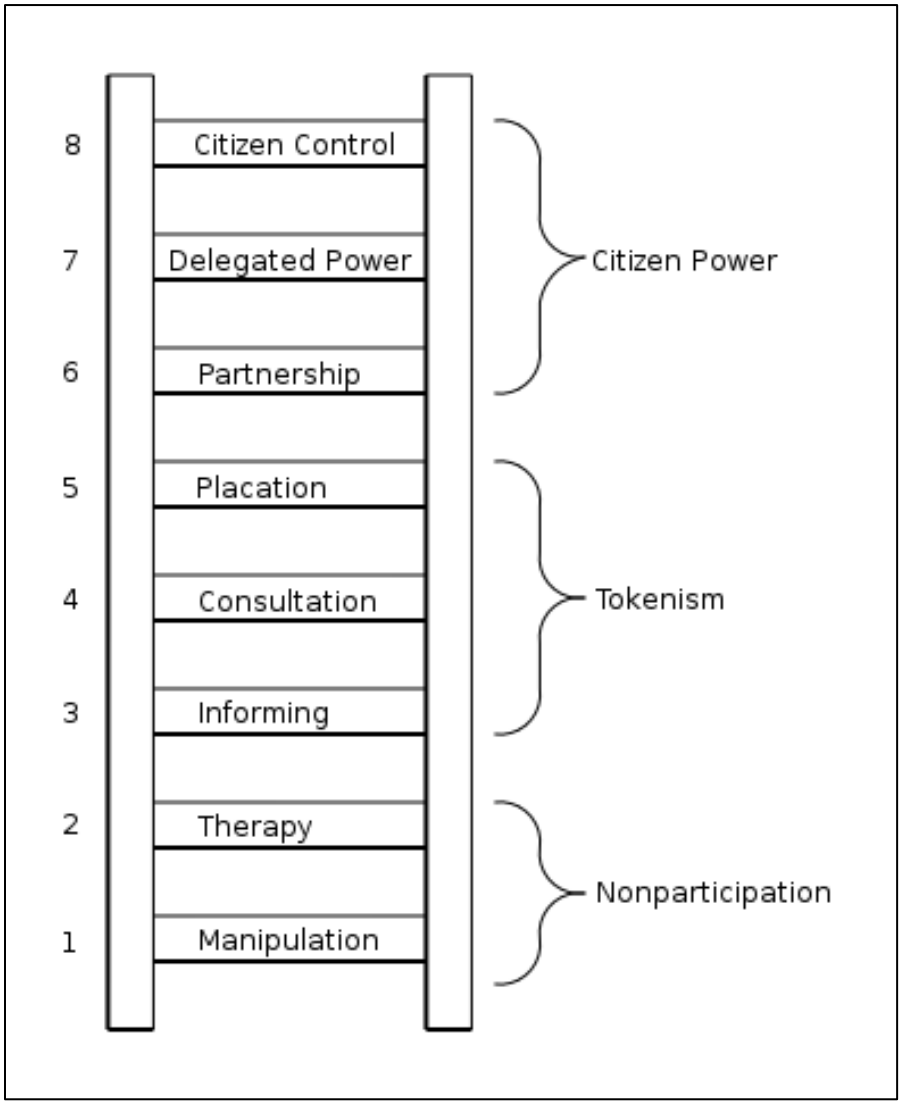
Winkler, H. 2006. Energy policies for sustainable development in South Africa. *Options for the Future*. University of Cape Town. Energy research centre. http://www.iaea.org/OurWork/ST/NE/Pess/assets/South_Africa_Report_May06.pdf. (Last accessed 13/11/2011).

Worldmapper. 2000. http://www.worldmapper.org/display.php?selected=295. (Last accessed 25/11/2011).

Worthington, R. 2011. Tariff reversal threatens investment. *Business Day*, 1st August 2011. http://www.businessday.co.za/Articles/Content.aspx?id=149621. (Last accessed 17/12/2011).

Appendix A

Arnstein's (1969) Ladder of Participation



(Arnstein, 1969)

Appendix B

ENERGY EFFICIENCY ACCORD

Between

The Government of South Africa, Department of Minerals and Energy (DME)

and

(Full Company Name)

1. PARTIES

This document constitutes an accord between the Department of Minerals and Energy (DME) and the undersigned associations and individual companies using energy in their business operations.

2. BACKGROUND

Both South African business and the Government recognise that improvements in energy efficiency are needed if the country is to remain competitive internationally whilst dealing effectively with potential electricity capacity shortages, environmental concerns and the steadily rising price of all energy sources.

The Government of South Africa, through the DME, has issued the Energy Efficiency Strategy of the Republic of South Africa in March 2005. One element of this Strategy is the encouragement of business-led, voluntary initiatives to improve energy efficiency. This Accord stands as a commitment between government and industry to support this specific objective of the Strategy. Energy efficiency commitments should not be seen in isolation of the national imperatives of increased investment, economic growth and job creation or the business drivers of efficiency, competitiveness and safety standards.

3. PURPOSE

The DME and the industry signatories agree to collaborate to establish a mutually beneficial framework for voluntary energy efficiency initiatives that will help move the country towards its goals of attracting investment in Clean Development Mechanism (CDM) projects and efficient energy use.

Specifically, the DME and the industry signatories will work together to establish a programme that individual industry associations and companies will be able to join voluntarily.

4. COMMITMENTS

The Parties recognise the national imperative to achieve higher economic growth rates and agree that energy efficiency improvements need to be considered within the context of this overarching imperative.

The Parties agree to cooperate to pursue the national energy efficiency targets on a voluntary basis, recognising that energy usage is a major contributor to greenhouse gas emissions in South Africa. They also agree to collaborate on initiatives that could result in CDM projects. The success of voluntary based initiatives will form part of the regular reviews provided for in the Energy Efficiency Strategy.

