2010

CDM STATUS REVIEW

SOUTH AFRICAN DESIGNATED NATIONAL AUTHORITY
DEPARTMENT OF ENERGY

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

South African Designated National Authority for the Clean Development Mechanism: CDM Status Review

2010

Vision

To lead in the development and promotion of Clean Development Mechanism

Mission

Effective and efficient regulation of Clean Development Mechanism activities in accordance with the objectives of the United Nations Framework Convention on Climate Change and Kyoto Protocol

Contact Details

DNA

Contact	Ms. Lindiwe Chauke Director: Designated National Authority for the Clean Development Mechanism
Postal address	Department of Energy, Private Bag X19, Arcadia, 0007
Physical address	Department of Energy, Travenna Building, 71 Meintjies Street, Sunnyside
Telephone	+27 12 444 4111
Fax	+27 12 341 5133
E-mail	DNA@energy.gov.za

Executive Summary

The Clean Development Mechanism (CDM) plays an important role in South Africa's efforts to combating climate change. The Designated National Authority (DNA), South Africa's custodian for the CDM, has prepared the report to review

the development of the CDM in the country in order to provide insights into the successes and challenges of CDM project implementation and also to highlight 2010 CDM activities.

The global Carbon Market has developed tremendously since its establishment in 2005. According to Point Carbon the supply of credits from the two market-based Mechanisms, Clean Development Mechanism and Joint Implementation are expected to reach 2.5 billion tonne of Carbon dioxide equivalent (CO_2e) by 2012. CDM has the largest CO_2e project based offset system in the world with over 2968 registered projects and over 588 million of certified emission reduction certificates issued. Most of the CDM projects are located in the more advanced developing countries with China remaining a dominant player.

As of December 2010, 193 CDM projects were submitted to the DNA – 157 Project Idea Notes (PINs) and 36 Project Design Documents (PDDs). Out of 36 PDDs, only 19 have been registered by the CDM Executive Board as CDM projects and only six of the 19 have been issued with Certified Emission Reductions (CER's). The projects submitted to the DNA for initial review and approval cover the following type: bio-fuels, energy efficiency, waste management, cogeneration, fuel switching and hydro-power, and also cover sectors like manufacturing, mining, agriculture, energy, waste management, housing, transport and residential. The updated information on the projects statistics is available on the Designated National Authority website: http://www.energy.gov.za/files/esources/Kyoto/kyotoframe.html.

Based on the Project Design Documents submitted to DNA, the registered projects have the potential to reduce 3 247 426 tons of CO_2e per annum. Six projects have already been issued with Certified Emission Reduction (CERs) amounting to 1 794 261 CO_2e. From the registered projects nitrous oxide reduction projects account for 41% of emission reductions; followed by methane recovery and flaring projects at 22%; cogeneration at 21% and fuel

switch, renewable energy and energy efficiency projects taking up the remainder of the 16%.

Despite the relatively small number of registered projects, there is a rapidly growing project pipeline as evidently indicated by the number of Project Idea Notes (PINs) that the Designated National Authority (DNA) has received. Some of the projects that have passed the host country approval stage have been selected and discussed in details in the case studies section of this report.

Apart from reducing GHG emissions, CDM projects also contribute to economic and social development. The CDM projects received by the DNA have resulted in transfer of new technology in field such as Landfill-Gas-to-Energy and renewable energy technologies. These projects have also led to job creation as well as skills transfer. A number of registered PDDs have forward sold their CERs or entered into a selling contract with prospective CER buyers, this has brought additional revenue into the country.

CDM in South Africa is very much of work in progress and is still far from perfect, encountering a range of constraints such as high transaction costs of obtaining CER's; lack of financing for project development and implementation; and also the uncertainties around the post 2012 regime. Most projects have experience delays in finalising project validation and verification; this is further aggravated by the fact that there are limited numbers of accredited DOEs in the world.

Foreword

To address challenges posed by Climate Change, the global community adopted the United Nations Framework Convention on Climate Change and the Kyoto Protocol with the main objective of curbing the greenhouse gas emissions responsible for global warming. Annex I countries (developed countries) agreed to reduce their collective emissions of greenhouse gases by 5, 2% using the three flexible mechanisms of the Protocol, i.e. Emission Trading, Joint Implementation and Clean Development Mechanism. South Africa as a developing country only participates in Clean Development Mechanism (CDM).

The year of 2010 marks the halfway point of the first commitment period of the Kyoto Protocol. The timing of this review is particularly pertinent when one considers that in December 2011; world leaders and expertise in the climate change will be meeting for the 17th Conference of Parties (COP 17) and the 7th Meeting of the Parties under the Kyoto Protocol (CMP) here in South Africa to discuss the future of CDM.

The Report aims to review and provide detailed information on the current status of CDM in South Africa, share with the public success stories and also highlights barriers encountered during the development of CDM projects and also highlights some steps taken to address some of these barriers.

The accuracy of information in this report is dependent on the information provided to the South African Designated National Authority by different stakeholders including Project developers, Designated Operational Entities, and Investors. We express our appreciation to all organisations that responded to our questionnaires which made it possible for us to put together this annual report. We hope that this report will provide useful information to all stakeholders

Ms Nelisiwe Magubane
Director General
Department of Energy

1 INTRODUCTION

Clean Development Mechanism (CDM) is an important component of a global response to combating Climate Change. The effects of climate change are already experienced in some parts of the world as demonstrated by high temperatures, droughts, increased rates of rainfall, irregular rainfall patterns and subsequent flooding. The global community is working very hard to address the challenges posed by Climate Change. The two main approaches that are currently being used to deal with climate change are mitigation and adaptation.

Mitigation of climate change is the most important, as it involves measures that are aimed at reducing the amount of Greenhouse Gases (GHGs) entering the atmosphere from human activities. Adaptation refers to planning in order to take into account and finding ways to adjust to the negative impacts of Climate Change.

The adoption of Kyoto Protocol was an important step in addressing the challenges of climate change and cutting greenhouse gas emissions. It also introduced three flexibility mechanisms i.e. Emissions Trading, Joint Implementation and Clean Development Mechanism as instruments that Annex I parties could use to achieve their emission reduction targets. Furthermore, it has led to the establishment of the Carbon Market, which has developed tremendously over the years since the adoption of the Kyoto. The CDM's biggest strength has been its ability to bring developing and developed countries, the public and private sectors together to reduce emissions cost-effectively.

The South African Designated National Authority (DNA) was established in 2004 December as one of the prerequisite for participation under the CDM in order to create a pleasant or conducive environment for facilitating and enhancing the development of CDM in South Africa. It is mandated to conduct evaluation and

approval of CDM projects, promote and facilitate the development of CDM projects and also secures an adequate share of CDM investment.

