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MBA 2005/6

Accelerating the implementation of the Clean Development Mechanism in South African Industry.

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A research report submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration

November 2006

ABSTRACT

One of the ways the world has responded to the threat of global warming is by drafting the Kyoto Protocol and the associated Clean Development Mechanism (CDM) to reduce greenhouse gases. South Africa is an attractive country for the implementation of industrial CDM projects, yet lags behind many other countries. This research determines the factors that are causing South Africa to lag other developing countries in the implementation of industrial Clean Development Mechanism projects and the interventions that will have the most impact on accelerating the implementation in the future.

The exploratory research process involved semi-structured interviews of 30 experts involved in the South African Clean Development Mechanism process. Data collected from the interviews was analysed using content analysis and then quantitative statistical analysis on the resultant frequency table. Clustering was then performed to create a matrix of influencing factors and develop a framework for required intervention.

The outcome of the research was the South African CDM matrix which orders all factors influencing the implementation of industrial CDM projects into one of four classifications. Depending on the classification, a proposed intervention method was developed in order to accelerate the implementation of industrial CDM projects in South Africa. If implemented, the matrix will allow CDM practioners to develop an implementation strategy for the implementation of CDM projects within South African industry.

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DECLARATION

I declare that this research project is my own, unaided work. It is submitted in partial fulfilment of the requirements of the degree of Master of Business Administration for the Gordon Institute of Business Science (GIBS), University of Pretoria. It has not been submitted before for any degree or examination in any other university.

..... Date: 14 November 2006

Grant Little

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ACKNOWLEDGEMENTS

One uses milestones in one's life to reflect on the journey so far. Completing this research and the MBA program at GIBS was one of those milestones. It was a journey that has developed me and affected many people around me, I trust for the better and that the fruit of this change will be borne for many years to come.

Firstly I'd like to thank my colleagues and the management of Sappi for affording me the opportunity to enrich myself through these studies. In particular thanks to Dinga Mncube, Stuart Christie and Sakkie Pretorius, you have been most supportive.

The various people interviewed for this research. Thank you for your willingness to share your experiences and knowledge; this has really been an accelerated growth experience for me.

My friends and family who have not always seen me, but have always been there over the past few years, you are all stars. Alan thanks for the comments. And who could forget a great bunch of new friends – thanks to my class mates and the faculty of GIBS for a memorable journey.

I was blessed to have an encouraging and involved supervisor. A real "scholar and a gentleman," Tudor Maxwell thank you for your assistance and go well to Australia.

Lastly I'd need to thank the best wife in the world, Elmarie, and the two best sons in the world, Alex and Lloyd. I could not have done this without your support and the Lord Jesus. Thank you for your sacrifices and the constant belief.

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LIST OF ABBREVIATIONS

CDM – Clean Development Mechanism

CER – Certified Emissions Reduction

CO_2 – Carbon Dioxide

CO_2e – CO_2 equivalent

COP – Conference of Parties

DEAT – Department of Environmental Affairs and Tourism

DME – Department of Minerals and Energy

DNA – Designated National Authority

DOE – Designated Operating Entity

DTI – Department of Trade and Industry

DWAF – Department of Water and Forestry

EB – United Nations Executive Board of the UNFCCC (a.k.a. UNEB)

EIA – Environmental Impact Assessment

EUA – European Union Allocation

FDI – Foreign Direct Investment

GHG – Green House Gas/es

IPCC – Intergovernmental Panel on Climate Change

IPP – Independent Power Producer

IRR – Internal Rate of Return

JI – Joint Implementation

JSE – Johannesburg Stock Exchange

MOP – Members of Parties

NBI – National Business Initiative

NERSA – National Energy Regulation Authority of South Africa

NGO – Non-Governmental Organisation

PDD – Project Design Document

ppm – parts per million

SACAN – South African Climate Action Network

SD – Sustainable Development

SWOT – Strengths, Weaknesses, Opportunities and Threats

t CO_2e – tons Carbon Dioxide equivalent

UNEB – see EB

UNEP – United Nations Environment Programme

UNFCCC – United Nations Framework Convention on Climate Change

WBCSD – World Business Council for Sustainable Development

WRI – World Resources Institute

CHAPTER 1 INTRODUCTION TO THE RESEARCH PROBLEM

"One could be forgiven for thinking that, with such a stunning all-round success to point at (Montreal Protocol), the nations of Earth would have jumped at the chance to address climate change using a similar mechanism (Kyoto Protocol). At first there was great enthusiasm for an international treaty to limit emissions of greenhouse gases. So what happened?"

Tim Flannery; The Weather Makers, pp 221

1.1. INTRODUCTION

The animated Disney motion picture, Chicken Little tells of a young chicken that sees the sky falling but no one believes him. He sticks to his story amid doubt and disbelief from family and friends but starts doubting himself. He is finally vindicated and saves the planet from an impending alien invasion and ends as the hero with the maiden and his father's affection. In many respects, scientists, environmentalists and politicians who have advocated the need to address the impact of global warming on the Earth and her people have, until recently, been viewed with much of the same scepticism that Chicken Little faced.

This research seeks to determine the factors that are causing South Africa to lag other developing countries in the implementation of industrial Clean Development Mechanism projects and the interventions that will have the most impact on accelerating the implementation. This chapter will outline the worldwide response to global warming and show that South Africa is an attractive host country for Clean Development Mechanism projects under the Kyoto Protocol. However, South Africa is lagging behind a number of other developing countries in implementing these projects.

1.2. BACKGROUND

One of the primary responses to global warming has been the Kyoto Protocol (United Nations, 1997) which was ratified in 2005. Stemming from 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 (or countries listed in Annex I of the Protocol) to meet their targets set under the Protocol. The potential benefits for non-Annex I countries (or developing countries – i.e. those not listed in Annex I of the Protocol) to participate in the CDM are 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. A carbon credit is unit that represents a verified equivalent of a single ton of carbon dioxide. In terms of the CDM, carbon credits are defined as certified emission reductions (CER's). The Kyoto Protocol has classified South Africa as a non-Annex I country or developing 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 targets by other mechanisms such as emission reduction. CDM projects are projects that reduce the gaseous emissions of carbon dioxide (CO_2) and/or a number of other gases that increase global warming, the so called greenhouse gases (GHG). There are a number of criteria such as contributing to sustainable development and passing additionality tests that projects need to comply with under the Marrakech Accord before they can be registered with the United Nations as a CDM project.

South Africa is an attractive country to host CDM projects (Greene, 2005; Jung, 2006; Greene, 2006) and yet it continues to lag other non-Annex I countries such as India, China, Brazil and even Honduras and Chile in the number of projects that are being implemented (Table 1). As of 9 August 2006 a total of 996 CDM projects had been logged with the United Nations, only 12 were from South Africa (United Nations Environment Programme, 2006). This has often been highlighted in the contemporary press, such as the article, “SA tardy in signing up for carbon credits” (Njobeni, 2006). When comparing a number of other non-Annex I countries, including a few that are considered smaller than South Africa, many have registered more projects than South Africa.

The aim of this research is to determine the factors that are causing South Africa to lag other developing countries in the implementation of industrial Clean Development Mechanism projects and the interventions that will have the most impact on accelerating the implementation. Specifically, non-sink industrial projects will be considered. A non sink project is one that reduces greenhouse gases directly (Jung, 2006) in contrast with a sequestration project which removes or sequesters carbon directly from the atmosphere, such as afforestation or underground storage of concentrated carbon dioxide (South African Climate Action Network – SACAN, 2002; Bond & Dada, 2005). There are both positive or encouraging reasons; such as formal government structures that exist within a fairly stable economy (Greene, 2005; Greene, 2006) and potential cost of energy saving (The Climate Group, 2005) and negative or discouraging reasons; such as CDM being a complex process (World Business Council for Sustainable Development (WBCSD) & World

Resource Institute (WRI), 2001; WBCSD & WRI, 2005; Kamel, 2005) with high transaction costs (Michaelowa, Stronzik, Eckermann and Hunt, 2003) influencing industrial CDM project implementation.

Country	Number of CDM Projects
India	364
Brazil	179
China	120
Mexico	69
Philippines	25
Chile	24
Honduras	19
Malaysia	19
South Korea	15
Ecuador	12
Guatemala	12
Thailand	12
South Africa	12

Table 1: Global CDM project data as of 9 August 2006 (UNEP, 2006)

Popular culture has also shown an interest in global warming with a number of motion pictures being released with global warming and climate change as a key theme. *Day After Tomorrow* (2004); *Ice Age 2* (2005); *Who killed the electric car?* (2005) and *An inconvenient truth* (2006) are four of the better known releases from the previous three years.

1.3. RESEARCH STRUCTURE

In order to address the research aim a structured approach has been adopted. Chapter 2 will examine the existing body of knowledge and review the literature. Emerging from the literature review, Chapter 3 will propose three propositions to

that will address the aim of the research. The methodology that was used is delivered in Chapter 4. The results of the data gathering are presented in Chapter 5 followed by the discussion thereof in the light of the propositions made in Chapter 6. A model to address the aim of the research and the way forward is also presented in Chapter 6. The final chapter, Chapter 7, concludes the research by highlighting its main findings and discussion.

CHAPTER 2 LITERATURE REVIEW

"Over the last century the amount of carbon dioxide in our atmosphere has risen, driven in large part by our usage of fossil fuels, but also by other factors that are related to the rising population and increasing consumption, such as land use change. Coincident with this rise has been an increase in the global average temperature, up by nearly a degree Celsius. If these trends continue, global temperatures could rise by a further one to four degrees by the end of the 21st century, potentially leading to disruptive climate change in many places."

WBCSD; Facts and trends to 2050, pp 3

2.1. INTRODUCTION

Since the middle of the last century, more especially since the 1960's, both the concentration of carbon dioxide (CO_2) and the mean air temperature of the earth's atmosphere have risen steadily (Intergovernmental Panel for Climate Change (IPCC), 2001). According to data from the IPCC Synthesis report (2001) obtained by analysing palaeo-drendritic (analysis of ancient tree rings) and polar ice cores (which trap air when snow falls) the current levels of carbon dioxide, which are now in excess of 350 parts per million (ppm), are higher than any previously measurable data in history of the planet. Greenhouse gases originate from both natural and man-made (or anthropogenic) sources.

There has been much debate in the popular press about the effect that the anthropogenic component contributes to climate change. Even with sceptics such as well known Lomborg (2001) who titled his treatise, *The Skeptical Environmentalist*, agree that the atmosphere is warming, but argue the role that the anthropogenic portion plays. Lomborg also argues for possible other

influences such as sun spot activity and suggests that any potential response to global warming will not be economically practicable. To counter this, Oreskes (2004) shows that among 928 peer reviewed papers published with the keyword "*global climate change*" in the ten year period 1993 to 2003, there was 100% consensus with the IPCC report that global warming is affected by anthropogenic emissions and is not a natural phenomenon. Gore (2006) references this study in his motion picture "*An inconvenient truth*" and further mentions a similar study that was repeated using the popular press and non peer reviewed articles. In that study the split was almost evenly distributed (53% to 47%) which leads to mixed messages in the public domain. This was supported by Angus Reid Consultants (2006) who in a global survey of citizens found that South Africans, Kenyans and Americans were the three countries in the world who had the lowest awareness and perceived seriousness of the impacts of global warming in the world.

2.1.1. GLOBAL RESPONSE

After the success of the Montreal Protocol (United Nations, 1987) to reduce the emissions of ozone depleting substances, the Kyoto Protocol (United Nations, 1997) was drafted in the hopes of achieving similar success with greenhouse gases. The objective of the protocol is the, "*stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system*" (United Nations, 1997: Article 2). As part of the Kyoto Protocol, developed countries (listed in Annex I of the Protocol and therefore referred to as "Annex I" countries) may offset their emissions with developing (non-Annex I) countries. The means for this to occur

is listed in Article 12 of the Protocol (United Nations, 1997) as the Clean Development Mechanism or CDM as it is more commonly referred to. The rules for the CDM were finalised in terms of the Marrakech Accord, after the 7th meeting of the Conference of Parties (COP) in Morocco (United Nations, 2001), and came into effect in February 2005 when the Kyoto Protocol was ratified by the required number of signatories. Nelson (2004) and Jung (2006) both give succinct overviews of these developments and other portions of the Kyoto Protocol in their introductions. Flannery (2005) also expands on some of the issues around the non involvement of the United States of America and Australia. This provides a good insight into the positioning of the Kyoto Protocol in the world at the time of the research and provides an overview to the global situation regarding global warming and responses to it.

2.2. SOUTH AFRICA IS LAGGING IN THE IMPLEMENTATION OF CDM PROJECTS.

Since the CDM became available for non-Annex I countries that were signatories to the Kyoto Protocol, there has been a flurry of activity in registering projects around the world. Almost 1000 projects had been submitted to the United Nations as of 9 August 2006 (UNEP, 2006); Table 1 shows the large number of countries that exceed South Africa's 12 projects at the time of the research. Njobeni (2006), writing in South Africa's leading business daily, Business Day, reiterates this fact when he says, *"(t)he slow takeoff of projects in SA (sic) is puzzling* ….". It is the aim of this research to determine the factors that are causing South Africa to lag other developing countries in the implementation of industrial Clean Development Mechanism projects and the interventions that will have the most impact on accelerating the implementation.

It is necessary to examine both positive factors (to ensure that South Africa is actually a suitable location for CDM projects) and negative factors (to determine possible future courses of action to mitigate or eradicate them and encourage the implementation of CDM projects).

2.2.1. NON-SINK INDUSTRIAL CDM PROJECTS

Due to this research being for a degree in Business Administration, the scope has been limited to investigating non-sink industrial CDM projects only. A non-sink CDM project is a project that does not sequester carbon (i.e. remove – or sink – the carbon from the atmosphere) but rather relies on the reduction or elimination of greenhouse gas (GHG) emissions.

2.2.1.1. INDUSTRIAL PROJECTS

The research has also been limited to industrial projects and excludes factors that are specifically applicable to projects that may be implemented in local governmental structures or communities. Although there may be some synergy between the various projects (such as complexity of the CDM process), some are only applicable to industrial projects (such as business decision making process) or municipal projects (such as the specific legislation for municipalities – viz. Municipal Finance Management Act No. 56 of 2003).

2.2.1.2. NON-SINK PROJECTS

SACAN (2002) and Bond & Dada (2005) make a case for the exclusion of sequestration projects due to scientific significance of sequestration still being under debate. Jung (2006) contends that potential between forestry and non-sink projects is, “quite different” (pp 2174) and that there are, “rather high

uncertainties" (pp 2174) in the forestry projects. She does exclude other forms of sequestration (geological and marine sequestration which have not been approved by the formal UNFCCC Conference of Parties yet) from her position, although these have received coverage in the popular press, as well as recent conferences and seminars in South Africa. Greene (2006) postulates that while there is a case for forestry carbon sequestration projects in South Africa, he also concedes that there are both practical and administrative stumbling blocks in getting these type of projects registered as CDM projects.

2.3. POSITIVE FACTORS

It is important to firstly determine whether South Africa is a suitable location for CDM projects to be developed and that it does not have some fundamental flaw that is precluding projects being developed in the country. Jung (2006) analysed 114 countries that had the potential to host CDM projects. She identified a number of indicators and then performed cluster analysis to identify the most attractive countries for CDM project implementation. In this study, South Africa was identified as a "*very attractive*" potential host country. Other countries identified as very attractive were:

- China
- Argentina
- Thailand
- Mexico
- Indonesia
- India
- Brazil.

A graphical conclusion from Jung is shown as Figure 1 below, with South Africa being the only very attractive country on the continent of Africa.

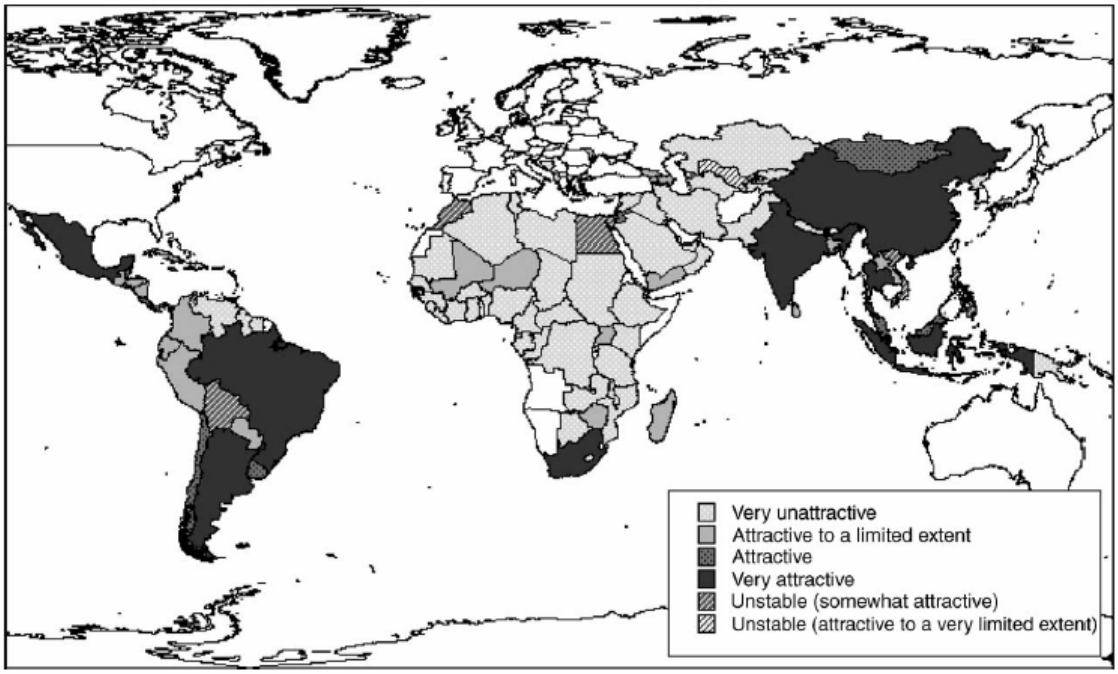

Figure 1: Map of Country attractiveness for CDM projects (from Jung, 2006)

It is interesting to note that from the UNEP (2006) statistics, that of the other "very attractive" countries, only Argentina (9 projects) and Indonesia (10 projects) lag South Africa in number of projects at the time of this research. However countries such as Chile, Ecuador, Guatemala, Honduras, Malaysia, Philippines and South Korea, which Jung does not define as "very attractive", have actually outperformed South Africa. The classifications that Jung ascribes to these countries is summarised in Table 2 below.

A number of factors have been identified in the literature that makes a country attractive for the implementation of a CDM project. These are discussed individually below in no particular rank or order.

Classification	Country
Attractive	Chile
Attractive to a limited extent	Guatemala, Philippines, Malaysia, Ecuador, Honduras
Not classified in paper, but indicated on map as Unstable but somewhat attractive	South Korea

Table 2: Classification of countries exceeding South Africa in CDM implementation (Jung, 2006)

2.3.1. FINANCE AVAILABLE FROM INVESTORS

Of all the literature reviewed, finances is by far the most widely cited of the factors encouraging industry to implement CDM projects. Many authors cite this in a positive frame in their papers (Maruyama, 1999; Nelson, 2004; Greene, 2005; The Climate Group, 2005; Dagoumas, Papagiannis and Dokopoulos, 2006; Ellis, Winkler, Corfee-Morlot and Gagnon-Lebrun, 2007; Greene, 2006; and Jung, 2006). Even SACAN (2002) and Bond and Dada (2005) cite financial investment, rather cynically from a civil society point of view, as the primary reason why industry would be interested in implementing CDM projects. The reasoning is that the availability of finances to industry provides capital for investment into projects that would not have been considered if traditional financial vehicles and instruments (debt and capital) were considered.

2.3.2. INCOME FROM THE SALE OF CARBON CREDITS

There has been a great increase in the number of carbon credits (of Certified Emission Reductions {CER's} to use their correct name) that have been issued by the United Nations. The official CDM pipeline statistics (UNEP, 2006) show an excess of 10 million t CO_2e (tons carbon dioxide equivalent) have been issued to date, with an excess of 1 billion t CO_2e already committed to the end of 2012. The profitability of the CDM for project implementers is addressed and commented on in both positive (Matsushashi, Fujisawa, Mitamura, Momobayashi and Yoshida, 2004) and negative views (Bond and Dada, 2005). The negative view is a civil society caution that industry may exploit the CDM for profit without actually entrenching the principles of sustainable development. A number of other authors also allude to the trade of carbon credits being economically profitable (Greiner and Michaelowa, 2003; Davidson et al., 2003; Greene, 2005; Dagoumas et al., 2006; Jung, 2006 and Ellis et al., 2007) and therefore acts as a positive incentive for CDM project implementation by businesses. Sonneborn (2004) also mentions the sale of carbon credits, but his treatise is aimed specifically at renewable energy projects. Capoor and Ambrosi (2006) evaluated the carbon market at an excess of US$ 21.5 billion at the end of September 2006, having an equivalent of 1,022 billion tCO_2e of carbon credits being available. Almost 21% of this was made up of CDM credits.

2.3.3. TECHNOLOGY TRANSFER

One of the goals of the Kyoto Protocol (United Nations, 1997: Article 10) was to promote technology transfer between Annex I and non-Annex I countries. Spalding-Fecher (2002); Nelson (2004) and Sonneborn (2004) all mention technology transfer as a positive factor influencing CDM. Although the literature

raises the transfer of technologies from developed countries to developing countries as a likely driver of the CDM process, it is the opinion of the author that this is not the case in South Africa. It is also the opinion of the author that this is unlikely to be as large a factor as literature cites as South African industries are fairly technologically advanced in comparison to other developing countries. South Africa has good industrial infrastructure, including being a global leader in the mining sector and the coal to liquid technologies (Sasol). South African industries are also not averse to developing new technologies, such as Eskom's involvement in the pebble bed modular nuclear reactor for electricity generation. This suggests that South Africa should not be logically regarded as a willing recipient of technology when it already views itself as a world leader and equal to many developed countries, despite being classified as a developing country.

2.3.4. CORPORATE GOVERNANCE AND THE ROLE OF STAKEHOLDERS

The influence of corporate governance has become more established within companies following Enron and the publication of national guidelines and legislation such as the King II Report in South Africa and Sarbanes-Oxley Act in the United States. Cogan (2006) highlights the increasing role that stakeholders play in encouraging companies (especially multi national corporations) from implementing suitable measures to respond to climate change (including CDM or other bilateral vehicles). Maxwell (2006) examines the role of the corporate board and their response to climate change. This is possibly driving more businesses in South Africa, especially the multi nationals with operations in Annex I countries with emission caps and those listed on the

Johannesburg Stock Exchange (JSE) and more specifically, the sustainability and social responsibility index (SRI). Linked with corporate governance is also the ability for industry to meet national or voluntary sustainable development criteria. Carbon emissions have become a regular component of corporate sustainability reports (Cogan, 2006).

2.3.5. NATIONAL INFRASTRUCTURE IN PLACE

In order for a company to be able to implement a CDM project, there are a few prerequisites that need to be in place. Jung (2006) lists these as:

- National signatory of the Kyoto Protocol
- Ratification of the Kyoto Protocol
- A national CDM authority (Designated National Authority – DNA) installed “timely”
- A national strategy study on greenhouse gas emissions completed

Spalding-Fecher (2002) and Greene (2006) add the need for sustainable development criteria to these. South Africa has these in place, compared to some of it’s neighbours like Swaziland and Namibia (which do not have a designated national government authority). Davidson, Halsnæs, Huq, Kok, Metz, Sokona and Verhagen (2003) show how *future* climate policies – noting that this paper precedes the CDM – can be used by industry to assist in achieving national and regional development goals. This would be the case in South Africa with renewable energy targets and CDM can certainly assist in achieving other national goals such as environmental, job creation (social) and economic objectives through the national sustainable development criteria.

2.3.6. IMPROVED ENERGY SECURITY & EFFICIENCY IN LARGE EMISSION SOURCES

With over 80% of South Africa's greenhouse gas emissions originating from energy generation (Greene, 2006) it is not surprising that the large industrial emitters would find the CDM an attractive option. Davidson et al. (2003) point out that energy is a major problem in Africa, "more so than anywhere else in the world" (Davidson et al., 2003, pp 106) and the CDM will assist in moving towards future energy security.

2.3.7. POLITICAL STABILITY AND ECONOMIC GROWTH

Greene (2006) highlights the stable political structures and the extended period of economic growth to be creating a prime environment for CDM implementation. He expands on the macro economic policies of national government, physical infrastructure, the *shining example* of a democratic republican government and non-restrictive foreign exchange controls. All of these factors in South Africa encourage foreign investors when compared to some other African nations – such as Zimbabwe.

2.4. NEGATIVE FACTORS

Far more has been written about the negative factors influencing the CDM process than the positive factors, including a guidebook titled, "*CDM PDD Guidebook: Navigating the pitfalls*" (Kamel, 2005).