4.1 Targets

Industry signatories acknowledge the target, set in terms of the Energy Efficiency Strategy of the Republic of South Africa, of a national final energy demand reduction of 12% by 2015, expressed as a percentage reduction against the projected national energy use in 2015, with a final energy demand reduction target for the industry and mining sector as a whole of 15% by 2015. The industry signatories commit to the following actions towards this target.

4.2 Industry

We, the undersigned industry signatories, agree to collaborate with each other and Government to:

- promote the development of sector specific strategies and targets, in partnership with Government, that will contribute to the achievement of the overall energy efficiency target set by Government;
- promote the use of Demand Side Management contracts concluded with energy suppliers, where they exist, and to negotiate additional such contracts where appropriate, towards achievement of the above target;
- develop common reporting requirements for energy usage from all energy sources, taking into account, where possible, existing internationally recognised protocols for reporting such as those developed by the Global Reporting Initiative;
- define industry-specific projected energy use in the future, based on Business-as-usual (BAU) growth expectations;
- agree on 2000 as the baseline year against which performance will be measured;
- establish methodologies that will allow the baseline quantification for energy use/intensity (consumption per unit of production or any other relevant denominator) in various sub sectors, and to take into account the need to measure specific energy intensity (providing for the differing sub sectors) rather than absolute energy use in order to promote industrial growth whilst achieving energy efficiency and recognising the energy conservation measures already in use in some sub sectors;
- establish methodologies to take into account increased production so that the pursuit of improved energy efficiency does not hamper industrial growth;
- develop a generic energy auditing protocol that can be adapted for use by the individual sector and company signatories;
- endeavour that, where appropriate, training material prepared during the course of this accord be accredited through the relevant SETA and that the sector skills plans of the various sectors include the development of the skills necessary to sustain the commitments made in this accord; and
- where appropriate, exploit opportunities presented by energy efficiency projects to develop CDM projects.

4.3 The DME

I, the undersigned, on behalf of government, agree that we will work cooperatively with industry signatories to realise the above commitments and to:

- engage with industry signatories leading up to the three yearly interval reviews that are envisaged in the Strategy;
- develop strategies, including the provision of fiscal and other incentives with signatories to incentivise the achievement of agreed sectoral targets by industry on a sector or enterprise basis;

- afford signatories the opportunity to provide input to the concept and structure of future energy related strategy, regulations and standards;
- build a relationship of trust and cooperation with signatories;
- encourage and enable information sharing and networking activities with the private sector and to seek synergy with the greenhouse gas initiatives undertaken by the Department of Environmental Affairs and Tourism;
- identify and share Best Practices (where appropriate to the South African context) among all parties and consider them as the basis for the establishment of standards;
- recognise industry signatories as contributors to the ongoing process to revise the National Energy Efficiency Strategy; and
- promote CDM projects as a vehicle to achieve improved energy efficiency.

5. MILESTONES

The Parties acknowledge the Energy Efficiency Strategy of the Republic of South Africa and agree that the strategy will be reviewed every three years in a collaborative process between the Parties.

The Parties acknowledge further that the Energy Bill, which will be enacted by the end of 2005, will contain elements relating to energy efficiency and agree that implementation of these elements will take place in consultation amongst the Parties.

Each energy using industry signatory, individually and/or with the assistance of and through collaboration with industry associations where appropriate, commits to the development of a specific energy efficiency strategy within one year of the signing of this Accord.

6. INSTITUTIONAL ARRANGEMENTS

The Industry signatories agree that the National Business Initiative will act as the liaison with Government in the implementation of this Accord. In this regard, Business Unity South Africa is recognised as one of the formal and representative business organisation mandated to deal with formal legislative and policy negotiations.

Industry parties will collaborate with Government in the compilation of an annual national progress report, including energy data and progress against the agreed targets.

Signed in Johannesburg, South Africa, this first day of August, 2006

_____

Buyelwa Patience Sonjica

For the DEPARTMENT OF MINERALS AND ENERGY

_____

(Name of Signatory)

(Company Name)

(Republic of South Africa, 2006)

Appendix C

Clean Development Mechanism South Africa
Designated National Authority

Department of Minerals and Energy

SUSTAINABLE DEVELOPMENT CRITERIA FOR APPROVAL OF CLEAN DEVELOPMENT MECHANISM PROJECTS BY THE DESIGNATED NATIONAL AUTHORITY OF THE CDM

14 October 2004

1. Background

In accordance with the procedures for the CDM agreed at Marrakech in 2001 participants in CDM projects will have to provide "*written approval of the voluntary participation from the designated national authority of each party involved, including confirmation by the host party that the project activity assists it in achieving sustainable development*" (Section 40(a), Decision 17/CP.7).

Host country project approval is one of the prerequisites of the registration of a potential CDM project with the United Framework Convention on Climate Change and the Kyoto Protocol. The rules which govern the CDM require a letter from the DNA of the host country which confirms that the project activity assists it in achieving sustainable development. The CDM procedures leave the definition of what sustainable development means as a sovereign decision of each developing country.

Therefore, for South Africa's participation in the CDM there has to be a procedure in place for deciding whether a proposed CDM project does assist the county in achieving sustainable development. The criteria to be used by the DNA in evaluating whether a project supports sustainable development are provided below. A companion document outlines the approval procedure to be followed.

2. Definition

Sustainable development is defined in the National Environmental Management Act (NEMA) as "*the integration of social, economic and environmental factors into planning, implementation and decision making so as to ensure that development serves present and future generations*". This definition of sustainable development will inform the decisions of the DNA of the CDM.

3. Criteria for CDM Project Approval

In accordance with the NEMA definition of sustainable development, three core criteria will be used to assess the contribution of the proposed project to sustainable development in South Africa. These are supported by additional criteria to allow the DNA to effectively regulate clean development mechanism project activity in South Africa.