As a custodian of CDM in South Africa, the DNA has prepared the report to review the development of the CDM in the country in order to provide insights into the successes and challenges of CDM project implementation and to also highlight 2010 CDM activities. The report provides detail information on the current status of the CDM with global and national focus, highlight success and challenges through case studies, provides an analysis for 2010 CDM project activities and a view to the future as more projects in the pipeline are developed.

2 CLIMATE CHANGE AND CLEAN DEVELOPMENT MECHANISM

2.1 What is Climate Change

Climate change refers to the change in representative or characteristic atmospheric conditions of particular regions on the earth surface. Science has shown that air pollutants particularly from fossil fuel use, make clouds reflect more of the sun's rays back into space. This leads to an effect known as global warming whereby less heat and energy leaves the earth atmosphere. Human activities such as burning of fossil fuels; deforestation; burning of biomass, etc, have greatly increased since the beginning of industrialized revolution, and has led to an increase in the amount of anthropogenic greenhouse gases in the atmosphere.

Global warming will have a range of global changes in climate patterns such as changes in rainfall patterns; changes in season patterns; melting of glaciers and ice caps. Changes in climate patterns will have significant impacts such as:

- Decreased water availability due to irregular rainfall patterns,

- Rising sea levels,
- Decreased agricultural productivity due to increased temperatures,
- Increased flooding due to intense rainfall,
- Damage to infrastructure due to extreme weathers,
- Loss of biodiversity for climate sensitive species and ecosystems due to invasion by alien species.

2.2 What is being done to combat climate change?

In 1988, the Intergovernmental Panel on Climate Change (IPCC) was created by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to assess the scientific knowledge on global warming. The IPCC concluded its First Synthetic Assessment Report in 1990 that indicated that climate change was human-induced. The report paved the way for an international Convention, the United Nations Framework Convention on Climate Change (UNFCCC), and it was signed by over 150 countries at the Rio Earth Summit in 1992. The main objective of the Convention is to: "stabilize greenhouse gas concentration at a level that would prevent dangerous anthropogenic interference with the climate system," (http://unfccc.int). To date 189 Countries have signed the Convention. The Parties to the Convention have since agreed to meet annually at the United Nations Climate Change Conference, formally known as the Conference of Parties (COP), to address climate change issues.

The parties to the Convention have been classified into 3 categories i.e. Annex I, Annex II and Non-Annex I countries. Annex I and II countries include nations that are members of the Organisation for Economic Co-operation and Development (OECD) as well as nations with economies in transition (EIT). Non-Annex I nations include, mostly developing nations and a small portion of

Least Developed Countries (LDCs). Annex I countries are required by the Convention to offer financial assistance to developing nations which will enable them to undertake greenhouse gas emission reduction activities as well as promoting the transfer of environmentally friendly technologies.

Parties to the Convention have already met 16 times annually, since the establishment of the Convention in 1995. Although the Convention does not have a legal mandate to committing countries to reduce their emissions, it however, directs parties to recognize that climate change is occurring and acknowledge that it is influenced by human activities.

The UNFCCC has tasked the IPCC with the responsibility of reviewing and compiling scientific data on current climate change issues so as to inform parties to the Convention on what to do about climate change. Since, 1990 the IPCC has continued to provide scientific, technical and methodological advice to the UNFCCC. Furthermore it provides policymakers with an objective source of information about causes of climate change, potential environmental and socio-economic impacts, possible response options for adaptation and mitigation. To date four of its Synthetic Assessment Reports have been published: 1990, 1995, 2001, and 2007 and the Fifth Synthetic Assessment Report is due in 2014.

The publication of the Second IPCC Assessment Report in 1995 demonstrated that the actions outlined in the UNFCCC were insufficient and triggered the negotiation of the Kyoto Protocol, which was finalised in 1997 as a first step towards a more ambitious international response to the global climate change threat. The Protocol provided a legally binding agreement under which industrialized countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990 over the five-year period of 2008-12. As an additional means of meeting these targets, the Kyoto Protocol

introduced three market-based mechanisms, thereby creating what is now known as the Carbon Market. The market-based mechanisms are briefly discussed below.

2.3 The Market-based Mechanisms under the Kyoto Protocol

The Market-based Mechanisms, also known as Flexibility Mechanisms refers to Emissions Trading, the Clean Development Mechanism and Joint Implementation, defined in details below. Mechanisms defined under the Kyoto Protocol intended to lower the overall costs of achieving emissions targets. It enables Annex I Parties to achieve emission reductions or to remove greenhouse gases from the atmosphere cost-effectively in other countries. The six gases listed in Annex A of the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20), as well as hydrofluorocarbons (HFC-23), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). Each of these GHGs has a different heat trapping property, with CO_2 trapping the least heat. The symbol most often used is tons of carbon dioxide equivalents (tCO_2e). To compare them they are indexed according to their Global Warming Potential (GWP) in Table 1 below.

Greenhouse gases	Chemical Formula	Anthropogenic Sources	Global Warming Potential
Carbon Dioxide	CO_2	Burning of fossil fuels (oil, coal, gas), forest clearing, cement production	1
Methane	CH_4	Landfills, production and distribution of natural gas & petroleum, fermentation from the digestive system of livestock, rice cultivation, burning of fossil fuels	21
Nitrous oxide	N_2O	Burning of fossil fuels production of fertilizers, nylon production, manure	310
Chlorofluoro-carbons	CCI_2F_2	Production/disposal of air conditioners, aerosol cans	6200-7100
Tetrafluoromethane	CF4	Aluminium production, semiconductor industry	6500
Hydrochloro-fluorocarbons	$HCHCIF_2$	Refrigeration gases, aluminium smelting, semi-conductor Manufacturing	1300-1400

Sulfur Hexaflouride	SF_6	Electrical transmissions & distribution systems, magnesium production	23900

Table 1: Common Metrics of GHGs as identified by the IPCC

2.3.1 **Emissions Trading**

Emissions trading commonly known as Cap and Trade allows parties to the Kyoto Protocol to buy emissions permits for greenhouse gas from other countries to help meet their domestic emission reduction targets. Usually the government or an international body sets a limit or cap on the amount of GHGs that can be emitted. Organisations or companies are issued with permits/allowances which give them the right to emit specific amounts of GHGs. The total amount of allowances given to a country's organizations cannot exceed a cap for that country. Entities, such as manufacturing firms or energy utilities, which exceed their allowance either face penalties or are required to buy credits from other firms that have not exceeded their allowance. This transfer of allowances is known as a trade, hence the name Cap and Trade. One example of a 'cap and trade' system is the European Union Emissions Trading System (EU ETS).