2.4.1. ADDITIONALITY REQUIREMENTS FOR PROJECTS INDISTINCT

The CDM process relies on three prerequisite elements for the project (over and above the fact that it reduces greenhouse gas emissions) to qualify (United Nations, 1997):

i.) Intentionality – this is an indication that the developer of the project actually *intended* to develop the project for its CDM potential and that the carbon credit component is not just an opportunistic add on after the fact.

ii.) Sustainability – the project must meet the national sustainable development criteria. These will differ from country to country dependent on local requirements.

iii.) Additionality – this is a "criterion for assessing whether a project has resulted in GHG emission reductions or removals in *addition* to what would have occurred in its absence." (World Business Council for Sustainable Development and World Resources Institute, 2004, pp96).

Often projects have difficulty in proving that they are additional, even though they are actually reducing or mitigating greenhouse gas emissions. Kamel (2005) emphasises the need for project developers to explain the project additionality sufficiently, while Greiner and Michaelowa (2003) offer a number of quantifiable methods for defining the investment additionality of a project. Nelson (2004) also mentions the unintended incentive of investors to bypass poorer countries (in this context – those in Africa) in order to minimise their risk and maximise their opportunity. Greene (2005) contends

that the UN Executive Board needs to make the concept of additionality more business friendly to ensure that CDM will be more effective in Africa.

2.4.2. COMPLEXITY OF CDM PROCESS

Linked to the issue of additionality, is the bureaucratic processes and overall complexity of the CDM process, both at an international and national level. The complexity and bureaucracy associated with the United Nations and the CDM is often cited as an obstacle (Maruyama, 1999 and Greene, 2005). Figure 2 (from Spalding-Fecher, 2002) shows a simplified representation of the steps in the CDM process, which even in its simplified form is fairly complex.

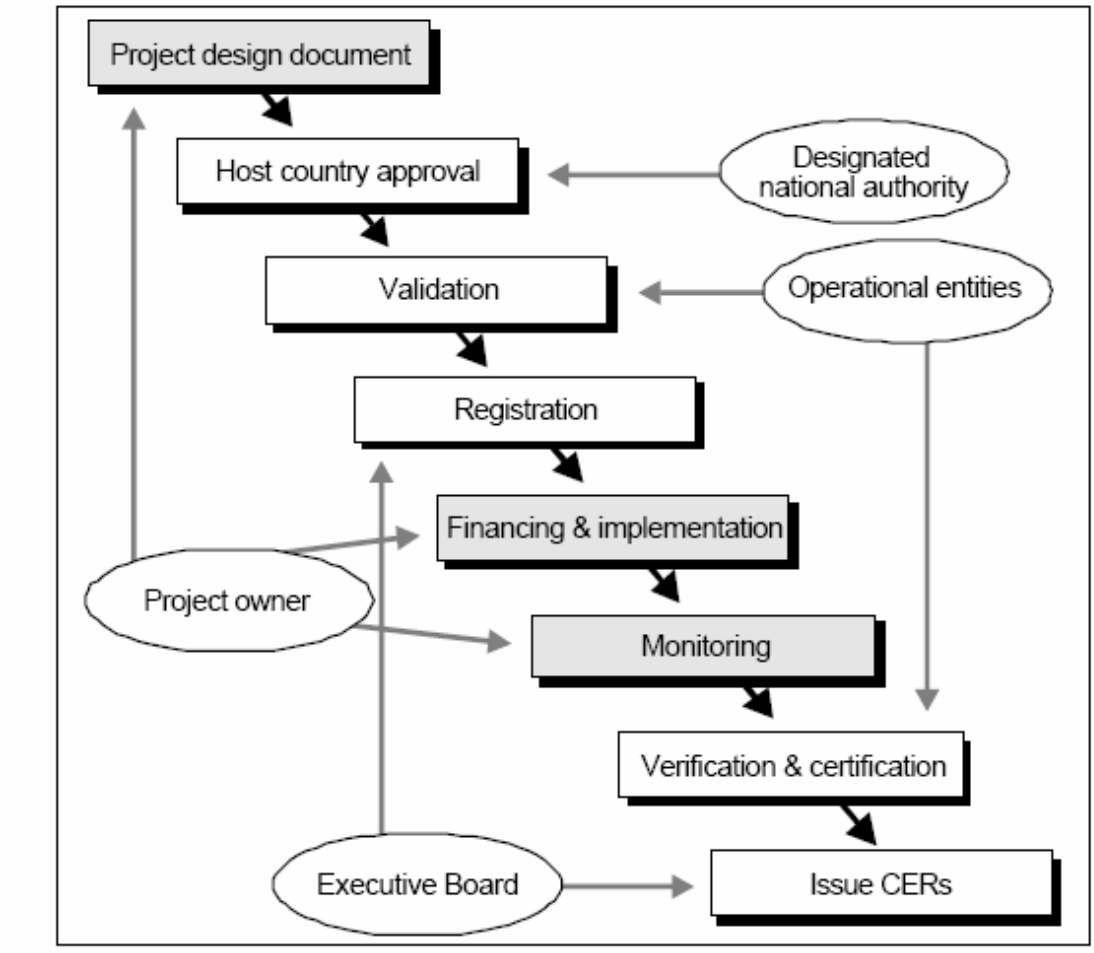

Figure 2: Simplified steps in CDM project cycle (Spalding-Fecher, 2002)

This excludes any actual project design, environmental impact assessments (EIA's), applications as an independent power producer (IPP), construction and commissioning. It can also be argued that apart from the national requirements such as the EIA or IPP, all other countries have identical standards to follow and they are not unique to South Africa.

2.4.3. SCEPTICISM REGARDING THE BENEFITS OF CDM

Although climate change is on the national government's agenda via the South Africa National Climate Change Response Strategy of 2004 (outlined in Greene, 2006) and a National Climate Change Committee (NCCC) has been convened, there still seems to be some reticence in raising climate change to the same priority as poverty alleviation, housing, HIV/AIDS or unemployment. Kim (2003) expounds on this in her paper as the principal barrier to the implementation of CDM projects in South Africa. She notes that some "private sector players" (read industry) (pp 6) appear to be alarmed by the introduction of the CDM into the country as it may be perceived to be a threat to some existing industries, especially in the power generation and coal mining sectors. Apart from scepticism among the business sector, there is a concern that the average South African is also sceptical about the authenticity and certainty of global climate change as a result of human activities (Njobeni, 2006). Many people feel that global climate change is merely a natural phenomenon and part of a greater ecological cycle and a repeat of previous cycles that have occurred during the earth's history. A global survey conducted by Angus Reid Consultants (2006) (pp 3) included a question that showed that South Africa,

along with the United States and Kenya ranked lowest concerning the public perception regarding, "*climate change or global warming due to the Greenhouse effect*". This reduced awareness and perception of the seriousness of the problem could then translate into inaction among decision makers. Non-governmental organisations (NGO's) and civil society in South Africa have also been outspoken in their censure of the CDM process. Bond and Dada (2005) cite a number of examples where they contend that CDM is being used to merely make money for the developers, and not fulfil the aims of sustainable development. The Bisasar Road landfill site project in Durban is a classic example of this. This involved the capture of methane gas from the decomposition at the landfill which was proposed as a CDM project. NGO's contended that the sustainable development criteria, specifically around the stakeholder public participation process and health issues were bypassed in order to gain the money from the sale of carbon credits. A position paper from South African Climate Action Network (SACAN) also cautions against sustainable development goals not being met in CDM projects (SACAN, 2002). These messages and those communicated in the media create scepticism around the CDM and any potential benefits.

2.4.4. HIGH TRANSACTION COSTS

The CDM process has a number of costs involved in a number of the process steps. From Figure 2 above, there are costs involved at the following steps:

Project Design Document (PDD) development. The actual PDD requires many hours of development work from high cost technical experts who understand the CDM process (otherwise this time can be extended even further). These costs

may be in direct personnel costs within an organisation, consultancy fees to a project developer, or a combination thereof. From project experience by the author, these costs are estimated at between €30,000 to €80,000. An unpublished United Nations Development Programme report from May 2006 quoted a figure of US$160,000 for this step (from an interview with Tyler, 2006).

- Methodology development costs. This step is not specifically included in Figure 2, but if no existing United Nations methodology exists for the particular project, a new methodology needs to be developed. From the author's project development experience, a typical consultancy fee for methodology development work will be between €30,000 and €100,000 and takes a minimum of 9 months to an excess of 3 years. The United Nations Executive Board also requires an additional US$1,000 per submission for the evaluation of the proposed methodology by their Methodology Panel.
- Host Country Approval. Currently in South Africa this step does not cost anything. However some other countries do require a fee for this step.
- Validation. This step requires an independent (third party) accredited audit body. The correct terminology is a Designated Operating Entity (DOE). It is similar to an ISO 9001 or ISO 14001 type audit – but focussed on the United Nations Executive Board guidelines. As South Africa only has a single DOE – viz. Price Waterhouse Coopers (PwC), many projects are audited by international firms (such as DNV from Norway, SGS from France and TÜV from Germany). This (from the author's project development experience) adds additional costs between

€5,000 and €15,000 depending on the complexity of the project and technical expertise required by the auditors.

- Registration. The United Nations Executive Board has a fee for registration. This is based on the number of CER's (carbon credits) that will be issued. On a typical medium sized project this will be around €750 to €1,500.
- Implementation. The actual project costs themselves have a huge range dependent on size and scale, from a few thousand to millions of Rand. Capital financing, with its associated costs, is required for this step too.
- Monitoring. After commissioning, the requirements of CDM may require additional monitoring that the developer may not normally have implemented as part of a traditional project. There are costs associated with this, both of equipment and manpower.
- Verification & certification. Once again, an independent accredited audit body (DOE) is required to audit the project. Mostly a different organisation is used to the one that performed the validation, in accordance with the rules of the Kyoto Protocol (United Nations, 1997). These costs are in the region of €4,000 and €10,000.
- Issuance of CER's (carbon credits). The United Nations has an administration fee, and there area also fees from the financial institutions that handle the financial transactions. Any sale agreements (Emission Reduction Purchase Agreement – or ERPA for short) have certain transaction costs and risk factors built in to them which add to the overall costs.

Due to the high costs detailed above, and by inference, projects need to have a fairly large emission reduction to be viable. South Africa's first registered CDM project in Cape Town, the Kuyasa Housing project (Greene, 2005), which installed solar power utilities into low cost housing units; struggled to make any sale of its carbon credits, as the volumes were not economically viable, although it is a model CDM project and has gained international acclaim. Michaelowa et al. (2003) is rather pessimistic when they quote a minimum figure of 50 000 t CO_2 e (or carbon credits) per annum to make a project practically viable. They argue for reduced transaction costs for small scale projects. In many ways, the United Nations has reduced costs for these projects, but all the associated steps (validation, projects finance etc.) remain creating substantial economic barriers. For developing countries to embrace the greenhouse gas emission reduction, Viguier (2004), insists that incentives are provided. The incentives are in essence a mitigation of the current transaction (or economic) costs such as tax incentives. It is the opinion of the author that the figure is closer to between 15,000 to 25,000 t CO_2e in South African industry currently.

2.4.5. PRICE VOLATILITY OF CARBON CREDITS (CER'S)

Since carbon became a tradable commodity on the European Emission Trading Scheme (EU ETS), the price for 1 ton of carbon equivalent has fluctuated from below €10 to over €30 (Figure 3). This volatility has caused project developers to be cautious about the potential financial risks, and only implement marginally unfavourable projects rather than taking larger financial risks (Maruyama, 1999). The low price currently obtainable for forward selling certified emission

reductions (CER's) of between US$3 to US$6 (according to Ellis et al., 2007) is an indication of the volatility of the carbon market causing a conservative pricing structure to reduce buyer risks. In his paper, Viguier (2004) mentions low prices (part of the volatile market) as a cause for suppressing CDM projects.

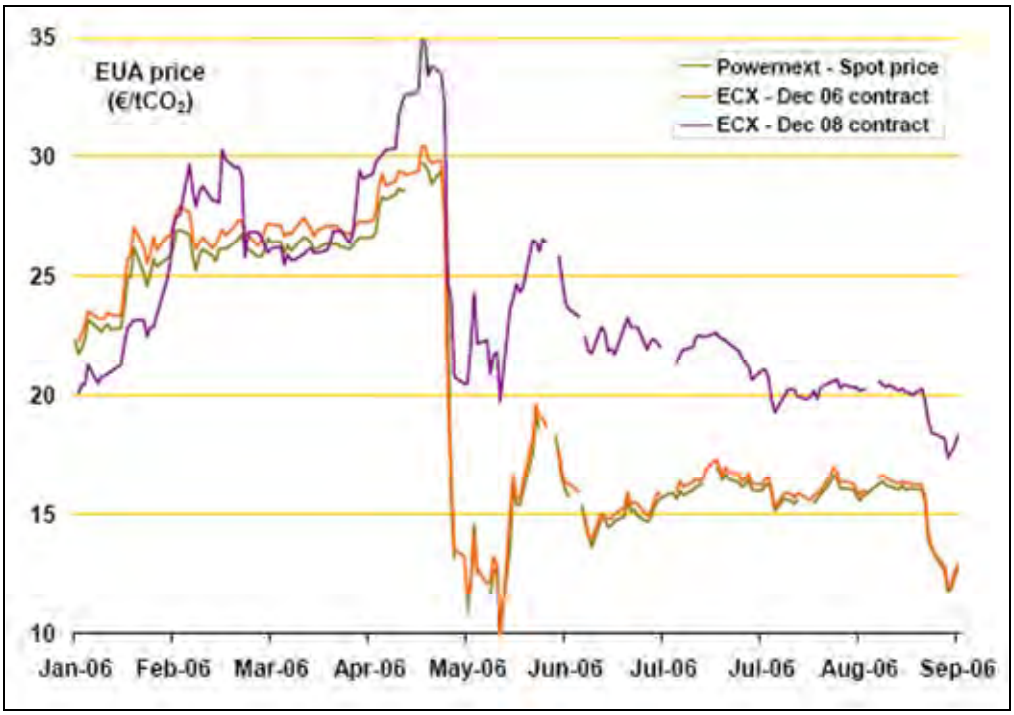

Figure 3: Carbon price in Euro (€) from EU ETS for 2006 to September (Capoor and Ambrosi, 2006)

In Figure 3, the CER prices indicated are as follows:

- Spot price – the price obtainable for selling CER's on the European Union emission trading scheme (EU ETS) the platform that most transaction occur through (Capoor and Ambrosi, 2006).
- Dec 06 contract – these are CER's that have been forward sold (i.e. sold at a specified price to be paid in December 2006). They closely follow the spot price as time draws closer to December 2006.

- Dec 08 contract - these are CER's that have been forward sold (i.e. sold at a specified price to be paid in December 2008). They are consistently higher that then spot price as they will be sold in the second phase of the EU ETS reporting, whereas the allocated European Union Allowances (EUA's) are not transferable. A EUA is equivalent to a CER, but generated in the European Union rather than in a non-Annex-I country.

2.4.6. UNCERTAINTY REGARDING POST-2012 AND THE KYOTO PROTOCOL

The Kyoto Protocol (United Nations, 1997) is only in place until 2012. Thereafter a new mechanism will need to be developed. Greene (2006, p. 13) specifies that, "participants in the CDM market need to move fast if they are to maximize the number of CERs they create by 2012". In his earlier treatise (Greene, 2005) on the whole of Africa, he suggests that the uncertainty regarding post 2012 as being a major obstacle to the entire CDM process.

2.4.7. INEFFECTIVE GOVERNMENT POLICIES AND LEADERSHIP

National development priorities do not match with the objectives of the CDM according to Nelson (2004). This leads to a number of potential CDM projects being overlooked, or not even starting, because of the concerns around national sustainable development targets and other socio-economic issues by the developers. The protracted deregulation of the South African energy market and additional requirements for Independent Power Producers (IPP) and environmental impact assessments (EIA); the possibility of taxation on revenue from certified emission reductions (CERs); a number of government initiatives

such as the National energy efficiency accord, a white paper on renewable energy and new air quality legislation (National Environmental Management: Air Quality Act 39 of 2004) are discussed in detail by Greene (2006), who believes that all of these play a part in slowing South African involvement in CDM projects.

2.4.8. RELATIVELY LOW ENERGY PRICES

The parastatal power utility company, Eskom, apart from being the largest power generator in Africa, also holds a monopoly on power generation in the country (Kim, 2003). Excluding the debate around whether Eskom power is actually cheap due to externalities being excluded from the consumer price, power off the national grid is cheap by global standards (Greene, 2006). Greene (2006, p. 18) continues to mention that this cheap power, “creates a perverse disincentive to investors in clean energy projects”.

2.4.9. LACK OF CDM CAPACITY IN SOUTH AFRICA

Capacity among proponents of CDM in South Africa has grown considerably over the past few years. The lack of sufficient capacity in all the various facets of the CDM process can inhibit the CDM process. A number of capacity building exercises have occurred in South Africa over the past few years from workshops (Greene, 2005) and resources such as Spalding-Fecher’s guidebook (Spalding-Fecher, 2002) and Africapractice’s investors guide (Greene, 2006). Although capacity building plays an important part in accelerating the CDM process, Greene (2005) does warn against an “all talk and no action” mentality that excessive capacity building can bring about.

2.4.10. CONSERVATIVE SOUTH AFRICAN INDUSTRY

Greene (2006) makes mention of a unique issue that is overlooked by all others, but is nonetheless an important issue. He postulates that South African industry is generally more conservative than counterparts in many other countries. He feels that this conservatism to embrace changes is hampering the adoption of CDM in South Africa.

2.5. WAY FORWARD

Although there has been fair amount written on a macro-level as to the future of the Kyoto Protocol post 2012 (e.g. Ellis et al., 2007), this section reviews the authors who dealt specifically with the South African and African context of CDM, viz. Kim (2003); Nelson (2004); Greene (2005) and Greene (2006).

2.5.1. BUSINESS TO TAKE LEADERSHIP ROLE IN CDM

There are more incentives for industry to implement CDM projects than there are for national government to ensure projects are implemented. So by implication, industry needs to be driving this process. Nelson (2004) makes a case that both multinational corporations and the energy sector should be taking a leading role in this process. Industry should drive the process within the framework set by government (in consultation with industry and other stakeholders).

2.5.2. GOVERNMENT TO CLARIFY AND STREAMLINE NATIONAL CDM PROCESS

Presupposing for the purposes of this research that the external (international) CDM related processes (such as the workings of the Conference of Parties/Meeting of Parties {COP/MOP} and United Nations Executive Board) are excluded from the debate. In addition to the knowledge that these are unvarying for all developing (non-Annex I) countries participating in the CDM process. The remaining processes that South Africa can control are those national requirements, such as requirements from the Designated National Authority (DNA), possible taxation and sustainable development criteria. Maruyama (1999) makes a case for national government to support potential CDM projects through the domestic policies that eliminate any barriers. He also expands this to include any potential trade implications (such as tax and foreign investment barriers). Kim (2003) reiterates the need for policies that encourages closing the gap between potential investors and project developers.

2.5.3. FORMAL STRUCTURES TO BE IMPLEMENTED TO FACILITATE COMMUNICATION BETWEEN STAKEHOLDERS

Communication is fundamental to many multi stakeholder processes, and the CDM process is no different in this regard. Maruyama (1999) in his appeal for government polices to support CDM processes, calls for government to begin the process by working with industry to understand their behaviours around investments. Nelson (2004) also points out that the various stakeholders need to communicate in order to take maximum advantage of the opportunities that exist with the CDM. Greene (2006) contends that there has been ample communication between government and industry in institutions such as Business Unity South Africa (BUSA) and the National Economic Development

and Labour Council (NEDLAC). However, Kim (2003) argues that the amount of communication remains insufficient.

2.5.4. INCREASED CAPACITY BUILDING ACROSS THE CDM PROCESS

There has been a marked increase in the number of people involved in the extended CDM *supply chain* over the past few years in South Africa. There have also been numerous capacity building exercises in South Africa over the past few years (Greene, 2005). Greene, in the same treatise, warns against excessive capacity building leading to an "all talk and no action" situation. However, there is an apparent lack of capacity in some key areas of the country currently.

2.5.5. LOCAL SUCCESS STORIES

The adage goes, "*nothing breeds success, like success*" From a purely common sense point of view, the author contends that not having any successful projects for business to observe and compare is limiting involvement in the process. It is the opinion of the author that as successful CDM projects are implemented by South African industries, they will act as a catalyst to promote additional projects. The word "successful" is defined from a triple-bottom line perspective with real benefits being displayed on the companies' financials and sustainable development objectives. It is however the contention of the author that for CDM to become entrenched in industry, it needs to be a core business objective and not merely an "add-on" for publicity or goodwill.

2.6. CONCLUSION

Much has been written about global warming and the business response to it. Much of the research examined was generic and covered universal issues such as additionality pitfalls (Kamel, 2005); high transaction costs of the Kyoto mechanisms (Michaelowa et al., 2003), complexity of the CDM process (Spalding-Fecher, 2002) and price volatility of the carbon market (Ellis et al., 2007). There are very few reports that specifically address South African conditions, Spalding-Fecher (2002), Kim (2003) and Greene (2006) being the exceptions.

No specific literature exists covering the research question, but there is sufficient evidence that there is a gap in the current knowledge set regarding the implementation of CDM projects in South African industry. Greene (2006) alludes to this in his conclusions and expects a dramatic increase in future South African CDM projects. A need also exists when the CDM performance of comparable developing countries (Table 1) is examined. The research will add to the knowledge regarding the implementation of industrial CDM projects in South Africa to assist in addressing this gap.

CHAPTER 3 PROPOSITIONS

"If we decide to act, we will need to reduce carbon emissions across the whole global economy. Fortunately, we have the tools to do this, especially if we think in terms of 50-year campaigns, not instant solutions"
Prof Robert Socolow, Princeton Carbon Mitigation Initiative

3.1. PURPOSE OF THE RESEARCH

This research seeks to determine the factors that are causing South Africa to lag other developing countries in the implementation of industrial Clean Development Mechanism projects and the interventions that will have the most impact on accelerating the implementation. Based on the literature review, the following propositions have been formulated.

3.2. PROPOSITION 1

Proposition 1: The following factors encourage industrial CDM project implementation in South African industry:

- Finance is available for CDM projects utilising instruments that are not available for traditional project finance (Maruyama, 1999; Nelson, 2004; Greene, 2005; The Climate Group, 2005; Dagoumas, Papagiannis and Dokopoulos, 2006; Ellis, Winkler, Corfee-Morlot and Gagnon-Lebrun, 2007; Greene, 2006; and Jung, 2006),
- CDM projects are capable of generating income for industry through the sale of carbon credits in addition to any savings or income of the project itself (e.g. power savings through energy efficiency) (Greiner and Michaelowa, 2003; Davidson et al., 2003; Matsushashi, Fujisawa, Mitamura,

Momobayashi and Yoshida, 2004; Greene, 2005; Dagoumas et al., 2006; Jung, 2006 and Ellis et al., 2007),

- The CDM allows for knowledge & technology transfer to occur between Annex I (developed) & non-Annex I (developing) countries enabling industry to reduce the risk of using "new" technologies and import technologies that they may not have under the business as usual scenario (Spalding-Fecher, 2002; Nelson, 2004 and Sonneborn, 2004),
- Improved corporate governance is resulting in more stakeholder driven pressures and requirements for industry to implement projects to reduce greenhouse gases (Cogan, 2006 and Maxwell, 2006),
- South Africa has a favourable infrastructure (including transport networks, telecommunications, workforce skills etc.) in place that facilitates the implementation of industrial CDM projects (Spalding-Fecher, 2002; Jung, 2006 and Greene, 2006),
- The necessity for energy security and rising energy costs is driving industry to implement CDM projects (Davidson et al. 2003 and Greene, 2006),
- Political stability and economic growth offer investor confidence for CDM projects (Greene, 2006).

3.3. PROPOSITION 2

Proposition 2: The following factors discourage CDM project development in South African industry:

- United Nations requirements for additionality for projects are difficult to determine and consequently discourage some projects being implemented (Greiner and Michaelowa, 2003 and Kamel, 2005),

- Processes in the CDM are very bureaucratic and complex, discouraging potential project developers from making an effort to implement an industrial CDM project (Maruyama, 1999; Spalding-Fecher, 2002 and Greene, 2006),
- Scepticism exists regarding the benefits of CDM projects leading South African developers to have reservations regarding implementing projects (Kim, 2003 and Bond and Dada, 2005),
- The transaction costs required to implement a CDM project are considered prohibitively high in comparison to any potential benefits (Viguier, 2004 and Greene, 2005),
- The volatility of carbon credit market and price fluctuations increases payback risks for projects (Ellis et al., 2007),
- Uncertainty on the validity of CDM post 2012 when the Kyoto Protocol expires increases the medium to long term risk and decreases any potential project payback period (Greene, 2005 and Greene, 2006),
- Government policies (such as EIA requirements) and their inefficient implementation, hinder CDM implementation and growth rather than facilitating the implementation of industrial CDM projects (Nelson, 2004),
- Relatively low local industrial electricity costs discourage industry from implementing costly projects to save electricity (Kim, 2003 and Greene, 2006),
- Lack of local technical capacity in the various fields required to implement CDM projects (Greene, 2006),

- South African business has a conservative approach which does not encourage implementation of non-core business initiatives such as CDM projects (Greene, 2006).