Sustainable development criteria

The DNA will evaluate CDM projects submitted to it through consideration of the following three criteria:

1. **Economic**: Does the project contribute to national economic development?
2. **Social**: Does the project contribute to social development in South Africa?
3. **Environmental**: Does the project conform to the National Environmental Management Act principles of sustainable development? These are that "sustainable development requires the consideration of all relevant factors including the following:
    a. That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be avoided, are minimised and remedied
    b. That pollution and degradation of the environment are avoided, or where they cannot be altogether avoided, are minimised and remedied
    c. That the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied
    d. That waste is avoided, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner
    e. That the use and exploitation of non-renewable resources is responsible and equitable, and takes into account the consequences of the depletion of the resource
    f. That the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardized
    g. That a risk averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions
    h. That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied."

In determining the answers to questions 1-3 the DNA should be informed by consideration of the project indicators provided in Table 1. overleaf.

General regulatory authority

If a project is deemed by the DNA to be contrary to the spirit of the Kyoto Protocol or contrary to the intention of stated government policy the DNA reserves the right to refuse project approval until such time as suitable alterations are made to the project design. In such instances clear reasons for the rejection of a project must be provided by the DNA.

Table 1. Indicators in support of the project approval criteria

	Criteria	Indicator
Environmental	Impact on local environmental quality	• Impact of the project on air quality • Impact of the project on water pollution • Impact of the project on the generation or disposal of solid waste • Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic)
	Change in usage of natural resources	• Impact of the project on community access to natural resources • Impact of the project on the sustainability of use of water, minerals or other non renewable natural resources • Impact of the project on the efficiency of resource utilisation
	Impacts on biodiversity and ecosystems	• Changes in local or regional biodiversity arising from the project
Economic	Economic impacts	• Impact of the project on foreign exchange requirements • Impact of the project on existing economic activity in the area • Impact of the project on the cost of energy • Impact of the project on foreign direct investment
	Appropriate technology transfer	• Positive or negative implications for the transfer of technology to South Africa arising from the project • Impacts of the project on local skills development • Demonstration and replication potential of the project
Social	Alignment with national provincial and local development priorities	• How the project is aligned with provincial and national government objectives • How the project is aligned with local developmental objectives • Impact of the project on the provision of, or access to, basic services to the area • Impact of the project on the relocation of communities if applicable • Contribution of the project to a any specific sectoral objectives (for example, renewable energy targets)
	Social equity and poverty alleviation	• Impact of the project on employment levels? (specify the number of jobs created/lost; the duration of time employed, distribution of employment opportunities, types of employment, categories of employment changes in terms of skill levels and gender and racial equity) • Impact of the project on community social structures • Impact of the project on social heritage • Impact of the project on the provision of social amenities to the community in which the project is situated • Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes
General	General project acceptability	• Are the distribution of project benefits reasonable and fair?

4. Application of Criteria

The DNA will consider each project application against the three core criteria and will make an assessment of whether *on balance* the project supports sustainable development in the country. In some instances, projects will have a negative impact on one or more dimensions of sustainable development and a positive impact on the other dimensions. In such cases the DNA, in fulfilment of its regulatory role and with support from the inter-departmental advisory committee, will assess the overall contribution or otherwise of the project to sustainable development.

Reasons for the decision

The DNA will provide reasons for the decision. In these reasons the DNA will set out the analysis behind the decision and will note the expected performance of the project against the relevant indicators used.

Given the complexity of numerically weighting indicators against one another the DNA will not use a pre-defined formal scoring system to score and evaluate projects.

4

(Republic of South Africa, 2004b)

Appendix D

CDM DNA Application Form

Clean Development Mechanism South Africa
Designated National Authority

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

Private Bag X 19 , Acardia ,Pretoria, 0007, Tel:012-444 4116, Fax: 012 341 5133
Private Bag X9111, Cape Town, 8000, Tel: 021-469 6412, Fax: 021-465 5980

Project Identification Note (PIN)

Project reference number (office	
Date received (office use only)	

NOTES ON COMPLETING THIS PROJECT IDENTIFICATION NOTE

1. Please provide this PIN in both hard-copy

Part A: Project Proponent Details

Project Name	
Date of Submission of PIN	

Project Developer	
Name	*Name of project company/developer (Note: this is the name of the project owner NOT the name of any other party acting on behalf of the project owner)*
Organizational Category	*Select most applicable: National Government/ Government Agency/ Provincial Government/ Municipality/ Private Company/ Non-Governmental Organisation/ Other (give details)*
Legal Status	*For example: Privately held company/ limited company/ limited partnership etc.*
Street Address	

1

Postal Address (if different from above)	
Website Address	
Main Activities	*(Not more than 1 paragraph)*
Summary of Financial Performance in last fiscal year	*Summarise financials (total assets, revenues, profits etc) in 5 lines or less*
Contact Person(s)	
Telephone	Work: Cell:
Fax	
Email Address	
Project Partners Provide the following Information for **all** project partners (copy and paste relevant sections of the table if information is to be provided on more than one partner organisation)	
Name	
Nature of partner	*Describe nature of relationship with partner*
Organizational Category	*Select most applicable:* *National Government/ Government Agency/ provincial Government/ Municipality/ Private Company/ Non-Governmental Organisation/ Other (give details)*
Legal Status (if private company)	*For example: Privately held company/ limited company/ limited partnership etc.*
Street Address	
Postal Address (if different to Street Address)	
Website Address	
Main Activities	

	(Not more than 1 paragraph)
Contact Person(s)	Name
Telephone	Work: Cell:
Fax	
Email Address	
Contractual Arrangements	
Contractual arrangements between various entities involved	*Provide a brief description of the contractual and/or legal relationship(s) between the various key business entities including owner(s) of the future CERs. (If applicable)*

Part B: Project Overview (Technical Summary, Location and Schedule)

Technical Summary of the project	
Objective of the Project	*Describe in less than 5 lines*
Project Description *Present a brief description of the project (approximately ½ page A4)* *Identify the main processes and activities involved in the project. A flow diagram showing the processes/materials and/or products involved may be used to complement the description (over and above the ½ page A4).*	