2.3.2 **Joint Implementation (JI)**

Joint implementation allows trading between two Annex I countries. A country can claim emissions reduction credits by investing in a cleaner project in another Annex I country. The credits obtained are referred to as Emissions Reduction Units (ERUs). Each ERU is equivalent to 1 tonne of CO_2e. The host country loses its ERUs but gains a sustainable project with low carbon emissions, technology transfer and foreign investment.

2.3.3 **Clean Development Mechanism (CDM)**

CDM is defined under Article 12 of the Kyoto Protocol. It allows industrialized nations (Annex I nations), to fund or invest in GHG emissions reduction projects in developing nations (Non-Annex I nations) in return for Certified Emission Reductions (CERs). Such projects include energy efficiency improvement projects; cleaner and renewable energy projects; reforestation activities; cogeneration projects; N_2O reduction projects; CH_4 recovery and flaring project; etc. The projects must contribute to sustainable development as defined by a particular host country.

The main stakeholders in CDM include project developers, Designated Operational Entities, CDM Executive Board, project owners, project investors, DNAs, Non-Governmental Organisations and the general public. International negotiations on the new targets for the second commitment period under the Kyoto Protocol are underway.

a) Institutional Framework for handling CDM

- ***Conference of Parties and Meeting of Parties (CMP)***

The body that has the highest authority over CDM is the Conference of Parties also serving as the Meeting of Parties to the Kyoto Protocol (CMP). "The CMP provides guidance to the CDM Executive Board through adoption of decisions and resolutions, published in reports of the CMP, usually under the title: "Further guidance relating to the clean development mechanism," (**www.unfccc.int**).

- ***Clean Development Mechanism Executive Board***

The CDM Executive Board (EB) supervises the actual operation of CDM under the guidance of CMP. Responsibilities of the CDM EB include: approval of new

baseline and monitoring methodologies; registration of CDM projects; issuance of CERs; maintenance of the CDM registry as well as making recommendations to the COP/MOP on further modalities that can be used in CDM.

○ *Designated Operational Entities*

A Designated Operational Entity (DOE) is an organization or company accredited by the CDM EB to validate and verify CDM projects. The DOE validates and subsequently requests registration of a proposed CDM activity and verifies emissions reductions of a registered CDM project, certifies accordingly and requests the CDM EB to issue CER's appropriately.

○ *Designated National Authorities*

The Kyoto requires all nations participating in CDM to designate a national authority called the Designated National Authority which is responsible for overseeing the host country approval process. Project approval by the host country is a pre-requisite for registration of a CDM project with the UNFCCC.

The main function of the DNA is to assess projects eligibility under CDM by evaluating the projects' contribution to sustainable development, coordinating matters pertaining to the approval of a CDM project proposals, as well as issuing of Letters of No Objections and letters of Approvals to project developers and making the necessary recommendations thereof to project developers.

3 GLOBAL PERSPECTIVE: CARBON MARKET

The global carbon market was established in 2005 with entry into force of the Kyoto Protocol. Carbon markets have developed in order to facilitate the trade in carbon credits and help to mitigate climate change in a cost effective way.

The total value of the market was US$144 billion (€103 billion) by end of 2009 with 8.7 billion tCO_2e traded (World Bank, 2010). Point Carbon expects supply of credits from the two market-based Mechanisms, CDM and JI, to reach 2.5 billion tCO_2e by 2012.

3.1 Structure of the Global Carbon Market

There are many types of carbon markets, but there are currently two main markets for trading carbon. These include:

(i) The regulated carbon markets, which are regulated by international rules, defined in the Kyoto Protocol and Marrakech Accords and it includes Clean Development Mechanism (CDM) projects.

(ii) The voluntary carbon markets, which are unregulated and include a range of different trading relationships and voluntary project standards.

There are some key differences between CDM and voluntary markets, summarized in the Table 2 below.

Compliance Market (e.g. CER)	**Voluntary Market (VER)**
Compliance markets generate and trade green house gas emission reductions known as Certified Emission Reductions (CERs) that are regulated and directly initiated under the Kyoto Protocol's Clean Development Mechanism (CDM).	Voluntary markets generate and trade greenhouse gas emission reductions that are not regulated or directly initiated by the Kyoto Protocol and known as Verified Emission Reductions or (VERs).
Certified Emission Reduction (CERs): Green house gas reduction of any CDM project is measured according to internationally agreed methods and are quantified in standard units called Certified Emission Reductions (CERs). These are expressed in tons of carbon dioxide (CO2) equivalents.	Verified Emission Reduction (VERs): Green house gas reductions outside Kyoto Protocol is measured according to internationally agreed methods and are quantified in standard units called Verified Emission Reductions (VERs). These are also expressed in tons of carbon dioxide (CO_2) equivalents.

Table 2: Compliance Vs Voluntary Market

Carbon credits can only be traded if they meet certain criteria which help to ensure that the emissions reductions or removals have, or will, actually occur and that they have only occurred because of the carbon offset project.

The commodity which is traded in carbon markets is 'tonnes of carbon dioxide equivalent. Each tonne of carbon dioxide emitted (or another GHG) has an incremental impact on atmospheric GHG concentrations and therefore climate change.

3.2 **Overview of the CDM market**

CDM has the largest CO_2e project based offset system in the world with over 3299 registered projects and over 588 million of certified emission reduction certificates issued (For updated figures please visit www.unfccc.int). Several types of CDM project have been developed. Renewable energy projects account for more than 60 % of the total registered projects. Table 3 below highlights Global CDM registered Projects by scope:

	Sectoral Scope	***Registered projects***
1	Energy Industries (renewable/non-renewable sources)	2300
2	Energy distribution	o
3	Energy demand	39
4	Manufacturing industries	16
5	Chemical Industries	69
6	Construction	0
7	Transport	6
8	Mining /Mineral Production	44

9	Metal Production	9
10	Fugitive emissions from Fuels (solid, oil and gas)	160
11	Fugitive emissions from production& consumption of halocarbons& sulphur hexafluoride	26
12	Solvents use	0
13	Waste handling and disposal	526
14	Afforestation &reforestation	21
16	Agriculture	83

Table 3: Global Registered CDM projects all over by scope, Source www.unfccc.int

Most of the CDM projects are located in the more advanced developing countries. China remains the largest Clean Development Mechanism (CDM) trader accounting for 44% of the registered projects, followed by India and Brazil with 21% and 6% respectively.

Despite efforts for the development of CDM projects in Africa, only 2% (58 projects) are located in the region. South Africa leads Africa with only 19 registered projects. One of the reasons why CDM investment lagged behind in Africa than in other parts of developing countries is because the continent emits the fewest greenhouse gases and it also offers the lowest opportunities for emissions reduction projects.