3.4. PROPOSITION 3

Proposition 3: The following interventions will accelerate the implementation of CDM in South African industry:

- Business to take the leadership and drive CDM in South Africa (Nelson, 2004),
- A post-2012 CDM strategy is identified and finalised so that stakeholders know the implications of both the current dispensation (until 2012) and any possible future scenarios,
- The national CDM processes need to be streamlined by government to facilitate project implementation (Maruyama, 1999 and Kim, 2003),
- Formal structures to facilitate communication between stakeholders to prevent a silo mindset in knowledge and capacity (Maruyama, 1999; Kim, 2003; Nelson, 2004 and Greene, 2006),
- CDM specific capacity building to be increased (Greene, 2005),
- Successful industrial CDM projects are required to encourage further project activity.

CHAPTER 4 RESEARCH METHODOLOGY

"… it is time to start exploring alternatives. Global warming is too important to simply rely on the hope that somehow a new solution will emerge; and too important simply to rely on the goodwill of the United States (…) The well-being of the entire planet is at stake."

Joseph E. Stiglitz; A new agenda for Global Warming

4.1. Introduction

The research sought to ascertain the various factors at play that influence South African industries both positively and negatively when considering implementing projects under the United Nations Clean Development Mechanism. This was done in order that the positive factors could be highlighted in future project proposals and the negative factors could be clearly identified and mitigated by project developers and develop interventions that would have the most impact on accelerating the implementation of these projects.

The research methodology used was based on exploratory research techniques (Welman and Kruger, 2001) with particular emphasis on semi-structured interviews of subject experts (Welman and Kruger, 2001; Fontana and Frey, 2005).

Although research has been done on the broader subject of climate change and potential carbon based projects (under either the Clean Development Mechanism or other bilateral agreements) in South Africa (SACAN, 2002; Spalding-Fecher, 2002; Bond and Dada, 2005; Greene, 2006; Jung, 2006), no research has been conducted specifically looking at the aspects supporting or

restricting the implementation of Clean Development Mechanism projects within South African industry. Welman and Kruger (2001) support the use of exploratory research in an area that has comparatively little established theory or research findings available.

4.2. Population and Sampling

4.2.1. POPULATION OF RELEVANCE

The population of relevance was defined as the various individual stakeholders involved in the industrial CDM process in South Africa. The stakeholders were divided into five broad categories namely industry, project developers, government, policy developers and support catalysts. The population was limited to people within these stakeholder groups that were involved in the CDM process in South African industry.

The primary method of sampling was non-probability, purposive judgemental sampling (Welman & Kruger, 2001; Albright, Winston and Zappe, 2003). Within the industrial environmental management field, key stakeholders in the various categories were identified and approached to participate in the research. A few stakeholders kindly suggested additional potential stakeholders that would be value-adding to the research topic and may be willing to participate. This then lead to a further sampling method of snowball sampling (Welman & Kruger, 2001) to complete the list of stakeholders.

4.2.2. SAMPLE

A number of leading experts in each of the categories were interviewed during a twelve week period from June 2006 to August 2006. A total of 30 interviews were conducted during this time period. The interviews occurred in Gauteng, Western Cape and KwaZulu Natal. During the period that the interviews were conducted and the network of potential CDM subject experts were being formed, the same names continued to be suggested as potential inclusions in the sample population. Of the list of 44 names on the network database that was developed, 30 people were interviewed. Of those that were not interviewed, most had kindly provided an equally suitable alternative candidate (e.g. Ms Wendy Poulton of Eskom referred the researcher to her colleague Ms Mandy Rambharos who is involved in the identification and implementation of CDM projects), or were part of a sufficiently large sub group (such as industry or project developers) or were not contactable by the author during the period of the data collection. This suggests that adequate inclusions from the number of experts had been achieved and that the sample was acceptable for the research to be consequential.

4.2.3. DATA COLLECTION (INTERVIEWS)

The interviews were conducted in two parts as described in Fontana and Frey (2005), with the first portion being a classical semi-structured interview (Fontana and Frey, 2005) using the descriptive guideline and introducing the questions to the interviewed stakeholder (Appendix I). The second portion occurred once this was completed and the interviewed stakeholder concluded their remarks. Fontana and Frey (2005) outline a reactionary phase whereby the author posed factors to the interviewed stakeholder that had been sourced either from the

literature review, or other interviewed stakeholders. The intent was to elicit views that had either been omitted by the stakeholder, or raise opposing viewpoints (e.g. the viewpoint that government capacity was lacking was raised to government stakeholders in order for them to comment and gain their perspective). The interviews were neither recorded nor transcribed, however copious notes were taken for analysis by the author, who conducted all interviews personally.

Although the majority of interviews were conducted face to face, it was not logistically possible to meet in person with all the stakeholders. Consequently three of the interviews (those of Messrs Raubenheimer, Tyani and Spalding-Fecher) were conducted telephonically. Although not ideal, Welman and Kruger (2001) and Henning (2004) allow for the possibility of using telephone interviews, the primary benefit being a cost saving. The final interview with Ms Tyani was telephonic, although this was the culmination of many short face to face meetings, emails and telephone calls.

Finally, three of the respondents (Messrs Muller, Ndebele and Terblanche), preferred to exchange views via email using a similar format of primary response followed by a secondary reaction to a reply from the researcher. Henning (2004) cautions that personal interviews are superior in this research, followed by telephonic and finally written (electronic email included) responses. The discounting of the 3 email interviews was assessed and the interviewees were from industry proponents and the value of their replies was considered

acceptable in a value based comparison with other replies already received by the author.

4.3. DATA ANALYSIS

The data from the interviews was then analysed from the author's interview notes. Content analysis (Welman and Kruger, 2001; Henning, 2004) was performed to extract the main ideas and opinions of the stakeholders. As far as possible personal statements and the views of the group they represented were identified and separated (Fontana & Frey, 2005). Stakeholders were initially divided into one of five groupings depending on their area of expertise and primary involvement in the CDM process (Table 3). The five groupings were:

- **Industry** – This group was representative of industrial (in terms of the research this was limited to manufacturing industries that emitted greenhouse gases from their operations) companies who had already had some experience with the Clean Development Mechanism, no matter how limited. Representatives were all employees in the companies that had CDM experience.
- **Government** – This group included government officials from both the official Clean Development Mechanism structures – viz. the Designated National Authority (DNA) and other departments that both served on the inter-ministerial oversight committee and had legislative function and responsibility in relation to some aspect of the Clean Development Mechanism process.

- **Policy Makers** –This group comprised individuals who had been part of the processes within South Africa and were, or had been, involved with setting of policy and giving direction to the government. Many had been instrumental in delivering international capacity building (e.g. World Bank, United Nations and Shell) or policy development for government department on aspects such as sustainable development criteria or the formal Clean Development Mechanism processes adopted by the government.
- **Project Developers** – This group comprised primarily consultants whose source of income and primary business focus is in the identification of opportunities for Clean Development Mechanism projects and implementation thereof. Their revenue is derived from various financing options available around the delivery and sale of carbon credits. Many are also involved with other industrial environmental projects to supplement their CDM work (due partly to the lack of projects currently in South Africa as identified in the problem statement).
- **Supporting Catalysts** – This group comprised people actively involved in the Clean Development Mechanism process, but from a support perspective. They do not have direct ownership of the project, but are critical to the successful implementation of many projects in the country. They include:

- the only registered Designated Operating Entity (DOE) or body certified to conduct validation and verification audits for the United Nations Executive Board (EB).
- Financial institutions that have structured packages for developers or industry to access finance for Clean Development Mechanism projects.
- Business support non governmental organisation (NGO).
- Environmental lawyers specialising in CDM implications.

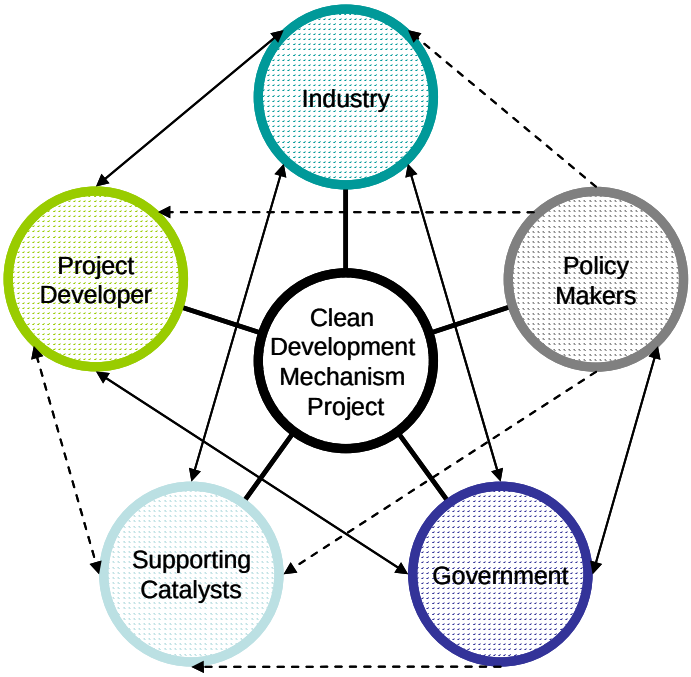

Figure 4: Relationships between stakeholder groups within the CDM process

These stakeholder groups are presented above (Figure 4) in a diagrammatic representation of their role in the CDM process. Solid lines indicate a direct two way interaction between the stakeholder groups (or the implementation process of a CDM project). A dashed line indicates a flow of information or a dependence or indirect relationship between the parties.

Stakeholder Group	Stakeholders interviewed
Industry	Dr Stuart Christie Mr Hannes Meyer Mr Eugene Muller Mr Pancho Ndebele Ms Mandy Rambharos Ms Ciska Terblanche Mr Sakkie van der Westhuizen
Government	Mr Masupha Mathenjwa Mr Leluma Matooane Ms Shirley Moroka Ms Lwazikazi Tyani
Policy Makers	Mr Michael Goldblatt Mr Stefan Raubenheimer Dr Bob Scholes Mr Randall Spalding-Fecher Dr Harald Winkler Mr Richard Worthington
Project Developers	Mr Gerrit Kornelius Mr Robbie Louw Mr Johan Posthumus Mr Henk Sa Dr Geoff Stiles Ms Emily Tyler Adv Johan van den Berg Mr Chris Whyte
Supporting Catalysts	Mr Andrew Gilder Mr Hugh Hawarden Ms Harmke Immink Mr Kumesh Naidoo Ms Jacqueline Obando

Table 3: Interviewed stakeholders by stakeholder grouping.

Each of the interviewed stakeholders were assigned to one of the five categories. There was a spread of respondents in each category (Table 3). The résumés of each interviewed stakeholder are presented in Appendix III which gives insight into each respondent's involvement in the CDM process within South Africa. Their responses were transposed from the interview notes into a spreadsheet in the format of a frequency table for systematic ranking and comparative analysis between the stakeholder groupings. The analysis was a rigorous approach for the examination of qualitative content analysis notes and data.

A five point systematic scoring scale (Welman and Kruger, 2001, pp 150 – 152) was used by the author to convert the stakeholder's comments into a numerical representation of an issue, depending on the frequency or emphasis imparted by the interviewed stakeholder. This rigorous systematic methodology was then validated by checking with seven of the respondents for consistency between their intentions and the author's interpretation. This was done to minimise any researcher bias (Daft, 2001 and Henning, 2004) and ensure that the quantification of the qualitative data was an accurate representation of the interviews. Further analysis was then performed using box plots of the issues and stakeholder groups. Finally, clustering of the issues using a method documented by Goldratt (1994) was performed to establish a core of major, macro level issues that are core to the research.

4.4. ADDITIONAL DIALOGUES CONSIDERED

During the research and data gathering phases, a number of other dialogues occurred that have been considered in the development of this research and used in drawing some of the discussion in this document.

4.4.1. CDM PROJECT DEVELOPMENT

During the research, the author was actively involved in the development and registration of a CDM project within Sappi Kraft (Pty) Ltd at the Tugela pulp and paper mill, located on the northern KwaZulu Natal coast. The project was a fuel switch project, replacing coal with biomass and thereby reducing fossil fuel based emissions. This personal experience proved extremely useful in both intimately understanding the CDM process and building a network of stakeholders to interview.

4.4.2. NATIONAL WORKSHOPS AND CAPCITY BUILDING SESSIONS

There have been a number of national workshops and missions that have been attended by the author as an invited participant. Once again, these have been useful in understanding the CDM process and its frustrations within South Africa and some of the capacity building that has occurred. They also contributed to network building and having access to the views of numerous international climate change experts.

4.4.3. VIEWS FROM UNITED STATES OF AMERICA

The GIBS MBA included a study tour to the eastern seaboard of the USA. This included interviews with a number of people involved in the field of climate change and environmental protection. There were in five main categories:

- **Massachusetts Department of Environmental Affairs –** Phil Griffith (Chief of Staff) and David Cash (Director of Air, Energy & Waste Policy) – discussions on state legislation and initiatives. Some insight into the political issues around the USA's not ratification of the Kyoto Protocol and likely future development at State level.
- **Graduate students –** Student members of Net Impact, a social and environmentally focussed student network of business school students and professionals were interviewed at Columbia University, Harvard Business School, Kennedy School of Government and a professional chapter in Boston. They gave insight into the academic debates on sustainable development within the USA.
- **Regional Greenhouse Gas Initiative (RGGI) –** This is the emission mitigation instrument that has been adopted and implemented by the New England states to address global warming. Sonia Hamel (Technical Advisor) was interviewed regarding the developments in the USA in comparison to the Kyoto mechanisms.
- **Massachusetts Institute of Technology (MIT) Joint program on the Science and Policy of Climate Change –** meetings were held with Dr John Reilly (an agricultural economist specifically interested in climate policy and economics); Prof Ronald Prinn (leading the global climate change model development and scientific research); Jaemin Song

(Doctoral student reading her PhD on developing country participation in global climate change agreements) and Dr Denny Ellerman (an economist with specific interests in emission trading and energy economics). MIT develops a lot of research into global warming and climate change. Much of their research focus is economic, and not merely the science of climate change.

- **Industrial representatives reducing emissions –** Two Sappi employees involved with reducing greenhouse gas emissions in Maine.

4.5. LIMITATIONS

As with any research, there are limitations that exist with the body of work.

- Being exploratory research in the researcher's field of work, Henning (2004) and Daft (2001) both warn against potential bias of the researcher who has a vested interest and own opinion being expressed in the research. This was guarded against in the data collection by using non-leading questions and allowing the interviewed stakeholders to raise their point of view. The choice of stakeholder group was selected to represent as many possible points of view as possible. Feedback was also obtained from some respondents to ensure that researcher bias was lessened. Finally, as much as possible, the researcher attempted to have no bring his own preconceived ideas and opinions into the research, but relied on the respondents feedback and data analysis to establish the findings.
- The research is focussed on South Africa and is therefore not directly reproducible in any other country. However, it could well be used as a

framework for research in other countries, providing the literature is customised to that country.

- At the time that the research was conducted, South Africa was lagging behind in the implementation CDM, but there were signs that the trend may have reversed.
- Only practioners were interviewed from industry, no senior managers or decision makers were interviewed. Some of the findings regarding the conservative nature or reasons for CDM not receiving support may therefore be speculative.

CHAPTER 5 RESULTS

"There are even those who argue that the world can have its cake and eat it too, by which they mean that we can burn all of our fossil fuel and still avoid climate change. … It is now time to examine how industry envisages that our cake might be both eaten and kept, without leaving us holding a plateful of dung."
Tim Flannery; The Weather Makers, pp 248

5.1. STRUCTURE OF DATA ANALYSIS

This chapter will present the results obtained from the interviews. It follows the structure employed in the analysis of the data, which entailed the following steps:

- Content analysis of stakeholder responses (Welman and Kruger, 2001; Henning, 2004),
- Ranking and clustering of issues (Goldratt, 1994),
- Quantification and descriptive statistics of interview data by application of a rigorous, systematic methodology.

5.1.1. ANALYSIS OF INTERVIEW NOTES

The interview notes were read and further notes and clarifications made by the author as part of the content analysis (Welman and Kruger, 2001; Henning, 2004). Issues identified were transposed from the interview notes into a spreadsheet, a total of 56 issues were identified in this phase. Fontana and Frey (2005) refer to the possibility of quantifying qualitative data from interviews. A systematic scoring scale was then developed and used to convert the stakeholder's responses and comments into a numerical representation,

dependent on the relative emphasis given and frequency of reference during the interviews (Table 4). If an issue was not mentioned, a null value (blank) was used, instead of an arbitrary or neutral value being assigned. Issues mentioned with words like, “important”, “significant”, “major”, “central”, “key” and “main” or synonyms were rated with a score of “1” or “5”, depending on context. Issues that received a high relative frequency of mention in each interview were also given a similar score. Each respondent raised an average of 31.87 issues (out of 56). This was felt to be representative for the type of interviews conducted.

To ensure accuracy and to minimise any bias (Daft, 2001 and Henning, 2004) or misrepresentation, seven stakeholders were asked to validate the numerical interpretation. The stakeholders approached were Messrs Christie, Goldblatt, Hawarden, Louw, Posthumus, Sa and van der Westhuizen. This was 23% of the total sample. The feedback confirmed that there was an acceptable representation of the interpretation. Five of the seven stakeholders required no changes, and the remaining two made suggestions that indicated there was no need to make any changes to the data interpretation from the content analysis. The methodology was rigorously and systematically applied to ensure consistency in the quantification of the stakeholder’s responses after the content analysis.

Value	Ranking criterion
1	A large discouraging factor
2	Somewhat discouraging
3	Neutral towards issue (i.e. neither encouraging or discouraging)
4	Somewhat encouraging
5	A large encouraging factor
Blank / null value	Issue was not mentioned

Table 4: Systematic five point scale and ranking criterion used for the systematic data quantification.

5.2. DESCRIPTIVE STATISTICS OF THE QUALITATIVE DATA

Once the appropriate scores had been recorded, a visual quality assessment of the graphical representation of the data was performed to verify that no outlying or spurious data was present. Basic descriptive statistical analysis was then performed in order to get preliminary results from the data. The following terms were calculated:

- Count – a numerical integer count of the number of respondents that mentioned an issue. This gave an indication of the significance of the issue within the population of relevance that was sampled.
- Mean – an average of the scores recorded. This gave an indication if the issue was of significance to all the stakeholders that mentioned it (a high or low score). It needed to be looked at in conjunction with the standard deviation to be fully interpreted.
- Standard Deviation – a measure of the spread of scores within an issue. This gave an indication of the level of agreement or disagreement of the respondents who mentioned an issue.

All of the descriptive statistics were performed using Microsoft Excel 2003. The results of this stage are presented in Appendix II.

5.2.1. DESCRIPTIVE STATISTICS - COUNT

The issues most frequently raised by the stakeholders are listed in Table 5. This gave an indication of the importance of an issue across the stakeholders interviewed. A number of issues were raised by almost all the respondents. A few of the factors in Table 5 can be considered factors positively promoting CDM in South African industry evidenced by a high mean (>4), a low standard deviation and also from the positive and negative counts in Appendix II.

However the majority of factors listed are either negative (i.e. low mean - <2) or have some apparent discrepancy (high standard deviation) which indicates that not all stakeholder groups concurred on the issue.

	Issue	Count	Mean	SD
1	Potential for renewable & energy efficiency	29	4.6	0.50
2	Govt Leadership	28	2.5	1.29
3	Post 2012 uncertainty	28	1.5	0.79
4	CDM capacity in SA	27	2.7	1.46
5	DNA effectiveness in promoting CDM	26	2.2	1.01
6	Industry understanding of CDM process	26	1.3	0.45
7	Govt capacity	25	2.4	1.08
8	Silos in capacity	25	1.6	0.87
9	Lack of awareness of CDM process	25	1.5	0.51
10	Govt guidance	25	2.0	1.21
11	Business priorities elsewhere (not CDM) / talk no action	24	1.4	0.49
12	Large emitters	24	4.8	0.41
13	Industry leadership	24	2.3	1.37
14	Complexity of CDM process	23	1.5	0.59
15	Industry capex (economic) focus	23	1.6	0.72
16	Bureaucratic process	22	1.4	0.50
17	Additionality	21	1.6	0.86
18	Govt:Industry cooperation	20	2.1	0.94
19	"Cheap" coal power	20	1.5	0.69
20	Methodology applicability to SA	20	1.9	0.93

Table 5: Top 20 issues from interviews ranked by count

It is worthwhile noting that there was a high level of agreement on many of the negative factors that had been highlighted in the literature review and many more negative than positive factors were mentioned by the respondents. This can be seen from Figure 5 below which shows that of a total of 956 recorded responses, 641 (67%) negative issues (response scores 1 & 2) were raised, while only 248 (26%) positive issues (response scores 4 & 5) were raised.

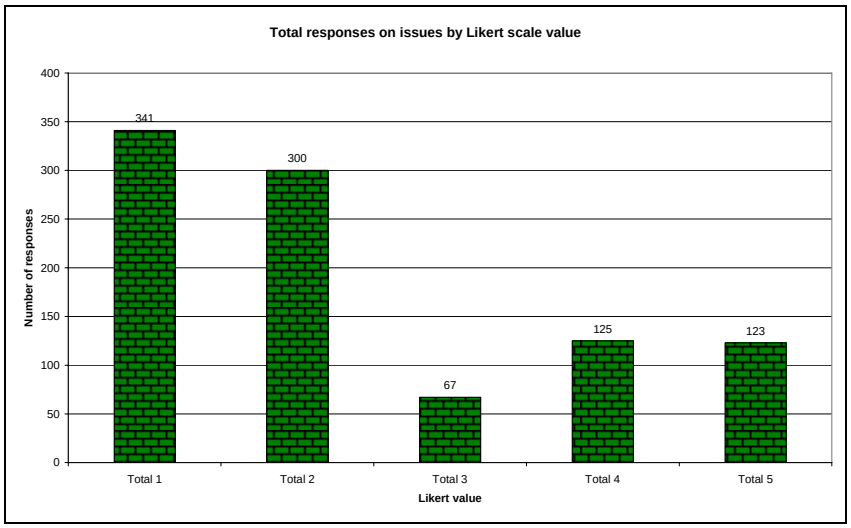

Figure 5: Graph of total responses of stakeholders by systematic score value.

This follows from the literature reviewed which also listed a greater percentage of negative factors. The large number of negative factors is likely to be the cause of the sluggish implementation of industrial CDM projects in South Africa.

5.2.2. DESCRIPTIVE STATISTICS - MEAN

The mean gives a good indication of the centrality of a data set. In this context, the mean is used as an indicator of whether the stakeholders saw a particular issue as positive or negative driver of CDM in South African industry. Data ranked by lowest means (Table 6) and highest means (Table 7) is presented below for discussion. The closer the mean is to the extreme (1 or 5), the lower the standard deviation is likely to be. This is demonstrated clearly with the majority of standard deviations being less than 1. Once again there are more negative issues raised than positive factors. The level of agreement is also higher among the negative responses (demonstrated by lower standard deviations in general). It is also important to note that one cannot apply absolute

ranking to any of these issues, as the count should also be considered in the relative importance that all respondents placed on an issue.