Technical Summary of the project	
Project Constraints Are there any constraints affecting project operations or commissioning? *(Brief description: 1 paragraph or less)* *Note: these may be due to energy supply, infrastructure, other resources etc.*	
Technology to be employed	*Describe in less than 5 lines.* *Is the technology one that has been previously tried and tested in South Africa or internationally? If yes, provide details (1 paragraph)* *Have the project operators had any previous experience or expertise with operating the technology?* If yes - provide brief details (1-2 lines)
Greenhouse Gases Targeted	*Identify which greenhouse gas(es) this project will target.* *Note: CDM projects must result in a reduction of one of the following greenhouse gases: CO_2/ CH_4/N_2O/HFCs/PCFs/SF_6*
Emission reductions	*Indicate the expected emission reductions that will occur due to the project.* *Note: please provide annual and total emission reductions in tonnes CO2 equivalent*
Baseline & Additionality Assessment	*Provide an indication of the baseline and additionality approach to be used, with a brief explanation of why the project is additional as defined under the Kyoto Protocol.*

Technical Summary of the project	
Monitoring	*Describe the parameters that will be used as performance indicators that will be monitored to verify that emissions reductions are taking place.* *Note: parameters may include emissions output, energy production, energy sales, environmental impacts etc.*
Type of project/activities	*Identify which type of activity is involved in this project - and for each, provide brief details*
a. Energy Supply	*Select if applicable: Renewable Energy (excluding biomass)/ Biomass/ Cogeneration/ Improving energy efficiency by replacing existing equipment/minimization of transport and distribution/ fuel switch/ other* *Provide details (1-2 lines)*
b. Energy Demand	*Select if applicable: Replacement of existing 'household equipment'/ improvement of energy efficiency of existing production equipment/ other* *Provide details (1-2 lines)*
c. Industrial Process	*Provide details (1-2 lines)*
d. Transport	*Select if applicable: More efficient engines for transport/ modal shift/ fuel switch/ other* *Provide details (1-2 lines)*
e. Waste Management	*Select if applicable: Capture of landfill methane emissions/ utilization of waste and waste water emissions/ other* *Provide details (1-2 lines)*
f. Forestry/ land use	*Provide details (1-2 lines)*
g. Other	*Provide details (1-2 lines)*
Project Boundary Define the Project Boundary (Approximately 1 paragraph) Note: a project boundary refers to all emissions which are under the control or directly affected by the project activity. Such a boundary can encompass equipment, processes and process flows.	
Indicate Emissions outside the Project Boundary	*Note: Significant and measurable net emissions of GHG that are attributable to the project outside of the project boundary*

Technical Summary of the project	

Location of the Project	
Province	
Municipality	
Nearest city/large town	
Brief description of the location of the project site	*No more than 3-5 lines*

Project Schedule/Timetable	
Earliest Project Start Date	*Year/month*
When is the expected first year of CER delivery	*Year*
Project Lifetime	*No. Years*
Project End Date	*Year/month*
Crediting Period	*Has a crediting period for the project been identified?* *If yes - which option has been selected (10 years or X times 7 years, with reassessment of baseline for each 7 year renewal?*
Current Status or phase of the project	*Select most applicable:* *Under discussion/ planning/preparation/construction or other actions already commenced/ Other (explain)* *Please provide brief details (1-2 lines)*
DNA Approval	*Has this project been submitted to the DNA for approval previously?* *If yes - provide date of last submission and brief details of the response from the DNA (1 paragraph)* *Provide details of any other official response by the DNA regarding this project*

Project Schedule/Timetable	
Approval by other bodies	*Has this project (or any elements of the project) been submitted to any other national, provincial or local government departments or agencies for regulatory or legal approval (excluding EIA process - see Part C). If so - provide brief details.*

Part C: Performance Against the DNA's Sustainable Development Criteria

South Africa has identified the following sustainable development criteria and indicators against which each CDM project will be assessed. Please provide your interpretation of how this project will address each of these **criteria and indicators** where they are relevant to the project. If the space provided is not sufficient please append additional information as required.

NOTE: For all indicators which are of relevance to the project show how the performance of the project against these indicators can be objectively monitored and measured on an ongoing basis.

1. Economic: Does the project contribute to national economic development?

Please give details (1 paragraph)

2. Social: Does the project contribute to social development in South Africa?

Please give details (1 paragraph)

3. Environmental: Does the project conform to the National Environmental Management Act principles of sustainable development? Please provide **brief** comment for each of these below.	
i) That the **disturbance of ecosystems and loss of biological diversity** are avoided, or where they cannot be avoided, are minimised and remedied	*(1 paragraph)*
ii) That **pollution and degradation of the environment** are avoided, or where they cannot be altogether avoided, are minimised and remedied	*(1 paragraph)*
iii) That the **disturbance of landscapes and sites that constitute the nation's cultural heritage** is avoided, or where it cannot be altogether avoided, is minimised and remedied	*(1 paragraph)*
iv) That **waste is avoided**, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner	*(1 paragraph)*
v) That **the use and exploitation of non-renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource	*(1 paragraph)*
vi) That the **development, use and exploitation of renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource.	*(1 paragraph)*
vii) That **a risk averse and cautious approach** is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions	*(1 paragraph)*

vii) That **negative impacts on the environment and on people's environmental rights** be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied	*(1 paragraph)*
Other comments **Please provide any other comments on how this project contributes to sustainable development in South Africa** (optional)	