Africa offers few investment opportunities compare with China. This however, is not a sufficient reason to explain the current state. More profound problems exist than a lack of potential, namely:

- Lack of professionals with an in-depth knowledge of CDM,
- Few operating Designated Operational Entities (DOEs) in Africa,
- Lack of finance to develop conventional and CDM projects.

European Union Emissions Trading Scheme (EU ETS) remains an engine of the carbon market.

3.3 **Carbon prices**

There is no single price for carbon globally, therefore the Carbon Market is a system with different 'commodities', or types of carbon credits. The Certified Emission Reduction is currently traded in two market segments, i.e. the primary market and the secondary market.

The primary market refers to the initial transaction between the project developer and the investor. It is a transaction that carries the CER, the commodity in question, from the project in the developing country to the international market. Primary CER Purchase: Non guaranteed volume of CERs, as is dependent on the performance of a specific CDM project or a portfolio of projects.

The secondary market refers to any further transaction after the primary transaction: the onward sale of the CER until eventually it is bought by the final consumer who will submit it to meet their target. The CERs for the Secondary Market are linked to the spot market price. For information on prices in the spots market please check www.marketevolution.com or www.pointcarbon.com Figure 1 below is an example of the secondary Market price.

3.4 **CDM a Source for Finance and Investment Leverage**

The key feature of carbon finance is that it can both complement and leverage other financial resources to unlock low carbon investments in developing countries. According to the World Bank, carbon finance has helped leverage more than US$ 2.5 billion. Carbon financing can be defined as financial resources provided to projects generating (or expected to generate) green

house gas emission reductions, in simple term, carbon finance is a purchase contract whereby one party pays another party in exchange for a given quantity of Green House Gas (GHG) emission reductions in the form of the purchase of such emission reductions.

CDM projects require upfront investments to fund the development of the physical project as well as the project registration component. There are a variety of different sources from which this funding can be obtained including loan funding, equity, grants and upfront payment for future carbon emission reductions.

The existence of CERs is important to stakeholders as it improves the overall profitability of the project and where upfront payments are received it may reduce debt and equity requirements. While for agencies that provide risk mitigation, this offers an opportunity to expand services to emission reduction components.

4 A REVIEW OF THE CDM IN SOUTH AFRICA

South Africa ratified the United Nations Framework Convention on Climate Change in 1997 and the Kyoto Protocol in 2002. The ratification of both Treaties also paved the way for South Africa to participate in Clean Development Mechanism. South Africa has a great potential of developing CDM projects given its GHG emissions level. Compared to other major developing countries, its emissions intensity is relatively high due to its reliance on coal.

The energy sector is a key source of GHG emissions (see Figure 2 below). In 2000, it contributed 82.60% of GHG emissions, followed by industrial processes at 7%, Agriculture, forestry and land use at 8.4%, and waste at 2.0 % (DEA,

2009). The primary source of GHG emissions is the production of CO_2 from energy production and use.

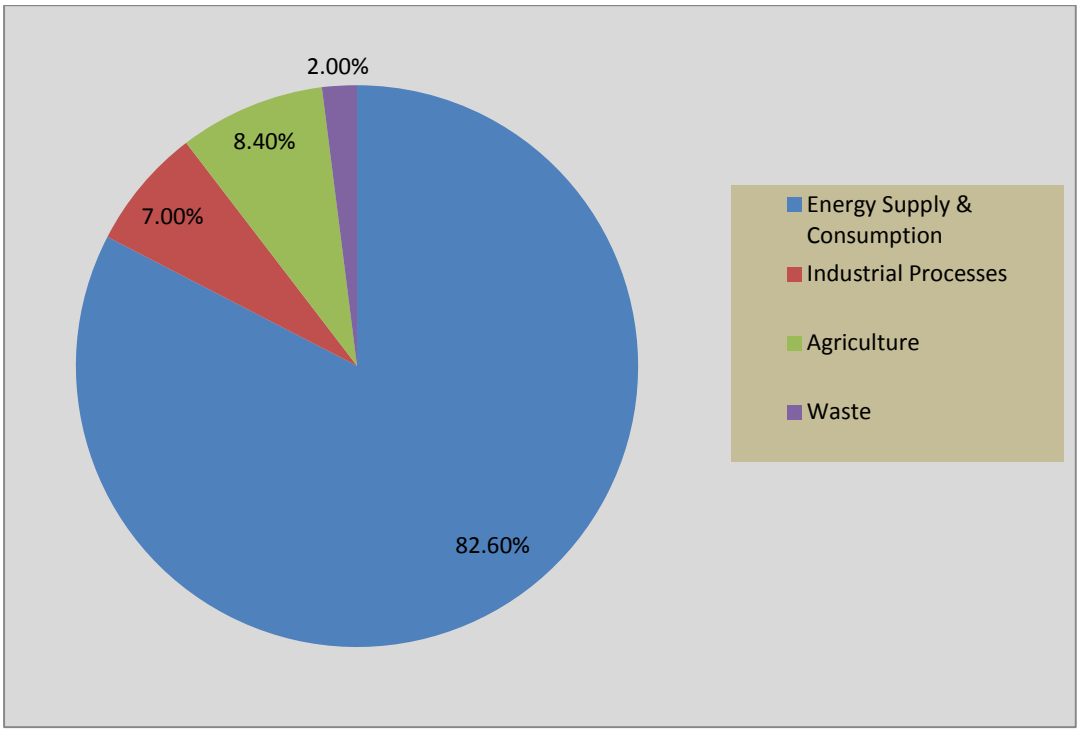

Figure 1: SA GHG emission by sector, Source: DEA, 2009

Given that the energy sector contributes most to GHG emissions, the potential for CDM projects is large. This includes both supply-side and demand-side projects. There are a number of opportunities which have good potential for emissions reduction, and these include:

- Electricity generation from Renewable energy source (Solar, wind, hydro and biomass,
- Fuel switching for thermal energy supply, for example from coal and oil to natural gas; from electricity to natural gas,
- Energy efficiency improvements in steam and thermal energy supply systems
- Energy management (energy efficiency) in the following areas: variable speed drive; electrical motors; lighting; and compressed air systems.

CDM potential within other sectors:

- Agriculture – afforestation & reforestation; fire controls; improved management of woodlands; biofuel production,
- Transport and automotive sectors – Improved public transport, urban planning & traffic management; vehicle fuel switch; vehicle efficiency, road to rail transport,
- Manufacturing – industrial energy efficiency; structural changes to less energy & emissions-intensive; boiler conversion to gas.