	Issue	Count	Mean	SD
1	AIJ/trading Experience	3	1.0	0.00
2	Conservative industry/inertia	19	1.1	0.32
3	Industry understanding of CDM process	26	1.3	0.45
4	Africa not investment destination	3	1.3	0.58
5	Mixed messages on CDM	17	1.4	0.49
6	Business priorities elsewhere (not CDM) / talk no action	24	1.4	0.49
7	Bureaucratic process	22	1.4	0.50
8	Transaction & monitoring costs	17	1.4	0.62
9	SA banks do not understand CDM financing	12	1.4	0.51
10	Complexity of CDM process	23	1.5	0.59
11	"Cheap" coal power	20	1.5	0.69
12	Lack of awareness of CDM process	25	1.5	0.51
13	Post 2012 uncertainty	28	1.5	0.79
14	Time to return CER's (2012)	18	1.6	0.62
15	Legislation	16	1.6	0.81
16	Eskom policies	16	1.6	0.81
17	Success stories/critical CDM mass	16	1.6	0.51
18	SA slow with DNA/KP	19	1.6	0.69
19	Silos in capacity	25	1.6	0.87
20	Industry capex (economic) focus	23	1.6	0.72
21	Additionality	21	1.6	0.86
22	ID correct projects	10	1.7	0.95
23	Expensive to keep up to date with CDM developments	11	1.7	0.47
24	Tax on CER's	13	1.8	0.73
25	US & Aus excluded/multinationals	6	1.8	0.75
26	SA do not see CC as real	13	1.8	0.69
27	Methodology applicability to SA	20	1.9	0.93
28	Volatility of CER prices	14	1.9	0.95
29	Incentives for industry	18	1.9	0.73
30	EIA/NER/IPP Process	19	1.9	1.08

Table 6: The 30 issues with the lowest means - indicating negative factors for CDM

From the negative factors presented in Table 6, a number of the factors identified in the literature review were present. A number of issues not revealed by the literature review had also been highlighted (e.g. *mixed messages on*

CDM) and these are discussed in Chapter 6. Among those already listed in Chapter 2 (section references in parenthesis) are:

- Additionality (2.4.1)
- Complexity of CDM process (2.4.2)
- Transaction costs (2.4.4)
- Volatility of CER's (2.4.5)
- Uncertainty regarding post 2012 Kyoto and CDM processes (2.4.6)

	Issue	Count	Mean	SD
1	Large emitters	24	4.8	0.41
2	Ratification of Kyoto by SA	15	4.6	0.51
3	Potential for renewable & energy efficiency	29	4.6	0.50
4	Corporate governance	11	4.5	0.52
5	SA infrastructure	15	4.5	0.52
6	Political stability	7	4.4	0.53
7	Energy crisis	8	4.4	0.74
8	Old technology ready for replacement	15	4.3	0.70
9	Growth of CER market/Money	18	4.2	0.94
10	Increased media coverage of CC & CDM	10	4.2	1.03
11	Best destination in Africa for foreign CDM	10	4.2	0.63
12	Price of CER's	16	3.8	1.24
13	DNA in DME	17	3.6	1.22
14	SA economy growth	8	3.6	1.69
15	Technology transfer	7	3.6	1.13

Table 7: The 15 issues with the highest means - indicating positive factors for CDM

In line with the observation made from Figure 5 the counts and absolute number of positive issues are expected to be lower than for the negative issues. This is seen in Table 7 with only 11 issues having a mean greater than 4 whereas 30 issues had comparable means less than 2.

Comparing the data in Table 7 with the literature review in Chapter 2, again illustrates the link between the forecasts from the literature and the actual

response from the stakeholders. Issues highlighted in Chapter 2 (section references in parenthesis) are:

- Income from the sale of CER's – price of CER's (2.3.2)
- Corporate governance and the role of stakeholders (2.3.4)
- National infrastructure in place (2.3.5)
- Political stability and economic growth (2.3.7)

5.2.3. DESCRIPTIVE STATISTICS – STANDARD DEVIATION

The standard deviation gives an indication of the spread of data within a particular data set, that is, the disparity between stakeholder opinions on a particular issue. The issues that had the highest disparity among the respondents (Table 8) were reviewed first. Once again, as with the means above, it is important to examine the standard deviation in conjunction with the count (to see if one or two outliers or extreme answers could have skewed the data disproportionately). This is the case in the economic growth (the top issue in Table 8) where two responses out of only 8 of "1" (for valid reasons) have raised the standard deviation. It is likely that many of these higher standard deviations would better be explained in terms of the boxplots that are presented below. Most of these contentious issues do not feature in the literature reviewed in Chapter 2, further supporting the need for this research.

The lower standard deviation is an indicator of a higher level of agreement between the respondents. Again the count is an indicator of the relative importance of the issue, as the first issue on Table 9, although there is a 100% agreement among the respondents raising this issue (from the 0.00 standard

deviation), they only amounted to 3 (or 10% of the total sample) and therefore not too much credence should be placed on this issue in comparison to the following 3 issues, all of which have greater than 66% of the total surveyed respondents commenting on the issue.

	Issue	Count	Mean	SD
1	SA economy growth	8	3.6	1.69
2	Climate change a real issue	11	2.7	1.68
3	CDM capacity in SA	27	2.7	1.46
4	Industry leadership	24	2.3	1.37
5	Civil society (NGO's)	11	2.4	1.36
6	Govt Leadership	28	2.5	1.29
7	Foreign finance attractive to small companies only/available	13	2.7	1.25
8	Price of CER's	16	3.8	1.24
9	DNA in DME	17	3.6	1.22
10	SA SD & BEE requirements	19	2.6	1.21
11	Govt guidance	25	2.0	1.21
12	Technology transfer	7	3.6	1.13
13	Govt capacity	25	2.4	1.08
14	EIA/NER/IPP Process	19	1.9	1.08
15	Increased media coverage of CC & CDM	10	4.2	1.03

Table 8: Issues that displayed greatest disparity in respondent answers (descending standard deviation)

There are a number of the issues raised in Chapter 2 which are included in this table; the bureaucratic process, conservative industry in South Africa, corporate governance, transaction costs and complexity of the CDM process all rank in both.

	Issue	Count	Mean	SD
1	AIJ/trading Experience	3	1.0	0.00
2	Conservative industry/inertia	19	1.1	0.32
3	Large emitters	24	4.8	0.41
4	Industry understanding of CDM process	26	1.3	0.45
5	Expensive to keep up to date with CDM developments	11	1.7	0.47
6	Mixed messages on CDM	17	1.4	0.49
7	Business priorities elsewhere (not CDM) / talk no action	24	1.4	0.49
8	Potential for renewable & energy efficiency	29	4.6	0.50
9	Bureaucratic process	22	1.4	0.50
10	Ratification of Kyoto by SA	15	4.6	0.51
11	Lack of awareness of CDM process	25	1.5	0.51
12	Success stories/critical CDM mass	16	1.6	0.51
13	SA banks do not understand CDM financing	12	1.4	0.51
14	SA infrastructure	15	4.5	0.52
15	Corporate governance	11	4.5	0.52
16	Political stability	7	4.4	0.53
17	Africa not investment destination	3	1.3	0.58
18	Complexity of CDM process	23	1.5	0.59
19	Time to return CER's (2012)	18	1.6	0.62
20	Transaction & monitoring costs	17	1.4	0.62

Table 9: Issues that displayed greatest agreement in respondent answers (ascending standard deviation)

5.3. CLUSTERING OF ISSUES

Subsequent to the content analysis, the 56 identified issues were clustered logically (Goldblatt, 1994) and grouped into broader factors that form the basis for discussion. These areas require focus in order to determine a way forward to accelerate the implementation of CDM projects in South African industry in accordance with Proposition 3. The issues were grouped into 9 major factors. These are presented in Figure 6 in graphical form. This figure shows the factors positioned in one of five overarching themes, viz. international, enabling, government, industry and ancillary. The international factors are applicable to all non-Annex I countries and not just unique to South Africa, so their influence on the local findings are not expected to be a primary cause as India, China and

Brazil, all of which have implemented many more CDM projects than South Africa to date (Table 1) also have the same constraints.

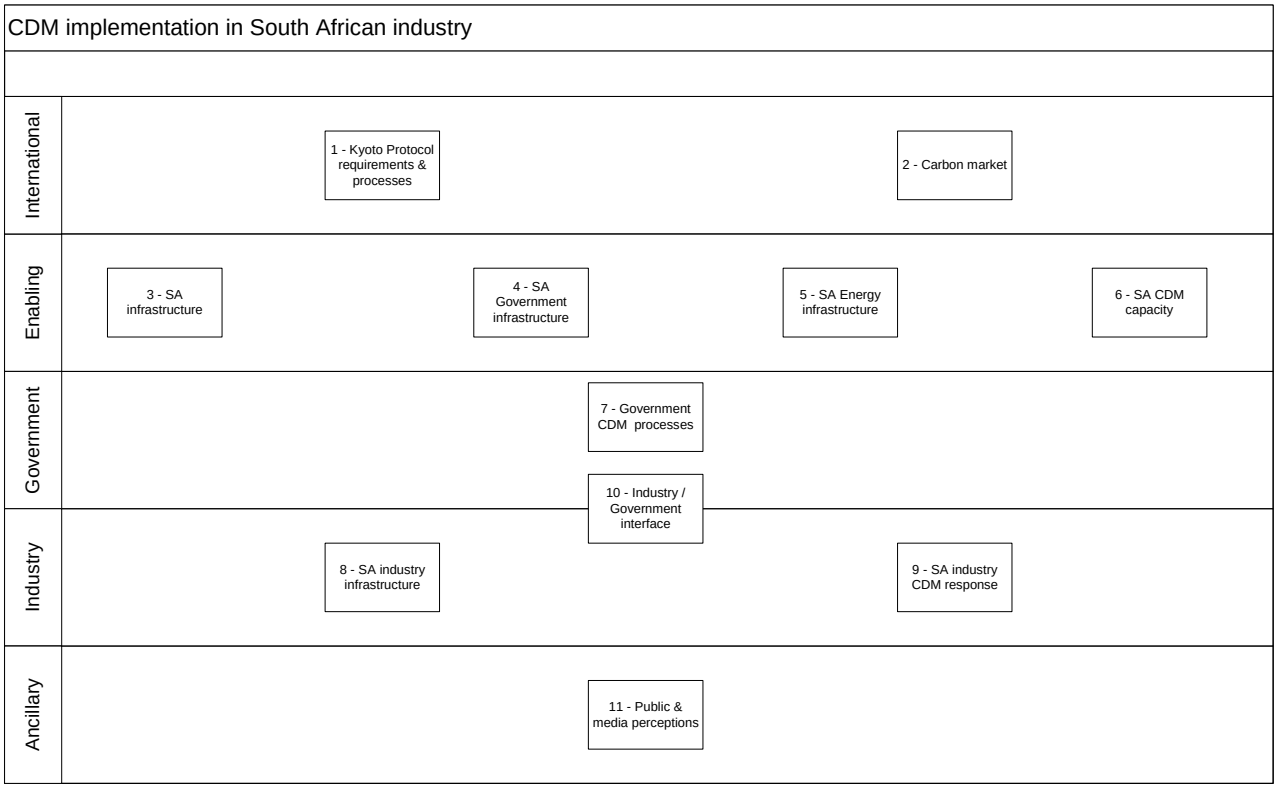

Figure 6: Clustered issues from interviews

Enabling factors are those that are in place in South Africa but are not unique to the CDM process. These could well influence the implementation of CDM projects in the country. Government factors are those applicable to the government's response to CDM in South Africa. The same stance is applicable for industry factors. Finally ancillary factors relate to the media and general populace's response to global warming, climate change and CDM in particular. Although it can be argued that this is part of the enabling environment, the view of the author was that this changes faster and is more subjective than the factors included in the enabling environment. The full list of associated issues from the content analysis and 9 clustered factors is presented in Table 10.

	Clustered factor	Stakeholder issue
1	Kyoto Protocol requirements and processes	• Additionality • Post 2012 uncertainty • Expensive to keep up to date with CDM developments • Complexity of CDM process • Methodologies applicable to SA • Bureaucratic process • Transaction costs • USA & Australia outside Kyoto
2	Carbon markets	• Volatility of CER price • Growth of CER market / money • Price of CER's • Time to return CER's
3	South African infrastructure	• SA Economic growth • Political stability • SA infrastructure developed • Africa not a huge international investment destination • SA best investment destination in Africa • No SA experience in AIJ or emission trading • Role of civil society / NGO's • Attractiveness of foreign direct investment
4	SA Government infrastructure	• No direct legislation covering CDM • No formal incentives to industry to implement CDM • EIA / IPP processes • Potential taxation of CER's • Government leadership
5	SA Energy infrastructure	• Energy crisis • Cheap coal power • Eskom policies
6	SA CDM capacity	• CDM capacity in South Africa • Silos in capacity • SA banks not understanding CDM finance
7	Government CDM processes	• SA ratified Kyoto Protocol • DNA in DME • SA slow to form a DNA • DNA effectiveness in promoting CDM • Government guidance • Government capacity • Sustainable devt & BEE requirements
8	SA industry infrastructure	• Corporate governance • Conservative industry / inertia • Potential for renewable energy / energy efficiency • Old technology ready for replacement • Large emitters • Industry economic focus

9	SA industry CDM response	• Industry leadership • Industry understanding of CDM process • Technology transfer • Identification of correct projects • Business priorities elsewhere (not CDM) • Lack of success stories / critical CDM mass
10	Industry / government interface	• Government : industry cooperation
11	Public & media perceptions	• Climate change is a real issue • Increased media coverage of global warming issues • Lack of awareness of CDM process • Mixed messages on CDM & climate change • South Africa does not perceive climate as a real issue

Table 10: Clustered factors and associated issues

It is on these nine clustered factors that the remaining analysis and discussion of this research is based.

5.4. PRESENTATION OF RESULTS

An overview of the stakeholder responses is presented below in order to clarify the author's understanding of each factor and present data on the feedback. Boxplots (Albright, Winston and Zappe, 2003, pp 95 – 99) were used to compare the stakeholder grouping's responses. All boxplot analyses were conducted using the Number Cruncher Statistical System – NCSS 2004 – software package. An overview of boxplot analysis is presented in Appendix IV.

5.4.1. POSITIVE FACTORS

A number of positive issues were raised, looking at Figure 29 the following 5 factors emerged as positive factors:

- Carbon markets
- South African infrastructure

- South African CDM capacity
- Government CDM processes
- South African industry infrastructure

5.4.1.1. CARBON MARKETS

The active and growing carbon market and prices available (Figure 3) for CER's (carbon credits) is encouraging industry to implement CDM projects. Even though the carbon market is growing tremendously, the potential financial gains from CDM projects in South Africa are not as great as some other countries like China which has a number of projects that mitigate the emission of HFC's (hydro-fluoro-carbons) and SF_6 (Sulphur hexafluoride). These two greenhouse gases are particularly potent and return vast amounts of carbon credits in comparison to CO_2 (carbon dioxide) and CH_4 (methane) type projects which are more common in South Africa. There is a ratio of a few thousand to one in both cases (United Nations, 1997). As one industry stakeholder put it, "*CDM will be unlikely to swing an investment; it is a sweetener, not the honey-pot*." Another quote by a supporting catalyst was, "*CDM smells like the environment, but it is business; it is both, yet neither. There is money, lots of money to be made.*" Another interesting quote on the carbon market came from a policy maker, "*the CDM process and emission trading market is the only instrument we have, and as such it is a good thing. But not the best thing! We have to compromise in order to be part of the (global warming) solution.*"

The carbon markets that have expanded around the world, but more especially in Europe, driven by the European Union Emission Trading Scheme (EU ETS),

has encouraged companies to become involved in the CDM. Even small projects in South Africa (like the Kuyasa housing project in Cape Town, which installed energy efficient heaters and insulation into low cost housing but has only yielded around 6000 CER's per annum) can return significant sales. The CER's from the Kuyasa project have been sold into Europe for, "*around €14 per ton.*" This gives a return of around €84,000 per annum to the project. Taking the fact that other projects in South Africa should return on average 166,000 CER's per annum (United Nations Environment Programme, 2006) and a more conservative figure of €10 per CER is more reasonable for this purpose, an average return of around €1,660,000 per annum can be expected from each project. These are significant numbers and are really encouraging and motivating a number of the stakeholders involved in project development.

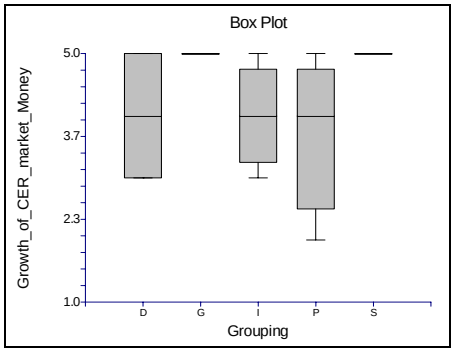

Figure 7: Growth of carbon market and expected monetary returns

The growth of the carbon market internationally (Figure 7) returned a boxplot with stakeholder responses being in the upper half of the boxplot (i.e. indicating a positive factor). Of the 18 respondents who mentioned this issue, only one policy maker mentioned it in a slightly negative light. Government and

supporting catalysts deemed this to be an extremely positive factor, while although still positive, developers, industry and policy makers were all slightly more reticent with a larger spread of results. This supports the general view of researchers (Greiner and Michaelowa, 2003; Matsushashi et al., 2004; Greene, 2005; Dagoumas et al., 2006; Jung, 2006 and Ellis et al., 2007) that have previously identified the income from the sale of carbon credits on an established market as a positive factor.

5.4.1.2. SOUTH AFRICAN INFRASTRUCTURE

Over the past decade, South Africa has had a period of economic growth and political stability. Inflationary and fiscal growth targets that were set have been met and the economic growth looks set to continue into the future, especially leading up to the 2010 FIFA football world cup competition. In comparison to the rest of Africa, and many other developing countries, South Africa is fairly advanced. Infrastructure such as telecommunication networks; transportation networks for road, rail, air and sea; an advanced banking system; access to educated employees and expertise and availability of raw materials all contribute to South Africa's favourable position. By having this infrastructure in place, it is a strong enabler for CDM projects to be implemented. Any foreign investors should have a high confidence in a project in comparison to a number of other developing countries, all other conditions being equal. Spalding-Fecher (2002) Davidson et al. (2003); Jung (2006) and Greene (2006) all support this view.

However, even with the enabling infrastructure in place, one of the supporting catalysts made the following interesting comment regarding economic growth, "*With the economic growth, industry had no need to look at CDM projects because they were making money on their core business. This discouraged companies from exploring opportunities such as CDM.*" This is an interesting point and links to industries CDM response (5.4.2.4) below.

From Figure 8 existence of developed infrastructure is a factor that encourages the implementation of CDM projects. All 15 respondents who raised infrastructure as an issue responded with a 4 or 5 on the systematic scoring scale. Associated issues that are grouped together in this factor show a similar boxplot shape, the exception being South Africa's economic growth (Figure 9) that returned a spread of results in a two groupings – the supporting catalysts (S) and policy makers (P). This had a low response rate (only 8), but the reasoning for the disparity makes the issue worth adding and discussing in this section.

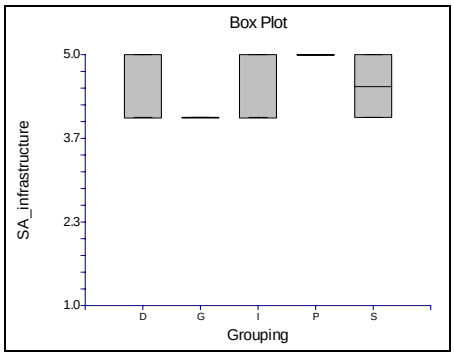

Figure 8: South African infrastructure

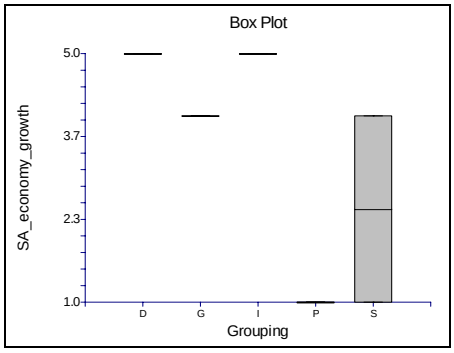

Figure 9: South Africa's economic growth

The general response was that economic growth was an enabler and added business confidence to potential foreign investors looking to South Africa as an investment destination. However the respondents that differed felt that economic growth lead to business success of local industry. As one respondent commented, "*(industry) did not need to look at CDM projects because they are making money anyway on their core operations. You need a bit of a squeeze and downturn for them to look at other options, such as CDM*."

5.4.1.3. SOUTH AFRICAN CDM CAPACITY

Capacity among individuals in South Africa has grown significantly over the past number of years. Apart from a number of individuals relocating to South Africa (such as Messrs Sa, Spalding-Fecher and Stiles) one of the policy makers made reference to, "*ten odd capacity building exercises aimed at capacity building in industry, sessions sponsored by the World Bank, UNIDO, Shell and UNDP have all taken place. So there has definitely not been a lack of access to information.*" Although there has been sufficient capacity building to develop a good understanding of the CDM process in South Africa, there is a need for

more capacity within the country. One of the supporting catalysts stated that, "*there are more specialists (lawyers, financial managers, engineers etc.) entering into the market growing capacity in South Africa. This reduces the learning curve and removes more hurdles.*" This said however, there is a need for more practioners and practioners with experience. In this context, practioners are those individuals who have the capacity to function within the CDM framework as part of their normal duties, more specifically either within industry, or as project developers. As of the policy makers stated, "*There are a lot of good practioners in South Africa, but there are just not enough. We have about a dozen good people, but need far more. Projects take a lot of time to develop and we probably need about 30 to 40 practioners to really get going.*" The experiential learning gained by developers and industry practioners is extremely valuable. The author's involvement in the implementation of a project in northern KwaZulu Natal corroborated this with much of the knowledge being of a tacit nature and learned while preparing documentation, being audited and following the official United Nations and government processes. Another policy maker referred to the problem as there being, "*gaps of information across the board. No one seems to have the full picture of what is going on in CDM in South Africa.*" Most stakeholders raised the existence of capacity silos as an issue. Another point raised by two of the government stakeholders, was that of a lack of capacity among black practioners. One of the national government policies is that of black economic empowerment, but as one of the stakeholders put it, "*There is a lack of black capacity specifically. It is not critical yet, but black capacity needs to be developed, but we don't see it coming through yet.*" Another government stakeholder was concerned about the need for more

capacity but raised the point that, "*industry does not understand the guidelines and rules for CDM. There are a lot of projects that they (industry) are developing that should be CDM projects, but are not considered and consequently the opportunity is missed. … It is not so much a lack of personnel, but more of a lack of project development experience and understanding.*"

There is a lot of excellent CDM capacity in South Africa; however it is often operating in silos. Although Greene (2005); Greene (2006) and Davidson et al. (2003) refer to capacity, they do not delve into the possibility of silos or capacity facilitating more projects in the country.

Although the boxplots for this factor came out demonstrating a difference in opinion regarding the CDM capacity in South Africa, the above comments indicated that CDM capacity existed in South Africa and there was not a gap in the required skills. CDM capacity (Figure 10) includes all aspects of the CDM process from government resources to availability of financing competence to technical skills to implement a CDM project to legislative understanding and interpretation of the process.

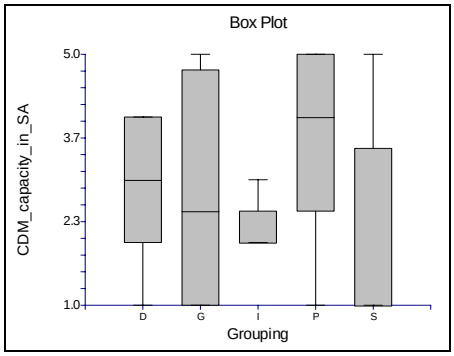

Figure 10: Existence of CDM capacity in South Africa

Once more there is a large spread in responses, with industry being in the most agreement with the view that there is insufficient capacity. Although the 27 respondents focussed on this, an allied and more telling issue is seen in Figure 11 whereby most groupings, apart from the government (G), see that there are capacity silos that exist and there is a communication gap or a capacity gap in parts of the process. In all fairness, some of the government respondents did highlight this as a negative issue too. These silos and gaps are a likely cause of any breakdown or slowness in the process (Figure 2) that Spalding-Fecher (2002) presented.

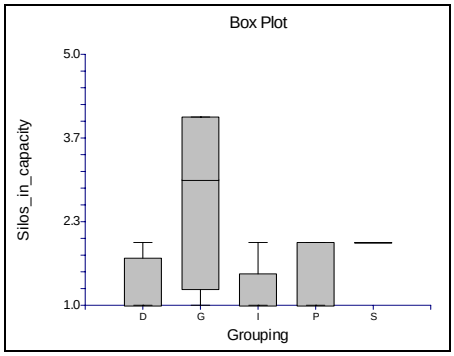

Figure 11: Silos in CDM capacity

5.4.1.4. GOVERNMENT CDM PROCESSES

The Designated National Authority (DNA) located in the Department of Mineral Affairs (DME), has done a good quality effort at streamlining and facilitating the CDM process in South Africa to date. Although there were concerns raised about the DNA being in the incorrect department (**Error! Reference source not found.**), this is one of those academic debates that there is no correct answer too. The Department of Environmental Affairs and Tourism (DEAT) or

Department of Trade and Industry (DTI) could easily have housed the DNA, but then there would have been just as many reasons to question their existence there too. One of the developers who had experience with CDM projects in other countries and has attended a number of the United Nations meetings where he has had dealing with other national authorities stated that, "*the DNA should just facilitate the process ... Industry needs to take the lead. The (South African) DNA is better than most.*" A member of the DNA summed it up well when she said, "*it (the DNA) is well placed in the DME. But it would be well placed in any department, so long as it is in national government and not elsewhere.*"

Industry stakeholders all mentioned that their interactions with the DNA had been mostly positive with anticipated deadlines being met and a general satisfaction with the DNA, the same was not necessarily true with their dealings with other government departments. One industry stakeholder mentioned that the DNA, "*lacked some capacity and needs to be more consistent.*" This lack of consistency is more to do with an interpretation of sustainable development (SD) criteria than capacity. These sustainable development criteria were undergoing review by a national committee and clarification was planned for 2007.

Another function that the government has been slow to leverage has been the promotion of CDM in South Africa. The Promotions Sub-committee of the DNA was only formalised during 2006 and the effectiveness of this committee will

further encourage the implementation of CDM projects in South Africa. Budget constraints were raised by a government stakeholder however.