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Environmental	Impact on local environmental quality	• Impact of the project on air quality • Impact of the project on water pollution • Impact of the project on the generation or disposal of solid waste • Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic)	Please comment on the impact of the project on local environmental quality. Comment specifically on the indicators of relevance which are given here. (1 paragraph)
	Change in usage of natural resources	• Impact of the project on community access to natural resources • Impact of the project on the sustainability of use of water, minerals or other non renewable natural resources • Impact of the project on the efficiency of resource utilisation	Please comment on the impact of the project on the usage of natural resources. Comment specifically on the indicators of relevance which are given here. (1 paragraph)
	Impacts on biodiversity and ecosystems	• Changes in local or regional biodiversity arising from the project	Please comment on the impact of the project on biodiversity and ecosystems. Comment specifically on the indicators of relevance which are given here. (1 paragraph)

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Economic	Economic impacts	• Impact of the project on foreign exchange requirements • Impact of the project on existing economic activity in the area • Impact of the project on the cost of energy • Impact of the project on foreign direct investment	Please comment on the economic impacts of the project. Comment specifically on the indicators of relevance which are given here. (1 paragraph)
	Appropriate technology transfer	• Positive or negative implications for the transfer of technology to South Africa arising from the project • Impacts of the project on local skills development • Demonstration and replication potential of the project	Please comment on the impacts of the project on appropriate technology transfer. Comment specifically on the indicators of relevance which are given here. (1 paragraph)

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Social	Alignment with national provincial and local development priorities	• How the project is aligned with provincial and national government objectives • How the project is aligned with local developmental objectives • Impact of the project on the provision of, or access to, basic services to the area • Impact of the project on the relocation of communities if applicable • Contribution of the project to a any specific sectoral objectives (for example, renewable energy targets)	Please comment on how the project is aligned with national, provincial and local development priorities. Comment specifically the indicators of relevance to the project which are given here. (1 paragraph)
	Social equity and poverty alleviation	• Impact of the project on employment levels? (specify the number of jobs created/lost; the duration of time employed, distribution of employment opportunities, types of employment, categories of employment changes in terms of skill levels and gender and racial equity) • Impact of the project on community social structures • Impact of the project on social heritage • Impact of the project on the provision of social amenities to the community in which the project is situated • Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes	Please comment on the impact of the project on social equity and poverty alleviation. Comment specifically on the indicators of relevance which are given here. (1 paragraph)

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
General	General Project Acceptability	• Are the distribution of project benefits deemed to be reasonable and fair?	Please comment on whether the benefits occurring from the project due to the contribution of the CDM are reasonable and fair. (1 paragraph)

Part D: Finance

Project Costs	
Development Costs (R's)	
Installed Costs (R's)	
Other Costs (R's)	
Total Project Costs (R's)	
Sources of Finance	
Equity	*Name of Organisation(s) and amount (R's) contributed by each*
Debt (long term)	*Name of organization(s) and amount (R's) for each*
Debt (short term)	*Name of organization(s) and amount (R's) for each*
Amount not identified (R's)	*Amount (R's) and a brief summary of the needs and any outstanding issues (1 paragraph or less)*
Total CDM Contribution sought	*Amount (R's) and a brief summary of the needs and any outstanding issues (1 paragraph or less)*
Expected Price of CER in case of a contract to purchase for: A period of 7 years A period of 10 years A period of 14 years (2x7 years)	 *Price? (R's)* *Price? (R's)* *Price? (R's)*
Indicate the **projected Internal Rate of Return** for the project with and without CER revenues.	*Note: Please indicate assumed price of CER as used in your calculation*

Constraints on tradability of carbon credits	*Have any commercial arrangements been made that may impact the tradability of the carbon emission reductions? If yes, please define.Note. Examples would be subjection to a mortgage, government tax etc.*
Preliminary discussions with potential purchasers	*Have you had any preliminary discussions with any potential purchasers of the carbon credits (CERs)* *If yes, please give brief details.*

(Republic of South Africa, 2004c)

Appendix E

CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

A. General description of project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

SECTION A. General description of project activity

A.1. Title of the project activity:

>>

A.2. Description of the project activity:

>>

A.3. Project participants:

>>

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>

A.4.1.1. Host Party(ies):

>>

A.4.1.2. Region/State/Province etc.:

>>

A.4.1.3. City/Town/Community etc.:

>>

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

>>

A.4.2. Category(ies) of project activity:

>>

A.4.3. Technology to be employed by the project activity:

>>

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

>>

A.4.5. Public funding of the project activity:

>>

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

>>

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

>>

B.3. Description of the sources and gases included in the project boundary:

>>

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>>

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

>>

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	
Data unit:	
Description:	
Source of data used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3. Ex-ante calculation of emission reductions:

>>

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	
Data unit:	
Description:	
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

B.7.2. Description of the monitoring plan:

>>

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

>>

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

C.1.2. Expected operational lifetime of the project activity:

>>

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

C.2.2.2. Length:

>>

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

E.2. Summary of the comments received:

>>

E.3. Report on how due account was taken of any comments received:

>>

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postcode/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last name:	
Middle name:	
First name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal e-mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION

- - - - -

(UNFCCC, 2006)

Appendix F

Interview Guidelines

Carbon Development Mechanism (CDM) as a tool to promote the use of Renewable Energy.

A. Introductory questions.

1. Please introduce yourself and describe your position within your company.
2. What role does your company play in the renewable energy (RE) and CDM arena?
3. What do you understand about the concept of CDM?
4. Do you think it is a complicated process? Why?

B. Policy framework of renewable energies and CDM in South Africa.

5. What policy framework exists for RE in South Africa?
6. Do you feel that the targets set in these policies are realistic?
7. Do you know how these policies were formed?
8. If yes, was this done in a consultative way? Please explain.
9. Regarding South Africa's current RE policies, what are the:
    a) positive effects?
    b) negative effects?
10. How would you estimate the competitiveness of renewable energies in South Africa?
11. What do you think are the main hurdles for RE in South Africa?
12. To what extent do you think the CDM could strengthen the position of RE in South Africa? Discuss.
13. To what extent do you think the CDM is integrated in South Africa's RE policy and is well considered?
14. The DNA is established and Sustainable Development Criteria are formulated.

a) How would you estimate the competitiveness of South Africa on the global CDM market?

b) To what extent will the CDM help to substantially support sustainable development in South Africa?