There are numerous organizations that are embarking on energy efficiency improvements in their operations. It would be a missed opportunity if such improvements did not benefit from carbon finance under the CDM. These improvements could include both large process changes as well as simple housekeeping measures.

Greater use of programmatic CDM: A programmatic CDM is a programme consisting of a number of small projects that are too small to participate in the traditional CDM structure due to the high level of transaction costs and complexity of the registration and monitoring processes. When these small projects are combined they have enough emission reductions and carbon revenue earning potential to exist as a CDM project. Examples of such projects would include the installation of solar water heaters and compact fluorescent light bulbs at a residential level. There appears to be real potential for the use of the programmatic. CDM may also play an important role in bolstering the low carbon development path which South Africa has set for itself.

4.1 Host country approval of CDM projects

The South African government established the Designated National Authority (DNA) in 2004 within Department of Minerals and Energy (DME) to allow for the operation of the CDM in South Africa. As a result of the split of DME into two Departments in May 2009, the DNA now resides within the Department of Energy.

The main function of the DNA is to regulate CDM activities in accordance with the United Nations Framework Convention on Climate Change and Kyoto Protocol requirements. Functions of the DNA are overseen by the steering committee constituted by members representing the following National Departments: Energy; Environmental Affairs; Water Affairs; International Relations and Cooperation; Trade and Industry; Agriculture, Forestry and Fisheries; Transport; National Treasury; Science and Technology; and Health.

The primary role of the DNA is to evaluate potential CDM projects based on the degree to which the projects contribute towards sustainable development. If a project meets the DNA's criteria, and is also in compliance with the required domestic legislations and CDM rules and procedures, then the DNA approves a CDM project proposal by issuing a Letter of Approval. The Letter of Approval is required before the project can be registered as a CDM project with the CDM Executive Board. The DNA also conducts on site monitoring of CDM projects that are already operational, in order to check compliance with sustainable development criteria as outlined in the approved PDDs as well as making recommendations to project developers whenever non-compliance is experienced.

In addition to this regulatory function the DNA also rolls out CDM awareness raising campaigns and capacity building activities. The DNA is also available to provide assistance to project developers and/or project owners on issues relating to regulatory requirements, providing general information about CDM;

providing contact details for other relevant stakeholders that may be of assistance to project developers.

4.2 Statistical analysis

i. CDM Project Portfolio

As of December 2010 there were 193 CDM projects submitted to the DNA – 157 Project Idea Notes (PINs) and 36 Project Design Documents (PDDs), for an updated project Portfolio please download a copy from the website: www.energy.gov.za. Out of 36 PDDs, 19 have been registered by the CDM Executive Board as CDM projects and 6 projects were issued with Certified Emission Reduction certificates. The projects submitted to the DNA for initial review and approval cover the following types, bio-fuels, energy efficiency, waste management, cogeneration, fuel switching and hydro-power, and cover sectors like manufacturing, mining, agriculture, energy, waste management, housing, transport and residential. Table 4 below indicate projects submitted to DNA by sector as of December 2010.

Project Sector	**Number**
Renewable Energy	66
Energy Efficiency	29
Cogeneration	23
Bio-Fuel Production	5
Industrial Processes	6
Fuel Switch	23
Methane Recovery and Flaring (Electricity generation)	14
Nitrous Oxide Reduction	4
Waste Management	20
Transport	3
Total	**193**

Table 4 Projects distribution by Sector, Source: DNA

Thirty four percent of the projects that have been received by Designated National Authority; fall within the Renewable Energy (RE) sector as highlighted in Figure 3 below. Energy Efficiency projects also show high prevalence contributing 15 % mainly due to the rollout of Compact Fluorescent Lightbulbs (CFLs) as well as the Light Emitting Diodes (LEDs), particularly by Local Municipalities.

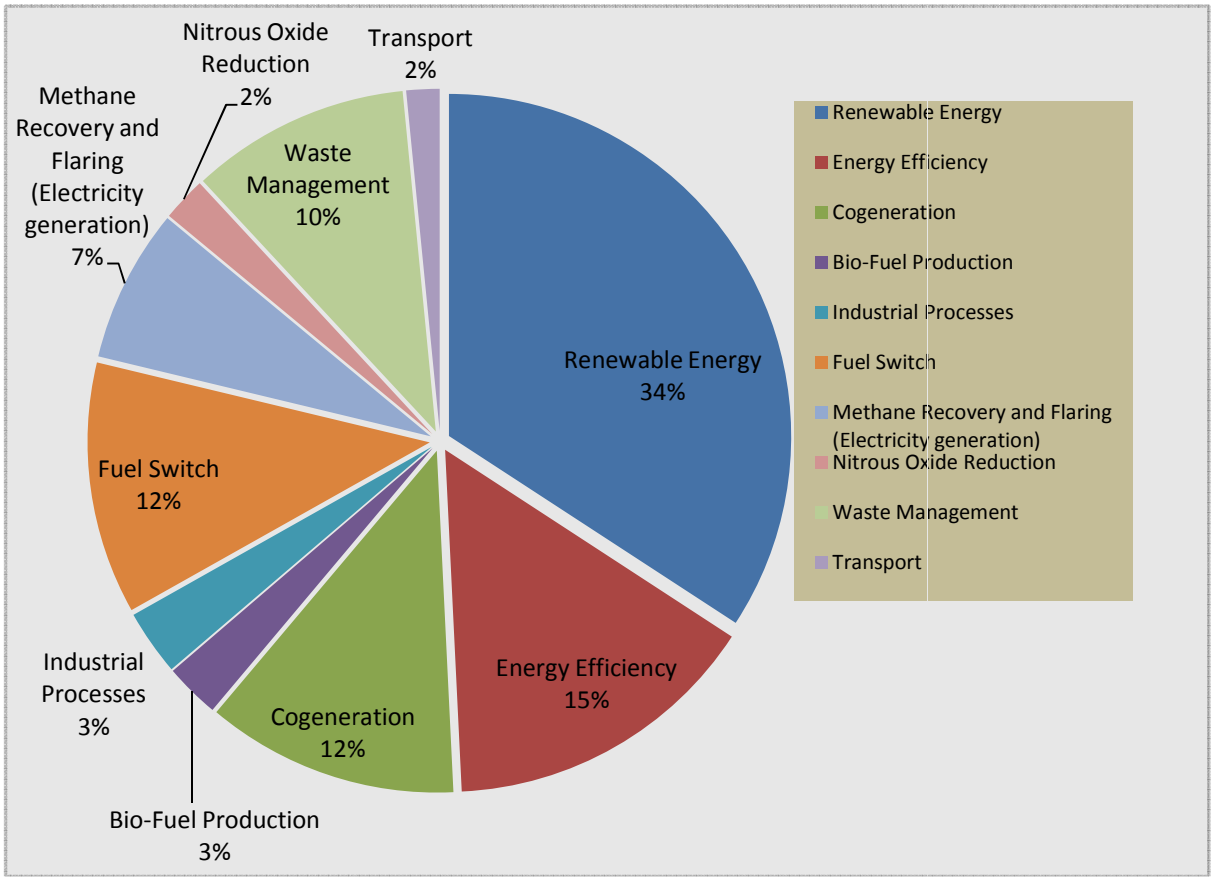

Figure 2*: *Projects distribution by Sector

Based on the Project Design Documents submitted to DNA, the 19 registered projects have the potential to reduce 3 247 426 tons of CO_2e per annum. The potential reduction for individual registered projects is highlighted in Table 4 below.