There were a number of concerns about a lack of leadership from the government regarding the CDM process. As one of the policy maker stated, "*industry needs to take the lead, it is not government's role, they should only facilitate the process.*" A number of the frustrations mentioned were not aimed at the government's CDM capacity, but are captured below in section 5.4.2.2 and include issues such as the environmental impact assessment (EIA) process and climate change not being on the national agenda.

Spalding-Fecher (2002); Greene (2006) and Jung (2006) all state that effective government CDM processes are a prerequisite for the implementation of CDM projects. The South Africa government CDM processes are among the best in the world.

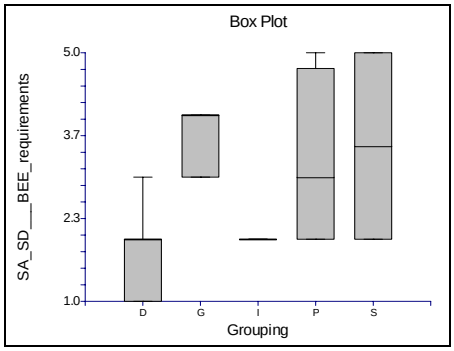

Figure 12: Additional government CDM requirements (BEE / SD etc.)

The requirements from the DNA for CDM projects (Figure 12) – specifically the sustainable development criteria and the requirement for any CDM project to

include black economic empowerment (BEE) components, returned a positive (albeit spread) result. Both the policy makers (P) and supporting catalysts (S) returned positive values on this issue, with only the developers (D) and industry (I) remaining low from the 19 respondents who raised the issue.

5.4.1.5. SOUTH AFRICAN INDUSTRY INFRASTRUCTURE

Linked to the national infrastructure that is available in South Africa (section 5.4.1.2 above), the South African industrial infrastructure is now examined. South Africa has a large number of corporate industries, many of which are multi-nationals with operations outside the Republic of South Africa (e.g. Sasol, Anglo-American, BHP Billiton; Sappi; De Beers; Kumba and SABMiller). This factor has two facets to it, firstly there are the positive physical attributes of South African industry and secondly there is the conservativeness of business practices within industry.

There are a number of leading industries in South Africa. Sasol's coal to liquid plants; Sappi, the coated fine paper company; the mining industry and Eskom, one of the world's largest power utility companies are among the leaders. Many of the industrial manufacturing companies are very energy intensive, such as aluminium and other metal smelters, Sasol's technologies and the mining industry. Many of the plants have been in operation for many years and are not particularly energy efficient. As one developer put it, "*Whenever I travel to Sasolburg (a Sasol site) I think of the song lyrics, 'Smoke on the water, fire in the sky.'*" These are the opening lyrics from the Deep Purple song, *Smoke on the* water. Greene (2006) made mention of the large emitters and generally

energy inefficient industries in South Africa. These are ideal components for CDM projects that are aimed at improving energy efficiency and mitigating greenhouse gas emissions.

Many South African industries are either multi-nationals or are publicly listed on the Johannesburg Stock Exchange (JSE). As such they are required to apply corporate governance principles to their undertakings. Maxwell (2006) and Cogan (2006) both make mention of this. A number of stakeholders (**Error! Reference source not found.**) also mentioned this as a positive factor in the implementation of South African industrial CDM projects.

Even though the physical infrastructure encourages CDM implementation, some of the business practices in force in South Africa hamper the process. Greene (2006) mentions a conservative business ethic that abounds in South African industries. Many respondents mentioned both the conservative nature of South African industry (Figure 23) and that business is focussed on core operations and does not consider CDM as a business imperative (Figure 22). A supporting catalyst stated, "*in South Africa's resource based economy it has been very easy to make money historically. The business ethos and decision making has been based primarily on financial decisions by the Board (of Directors). These decisions affected their personal futures. CDM decisions do not fit the traditional mould, so they are difficult to get past the Board and approved.*" He went on to use the analogy of Field Marshall Montgomery who after the Second World War battle of El Alamein was quoted as giving the reason for his victory to the fact that he didn't gamble, but waited until he knew that he would win. Similarly with

South African industry, they are unlikely to take a risk, but await assured success and payback. The conservativism was often referred to as "*risk averse."* A policy maker commented on this by using the following example, "*Some (South African) companies that have been involved in CDM the longest still have no CDM projects registered. I find this very puzzling and indicative of a myopic view.*"

Many of the industry practioners involved in CDM were in middle management positions. Almost all were performing their CDM duties as part of their normal technical or environmental functions and had created limited awareness within their organisations. Senior management driven CDM initiatives were clearly lacking apart from a single company that had a global greenhouse gas strategy driven from the Executive Board.

From Figure 13 all stakeholder groupings indicated that the existence of large industrial greenhouse gas emitters in South Africa was a factor that encouraged the implementation of CDM projects. The large potential among South African industries to implement energy efficiency and energy saving technologies and techniques (Figure 14) coupled with the large potential for renewable energy in South Africa (biomass, solar, wind etc.) ranked highest in the issues mentioned (Table 5) and also had one of the highest means (Table 7). This is the most positively accepted factor that should encourage CDM implementation in South African industry. Not a single respondent of the 29 gave an equivalent score of 3 or less. This issue is clustered with the energy crisis or "*coming energy economy*" as one respondent put it.

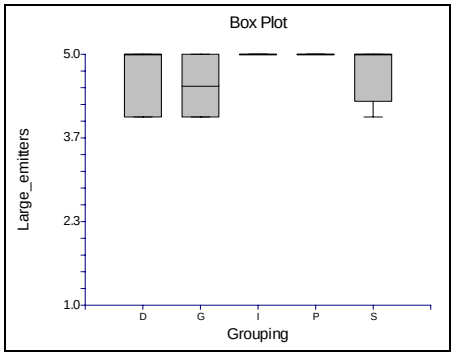

Figure 13: The existence of large industrial greenhouse gas emitters

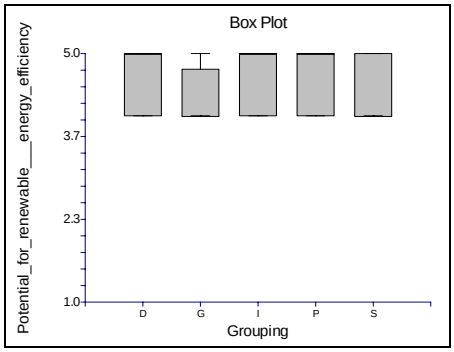

Figure 14: Potential for renewable energy and energy efficiency in SA industry

5.4.2. NEGATIVE FACTORS

A number of negative issues were raised, looking at Figure 29 the following 6 factors emerged as negative factors:

- Kyoto Protocol requirements and processes
- South African government infrastructure
- South African Energy infrastructure
- South African industry CDM response
- Industry / Government interface
- Public and media perceptions

5.4.2.1. KYOTO PROTOCOL REQUIREMENTS AND PROCESSES

The complexity and bureaucratic nature of the Kyoto Protocol and all its associated process applicable to South African industry (Figure 2 from Spading-Fecher, 2002) have been highlighted as one of the primary deterrents for industries to get involved in the CDM process. As one of the supporting catalysts who had previous experience in aid organisations stated, "*Working with the United Nations is no easy task.*" The censure can not all be laid on this factor however, as it is the CDM process, which exists solely due to the machinations of the United Nations and as a direct result of the Kyoto Protocol (United Nations, 1997), that is the focus of this research. These processes are also not unique to South Africa, but all developing countries (non-Annex I) are subject to the same guidelines and regulations. A number of these countries have grasped these regulations and are exceeding South Africa in the implementation of industrial CDM projects (Table 1). So although the complexity of the process may inhibit the proliferation of projects and act as a necessary balance to prevent the Kyoto Protocol from becoming nonsensical due to an abundance of poor quality projects that do not meet sustainable development or greenhouse gas emission reduction criteria, all blame can not be laid with this factor. A supporting catalyst used the example of, "*there is a carrot dangling at the end of the process. But it may take 2 years to get there, and there are still no guarantees, you just have to hope for the best!*," in order to explain the CDM process. One policy maker shared that the complexity of the CDM process was, "*proliferated because of the precedent system, much like the legal system.*" The South African government is active in deliberations and negotiations of the United Nations structures, the conference of parties/members of parties

(COP/MOP). Through this participation, clarity on Kyoto compliance, possible future requirements for South Africa to take on caps (or emission limits) as a developing country and any post 2012 regulations (Kyoto Protocol is only valid until 2012 thereafter it ceases to be enforceable).

The one element of the Kyoto mechanisms that there is a possibility to change perceptions and prepare South African industry to implement CDM projects, is the post 2012 period. A project developer stated, "*This lack of certainty is a massive, massive problem. The wheels turn slowly and it is a huge problem to sort out.*" A policy maker echoed this by saying, "*2012 is a massive issue. Many projects work over 15 years (to 2020) but not over 7 years (to 2012).*" Although there is no certainty regarding the post 2012 structure, there was a general confidence among the stakeholders that are actively involved in government, policy making and supporting catalysts (and to a lesser extent industry and development) that there would be a replacement for the Kyoto Protocol with greenhouse gas reduction and trading instruments. One policy maker jokingly referred to this future scheme as, "*Kyoto 2 or Son of Kyoto.*" He then continued to make this observation regarding the future of carbon trading, "*It is sad to see that just as people were starting to do something, but they have almost missed the window of opportunity. There will be a scheme in the future, but it will not be the same as it is presently. Carbon will be a line item in everyone's budget, but the mechanics will shift.*"

Industry needs to be active in lobbying government to represent the needs of the country at the COP/MOP meetings to ensure that South Africa has a

favourable future place in the post 2012 scheme. The Europeans have already indicated that their trading platform (the EU ETS) will be trading CER (carbon credits) as late as 2020 (interview with Sa, 2006), so this bodes well for a post-Kyoto option.

A number of issues raised have been clustered with Figure 15 (CDM process is overly bureaucratic) and were mentioned in different forms from being an overly bureaucratic process, a complex process, difficulty in understanding, the additionality requirements are difficult to interpret and the transaction costs are prohibitively high. Most of these individual issues had an excess of 20 respondents raising them (Appendix II), with almost all considering them negatively.

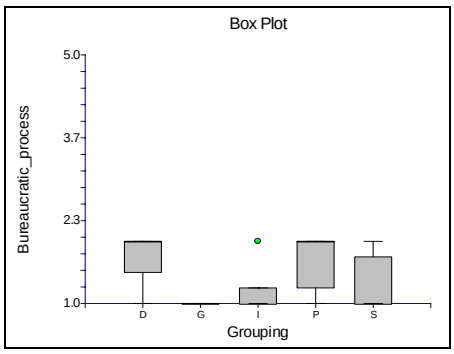

Figure 15: The CDM process is overly bureaucratic

There is no certainty as to what form post 2012 greenhouse gas strategies and policies will be in place. The non-participation by the United States and Australia, two of the world's largest greenhouse gas emitters, has exacerbated the situation. Although not highlighted in Table 9, the post 2012 uncertainty

boxplot (Figure 16) does show a reasonably negative picture with all stakeholder groupings being in the lower half of the graphic.

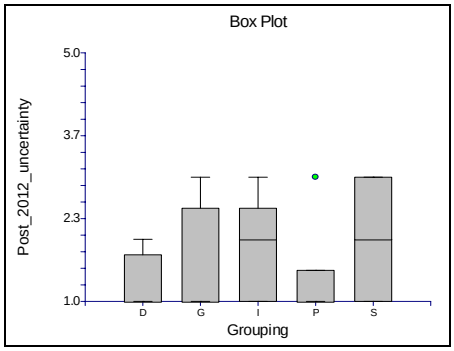

Figure 16: Uncertainty regarding post 2012

5.4.2.2. SOUTH AFRICAN GOVERNMENT INFRASTRUCTURE

It was shown in section 5.4.1.4 that the South African government has adequate, and in many ways superior, processes in place to facilitate the implementation of industrial CDM projects. However there are a number of issues that have been raised regarding the rest of the government infrastructure that inhibits the implementation of industrial CDM projects. The two biggest elements of this factor are that global warming and climate change does not enjoy a national priority and that ancillary processes that are required to register a CDM project (such as an EIA) are extremely onerous.

South Africa has a number of national priorities that central government focuses on, these include HIV/AIDS, housing, poverty alleviation, unemployment and energy security. Global warming or climate change has never been part of these, and probably rightly so considering the enormity of these issues currently. But as one government stakeholder stated, "*CDM can assist national*

government in achieving their priorities such as job creation. It allows companies to contribute to the National objectives and be paid while cleaning up." One of the project developers summed it up by saying, "*Since 1994 there has just been too much noise on the national agenda. BEE, unemployment, crime, poverty, AIDS have just crowded CDM out of the picture.* Another government official commented on the need to link climate change to the national objectives by saying, "*The government is not driving Eskom and Eskom is not driving the government, so coal based electricity remains the norm. There is no drive towards renewable energy.*" This dilemma will remain until climate change is raised to the national agenda. One policy maker commented that climate change has yet to be mentioned by the President in the state of the nation address or other auspicious occasions such as the opening of parliament, he further added, "*We need a strong leader in government to raise the national profile.*" After the release of the Stern report (Stern, 2006) in October 2006, Minister van Schalkwyk stated in a speech that he will be having an inter-ministerial committee addressed on this report (van Schalkwyk, 2006) in 2007. So it appears as if the profile is being raised and movement in a favourable direction.

While there are positive signs regarding government taking a leadership role and raising the profile of climate change in South Africa, the other processes that are often required to gain CDM registration more often than not act as the largest deterrent. There have been a number of cases of projects being delayed and losing a number of months waiting for various approvals and licenses from government and quasi-government agencies. As one policy maker summarised,

"*there are often just too many hoops to jump through.*" One project had to wait 12 months for an electricity generation license as an independent power producer (IPP) from the national energy regulatory authority of South Africa (NERSA), a further 8 months for Eskom to finalise a demand side management (DSM) subsidy and a further number of months for an environmental impact assessment (EIA). Finally there were delays with the DNA giving approval, which exacerbated the situation. Only then could the project proceed to registration. Experiences like this often leave frustration and a reticence to pursue future projects for industry. Not only is national government involved, but often provincial and local government structures need to give approval too, further complicating the process and adding to the frustration. A project developer felt that, "*Individuals involved in these various mechanisms often do not display an understanding of the complexities and challenges in developing a CDM project. Government seems to put more constraints in place than assisting in project developments.*" If government can align these processes to ensure that individuals are aware of the CDM process and do not hinder the overall process, but rather add value by involving the DNA in their processes, then some streamlining could occur.

Currently the environment that the government infrastructure operates in is acting more as a brake than an accelerator. There is a possibility to review and change this. In order to break the silo mentality and realise an increase in the number of industrial CDM projects, which can assist in the achievement of national goals, these processes need to be streamlined and accommodate the registration of more industrial CDM projects.

Most of these boxplots did not display complete consensus, often with the government (G) and policy makers (P) or supporting catalysts (S) in disagreement with the other stakeholder groupings. This can be expected with criticism aimed any particular stakeholder grouping, with a prejudiced response likely. The issue of the government's leadership role in the CDM process (Figure 17), this issue was raised by many of the stakeholders (28 out of 30 stakeholders). What is worth noting on this boxplot is the relatively high median values and box for the government (G) and policy makers (P) grouping. This indicates their perception that the government is playing a leadership role and is acting as a positive factor for the implementation of CDM projects in South African industry. The remaining three groupings of developers (D), Industry (I) and supporting catalysts (S) all returned low values with their boxes being lower on the systematic scoring scale range, indicating a perceived lack of government leadership and this playing a negative role in the implementation of South African industrial CDM projects. *Note the outlier at score "5" on the developers (D) plot.* This should be contrasted with Figure 24 which shows the stakeholders view on the leadership role that industry is playing.

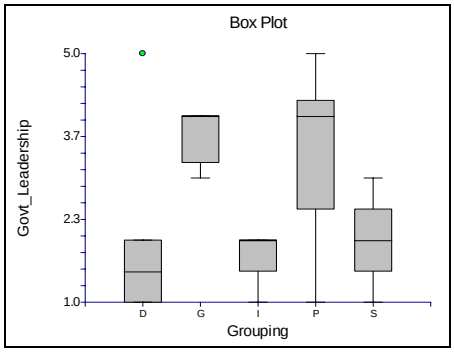

Figure 17: Government leadership or apparent lack thereof

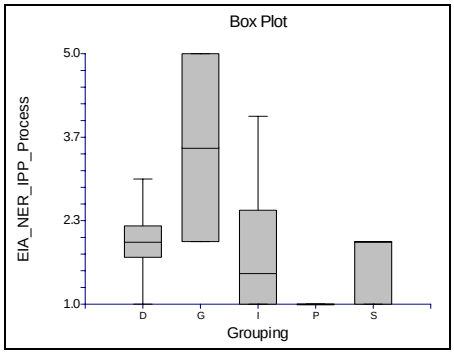

Figure 18: Additional government requirements (EIA, IPP etc.)

Another issue that was raised by almost two thirds (19) of stakeholders was that of the additional governmental requirements (Figure 18) over and above the normal CDM project cycle. These include the environmental impact assessment (EIA), the need to get permission to operate as an independent power producer (IPP) and the stakeholder consultations and oftentimes longwinded interactions with government departments outside the designated national authority (DNA) for the CDM process. All groupings apart from government (G) raised this as a negative or constraining issue.

5.4.2.3. SOUTH AFRICAN ENERGY INFRASTRUCTURE

South African industry is very energy intensive. An example of this is Sappi, the pulp and paper company, which has energy as one of its primary costs (interview with Christie, 2006). A policy maker was more assertive when he stated, "*From a macro-economic view, this is the end of the Information age. We are moving fast into the Energy age. If South Africa is going to enter confidently, we need to get our act together. CDM drives this.*" He further

added, "*There is a new economy coming, in 5 to 10 years you will not be able to sell any products without a 'carbon neutral' label.*" He further added that if Peak Oil does occur, this will only further speed up this process. South African power is supplied almost in it's entirety from the parastatal power utility, Eskom. Traditionally industry has received some of the cheapest electrical power in the world (Greene, 2006); with many of the externalities excluded in the pricing. This has lead to a disincentive to save power in comparison to many other countries, as a supporting catalyst commented, "*Power has been cheap to users, so why do they need to pay (for a project) to save it?*" Eskom capacity had been sufficient to supply South Africa, but power shortages and black outs in the Western Cape during 2006 had raised the profile, as one supporting catalyst commented, "*the Koeberg (a power station in the Western Cape) crisis is one of the best things that could have happened for CDM. It is a great business driver to get off Eskom dependency.*" Another policy maker said, "*the era of cheap electricity has passed,*" and this highlights the need for change.

Even with the cheap power, much of South Africa is still not on the national grid, or uses other forms of power. An industry stakeholder commented on the fact that lower quality coal is still being used for cooking and heating in Soweto (a predominantly black part of Johannesburg). "*Electricity is used for lighting, but the burning of coal inefficiently, causing huge greenhouse gas emissions, not to mention the poor health effects too.*" Another industry stakeholder related that governmental policy needs to actively promote renewable energy and smaller power producers. "*Currently there is a mindset that if there is no power, we just get a diesel genset (generator). This is not a long term solution as it is far more*

inefficient. In Poland there are literally thousands of small private hyrdo (electric) suppliers into the national grid. We need to be promoting that culture here in South Africa too."

The other processes such as generating licenses for an independent power producer (IPP) were addressed in section 5.4.2.2. Eskom has attempted to promote renewable energy and energy efficiency through various mechanisms and continues with initiatives such as demand side management (DSM). South Africa needs to encourage a culture of both electricity saving and renewable energy. Eskom is involved in many of these initiatives in leadership roles; one supporting catalyst compared the situation to, "*the fox guarding the hen house.*" Civil society is acting as a watch dog in many of these processes, but often feels that they do not have the resources to cover them adequately. An encouragement is that Eskom is actively involved in the CDM process, with four projects in advanced stages of development (interview with Rambharos, 2006).

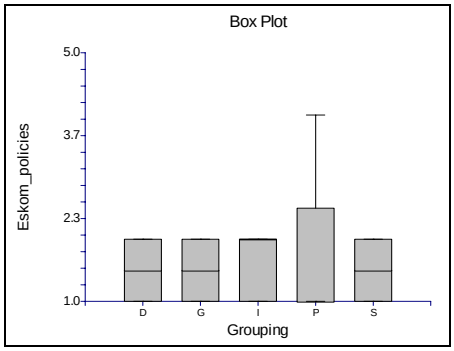

Figure 19: National power supplier policies

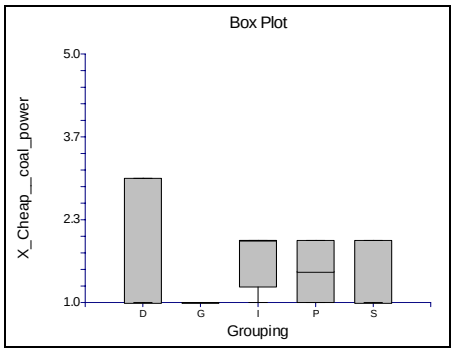

Figure 20: Availability of cheap power to SA industry

A negative issue raised by 15 out of 16 respondents was that of the national power utility, Eskom's policies (Figure 19) and 18 out of 20 respondents on the availability of cheap industrial coal based electricity (Figure 20).

5.4.2.4. SOUTH AFRICAN INDUSTRY CDM RESPONSE

South African industry has a limited awareness of the carbon market and that it poses an opportunity for them, but there has been little action in the form of official CDM projects (Table 1) that have come to the fore. As one industry stakeholder said, "*We know that we should be doing something, but so far it's been a bit like driving in a car and not knowing where we are going.*" There has been a general ignorance around the formal carbon process of the Kyoto mechanism. An industry stakeholder who attended a presentation by Ciska Terblanche of Mondi to the Durban Chamber of Commerce and Industry's environmental congress in July 2006 stated, "*From about 40 or 50 people in the room, it was very clear that there were very few people who even knew half as much as Ciska on this subject. There was a general ignorance among the business people, and these are people who have an interest the environmental response of business.*" This comment was particularly illuminating on the mindset of business leaders and decision makers. A number of developers

related the difficulty in getting decisions made in industry. One related of an excellent project concept at one of the large mining companies took more than a year, just to get through the board of directors. A policy maker put it this way, "*There is a lot of technical expertise in South African companies, so they assume that they have the CDM expertise existing in the company.*" He further added that, "*there are a whole bunch of young 'techies' and enthusiasts on the fringe looking at CDM, but no core management and decision makers involved.*" Internal processes such as financing of carbon projects; a good understanding of the CDM process and the strategic importance of this (especially for multi-national companies with operations in Annex I signatories of the Kyoto Protocol) at board level, need to be driven into companies.

Industry needs to take a more active leadership role in this process. This is discussed further in 5.4.2.5. A final issue that is hampering the implementation of industrial CDM process is that after 4 years there are still no successful industrial projects in the country. A few have reached the registration phase, but none have realised a significant monetary value from the process yet. An industry stakeholder referred to this as a lack of "adequate role models." Two policy makers put it in these terms, "*Demonstration has a hell of a lot of value. It allows people to see if and how the process works." And the other added, "We need success stories, success breeds success, whereas a lack of success breeds scepticism.*"

So far South African industry has not implemented many CDM projects. Much of the responsibility for this inactivity was placed in the response that industry itself has provided and not on factors external to itself.

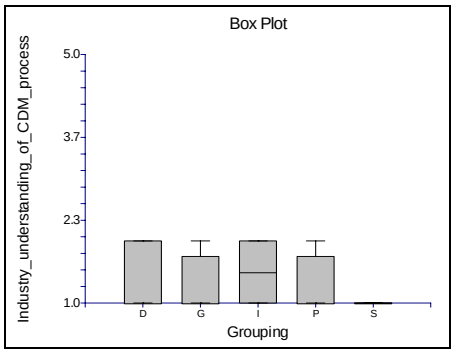

Figure 21: A lack of understanding of the CDM process in industry

South African industry has a general lack of understanding of the CDM process. Although there is a limited awareness across most levels of carbon projects and the possibility of getting *carbon credits* in terms of the Kyoto Protocol, there is a general lack of understanding, in all but a selected few environmental or energy technicians, within industrial concerns. There is a strong agreement (Figure 21) among all the stakeholder groupings on this issue. This issue was raised by 26 of the 30 stakeholders. *Note that for the "S" grouping in Figure 21, the boxplot is not absent, but merely condensed into a line at the "1" value as all respondents in this grouping gave a score of "1" highlighting their perceived significance of this issue. This is present in a number of other boxplots too.*

All stakeholders agreed that South African industry is focussed on it core business (Figure 22) and does not see CDM as complementing this. This issue was raised by 24 of the respondents and all saw this as a negative factor.

Linked to this was the following issue (Figure 23) of South African industry generally being rather conservative and slow to embrace changes that are not directly linked to their core business.