15. To what extent do you think South Africa's Sustainable Development Criteria are adequate to support the role of RE within the South Africa CDM market?

16. In your perspective, how important is it that CDM have a strong focus on RE projects, rather than purely preventing additional pollution, like energy efficiency projects?

17. Foreign CDM Investment favours "cheap" CDM Projects. Would you say that South Africa should emphasise to develop RE CDM projects (unilateral CDM projects) and sell CERs on the Carbon Market?

18. To what extent do you see a conflict between a progressive RE policy and the CDM competitiveness of South Africa?

C. RE CDM Projects in SA.

19. To what extent have you been involved in RE CDM projects in South Africa?

20. How would you estimate the risks implied in CDM projects?

21. Would you characterize CDM as an economic mechanism? Why / why not?

22. How have the following factors affected CDM:

a) CDM uncertainty after 2012?

b) Transaction costs?

c) Time delay?

d) Additionality?

23. To what extent do you think the general knowledge of CDM amongst RE stakeholders is sufficient in South Africa?

24. What do you think are the main problems for Project Developers / RE Industry who want to take advantage of the CDM?

25. To what extent do you think the CDM will play an essential part to close the viability gap of RE in South Africa?

D. General Questions.

26. Do you think South Africa will have to reduce GHG emission in further commitment periods?

27. Why, in your opinion, has Africa, and in particular, South Africa, not been successful in developing CDM projects thus far?

28. What is your perspective on the issue of developed countries being given a mechanism to purchase carbon credits from developing countries?

29. What would you change about the CDM system if you could, in terms of trading?

a) Locally?

b) Globally?

30. Who do you believe should champion these changes?

31. Do you have any other comments about the general CDM scheme?

32. Why, in your opinion, has CDM worked in SA?

33. Do you think that CDM is:

a. An economistic or ecological approach? Please Explain

b. Technological i.e. a narrow approach or broad? Please Explain

c. Instrumental or communicative process? Please Explain

d. Technocratic i.e. closed or is it democratic, deliberative and open? Please Explain

e. Does it have a National or International approach? Please Explain

f. Is it unitary (hegemonic – power exerted over a dominant group over other groups) or diversifying? Please Explain.

34. How much has changed in the energy sector since the Renewable Energy Policy has been introduced? Please Explain.

35. Other Developing nations have prospered in the CDM field, i.e. China, India and Brazil. Why, in your opinion is SA lagging behind? What is the progress in the implementation of CDM policy and what are the reasons for this state?

Appendix G

SUNDAY INDEPENDENT
Sunday, 11 January 2009, p. 8

SA to get tough on climate

Minister voices concern about developed countries' apathy towards greenhouse gases

ELEANOR MOMBERG

As Japan's space agency prepares to launch a satellite later this month to monitor greenhouse gases around the world, South Africa will be preparing to toughen its stance on global greenhouse gas emission cuts when countries meet to finalise an effective international response to climate change in Copenhagen at the end of the year.

Talks last month to finalise a post-2012 climate change deal ended in disappointment with countries agreeing only to start earnest negotiations this year ahead of the Copenhagen meeting.

At the conclusion of the talks in Poznan, Poland, in December, Marthinus van Schalkwyk, the environmental affairs and tourism minister, stated that South Africa was committed to a deal in Copenhagen. But he remained concerned about the widening gap in trust between developed and developing countries, adding that South Africa was generally disappointed by the lack of leadership from developed countries.

"Rather than coming forward with clear numbers and adopting a range for mid-term emission reduction targets in a timely manner, some developed countries are still playing hide-and-seek with the climate. This is irresponsible," he said.

Developed nations also remained silent in response to detailed G77 and Chinese proposals on technology and finance, and were unwilling to engage in real negotiations on important issues.

Van Schalkwyk was also unhappy that the issue of adequate and predictable funding for adaptation had taken a back seat, saying this was a priority issue for developing countries where livelihoods, human lives, food security and the meeting of other basic needs were threatened by climate change.

The parties had deadlocked in Bali in 2006 over the issue of equity between rich and developing countries – the poorer countries, including South Africa, wanted rich countries to take the lead with ambitious and absolute emission reductions of between 80 percent and 95 percent below 1990 levels by mid-century. But the G8 indicated that they would set mid-term targets only after the 2012 expiry of the Kyoto Protocol.

Last year, the South African government published its long-term mitigation scenario, which outlined an ambitious vision and adopted a proactive and scientifically and economically robust policy framework that would ensure South Africa met the challenges of climate change.

The science shows that an increase in global average temperature above 2°C poses a danger to the poor in particular. To avoid the worst effects of climate change, countries need to limit the temperature increase to 2°C above pre-industrial levels. We are already about 0,7°C above pre-industrial levels.

According to the mitigation scenario it was clear that, without constraints, emissions might quadruple by 2050. This is not sustainable, the government says.

Among the government's goals is a targeted reduction of greenhouse gas emissions, including the setting of limits. The aim is to have emissions peak, plateau and decline. This means emissions must stop increasing by between 2020 and 2025 at the latest, stabilise for up to 10 years and then decline.

Included in the mitigation strategy was the introduction of a carbon tax, diversifying the energy mix away from coal, encouraging the use of renewable energy through feed-in tariffs, exploring and developing carbon capture and storage (CCS) for coal-fired power stations and all coal-to-liquid (CTL) plants, and not approving new coal-fired power stations without carbon-capture readiness.

Loshni Naidoo, manager for governance and sustainability at Ernst and Young, said that, although the government's intentions were sound and the potential benefits of a low-carbon economy were considerable, it was necessary for such a policy to be introduced with some sensitivity.

She questioned whether South Africa, by taking on targets, was setting itself up for a fall and what would happen if the country failed to meet the targets and the attempt precipitated a further slowdown of the economy.