Name of Registered Project	metric tonnes of Carbon dioxide ($CO_{2)}$ equivalent per annum($Mtco2_e$)
Durban Landfill-Gas-to-Electricity - Marianhill & LaMercy Landfills	68 833
Omnia Fertilizer Ltd, Nitrous Oxide Reduction	473 338
Tugela CFB10 Conversion from Coal to Bark Fired	55 912
Mondi Richards Bay Biomass	184 633
Transalloys Manganesse Alloy Smelter Energy Efficiency	55044
Sasol Nitrous Oxide Abatement	960322
Enviroserv Chloorkop Landfill Gas Recovery	188390
Catalalytic Reduction of N_2O Emissions with a Secondary Catalyst inside the Ammonia Reactor of the No. 9 Nitric Acid Plant	116779
N_2O Abatement Project at Nitric Acid Plant No. 11	265460
Kanhym Farm Manure to Energy	32660
Durban Landfill-Gas-to-Electricity - Bisasar Road Landfill	342705
Alton Landfill Gas to Energy	25893
Fuel Switch Project on the Gluten 20 Dryer of Tongaat hullet Starch Pty (Ltd)	5807
Kuyasa Low-Cost Urban Housing Energy Upgrade Project	6580
Bethlehem Hydroelectric	32688
Rosslyn Brewery Fuel Switch	100941
Lawley Fuel Switching	19159
PetroSA Biogas-to-energy	29933
Ekurhuleni Landfill Gas Recovery	282349
Total	**3 247 426**

Table 5: Annual GHG Emission Reductions for Registered Projects, Source: DNA

ii. Comparison of Annual GHG Emission Reductions for Registered Projects

Figure 3 below indicates individual emission reductions potential for the 19 registered projects. Based on the graph below Sasol Nitrous Oxide Abatement Project and Omnia Ltd, Nitrous Oxide Abatement Project reduces a significant amount of emissions as compared to other projects.

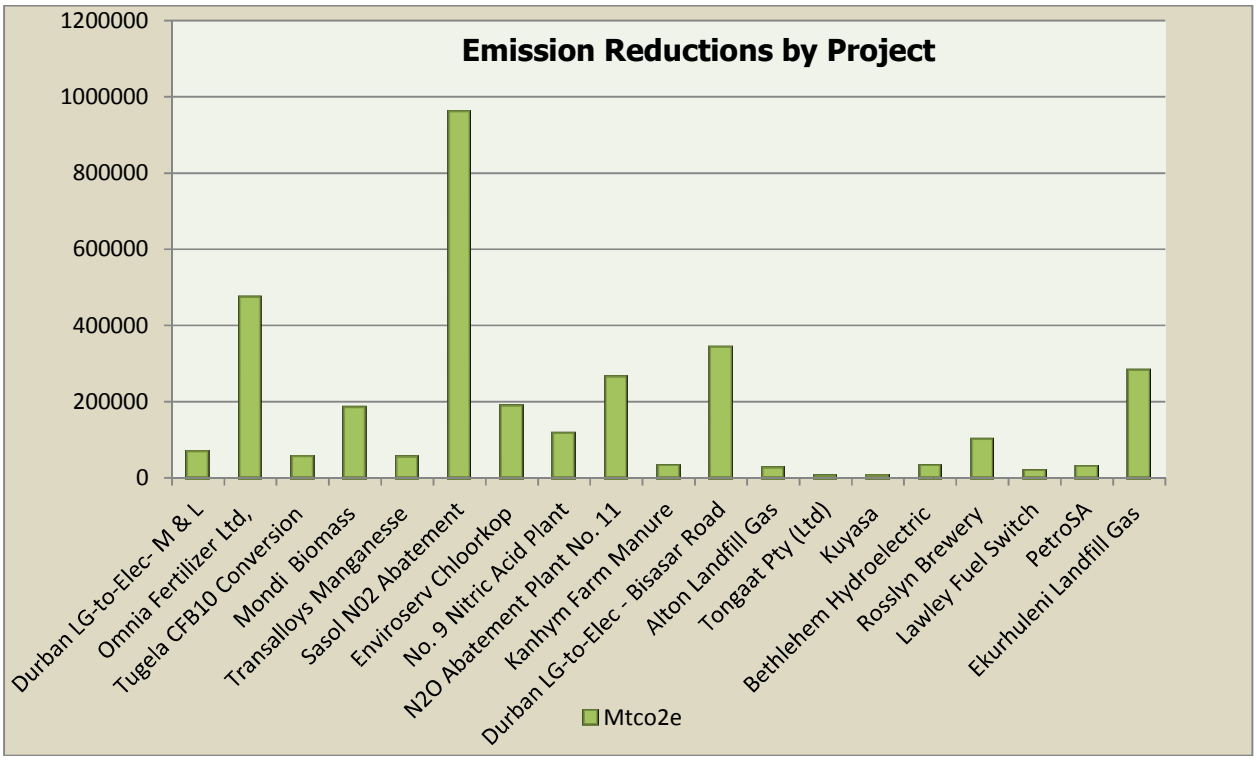

Figure 3: Annual GHG Emission Reductions for Registered Projects

Durban Landfill Gas-to-Electricity as well as Ekurhuleni Landfill Gas Recovery Project will result in a higher number of emission reductions per annum mainly due to the fact that CH_4 also has high Global Warming Potential (GWP) of 21. It is important, however to note that the GWP is not the only factor that affects the annual emission reductions, other factors such as the size of the project, the efficiency of the technology used, the baseline emissions, the project emission reductions level as well as the number of the crediting years are also essential. Thus not all, N_2O reduction projects will result in a significantly high number of annual emission reductions.

iii. Certified Emission Reductions issuance

As of December 2010, six South African projects have been issued with CERs for different verified periods. Out of these six; four have been issued more than once.