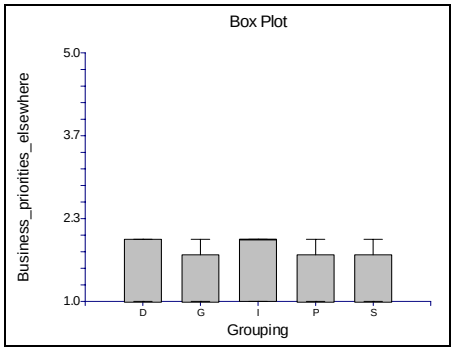

Figure 22: Business priorities on core business - not CDM

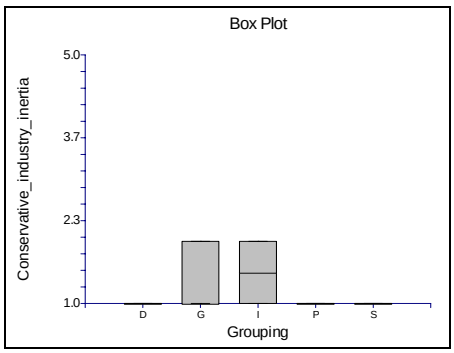

Figure 23: Conservatism of South African industry

Resistance to change from senior management was also mentioned by a number of the middle managers in industry that were interviewed. Conservativism in South African industry is an issue that has previously only been raised by Greene (2006), but the data suggests that it appears to be a far more important issue than previously considered in the South African context according to the 19 respondents that mentioned it. *Note that for the "D", "P" and "S" groupings in* Figure 23*, the boxplot is not absent, but merely condensed into*

a line at the "1" value as all respondents in this grouping gave a score of "1" highlighting their perceived significance of this issue.

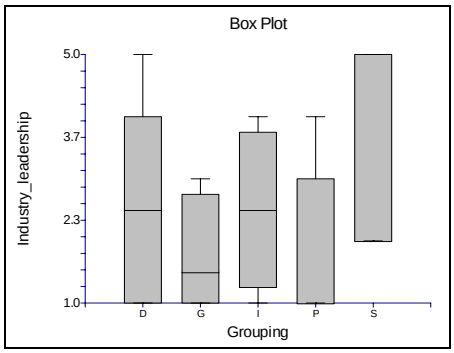

Figure 24: Industry leadership or apparent lack thereof

There is greater agreement among the stakeholders (i.e. the plots lie generally in the lower half of the graphic), on the lack of industry leadership when compared with Figure 17, but there is a larger spread within each grouping. There were 24 respondents who returned responses in all 5 score classes. This indicates a lack of consensus among the respondents and likelihood that there certain areas where industry may be taking a leadership role.

The final negative factor that is presented in this section and that was raised by just over half the respondents (16) is that there are very few CDM success stories within South Africa Figure 25. Even some of the registered projects in South Africa at the time of this research were criticised by respondents. One industry interviewee mentioned, "*The Kuyasa project is touted as a model CDM project, but is too small to make any money. This would never fly with my Board*." The proposed Mondi gas turbine project in Richards Bay also received

a fair amount of criticism based on that it has taken over three years to get UNEB approval.

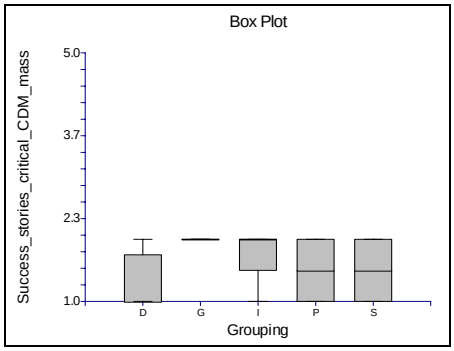

Figure 25: Lack of local CDM success stories

5.4.2.5. INDUSTRY / GOVERNMENT INTERFACE

The CDM process requires any industrial CDM project developers to interface with government at a number of points in the process. These interactions vary from dealing with the designated national authority (DNA), a possible environmental impact assessment (EIA), licensing as an independent power producer (IPP) to potential taxation and foreign exchange requirements for project financing. A certain amount of suspicion and cynicism exists between the two bodies traditionally. Maruyama (1999) and Nelson (2004) contend that communication gaps are likely to exist between the various stakeholder groups, especially project developers and government. Kim (2003) argues that there has been insufficient communication, even though Greene (2006) cites cases such as Business Unity South Africa (BUSA) and the National Business Initiative (NBI) as spearheading these interactions. It is the author's opinion that Kim (2003) is unfortunately correct and that a discontinuity and scepticism still remains between industry and government. One of the policy makers explained

this scepticism in the following manner, "*the people who know about CDM are generally from NGO's and similar organisations. They are used to communicating with the government after years in the anti-apartheid struggle and in lobbying. They are not used to dealing with industry, and don't even have networks or business savvy.*"

Both parties are looking at each other to take the leadership role. It was a policy maker who stated that, "the captains of industry need to give the guidance and leadership. They have adopted a political wait and see attitude waiting for government to set targets. This is wrong of them, CDM needs to be business driven with support from government." The author is in agreement with this statement. Industry has the most to gain from the process and needs to drive it. The individuals within the government do not necessarily fully understand the complexities and requirements of industry and how CDM relate to them. This needs to be driven by industry. Two government stakeholders had fairly strong views on this, with one stating, "We need to move away from a blaming culture. All parties need to sit down as a collective and discuss the issues. Only then can a way forward be charted, and this will benefit the whole country." Organisations like BUSA and NBI have taken some steps to facilitate a business driven leadership role, but these have not been adopted and embraced at all levels of industry yet. These initiatives also tend to be issue based, such as taxation of CER's or a voluntary renewable energy accord.

Two thirds (67%) of respondents (20) mentioned this as an issue (Figure 26). Although most groupings felt that cooperation was an inhibiting factor, the

supporting catalysts (S) generally had a positive view that there was cooperation between the parties and this was accelerating implementation.

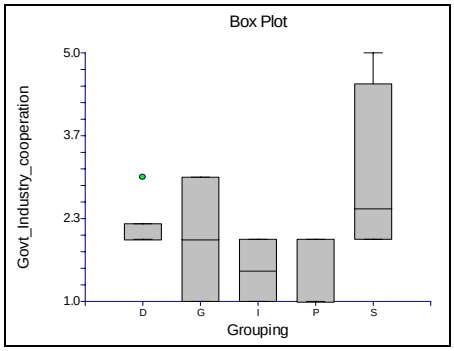

Figure 26: Cooperation between government and industry

The view by four of the five groupings in Figure 26 that there is a lack of cooperation and this is hindering the implementation of CDM projects is an issue that is discussed further in Chapter 6.

5.4.2.6. PUBLIC AND MEDIA PERCEPTIONS

In the movie *"An inconvenient truth*", Gore (2006) references a report in which 53% of media articles on global warming and climate change over a decade in the United States of America questioned the anthropogenic (or man made) nature of global warming. This is in comparison to a study on peer reviewed journal papers that concluded that there was unanimous agreement among the authors that global warming is indeed anthropogenic (Oreskes, 2004). Without any studies to consult, the author relied on a corporate press clipping service that he is subscribed to. There is an indication that in South Africa the figures are likely to be similar, there are many articles that are included in the clippings, with a slight bias in favour of the anthropogenic cause of global warming and

the need to respond to mitigate the impacts. The negative articles included those in publications such as *Engineering News*. As one supporting catalyst commented, "*The media plays a major factor in the response to global warming. The press is pushing bio-ethanol and bio-diesel in a large way. Other aspects are either under-reported or mixed and confusing messages are put out. A lot of the reporting is sensationalist and damaging to people trying to get CDM going.*"

Just as knowledge transfer is required to give industry decision makers an improved understanding of the CDM process, so too journalists and editors need to be educated on the CDM, global warming, climate change and the need to respond to it. This issue was raised by 17 stakeholders from all groupings (Figure 27).

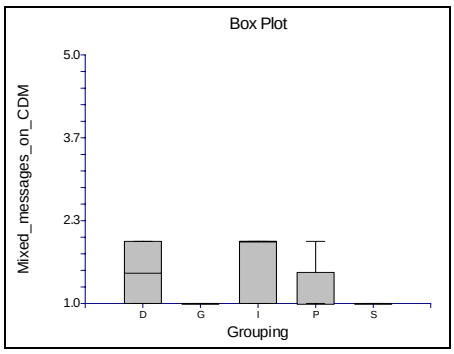

Figure 27: Mixed messages in media on global warming and climate change

.

Many respondents felt that this was doing "much harm" to the plight of those functioning within the carbon project environment and was influencing decision makers negatively. A number of developer and industry respondents related anecdotes about having to cover basic climate change science and refute some of the myths that abound, such as climate change being a "*natural*

phenomenon", or "*no real permanent impacts will occur as this has happened before prior to the last ice age*" and "*global warming is actually a good thing because there will be more arable land available for agriculture in places like Canada and Siberia*," before being able to make presentations to management teams and decision makers.

Although only raised by 13 respondents (Figure 28) the fact that there is a perception that South Africans do not view climate change and global warming as a serious or real issue is a concern and related to a negative factor in decision makers needing to implement greenhouse gas mitigation projects. This was supported by Angus Reid Consultants (2006) in Chapter 2. In the opinion of the author, this has been an existent issue is South Africa. The experiences from internal company training sessions has been that there is a large portion of the population that does not perceive global warming and associated climate change to be either real, or serious enough to make changes, and support the finding. However there is also anecdotal and experiential evidence that perception is shifting towards increased awareness.

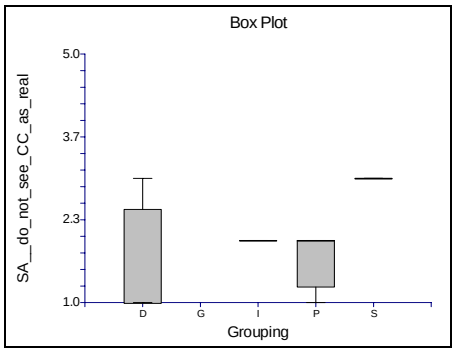

Figure 28: South Africans do not view climate change and global warming as a real issue

5.5. STAKEHOLDER VIEWS ON THE WAY FORWARD

All the stakeholders interviewed commented on the interventions that were required to accelerate industrial CDM projects in South Africa. As these were common and no clear sectoral bias emerged, they are presented in this section as part of the results. One of the policy makers summed it up very well when he said, "*No magic tricks are needed. We just need to keep doing what we are, but doing it better.*"

5.5.1. INDUSTRY LEADERSHIP

Strong leadership is required from industry; a supporting catalyst stated that, "*the captains of industry have been acting like this is a load of old crock. They need to wake up and act*." A policy maker echoed that, "*Eskom need to take the lead, they are a parastatal and have the biggest potential to gain*." Industry was urged by a number of stakeholders to use, "*industry forums and seminars*."

5.5.2. COMMUNICATION

Communication between all parties was also a key comment raised. As one government stakeholder said, "*We all need to engage and optimise all key players' inputs… We need to move away from a blaming culture.*" A policy maker had this suggestion about a high level Indaba (meeting), "*The captains of industry, the top guys, need to sit behind closed doors with really influential people, like the top 10 thinkers on business and climate change, and come up with a strategic plan. A plan where people can agree that there is a problem and set a course for what needs to be done.*"

5.5.3. INTEGRATE OTHER GOVERNMENT REQUIREMENT WITH CDM

The EIA and IPP requirements have been discussed in some length above. Additionally National Treasury requirements such as taxation need to be clarified. One policy maker commented, "*Environmental fiscal reform process is moribund. Treasury needs to be clearer.*" "*We need climate change on the national agenda if things are really going change, then we can use CDM to achieve goals such as renewable energy targets. Nothing will change until then,*" was the view of another policy maker.

5.5.4. EXPERIENCE AND SUCCESS STORIES

As more projects are implemented, capacity will be built. A developer said, "*we need a lot more experience so that more projects can be tackled. It's a bit of a catch 22 at the moment*." Another comment by a policy maker was that, "*capacity building needs to be focussed on actual projects now. We need to move away from workshops and reports to action*."

5.5.5. PROMOTION OF CDM

A government stakeholder stated, "*We need awareness, lots and lots of awareness on CDM. The Promotions sub committee (of the DNA) has a really important role to play*."

5.5.6. OPENING POWER MARKET

The energy infrastructure was discussed at length above; this too garnered a number of comments. A policy maker felt, "*The power market needs to be*

opened to reduce Eskom's dominance. Smaller players need to supply power easier and a renewable energy market needs to be developed."

5.5.7. PREPARATION FOR POST 2012

The Kyoto Protocol expires in 2012 and the uncertainty around this has been discussed above. A project developer stated, "*we know that change is coming, we just need the government to be open and honest about its position and what is likely to be in place so that we can prepare. We need to be confident that they are acting in the best interests of the country and all stakeholders."*

5.5.8. LEARN FROM OTHER COUNTRIES

Finally a supporting catalyst commented that, "*we need to be going to Brazil and India and learning from them. What are they doing that we could apply to promote CDM in South Africa?*" This is a good point and worthy of further exploration.

CHAPTER 6 DISCUSSION OF RESULTS

"One could be forgiven for thinking that, with such a stunning all-round success to point at (Montreal Protocol), the nations of Earth would have jumped at the chance to address climate change using a similar mechanism (Kyoto Protocol). At first there was great enthusiasm for an international treaty to limit emissions of greenhouse gases. So what happened?"
Tim Flannery; The Weather Makers, pp 221

6.1. PREAMBLE TO DISCUSSION

The data presented in the previous chapter showed that there were unquestionably factors that the stakeholders all found to be positively or negatively influencing the implementation of CDM projects in South African industry. Many of these were already identified in the literature review in Chapter 2. There were some factors however that displayed a discontinuity between stakeholders. From the analysis, there are areas that potential interventions can be made to encourage the increased implementation of CDM projects within South African industry. These form discussion points are compared with the propositions in Chapter 3. The propositions are then revisited and restated in terms of the results and discussion presented.

6.2. SOUTH AFRICA IS LAGGING IN THE IMPLEMENTATION OF CDM PROJECTS

The literature reviewed in Chapter 2 showed that South Africa was lagging behind in the implementation of CDM projects when compared to a number of other non-Annex I countries. An interesting point raised by one of the project developers interviewed was, "*when one looks at South Africa's projects on a per capita, per ton of carbon mitigated, South Africa is actually doing very well at the CDM process.*" This is an interesting metric and certainly encouraging,

however on absolute numbers and on progress to monetisation of projects, South Africa is lagging many of its comparable non-Annex I counterparts involved in the CDM (Table 1). Apart from this respondent who made this comment, yet still agreed that South Africa, and more specifically South African industry should be doing far more to foster the implementation of CDM projects, all other stakeholders agreed that South Africa is lagging other comparable non-Annex I countries in the implementation of CDM projects. The vast number of issues raised by those interviewed supported the statement that South Africa was lagging behind other non-Annex I countries.

6.3. DISCUSSION OF PROPOSITIONS 1 & 2

In the light of the results presented in Chapter 5, proposition 1 and 2 are evaluated below. Abridged factors (*in italics*) have been used for the discussion; the full propositions are located in Chapter 3. Responses to these factors in the light of the findings are presented after the abridged proposition factors.

6.3.1. PROPOSITION 1

Proposition 1 stated that the following factors encourage industrial CDM project implementation in South African industry:

- *Finance is available for CDM projects.* The availability of finance was mentioned by few stakeholders and in the context of this research, this was not a factor that either encourages or discourages the implementation of industrial CDM projects in South Africa,

- *CDM projects are capable of generating income for industry through the sale of carbon credits.* This factor is definitely an encouraging factor and has been consolidated with others under the major factor, “Carbon markets”,
- *The CDM allows for knowledge & technology transfer to occur.* Although mentioned by a few stakeholders, this was actually a very minor factor, and more likely to be of relevance to a few niches rather than an overall positive factor. It has been grouped with “SA industry CDM response” which is actually a negative factor!
- *Improved corporate governance.* This factor definitely is a positive factor as shown by **Error! Reference source not found.**. This has been consolidated and included in the factor “SA industry infrastructure”.
- *South Africa has a favourable infrastructure.* This has been confirmed by the results and forms a major factor that has includes issues such as political stability and economic growth.
- *Energy security and rising energy costs.* Although this issue is a positive driver, it is overshadowed by the energy policies and relatively cheap energy costs in South Africa. This issue is linked with the factor SA energy infrastructure” which is actually a negative factor.
- *Political stability and economic growth.* This issue is consolidated into the “SA infrastructure” factor.

Proposition 1 originally had 7 issues postulated as encouraging factors for the implementation of industrial CDM projects in South Africa. After the research

however, these have been consolidated and narrowed to only five. The factors that have been found that encourage industrial CDM project implementation in South Africa by the author are:

- CDM projects are capable of generating income for industry through the generation and sale of carbon credits (CER's) on a growing carbon market,
- South Africa has a favourable infrastructure (including political stability and economic growth) in place that facilitates the implementation of industrial CDM projects,
- South Africa has a favourable industrial infrastructure (including large greenhouse gas emitters, energy efficiency potential and renewable energy potential) in place that facilitates the implementation of industrial CDM projects. Furthermore, corporate governance requirements are putting more stakeholder driven pressures and requirements for industry to implement projects to reduce greenhouse gases,
- CDM capacity exists within South Africa to facilitate the implementation of industrial CDM projects,
- Government CDM processes are in place to facilitate the implementation of industrial CDM projects.

6.3.2. PROPOSITION 2

Proposition 2 stated that the following factors discourage industrial CDM project implementation in South African industry:

- *United Nations requirements for additionality are difficult to determine.* This issue has been consolidated with a few others under the factor “Kyoto Protocol requirements and processes”. This is a strong negative factor discouraging CDM implementation in South Africa.
- *Processes in the CDM are very bureaucratic and complex.* This issue has been consolidated with a few others under the factor “Kyoto Protocol requirements and processes”. This is a strong negative factor discouraging CDM implementation in South Africa.
- *Scepticism exists regarding the benefits of CDM.* This factor was seen to be a negative factor. It has been captured into two consolidated factors due to two components of it. Firstly in “SA industry CDM response” due to the scepticism that industry has viewed the benefits of CDM and secondly in the factor “Public & media perception” due to the scepticism that the general populace has viewed the impacts ad responses to climate change.
- *The transaction costs are prohibitively high.* This issue has been consolidated with a few others under the factor “Kyoto Protocol requirements and processes”. This is a strong negative factor discouraging CDM implementation in South Africa.
- *The volatility of carbon credit market.* Although the volatility of the carbon market is a slightly negative factor, the overall “Carbon market” has been included as a positive factor. The price volatility has not been prohibitively discouraging when compared to any potential returns.
- *Uncertainty on the validity of CDM post 2012.* This issue has been consolidated with a few others under the factor “Kyoto Protocol

requirements and processes". This is a strong negative factor discouraging CDM implementation in South Africa.

- *Government policies and their inefficient implementation.* This factor is a strong negative factor and has been consolidated as "SA government infrastructure".
- *Relatively low local industrial electricity costs.* Another strong negative factor that has been consolidated as "SA energy infrastructure".
- *Lack of local technical capacity.* Despite what the literature indicated, CDM capacity in South Africa emerged as a positive factor and is consolidated as "SA CDM capacity". There is however a need to develop more capacity and also to get experience among the proponents with current capacity.
- *South African business is conservative.* This was a strongly negative factor, but was linked with a positive factor "SA industry infrastructure" but is the area that requires focus to improve. Elements of this also lie in the factor "SA industry CDM response" which is strongly negative, especially around decision makers not understanding the CDM process or a lack of focus on non-core business.

Proposition 2 originally had 10 issues postulated as discouraging factors for the implementation of industrial CDM projects in South Africa. After the research however, these have been consolidated and narrowed to only six. The factors that have been found that discourage industrial CDM project implementation in South Africa by the author are:

- United Nations requirements for CDM projects are complex.
- Ineffective government procedures hinder industrial CDM implementation and growth rather than facilitating the implementation of industrial CDM projects,
- Relatively low local industrial electricity costs and energy policy discourage industry from implementing CDM projects to save electricity consumption,
- South African business has not responded proactively to the CDM due to a lack of understanding and a conservative approach which does not encourage implementation of non-core business initiatives such as CDM projects,
- A gap exists between industry and government as regards communication and collaboration around industrial CDM projects,
- Scepticism exists in South Africa regarding the causes and seriousness of the impact of climate change leading to reservations regarding the benefits or need for implementing industrial CDM projects.

6.4. CLUSTER ANALYSIS & PROPOSITION 3 REVIEW

In order to add value to industry, the author developed a matrix that offers a framework for positioning and ranking the relative significance of these factors. The 11 consolidated factors that were identified by the author were transposed onto the matrix (Figure 29). The matrix enables one to place a factor in a quadrant and then act accordingly.

The matrix has two components:

i.) Is the factor positively or negatively affecting the implementation of CDM projects in South African industry? Negative on the bottom half and positive on the top half (Y-axis),

ii.) The influence of the factor on the amount of change on the implementation of industrial CDM projects in South Africa. More difficult to change on the left and easier to change on the right (X-axis),

iii.) The numbers referred to are those used in Figure 6.

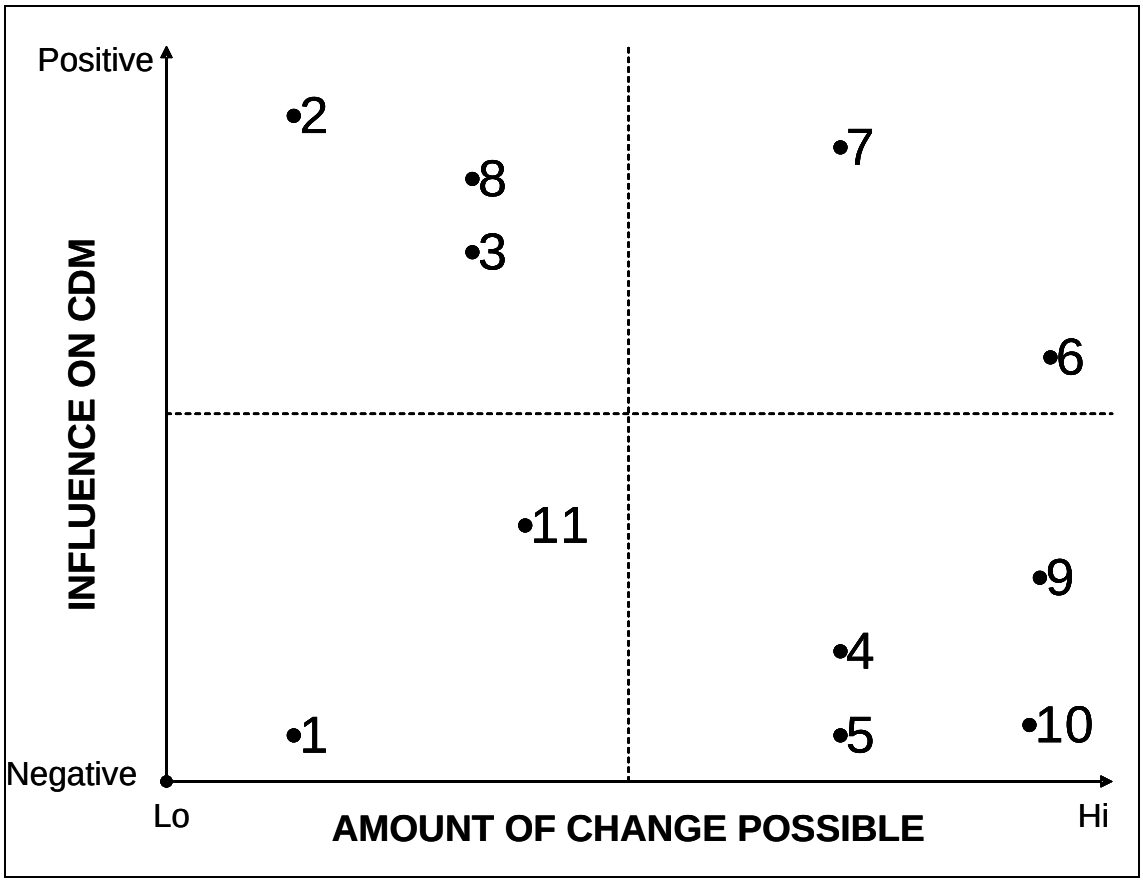

Figure 29: Matrix of clustered factors

By implication, movement is easier on the vertical axis, moving from negative to positive, or vice versa, than the horizontal axis, the amount of change possible. This may differ for a particular factor; these are discussed in the next chapter.