"Could it be as simple as the South African government wanting to do the right thing, or wanting to improve its global status by being acknowledged for daring to take such a step where other nations have failed to do so?" she asked.

Naidoo believed that moving to a low-carbon economy was a risk to economic growth as industry may not be in a position to afford penalties associated with using energy derived from coal. "Production may slow, businesses may close and potential foreign investors may opt to invest elsewhere."

Naidoo stressed that the introduction of a carbon tax must be carefully managed, as there was a temptation for big business to filter the cost down to the consumer. "Carbon taxes on businesses and individuals may result in small to medium businesses shutting down, as this is an additional expense they can ill afford. The individual may have less disposable income, further slowing growth of the economy," she said

One of the biggest challenges is transportation, a substantial contributor of carbon emissions. Naidoo said people would need to re-examine choices made in terms of transport. But, she said, there was a bright side as policy changes introduced by the government presented the country with many opportunities.

"By moving towards a low-carbon economy, industry will need to increase its focus on how it sources and uses energy. This could result in the re-engineering of systems and processes to become more energy-efficient, or the development of new technologies resulting in the expansion of current operations or even attracting foreign investors seeking to be technology leaders," she said.

Industry would require an alternative to coal as its energy source, which would see investment in the research and development of renewable energy sources. "The development of these alternative technologies may make it more affordable to access other sources of energy."

Though the cost of moving to the use of renewables is still prohibitive, policy changes, innovation and economies of scale will assist in making the move to the use of, for example, solar energy in households more cost-effective. Additional spin-offs could be growth in start-up businesses as providers of alternative energy, and the production and invention of low-carbon products.

"Moving to a low-carbon economy is not only the right thing to do, but also an opportunity for economic growth. However, success depends on everyone working together.

"The government has a responsibility to introduce a low-carbon policy in a workable manner with proper support systems, programmes and incentives to ensure it does not become a burden on citizens," she said.

SUNDAY INDEPENDENT
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Sevdet Atic, from the remote mountain village of Subin near the Bosnian town of Srebrenica, breaks ice on a creek that generates electric power for the village from an improvised turbine. Scientists warn that an increase in the global average temperature of more than 2°C could have disastrous consequences PHOTOGRAPH: AMEL EMRIC, AP

(Momberg, 2009)

Appendix H

ENGINEERING NEWS
09 Dec 2011, p.10

MANUFACTURING

Blowing Hot

SA firm starts manufacturing first wind rotor blade

JEAN MCKENZIE | CORRESPONDENT

South African wind turbine manufacturer Isivunguvungu Wind Energy Converter (I-WEC), which recently launched its new blade mould facility in the Cape Town harbour, started manufacturing its first 50 m rotor blade on December 5.

Financial director **Thomas Schaal** said I-WEC would be the first wind turbine manufacturer in South Africa.

At this stage, I-WEC had a single mould to produce rotor blades for 2.5 MW wind turbines. Schaal told *Engineering News* that the mould should be able to produce about 50 sets of rotor blades a year when full production capacity was reached in 2013.

The first blade would take about one month to produce and would be used as a test blade. During this period, a number of equipment and material suppliers would be present to give input in the process, I-WEC facilities and planning engineer **Simon Graaff** said.

The first blade would be tested to confirm that I-WEC's processes were robust and able to produce rotor blades with the ability to withstand the strain they would experience when in use. After the first test blade, Graaff estimated that a single blade would take about two weeks to manufacture from start to finish.

I-WEC said that the design of its wind turbine had been bought under licence from Aerodyne, a German engineering company specialising in the design of large-scale wind turbines.

THOMAS SCHAAL
I-WEC is the first wind turbine manufacturer in South Africa

"Aerodyne is one of the leading companies in the wind energy market worldwide, with a share in the biggest market, China, of more that 65% and more that 13 000 turbines running worldwide based on its design," said I-WEC MD Dr **Michael Kast**.

DCD-Dorbyl, an investor in I-WEC, would be a close partner in the manufacture and assembly of the remainder of the components for the wind turbines.

Schaal said companies in the DCD-Dorbyl group would manufacture the turbine tower and the flanges to bolt the forward tower segments together, and would assist in the assembly of the turbine nacelle. DCD-Dorbyl group companies would also be involved in the transport and erection of the completed turbines. The entire process would, however, be under the umbrella of I-WEC, which would act as project manager. "We certainly have a perfect fit with DCD-Dorbyl, our shareholder," Schaal said.

Initially, the local content of I-WEC wind turbines would be about 60% as components such as the gearbox and castings would need to be imported until there was sufficient capacity in South Africa to produce these. However, Schaal expected that local content would ultimately rise to 85%.

The cost of a turbine produced at the I-WEC facility, including transport, foundation costs and erection on site, was R15-million to R17-million per megawatt.

Currently, the company had an order for six wind turbines for ArcelorMittal's Saldanha steel plant, where the first complete I-WEC wind turbine would be installed in March. I-WEC would also be involved in the management of the Saldanha wind farm.

Schaal also stressed that job creation and skills development were key features of I-WEC's philosophy. The company employs about 30 people, but it would be recruiting another 75 to 100 staff members in the next two years. If it achieves its aim of producing 200 wind turbines a year, I-WEC would create a total of 400 direct jobs, something it hoped would happen in a four- to five-year timeframe.

Graaff said that I-WEC would likely be moving its blade production facility from the Cape Town harbour to Saldanha at the end of 2012 or the beginning of 2013, where the production capacity could potentially be increased.

A property in Saldanha had already been procured and I-WEC's existing staff training facility was already located in the neighbouring town of Vredenburg in anticipation of this move.