The statistical data on CERs issued is indicated in Table 6 below.

Name of Project	1st Issuance	2nd Issuance	3rd Issuance	Total CERs per Project
Omnia Fertilizer Limited Nitrous Oxide Reduction	26276	157352	321234	504862
Transalloys Manganese Alloy Smelter EE	223073	112292		335365
Sasol Nitrous Oxide Abatement	259537	543502		803039
PetroSA Biogas to Energy	32730			32730
Enviroserv Chloorkop Landfill Gas Recovery	83135			83135
Lawley Fuel Switch	18098	17032		35130
Total	**642849**	**830178**	**321234**	**1 794261**

Table 6: CERs issued per Project, Source DNA

Sasol Nitrous Oxide Abatement project has received the most CERs when compared to all other projects that have been issued (see Figure 4 below). The total number of CERs issued to South African projects is 1 794 261**,** thereby showing significant contribution to greenhouse gas emissions reduction.

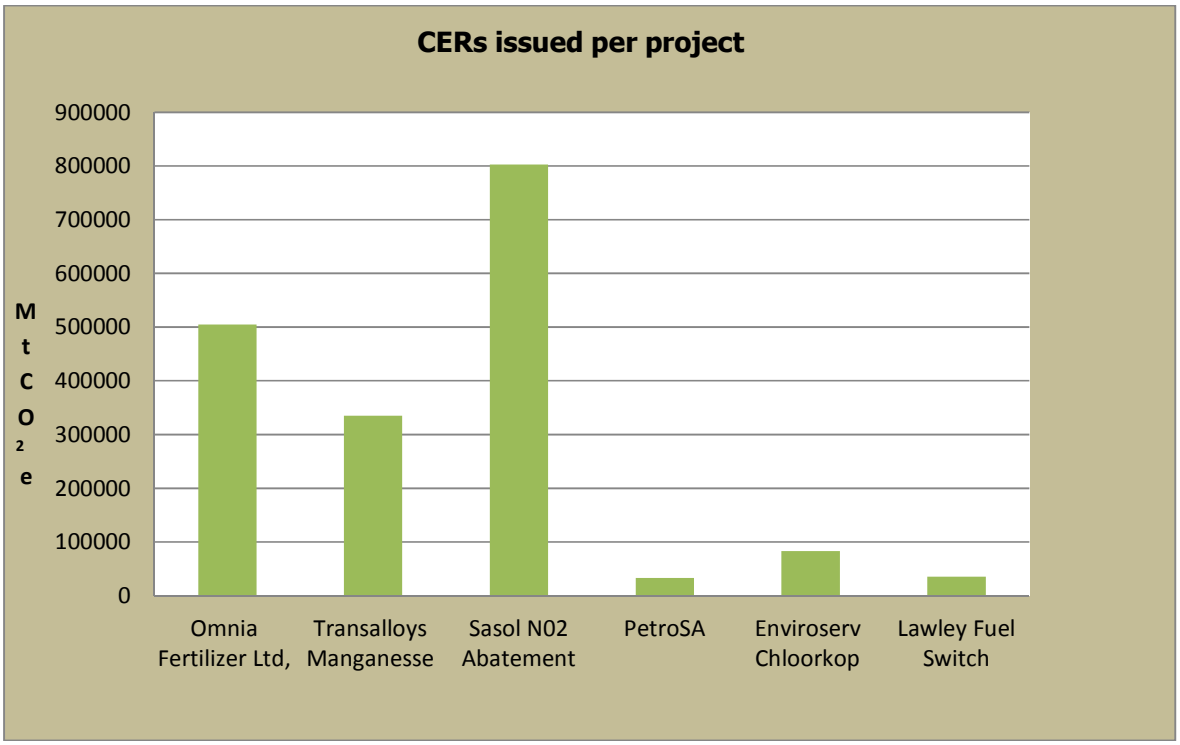

Figure 4 : ***Comparison of GHG Emission Reductions issued per Project***

4.3 The CDM contribution to Sustainable Development

South Africa sees addressing climate change issues as an integral part of achieving sustainable development, hence sustainable development is incorporated in the approval process. The three sustainable criteria that are currently used are Environment, Social, and Economic. Detailed information of the sustainable development criteria for South Africa can be obtained on the website: http://www.energy.gov.za/files/esources/kyoto/kyoto_frame.html

CDM has the dual objective of reducing greenhouse gas emissions and also contributing to sustainable development in the host country. There are significant developmental co-benefits associated with CDM. It has also provided opportunities to:

1) Support basic development needs and broader socioeconomic co-benefits such as improving energy access and energy services;
2) Develop local natural resources;
3) Provide solutions for solid waste management,
4) Reduce both local air and water pollution; and
5) Generate employment.

Some of these significant benefits will be highlighted in the Case studies discussions. Many CDM projects have played an important role in contributing to clean technology transfer and, even more, to technology diffusion—which is critical to broadening the reach of low carbon efforts. CDM has also seen significant benefits at the grass-root level of building capacity and of local empowerment of vulnerable groups. In many respects the sustainable development impacts of the mechanism are tied in with the economic impacts, in that CDM contributes to sustainable development through the in-flow of foreign exchange to the country and the leveraging of investment in the economy.

Sustainable development contributions of CDM projects are more visible in the area of job creation and skills development. Type of jobs created includes skilled, semi-skilled, unskilled, temporary as well as permanent jobs.

5 CASE STUDIES

5.1 Lawley Fuel-switch

Lawley Fuel-Switch Project is owned and developed by Corobrik (Pty) Ltd. The project entails the conversion from coal to natural gas of the thermal fuel used in clay brick baking kilns at Lawley Brick Factory, an existing brick factory wholly owned by Corobrick (Pty) Ltd. The conversion involve the replacement of the coal burners on the kilns with gas burners, the installation of an automated and integrated control system and the connection of the Lawley factory to the local natural gas network. The main objective of this project is to reduce GHG emissions by switching the plant's thermal fuel from coal to natural gas.

Figure 5: Lawley Corobrick Brick Factory

The methodology used in this project is the AM0008, which is for industrial fuel switching.

- ***Project Development and Status in terms of the CDM Cycle***

Corobrik (Pty) Ltd submitted a PDD for approval to DNA on the 10th October 2005. After complying with the requirements it was issued with a Letter of Approval. The project was registered with the UNFCCC on the 6th of March 2006. Expectations in terms of the amount of CERs reductions between 2005 & 2006 were 19 946 tCO_2e, however 18 098 tCO_2e and 17 032 tCO_2e were issued in 2005 and 2006 respectively, totalling to 35 130 tCO_2e in the two year period which exceeded the expectations.