6.4.1. PROPOSITION 3

Proposition 3 is now reviewed in the light of stakeholder comments (section 5.5) and Figure 29. Proposition 3 stated that the following interventions will accelerate the implementation of CDM in South African industry:

- *Business to take the leadership and drive CDM in South Africa.* This intervention remains.
- *A post-2012 CDM strategy is identified and finalised so that stakeholders know the implications of both the current dispensation (until 2012) and any possible future scenarios.* This intervention is revised and not so much that a strategy is finalised, but that there is just transparency regarding the preparations for post 2012.
- *The national CDM processes need to be streamlined by government to facilitate project implementation.* This intervention remains but is broadened to include the integration between government processes.
- *Formal structures to facilitate communication between stakeholders to prevent a silo mindset in knowledge and capacity.* This intervention remains.
- *CDM specific capacity building to be increased.* This intervention was not raised as a concern by the stakeholders, so it removed from the list. The CDM capacity in South Africa was actually raised as a positive enabler, but there are areas where more capacity is required.

- *Successful industrial CDM projects are required to encourage further project activity.* This intervention remains.

Proposition 3 originally had 6 interventions postulated as interventions that would accelerate the implementation of CDM in South African industry. After the research however, these have been revised to 7 interventions. The interventions that have been found by the author that would accelerate the implementation of CDM in South African industry are:

- A clear understanding of the Kyoto mechanisms and the opportunities for South Africa, including learnings from successful non-Annex I countries. Clear communications and preparation for any post-2012 scenario,
- The national processes supporting CDM need to be streamlined by government to facilitate project implementation and climate change linked to national government objectives,
- South African energy market needs to be opened to reduced Eskom and fossil based power dominance,
- Business to take the leadership and drive CDM in South Africa
- Formal structures to facilitate communication between stakeholders to prevent a silo mindset in knowledge and capacity,
- Successful industrial CDM projects are required to encourage further project activity,
- Promotion of CDM to change perceptions in the media and public.

6.5. SOUTH AFRICAN CDM MATRIX

The revised proposition 3 in the preceding section gives rise to a value adding matrix model based on Figure 29. Any single issue or cluster of factors can be positioned in one of the four quadrants, depending on the characteristics that they exhibit. Dependent on the quadrant that a factor resides in, an approach is proposed to apply interventions that will have the most impact on accelerating the implementation of industrial CDM projects in the South African context. The **South African CDM matrix** (Figure 30) is superimposed onto the same axes as the matrix of clustered factors (Figure 29).

The two axes of the matrix are:

- **X-axis:** The ease of change of influence of a factor on an industrial CDM project. The ease of change decreases from left to right across the matrix,
- **Y-axis**: The factor either positively or negatively affects the implementation of CDM projects in South African industry. Negative factors are in the lower half and positive factors in the upper half.

The four quadrants have been designated as:

- Obstacles
- Enablers
- Brakes
- Accelerators

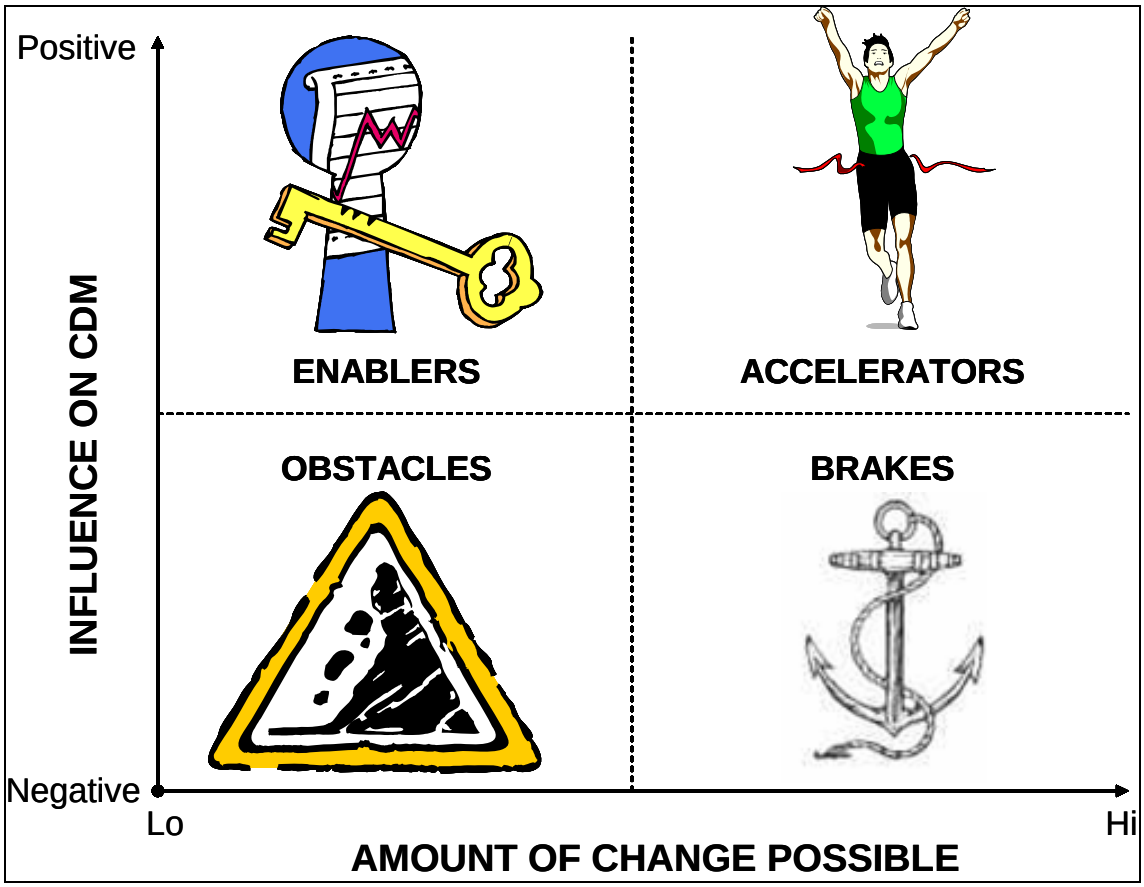

Figure 30: South African CDM matrix

6.5.1. OBSTACLES

Obstacles are those factors that can not easily be changed, yet there is little or no opportunity to exclude their negative influence on the implementation of an industrial CDM project. They are likened to rocks on the road, a possible showstopper, but alternative routes can be navigated providing the locations and extent of the obstacle is known. They include such factor as the high transaction costs, the complexity and the bureaucratic nature of the CDM process. Also included in this quadrant is the influence of the media and public perception. Currently this acts as an obstacle with the mixed messages and scepticism regarding the seriousness of the impacts of climate change and the need for action.

6.5.2. ENABLERS

Enablers are very similar to obstacles in that there is little possibility to change their influence on the implementation of industrial CDM projects, but unlike obstacles, they exert a positive influence on the process. They are likened to keys that open doors to opportunities. A key alone is no guarantee of success, but they allow alternative options and routes to be explored and provide access to additional options by their nature. The enablers identified include the South African infrastructure which provides access to expert services and networks. The existence of large greenhouse gas emitting industries that affords many opportunities for the implementation of industrial CDM projects. The development of a large international carbon market and the possibility of acceptable financial returns is also an enabler.

6.5.3. BRAKES

The following two quadrants have the potential to be changed and move vertically from one quadrant to the other. Brakes are defined as those factors that are holding the implementation of industrial CDM projects back, but have the potential to accelerate the implementation. By their nature, change is possible, provided the proper interventions are made to address the issues that are retarding the CDM process. They are likened to an anchor, that although an anchor plays an important role, it retards movement, but can be raised to allow movement once more. Factors located in this quadrant include the gap the exists in the interactions between industry and government; the energy policies and infrastructure in

the country and the slow response by industry to implement CDM projects due to conservativeness and a lack of focus and understanding of CDM opportunities.

6.5.4. ACCELERATORS

The final quadrant contains the accelerators. These are the factors that are most encouraging to the implementation of industrial CDM projects. They are likened to winning a race, as they are the factors that that truly allow project developers to obtain the prize or reward of a successful CDM project that mitigates greenhouse gas emissions, promotes sustainable development and is a source of income from the sale carbon credits (CER's) on the carbon market. They include the capacity in the country and the government's processes that are encouraging CDM currently. A caution is that due to their position on the right hand half of the matrix, change is easily possible. Not all change is positive, so if for example the government CDM authority (DNA) puts more restrictive sustainable development requirements or does not employ competent resources, the current accelerator will migrate to the brake quadrant and act as an inhibitor rather than accelerator. This is the quadrant, along with the enablers that project developers would ideally like many factors to reside in, along with the enablers.

6.6. PROPOSED INTERVENTIONS TO ENCOURAGE ACCELERATED CDM PROJECT IMPLEMENTATION IN SOUTH AFRICA

Each of these quadrants requires unique interventions in order to maximise the acceleration of the implementation of industrial CDM projects in South Africa. The proposed interventions are discussed below.

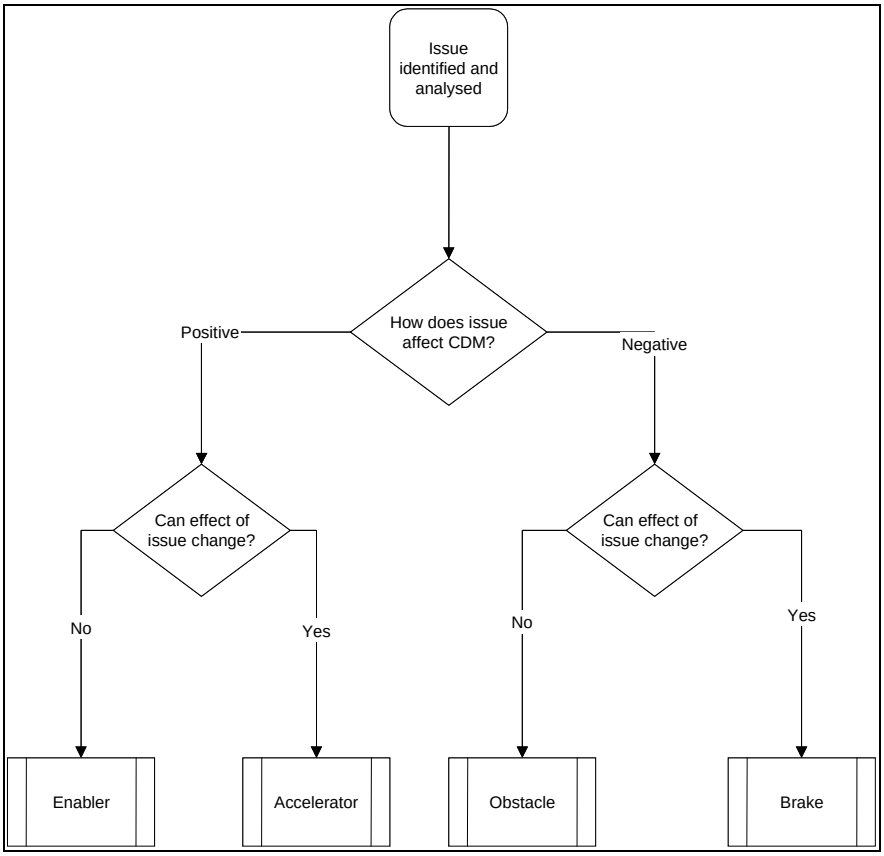

Figure 31: Decision tree to identify required interventions

When an issue is identified, the decision tree in Figure 31 needs to be followed to place it in the correct quadrant.

- An issue is identified.
- It is ascertained whether the factor affects the implementation of industrial CDM projects positively or negatively.

- A second query as to the possibility of effect of the factor changing (i.e. can the factor change easily or not) is ascertained.
- Depending on the route followed, one of four quadrants is selected. Proposed interventions are suggested in section 6.6 below.

Once this has been done, an intervention can be determined to incorporate into any implementation plan.

6.6.1. OBSTACLES

Obstacles, by their nature are not easily changed. The following interventions are required to address the effects of an obstacle.

- An understanding of the obstacle. What it aims to achieve and what the specific issues are. It is easier to address and counteract specific problems than a large nebulous problem. A useful methodology for this is the SWOT analysis where the Strengths, Weaknesses, Opportunities and Threats are examined. A Force Field analysis is also an example of a useful analysis tool, whereby positive and negative forces, and their relative influence are balanced against each other,
- Develop procedures to exploit any opportunities and strengths while mitigating the weaknesses and threats. Also identify where input is to be given into structures (such as national working groups) to influence any changes that may occur.

An example of this would be looking at the high transaction costs involved in an industrial CDM project implementation. Understanding the amounts and

comparing these with expected returns allows a project developer to set a cut off for a minimum acceptable level of expected CER's to be realised. This may be in the region of 20,000 tCO_2e per annum. Anything smaller than this, the developer need not spend time or resources on pursuing under the CDM processes.

6.6.2. ENABLERS

As with the obstacle, change is does not occur easily with an enabler. Once more it is important to understand the role of the enablers in order to be able to maximise their influence on the implementation of industrial CDM projects.

- Analyse the issue and once more using a SWOT or Force Field analysis. More importantly this analysis needs to highlight the strengths and opportunities that arise. These will then form the basis for strategic and tactical plans and areas to take advantage of in the development and implementation of industrial CDM projects,
- Although not ignored, the weaknesses and threats should be handled in a similar way to obstacles and if they have a significant influence, procedures need to need to be developed to mitigate their influence.

An example of this would be analysing an industry that one has access to (part of the industry infrastructure). Within the industry there may be opportunities for CDM projects in 3 areas (e.g. energy efficiency, solar heating and a complex industry specific process with no existing methodology). These 3 areas all pose potential for CDM project

development. Solar is likely to return a small quantity of CER's; the new methodology is likely to be riskier and will take longer to develop a methodology; the energy efficiency opportunities should form the starting point for project development in this case, even though all three are opportunities posed by the specific industry.

6.6.3. BRAKES

Change is possible for brakes. This should be the focus as a collective and part of implementation strategies of individual companies.

- Again a SWOT or Force Field analysis is a starting point to garner an understanding of the issue and how it impacts the process regarding the implementation of industrial CDM projects,
- The important elements to consider here are the opportunities. Plans need to be developed to move the opportunities from brakes to accelerators.
- Any weaknesses or threats need to be addressed and mitigated via procedures and tactical action plans, just as the strengths need to be built into the plans too.

An example of this would be the negative perceptions and understanding of decision makers in a company. In order to change their input from being inhibitive, in depth knowledge transfer sessions could be delivered in order to empower them to understand the opportunities that CDM can offer and ensure that it aligns with business imperatives and company strategy. This will move this factor from being a brake that holds the process back, to a potential

accelerator that boosts the implementation process and gives the company a potential strategic advantage. Similarly with issues that require collective action, such as government processes like the environmental impact assessment approval process. Empowered task teams with multi stakeholder involvement could be set up to ensure that recommendations are made and implemented.

6.6.4. ACCELERATORS

Accelerators are the factors that any project developer naturally wants to make use of. These are the factors that need to be analysed and then aligned with the strategic and tactical plans of the industry.

- A SWOT or Force Field analysis is again performed on the issue. The main aim of this analysis is to align the various opportunities and strengths from the factors and ensure that action plans (tactics) are optimised to ensure maximised returns,
- Any threats or weaknesses need to mitigated and addressed, especially if they have the potential to migrate the factor from the accelerator quadrant towards the brake quadrant,
- The ideal situation is to maintain the factor's positioning in the upper right quadrant and to reinforce its position therein.

An example of this is the CDM capacity that is available in South Africa. There are a number of competent practioners in South Africa. Many do not have experience across the full spectrum of the CDM process. Industries looking to implement CDM projects need to identify the skills available in the pool and link experts in to complement the successful achievement of the overall project.

This may also shape the direction of a strategy – using the previous example of a company looking at energy efficiency projects – they would need to link the available expertise to specific opportunities within the company – e.g. boiler efficiencies, electrical motor efficiencies etc.

6.7. DISCUSSION SUMMATION

The original propositions, although many of the individual issues are valid in terms of the research findings, required revision and restatement. The restatement results in a simplification of the original propositions in order to cluster the issues into broader meta-factors rather than unconsolidated issues. This allows for the development of the South African CDM matrix which provides a practical and value adding methodology for accelerating the implementation of industrial CDM projects in the future.

CHAPTER 7 CONCLUSION

"Political will is a renewable resource!"

Al Gore; An Inconvenient Truth

7.1. THE AIM OF THE RESEARCH

This research sought to determine the factors that are causing South Africa to lag other developing countries in the implementation of industrial Clean Development Mechanism (CDM) projects and the interventions that will have the most impact on accelerating the implementation. These factors have been identified from the literature reviewed and confirmed through South African experts in the field and practioners who corroborated them and raised further issues.

7.2. FACTORS INFLUENINCING THE IMPLEMENTATION OF INDUSTRIAL CDM PROJECTS

The factors identified were clustered into 11 categories (Table 11) that affect the implementation of industrial CDM projects in South Africa. These factors were then grouped (Figure 6) and then presented in a matrix (Figure 29). The matrix expounded the responses from the interviewed stakeholders and formed the framework on which proposed interventions were based. The factors were grouped according to two aspects, firstly, whether they functioned as a positive (accelerating) or negative (inhibiting) factor. Secondly they were classified according to the ease in which they could be changed or were static.

Influence	Clustered factor
Positive	Carbon markets (2)
	South African infrastructure (3)
	SA CDM capacity (6)
	Government CDM processes (7)
	SA industry infrastructure (8)
Negative	Kyoto Protocol requirements and processes (1)
	SA Government infrastructure (4)
	SA Energy infrastructure (5)
	SA industry CDM response (9)
	Industry / government interface (10)
	Public & media perceptions (11)

Table 11: Factors affecting the implementation of industrial CDM projects in South Africa

7.3. PROPOSED INTERVENTIONS TO ACCELERATE INDUSTRIAL CDM PROJECTS

Once all the factors had been transposed onto the matrix following a decisions tree (Figure 31) one of four proposed interventions were suggested. The proposed interventions are reliant on the quadrants of Figure 30, the South African CDM matrix. The four quadrants were termed:

- Obstacles
- Enablers
- Brakes
- Accelerators

For each quadrant an intervention was proposed. These are presented in section 6.6. Although this is a useful framework, it remains to be seen if this will be effective in assisting in the implementation of industrial CDM projects in the future. It is likely that it is a practical starting point for industries getting involved in the CDM process. Facets of this model will need to be expanded as this matrix gives a very high level strategic overview of the factors affecting the CDM process, but does not expound these to a practical tactical level for project specific implementation. Each project will require a unique business

implementation plan (tactical) and unique business processes determined in order to be successfully implemented. It will only be then that the business benefits of applying this model will truly be realised.

7.3.1. SIMPLIFIED SOUTH AFRICAN CDM MATRIX

The South African CDM matrix is presented in a simplified two by two matrix format (Figure 32) below as a summary of the representation.

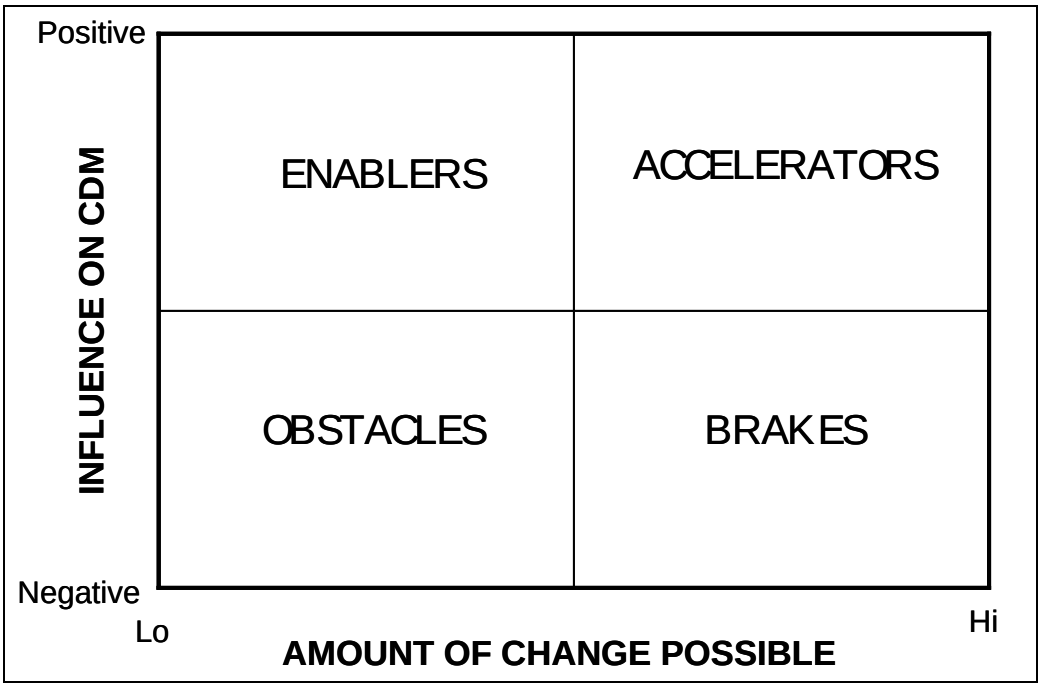

Figure 32: Simplified model of the South African CDM matrix

7.4. FURTHER RESEARCH RECOMMENDATIONS

Non scientific research into global warming and the effects climate change in South Africa are fairly new. There has been a growing amount of interest in this field internationally with Journals such as *Energy Policy*, *Climate Policy, Climatic Change* and *Environmental Science and Policy* leading the way. The

establishment of departments at institutions such as Massachusetts Institute of Technology's (MIT) joint program on the science and policy of climate change and Princeton's Carbon Mitigation Initiative further reiterates the significance placed on the subject. This research has been aimed at South African conditions and specifically on the implementation of industrial CDM projects. Although useful knowledge has been forthcoming from this research, there are still a number of areas that should be explored in the future. It is recommended that research should be conducted in the follow areas:

- To explore the corporate inertia specifically around industry response to climate change and South African industry's conservative reaction to new non-traditional opportunities. This should be focused on decision makers within industry,
- The potential for renewable energy alternatives in South African industry,
- Energy efficiency as a business driver in South Africa,
- A similar study of the factors influencing industrial CDM processes, but planned interventions should be ranked by the ***amount*** of influence on the CDM process,
- An examination of the factors that accelerated industrial CDM project implementation in countries that lead South Africa (Table 1) and which of those can be transferred to South Africa ,
- A case study based on a successful implementation of an industrial CDM project, using the matrix proposed in this research (Figure 30) and suggestions for modification of the framework of proposed modifications and practical business model development.

7.5. POSTSCRIPT

It is the opinion of the researcher that the value of knowledge is not so much in the creation of new knowledge, but in the practical application thereof in order to make a difference in the world. It is the hope of the author that this research will make a difference and that in some small way can contribute to the betterment of society, our country and ultimately our God given earth. I trust that there has been some value added by this treatise and that this has created a better future for us and our descendents.

"The benefits of strong, early action on climate change outweigh the costs."

Sir Nicholas Stern; The Stern Report

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APPENDICES

APPENDIX I: INTERVIEW GUIDELINES

The interviews took place in the stakeholders' choice of venue. The interviews were semi-structured, and they lasted about 60 – 90 minutes. The interviews were split into two distinct portions.

First portion – a semi-structured interview in which the stakeholder answered and discussed the various propositions that are posed to them. Questions were used to promote discussion if needed. The questions were open ended and discussion was encouraged to answer all questions.

Second portion – once the stakeholder had responded to all the propositions and discussion had finished on these topics, the researcher conducted some reactive responses by mentioning selected issues that had been identified in the literature review or other stakeholders and getting the stakeholders opinion on these issues.

Question guidelines:

a) Do you feel that global warming is a serious issue facing industry in South Africa today?

b) What contrary views abound in your organisation?

c) How does your organisation view the CDM w.r.t. project developments?

d) Should South African industry be implementing non-sink CDM projects?

e) Why has this view been taken and not an opposing view?

f) What strategic implications does the CDM have for South Africa as a country?

g) What gains does the CDM have for South African industry?

h) What factors do you feel are the most attractive to implementing CDM in South Africa?

i) What is your reasoning behind each of these?

j) What factors do you feel are the most discouraging to implementing CDM in South Africa?

k) What is your reasoning behind each of these

l) What factors do you feel will influence South Africa's continued implementation of CDM projects?

m) What is your reasoning behind each of these

n) What actions do you feel are needed for South African industry to implement the CDM as effectively as countries such as Brazil, China and India?

o) Any further comments that you'd like to make?