(McKenzie, 2011)

Appendix I

DNA

THE SOUTH AFRICAN DNA PROJECT APPROVAL PROCESS

INTRODUCTION

Project approval by the host country is one of the pre-requisites of international registration of a potential CDM project with the UNFCCC and the Kyoto Protocol. Assessment of projects for host country approval is the primary role of the Designated National Authority (DNA). Scope of this approval is limited to assessing the voluntary participation of South Africa in the Clean Development Mechanism (CDM) - and the contribution of projects to the sustainable development of the country.

It should be noted that the assessment of compliance of the project with other eligibility criteria and general rules of the CDM is not carried out by the DNA. That is the job of the Designated Operational Entities (DOEs). The role of the DOEs is not addressed here, but more information on this can be found on the UNFCCC website.

THE DNA FOR SOUTH AFRICA

The DNA for South Africa is located within the Department of Minerals and Energy. It was established in late 2004 and has developed:

- an approval procedure to be followed for evaluating whether a project meets the sustainable development requirements for South Africa in terms of the Kyoto Protocol; and
- a set of sustainable development criteria to be used to guide this evaluation. (The rules of the CDM leave the definition of what sustainable development is as a sovereign decision of each developing country.)

PROJECT APPROVAL PROCEDURE

The project approval procedure followed in South Africa is illustrated in this diagram.

The project developer or owner has two points of entry into the process:

- Voluntary screening: This is done via the submission of a brief Project Identification Note (PIN) and application form to the DNA. This stage is voluntary but provides the DNA with an opportunity to carry out an initial screening of the project and provide feedback to the developer on the likely performance of the project against approval criteria.
- Mandatory submission: All projects will require the submission of a more detailed description of the project via a Project Development Document and application form to receive a letter of approval from the DNA.

VOLUNTARY SCREENING

If the developer chooses initial voluntary screening, then they must submit a project identification note (PIN) and application form to the DNA. The project developer can request:

- a letter of no objection from the DNA;
- comments on the project; or
- the DNA's assistance in project development.

DNA

Alternatively, the project developer can simply provide the DNA with a PIN for information purposes.

Initial evaluation and letter of no objection The DNA, with the support of the advisory committee, will then conduct an initial evaluation of the likely sustainable development impacts of the project against a set of sustainable development criteria.

The DNA will inform the developer of the results of the initial screening within 30 days of submission of the application form and PIN. If the initial screening is favourable and the developer has requested it, the developer will receive a letter of no objection from the DNA. This letter will include a summary of the results of the initial screening of the performance of the project against the abovementioned sustainable development criteria. The letter itself is a statement from the DNA that, on the basis of the information received, the project under preparation does not show any violations with the project approval criteria. The provision by the DNA of this letter shall in no way compromise the opinion, independence or transparency of the DNA when subjecting the project to the later formal evaluation process required for the granting of the formal approval required from the DNA.

Important note: The purpose of the initial screening process and the letter of no objection is to improve the quality of CDM projects and to facilitate contact between prospective partners and investors. In no way do comments provided during this process affect the DNA's decision when subjecting projects to the later formal (mandatory) approval process. Thus, no final approval decision by the DNA is precluded through the issuance of a letter of no objection.

MANDATORY SUBMISSION

The project developer then submits the project details to the DNA in the form of a Project Design Document (PDD). This must be accompanied by a completed application form. Note that the PDD should already have been validated by the Designated Operational Entity at this stage. See the UNFCCC website for further details of the validation process.

The DNA will post the submitted project PDD on this website under Documents for Public Comment. These are posted for public consultation for a period of 30 days. PDD documents will also be made available to any interested parties on request.

The DNA will then evaluate the project on the basis of the information received and included in the PDD and on the comments received during the consultation period. It may ask for supplemental information.

The DNA then sends its recommendation and comments received during the public consultation period to the advisory committee of the DNA for consideration. The committee then submits its comments back to the DNA.

Based on comments from the committee, the DNA makes its final decision on the approval of the project. If successful, the developer will be given a letter of approval. This will be prepared to be signed by the Director General of the Department of Minerals and Energy

- Visit the project design documents currently open for public comment

TIME FRAMES

Project developers will be guaranteed a maximum time for each step of the approval procedure.

- Initial screening: The DNA will provide the project developer who has submitted the PIN with the results of the initial screening within 30 working days of submission of the application form and PIN.
- Final approval: In total, the period between submission of the PDD and receipt of a decision from the DNA should not exceed 45 working days.

APPEALS

Project participants will also have the right to appeal against the final decision taken by the DNA.
In a first step they may appeal the decision with the Minister of Minerals and Energy. The minister will verify the decision taken by the DNA and determine whether it has been produced in accordance with the approval procedures. The Minister will notify the project participants within 60 days of her decision.

Project participants have the right to appeal the determination of the minister before the administrative courts of South Africa.

DNA

GENERAL REGULATORY AUTHORITY

If a project is deemed by the DNA to be contrary to the spirit of the Kyoto Protocol or contrary to the intention of stated government policy, the DNA reserves the right to refuse project approval until such time as suitable alterations are made to the project design.

In such instances clear reasons for the rejection of a project must be provided by the DNA. The DNA will be informed by consideration of the project indicators provided below.

ENVIRONMENTAL IMPACT

Impact on local environmental quality

- Impact of the project on community access to natural resources;
- Impact of the project on water pollution;
- Impact of the project on the generation or disposal of solid waste; and
- Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic).

Change in usage of natural resources

- Impact of the project on community access to natural resources;
- Impact of the project on the sustainability of use of water, minerals or other non-renewable natural resources; and
- Impact of the project on the efficiency of resource utilisation

Impacts on biodiversity and ecosystems

- Changes in local or regional biodiversity arising from the project.

ECONOMIC

Economic impacts

- Impact of the project on foreign exchange requirements;
- Impact of the project on existing economic activity in the area;
- Impact of the project on the cost of energy; and
- Impact of the project on foreign direct investment.

Appropriate technology transfer

- Positive or negative implications for the transfer of technology to South Africa arising from the project;
- Impacts of the project on local skills development; and
- Demonstration and replication potential of the project.