APPENDIX II: TABULATED RESULTS FROM QUANTIFICATION OF INTERVIEW NOTES

	Issue	Count	Mean	Mode	Median	SD	Count positive	Count negative
1	Legislation	16	1.6	1	1	0.81	1	15
2	Tax on CER's	13	1.8	2	2	0.73	0	11
3	Govt Leadership	28	2.5	2	2	1.29	8	17
4	Govt capacity	25	2.4	2	2	1.08	4	14
5	CDM capacity in SA	27	2.7	2	2	1.46	10	14
6	Silos in capacity	25	1.6	1	1	0.87	2	23
7	DNA effectiveness in promoting CDM	26	2.2	2	2	1.01	4	19
8	SA slow with DNA/KP	19	1.6	1	1	0.69	0	17
9	Industry understanding of CDM process	26	1.3	1	1	0.45	0	26
10	Lack of awareness of CDM process	25	1.5	2	2	0.51	0	25
11	Complexity of CDM process	23	1.5	1	1	0.59	0	22
12	Expensive to keep up to date with CDM developments	11	1.7	2	2	0.47	0	11
13	Volatility of CER prices	14	1.9	1	2	0.95	1	11
14	Post 2012 uncertainty	28	1.5	1	1	0.79	0	23
15	Foreign finance attractive to small companies only/available	13	2.7	2	2	1.25	3	8
16	Industry capex (economic) focus	23	1.6	1	2	0.72	1	22
17	Business priorities elsewhere (not CDM) / talk no action	24	1.4	1	1	0.49	0	24
18	SA banks do not understand CDM financing	12	1.4	1	1	0.51	0	12
19	Conservative industry/inertia	19	1.1	1	1	0.32	0	19
20	Govt guidance	25	2.0	1	2	1.21	4	18
21	Govt:Industry cooperation	20	2.1	2	2	0.94	1	16
22	DNA in DME	17	3.6	4	4	1.22	11	5
23	Large emitters	24	4.8	5	5	0.41	24	0
24	Growth of CER market/Money	18	4.2	5	4.5	0.94	14	1
25	SA infrastructure	15	4.5	4	4	0.52	15	0
26	SA economy growth	8	3.6	4	4	1.69	6	2
27	Political stability	7	4.4	4	4	0.53	7	0
28	Old technology ready for replacement	15	4.3	4	4	0.70	13	0
29	Potential for renewable & energy efficiency	29	4.6	5	5	0.50	29	0
30	Best destination in Africa for foreign CDM	10	4.2	4	4	0.63	9	0

31	Corporate governance	11	4.5	5	5	0.52	11	0
32	Ratification of Kyoto by SA	15	4.6	5	5	0.51	15	0
33	Increased media coverage of CC & CDM	10	4.2	5	4.5	1.03	8	1
34	Mixed messages on CDM	17	1.4	1	1	0.49	0	17
35	Price of CER's	16	3.8	5	4	1.24	10	4
36	Climate change a real issue	11	2.7	2	2	1.68	4	7
37	SA do not see CC as real	13	1.8	2	2	0.69	0	11
38	Industry leadership	24	2.3	1	2	1.37	6	15
39	SA SD & BEE requirements	19	2.6	2	2	1.21	5	12
40	Eskom policies	16	1.6	1	1	0.81	1	15
41	"Cheap" coal power	20	1.5	1	1	0.69	0	18
42	Transaction & monitoring costs	17	1.4	1	1	0.62	0	16
43	Energy crisis	8	4.4	5	4.5	0.74	7	0
44	Additionality	21	1.6	1	1	0.86	1	18
45	US & Aus excluded/multinationals	6	1.8	2	2	0.75	0	5
46	Incentives for industry	18	1.9	2	2	0.73	1	16
47	Success stories/critical CDM mass	16	1.6	2	2	0.51	0	16
48	EIA/NER/IPP Process	19	1.9	2	2	1.08	2	16
49	Time to return CER's (2012)	18	1.6	1	1.5	0.62	0	17
50	Civil society (NGO's)	11	2.4	2	2	1.36	3	8
51	Methodology applicability to SA	20	1.9	2	2	0.93	2	17
52	ID correct projects	10	1.7	1	1	0.95	0	7
53	AIJ/trading Experience	3	1.0	1	1	0.00	0	3
54	Africa not investment destination	3	1.3	1	1	0.58	0	3
55	Bureaucratic process	22	1.4	1	1	0.50	0	22
56	Technology transfer	7	3.6	4	4	1.13	5	2

Table 12: Tabulated results from quantification of interview notes

APPENDIX III: INTERVIEWEES

A brief resume of the people interviewed giving some of their experience in the CDM discipline.

Dr Stuart Christie

Future Technology Manager

Sappi Limited

(Industry)

Dr Christie has a PhD in Biology and joined Sappi in 2003 as their Technology Futures Manager. Dr Christie's role is to evaluate new and emerging technologies within Sappi, the pulp and paper industry and related segments in order to maintain and grow Sappi's position as a global player. In addition, he is also responsible for the implementation of Sappi's sustainable development and greenhouse gas strategies. Prior to Sappi he worked for Shell International Renewables for 8 years, initially based in London where he was responsible for developing biomass management systems in various bio-climatic regions of the world. In his final 2 years he was Shell Forestry's technology manager based in Chile also responsible for Shell's operations in Paraguay, Uruguay and Argentina.

Mr Andrew Gilder

Director

Imbewu Enviro-legal specialists

(Supporting Catalyst)

Mr Gilder holds a BA, LLB, LLM (Marine & Environmental law) – specialising in environmental and climate change law: paying particular attention to the developing international and South African climate change legal and Clean Development Mechanism (CDM) regimes. Primary responsibility for IMBEWU's climate change & CDM legal consultancy practice. Research into and practical implementation of the international and South African legal regimes: (i) applicable to climate change mitigation projects in terms of the Kyoto Protocol's Clean Development Mechanism (CDM), including environmental legal, contractual and strategic advice; and (ii) conservation and Biosphere Reserves.

Mr Mike Goldblatt
Director

Palmer Development Group

(Policy developer)

Mr Goldblatt is an economist with two master's degrees, one from the University of London in environmental economics and one from Wits University in Geography and Environmental Studies. He was the lead author on the National Strategy Study on the Clean Development Mechanism for the World Bank and the Department of Environmental Affairs and Tourism and has also conducted work in the area of water resources and pollution control. Since joining PDG, where he is now a director, he has undertaken work in the fields of municipal finance and service delivery policy, including water and solid waste management, climate change and the CDM, water resources allocation modelling and environmental policy. Mr Goldblatt has assisted in the establishment of the Designated National Authority for the CDM under contract to the

Department of Minerals and Energy and has been involved in the evaluation and development of a number of public and private sector CDM projects in South Africa.

Mr Hugh Hawarden
Project, Structured trade & Commodity Finance

Rand Merchant Bank

(Supporting Catalyst)

Mr Hawarden qualified with a B.Sc in Biochemistry and Zoology from the University of Natal (Pietermaritzburg) and an LL.B. Worked in London financial markets for 8 years in Risk Management and Project Management. He returned to South Africa in 2004 and started working his own business in Environmental Finance when he perceived opportunities in this sector following the Kyoto Protocol coming into force. Now at RMB in the Project Finance department primarily looking to develop CDM opportunities.

Mrs Harmke Immink
Manager - Governance & Sustainability

Price Waterhouse Coopers (PwC)

(Supporting Catalyst)

Mrs. Immink is an environmental engineer and holds a B.Ing (Chemical Engineering) from the University of Pretoria and an M.Sc (Environmental Science) from Chalmers Technical University in Sweden. She is the manager of

the climate change business group within PwC. Her area of specialty is Life Cycle Assessments (LCA) and she has taken part of, or managed a range of projects including LCA studies in the textile sector, metals and the petrochemical industry. Recent projects include a comparative life cycle assessment for future fuels, a cradle-to-gate life cycle assessment for a South African manganese alloy as well as platinum group producer. Mrs. Immink has been instrumental in obtaining accreditation for auditing of Clean Development Mechanism (CDM) projects under the Kyoto Protocol. She is a registered professional engineer at the Engineering Council of South Africa and is also the national coordinator on Environmental Performance Evaluation for ISO Technical Committee 207.

Mr Gerrit Kornelius
Director

Airshed Planning Professionals (Pty) Ltd

(Project Developer)

Now a consultant (Director) with Airshed Planning Professionals (Pty) Ltd; previously Corporate Consultant with the SHE Centre of Sasol Ltd, responsible *inter alia* for Greenhouse Gas strategy. In that capacity, responsible for the development of corporate policy and targets for GHG reduction and submission of PIN and PDD documents to the SA DNA and the UNFCCC. Mr Kornelius was involved in the early development work of the Sasol gas pipeline from Mozambique as a CDM project.

Mr Robbie Louw
Director

Promethium Carbon

(Project Developer)

Promethium Carbon are a CDM project development house with a specific focus on CDM projects in the mining, minerals beneficiation, paper and energy sectors. They cover all phases of the project lifecycle and develop projects either for themselves or for the client's account. They have a number of projects currently in the pipeline and are among the leading project developers in Southern Africa.

Mr Masupha Mathenjwa
Deputy Director

Designated National Authority – Department Minerals & Energy

(Government)

Mr Mathenjwa has responsibility within the Designated National Authority (DNA) of the Department of Minerals and Energy for the promotion of CDM in South Africa. He was instrumental in the formation of the Promotions sub-committee of the DNA.

Mr Leluma Matooane
Deputy Director

Designated National Authority – Department Minerals & Energy

(Government)

Mr Matooane has responsibility within the Designated National Authority (DNA) of the Department of Minerals and Energy for the regulation and review of CDM projects. He is also involved in the Promotion of CDM in South Africa.

Mr Hannes Meyer
Group Manager Sustainability

PPC (Pretoria Portland Cement Ltd.)

(Industry)

Mr Meyer holds the following degrees – BSc, BSc (Hon), MSc in Chemistry. He is responsible for Overall responsible for the Environmental Management Systems and environmental compliance in PPC; developing and Implementation of a Sustainability Strategy; the sourcing and securing of secondary raw materials and fuels to replace natural raw materials and fossil fuels; reduction program for the emission of Green House Gasses – including investigating and implementing CDM projects; the conservation of energy in the PPC group and Government liaison regarding the applicable legislation.

Ms Shirley Moroka
Director: Atmospheric Policy Regulation and Planning

Department of Environmental Affairs and Tourism

(Government)

Ms Moroka has extensive experience in the UNFCCC meetings, having represented South Africa in negotiations and chaired a number of sessions at COP meetings of the UNFCCC for a number of years and having climate change in her portfolio for many of those. Within the Department of Environmental Affairs and Tourism, she has spearheaded many initiatives and continues to serve on various committees, including the Inter-ministerial and CDM project review process. She is a strong proponent of the inclusion of Sustainable Development criteria into CDM and promotion of CDM in the country.

Mr Eugene Muller
Production Manager

Omnia Fertilizer

(Industry)

Omnia Fertilizer was in the process of registering a potential CDM project to reduce N_2O emissions from a nitric acid plant at the time of the research. When the project was started, Mr Muller was the production manager for the nitric acid plant and remained involved from the point of view of getting the project registered and implemented on site. The project was in the final process of

submission to the United Nations Executive Board at the time of this research being conducted. Mr Muller is also completing his MBA at Wits Business School.

Mr Kumesh Naidoo
Programme Manager – Carbon Finance

Development Bank of Southern Africa (DBSA)

(Supporting Catalyst)

DBSA has a partnership agreement with the World Bank's Carbon Finance Unit for the identification of potential Clean Development Mechanism (CDM) project that may qualify for carbon finance.

Mr. Pancho Ndebele
Sustainable Development Manager

SAB Miller

(Industry)

Mr Ndebele holds the following degrees: MBA (Lincoln Business School, UK), Master of Laws (LLM) in Environmental Law (De Montfort, UK), Master of Science (MSc) in Water and Wastewater Engineering (Loughborough, UK) and a Bachelor of Engineering (Hons) in Electrical and Electronic Engineering (Brighton, UK). In 2002 he served on the Business Co-ordinating Forum, for the World Summit on Sustainable Development (WSSD) and assisted the

Johannesburg World Summit Company (JOWSCO) with the planning of the logistical arrangements for the summit's Ubuntu Village. He developed the water neutral concept for the WSSD, and has worked on water and effluent treatment projects, energy and emission reduction projects. He has experience in developing technical environmental solutions with a corporate social responsibility spin, project management and the implementation of strategies for sustainable development. He was instrumental in driving the first carbon credit emission reduction project by a major corporate in South Africa to be approved by the Department of Minerals and Energy. He serves on the Sustainability Advisory Forum of the National Business Initiative (NBI), the National Climate Change Committee, the CDM Promotions Committee and as an alternate member of the South African National Environmental Advisory Forum (NEAF) that advises the Minister of Environmental Affairs and Tourism. Before joining SAB in 2000, he worked for 3M and Hosiden Besson in the UK.

Ms Jacqueline Obando
National Project Manager - Sustainable Futures Unit

National Business Initiative

(Supporting Catalyst)

Ms Obando currently holds responsibility within the NBI for Project Management - Conceptualising, planning and monitoring of project plans; Reporting - Facilitating and devising synchronised and efficient reporting formats in respect of baseline, monitoring, steering committee and regional WBCSD reports and

the Evaluation of programme Communication – formulation, implementation and monitoring a communication strategy for the unit. She also holds responsibility for the financial management of the Unit. Her previous experience includes time with UNDP, and DANCED. She holds a BA (Hons.) and is currently completing a Masters programme in Environment and Society through the University of Pretoria.

Mr Johan Posthumus
Director (Finance)

Promethium Carbon

(Project Developer)

Promethium Carbon are a CDM project development house with a specific focus on CDM projects in the mining, minerals beneficiation, paper and energy sectors. They cover all phases of the project lifecycle and develop projects either for themselves or for the client's account. They have a number of projects currently in the pipeline and are among the leading project developers in Southern Africa.

Mr Stefan Raubenheimer
Executive Officer, SouthSouthNorth Trust

Managing Director: SouthSouthNorth s21

Member: Energy Transformations cc

(Policy developer)

Mr Raubenheimer is the CEO of the international SouthSouthNorth Group, as well as managing Director of SSN Africa s21. SSN is a leading organisation working in the not-for-profit sector on climate change and development issues. He is a Director of Energy Transformations cc which is a consultancy developing CDM projects for private sector clients. Mr Raubenheimer was a key member in the development of the CDM Gold Standard. In addition he is a registered facilitator, mediator and arbitrator, and is involved in numerous third party process interventions, including policy development work for the South African government.

Ms Mandy Rambharos
Chief Advisor: Sustainability

Eskom Holdings Pty Ltd.

(Industry)

Chief Advisor on Sustainability for Eskom Holdings, in the Corporate Sustainability Department. Responsible for Sustainability policy and strategy development for Eskom, including, Eskom's Sustainability Strategy, Climate Change Strategy and Renewables Strategy. Responsible for the coordination

and development of Eskom's CDM projects. Represents Eskom as a member of the South African delegation to the UN Conference of Parties on climate Change and to the UN Commission on Sustainable Development.

Mr Henk Sa
Director

EcoSecurities

(Project Developer)

Mr Sa manages the EcoSecurities office in Johannesburg South Africa. Mr Sa is responsible for all of EcoSecurities activities in sub-Saharan Africa, and is regarded as an expert in the field of CDM project development and finance and over the years he worked for various clients in a wide range of sectors (e.g. Pulp & Paper, Energy, Biofuels and Metals).

Dr Bob Scholes
Fellow

Council for Scientific and Industrial Research

(Policy Maker)

Dr Scholes is a systems ecologist, employed by the Council for Scientific and Industrial Research, South Africa since 1992. Before that, he was manager of the South African Savannah Biome Programme, and did his PhD, through the University of the Witwatersrand. He studies the effects of human activities on

the global ecosystem. He has over twenty years of field experience in many parts of Africa, and has published widely in the fields of savannah ecology and global change, including popular and scientific books. He has been involved in several high-profile environmental assessments and contributes to the formulation of national environmental policy. He is or has been a member of several steering committees of international research programmes, such as the Global Climate Observing System, and serves as a convening lead author for Intergovernmental Panel on Climate Change. He is a Fellow of the South African Academy and the Royal Society of South Africa, and a member of the South African Institute of Ecologists and several other professional societies, and serves on the editorial board of several journals.

Mr Randall Spalding-Fecher
Director

Econ Analysis South Africa.

(Policy maker)

Mr Spalding-Fecher has 9 years experience in energy and climate change analysis. He spent 6 years at the Energy & Development Research Centre, University of Cape Town. He has expertise in Clean Development Mechanism (CDM) methodology and project development, energy economics, mitigation analysis, and energy efficiency analysis. His experience includes reviewing and consolidating CDM baseline and monitoring methodologies, as well as serving as a consultant to the UNFCCC on additionality testing, technical guidelines for

baseline methodologies, witnessing of carbon auditors (proposed DOE's) and analysing requests for registration of CDM projects.

He advises private sector industry clients on CDM, has served as a policy advisor to the South African government and has led capacity building programmes in Southern Africa. He has contributed numerous professional articles, peer reviewed conference papers and research monographs on climate change, energy, and CDM. He developed the CDM Guidebook for Southern Africa, and has published many academic and policy documents on a wide array of subjects. He holds a BA cum laude from Harvard and a Master's degree in law.

Dr Geoff Stiles
Managing Director

Marbek Resource Consultants (Pty) Ltd

(Project Developer)

Dr Stiles has been involved in energy efficiency and climate change in Southern Africa for 19 years. Most recently, has worked on development of CDM guides for NBI and DBSA, Chamber of Mines and Africapractice, and has also worked on CDM project development in the areas of wind energy, coal-bed methane and energy efficiency.

Ms Ciska Terblanche
Environmental Manager

Mondi Business Paper, Richards Bay

(Industry)

Development of CDM projects at one of the largest integrated pulp & paper mills in Africa. Ms Terblanche has been actively involved in CDM project development, including the development of 2 new methodologies for more than four years in addition to her normal environmental management responsibilities for the mill. She is also considered as one of the experts in CDM within the Anglo American group.

Ms Lwazikazi Tyani
Director Designated National Authority for CDM in South Africa

Department of Minerals and Energy

(Government)

Ms Tyani is the first appointed Director of the South African Designated National Authority (DNA). Prior to being the director of DNA she has been involved in research in climate change and CDM at UCT's ERC and has written several publications in the area. She has also worked in an international organisation i.e. UNEP in Denmark and managed some donor funded climate change projects nationally within the Department of Environmental Affairs and Tourism.

Ms Emily Tyler
Climate Project Transactions,

SouthSouthNorth.

(Project Developer)

Ms Tyler is responsible for Climate Project Transactions at the South African office of The SouthSouthNorth Project, an international NGO. She is currently involved with the Gold Standard Kuyasa project in Cape Town and has much experience of CDM projects. She holds a B.Comm (Hons) degree in Economics and is currently studying for a Master's in Financial Management.

Adv Johan van den Berg
CEO. CDM and legal compliance expert

CDM Africa

(Project Developer)

Adv van den Berg practised at the Cape Bar as an advocate from 1993-2002, specialising in Environmental law and Environmental Dispute Resolution. During the year 2000 he made the decision to move fulltime into climate change work. In 2001/2002 he completed a certificate course in the Mathematical Modelling of Financial Derivates at the University of South Africa and in April 2002 left the bar to become head of the Energy Desk at Commodity Trading House in Stellenbosch. In November 20002 he was retained by UNEP's

Collaborating Centre on Energy and the Environment to write “Legal Background Paper on the CDM in Developing Countries”. Johan has also done work for the World Bank. He founded CDM Africa in mid-2003 as a specialised advisor to CDM project developers. Johan is an Associate Fellow of the Society of Advanced Legal Studies in London, legal advisor to the Darling National Demonstration Windfarm and the African Wind Energy Association, an internationally accredited mediator, an a registered trader of the South African Futures Exchange and has lectured at four SA Universities on CDM and energy.

Mr. Sakkie van der Westhuizen
Regional Environmental Manager

Sappi Management Services

(Industry)

Mr van der Westhuizen holds a Civil Engineer degree from Stellenbosch University. He has spent a large portion of his career to date in the Department of Water Affairs & Forestry (DWAF) on the water management side. He was involved in the construction large dams, canals, pump stations and blasting of tunnels for a large part of his career. He designed and planned water infrastructure for the Eastern part of the country and was involved with the management of water quality in South Africa. His duties included waste management and environmental management.

Mr Chris Whyte
Director

EnviroForm (Pty) Ltd, IMAGIS cc, and Gayakabusha (Pty) Ltd

(Project Developer)

Involved in total waste management solutions since 1999 with a specific focus on generating commercially viable and proven international innovations on waste beneficiation. Specific focus on wood wastes, organic fraction of MSW for producing Bio-Organic Fertilisers, thermally efficient building products and Wood-Plastic Composites. Has done preliminary CDM development work with Msunduzi Municipality (Pietermaritzburg) in Kwa Zulu Natal around their New England Road waste disposal site.

Dr Harald Winkler
Senior researcher

Energy Research Centre at the University of Cape Town.

(Policy Maker)

Dr Winkler holds a PhD and MA from UCT and an MSc in Energy & Resources from UC Berkeley. His research interests focus on energy and environment, in particular climate change and the economics of mitigation. He heads up the Energy, Environment and Climate Change programme at ERC.

Recent work has addressed the future commitments to climate action; energy scenarios for South Africa and Cape Town; the links between sustainable

development and climate change; policies and measures for renewable energy and energy efficiency; CDM project baselines; and valuation of climate change impacts. Harald has served as a member of the Methodologies Panel to the CDM Executive Board, the SA delegation to the negotiations under the UN Framework Convention on Climate Change, and is a lead author for the Intergovernmental Panel on Climate Change's Working Group III on mitigation.

Mr Richard Worthington

Co-ordinator of the South African Climate Action Network (SACAN) and Sustainable Energy and Climate Change Partnership (SECCP)

(Policy Maker)

SECCP aims, through a combination of awareness-raising, research, advocacy and local and international networking, to mobilize civil society for support of a more sustainable energy development path and responsible climate change policies in South and Southern Africa. Mr Worthington has been an office-bearer of Earthlife Africa Johannesburg branch for more than 8 years. Earthlife Africa, is a voluntary, non-government organisation working on environmental and social justice issues at various levels from policy formulation to direct action. He was named Energy Personality of the Year in 2002 by the Sustainable Energy Society of Southern Africa.

APPENDIX IV: EXPLAINATION OF BOXPLOT ANALYSIS

Boxplots (Albright, Winston and Zappe, 2003, pp 95 – 99) are a useful graphical method for summarising a data set. They are particularly useful when comparing two or more variables within a data set. This technique was used in this research, comparing the responses to each factor by stakeholder grouping. Boxplots show four main indicators of the data set:

a) centrality of the data (indicated by the median),
b) spread of the data (indicated by the box and legs),
c) outliers (indicated by any points outside the legs),
d) and skewness (indicated by relative box shape above and below the median).

All boxplot analyses were conducted using the Number Cruncher Statistical System – NCSS 2004 – software package. An example of a boxplot and the information that can be gleaned from it are presented below in Figure 33. The points worth noting from a boxplot graphic are:

- The mid-point of the data – represented by the median line. This gives an indication of the centrality of the data set.
- The spread around the mid-point – represented by the upper and lower legs of the plot extending form the box. This gives an indication of the spread of the data set.

- The relative lengths of each of the legs. This gives an indication of skewness of the data set.
- Any outlier are displayed (above or below) the box as points.
- The length of the box is the inter quartile range (IQR). The width of the box is arbitrary and relevant only from an aesthetic aspect.
- Finally when two (or more) boxplots are shown beside each other, the data (response on an issue) for different variables (in this case the variable will be stakeholder grouping) can be compared. The relative position and shape of the boxplots can be compared and information inferred – e.g. for similar boxplots – the 2 groups concur; for boxplots that do not align – the 2 groups have different opinions on the issue.

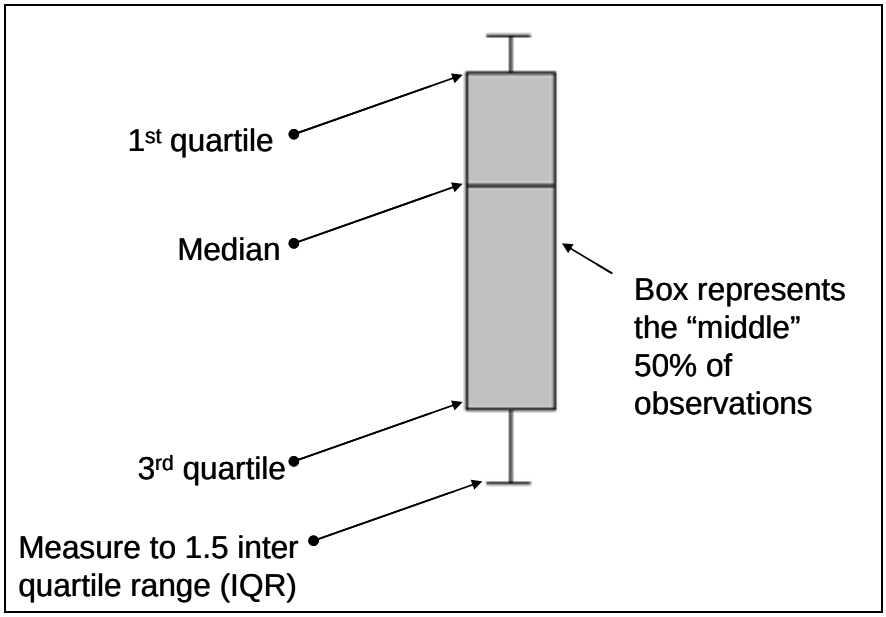

Figure 33: Components of a boxplot graph.