The CERs from the first verification of the project activity were sold to Statkraft Markets BV. The project is currently undertaking second verification and it is expected to reduce 41 244 tCO_2e per annum during the 2007 to 2014 period.

Among the challenges experienced included the fact that it was one of the 1st CDM projects to be registered. The PDD format and methodologies have since changed as a result Corobrik will need to revise its PDD to align with the new developments and this has a cost implications.

- ***The project contributions to sustainable development*:**

Economic: The project will bring foreign investment into the country via the sale of CERs.

Social: The air quality and working conditions at Corobrick Lawley has improved due to the implementation of a project.

Environmental: Since, implementation and subsequent operation, the project has resulted in the reduction of GHG emissions and is guaranteed to reduce more in the future. The particulate matter in the air, produced by burning coal has also been reduced due to the fuel switch.

5.2 Fuel Switch Project on the Gluten 20 Dryer of Tongaat Hullet Starch Pty (Ltd) Germiston Mill

The objective of the project is to reduce greenhouse gas emissions and unpleasant off-gas smells in a product dryer of Tongaat Hullet Starch (Pty) Ltd by switching fuel from coal to natural gas. The project is owned and developed by Tongaat Hullet Starch (Pty) Ltd. It is located in Germiston, Gauteng province. The entire project is being funded internally by Tongat Hullet Starch (Pty) Ltd.

➢ *Project Development and Status in terms of CDM*

The project activity began in 2006 and the Project Design Document was submitted to the DNA's office on the 10th December 2008 and finally registered with the CDM EB as a CDM project on the 25th of December 2010. The methodology used in the project is AMS III B. The project is expected to reduce 5 807 tCO_2e per annum.

The project experienced delays throughout the CDM development cycle including challenges with the validation process. TUV SUD was contracted to carry-out the validation process. Among the lessons learned included the fact that it is of outmost importance to keep records relating to the project activity, particularly those relating to additionality.

➢ *Project's Contribution to Sustainable Development*

Economic: Future sales of certified emission reductions generated by the Project will generate additional revenue for the company.

Social: The implementation of the project has an impact in the reduction of burnt cereal smell from the factory, thus having a positive impact on the living conditions in the areas surrounding the mill.

Environmental: The project activity eliminates the consumption of coal in the Gluten 20 drying process, thereby providing the following environmental benefits:

- Greenhouse gases reduction,
- The emission of Sulphur dioxide ($SO_{2)}$ due to the combustion of coal is eliminated,
- The emission of particulates from coal combustion is eliminated,
- The environmental impact of coal mining is reduced,
- The environmental impacts and emissions associated with coal transport are avoided,
- The environmental impact of coal ash disposal from the Gluten 20 drying process is eliminated.

5.3 **Omnia Steam Turbine Project**

The purpose of the project is to generate energy from wasted pressure release, thus improving Omnia's energy efficiency. This will be done by replacing the pressure reducing valves with a steam turbine which will generate electricity. Thus the project's overall objective is to improve energy efficiency of Omnia's Sasolburg plant. It is located in Sasolburg, Free State province. The project is developed and funded internally by Omnia.

- ***Project Development and Status in terms of CDM***

The project began in June 2008 and it was submitted to the DNA on the 3rd of August 2009. The project is still under the review process by the DNA due to the delay in the finalisation of the validation report. The Designated Operational Entity has already been to the site. Omni is currently addressing the, Corrective Action Requests and Clarification Requests raised by the DOE. These also include the finding that the steam was not being flared to the atmosphere as a result the methodology that the project was using was incorrect. This has led to the revision of the PDD and the methodology. The project now uses AMS II D and it is expected to reduce 7 933 tCO_2e per annum.

- ***Project's Contribution to Sustainable Development***

Economic: Sales of Certified Emission Reductions generated by the Project will generate additional revenue for the company. The steam turbine will result in fewer unplanned shutdowns at the Omnia facility. This will result in higher revenues due to increased periods of uninterrupted manufacturing and lower costs associated with shutting down and starting up a large manufacturing facility.

Social: Temporary jobs will be created during construction and implementation of the steam turbine.

Environmental: The project will displace electricity supply from the national grid, thereby reducing the generation of coal-based electricity and its associated environmental impacts such as the impact of coal mining; the utilisation of scarce water resources; particulate matter emissions; SO_2 emissions; GHG emissions; the environmental impacts associated with mining and transportation of coal and the impacts associated with the disposal of coal ash.

5.4 The Capture and Utilisation of Methane at the GFI Mining South Africa' owned Beatrix Mine in South Africa.

The proposed project activity involves the destruction and utilisation of methane at Beatrix gold mine. The project can be divided into two distinct activities:

a) First, the destruction and utilisation of mine methane; which originates in the main Beatrix mine from intersecting geological faults whilst mining. It should be noted that methane is highly explosive and is a safety hazard. Currently, the underground mine methane is diluted with ventilation air below its explosion limit and released into the atmosphere through ventilation shafts.

b) Second, the destruction of non-mine methane; which is methane emitted from boreholes drilled for exploration purposes by the Beatrix mine. Methane is realised from numerous exploration purposes by the Beatrix mine. Since the start of the drilling program in the 1950's, a number of

boreholes have intersected methane-carrying geological structures. During the development of this project, 488 holes were identified in the GFI Mining South Africa mining area. Only five of these boreholes, geographically far apart from each other, are venting methane at rates that justify the implementation of greenhouse gas reduction project.

The objective of the project is to use the underground mine methane which will then reduce the amount of electricity Beatrix needs to import from the national grid. The proposed project activity will destroy both the underground mine methane and the non-mine methane released from the boreholes. The project activity is located on the farm of Leeubult 52, in the Theunisen district, in the Free State province.

- ***Project Development and Status in terms of CDM***

The project began in August 2007. The PDD was submitted to the DNA's office on the 15th of June 2010. A signed draft validation report was received by the DNA on the 9th of December 2010. The project experienced delays in the validation process. The project is expected to reduce 244 219 tCO_2e per annum.

The project has attracted favourable press coverage. The story about potential jobs that will be created during implementation was published in the Business Day dated 27th May 2010.

- ***Project's Contribution to Sustainable Development***

Economical: The project will contribute to foreign earnings for South Africa via the carbon credit sales revenue.

Social: The project will create an unspecified number of jobs in both the construction and operation phase. The project will destroy underground mine methane and the methane released from the boreholes. Methane has always been a huge safety risk since is a highly explosive gas. The destruction of methane will result in a safer working environment. GFI Mining South Africa

have committed to contributing a percentage (R0.20 per ton of CO_2e and 0.5% of pre-tax profit) of their carbon credit revenue to the Gold Fields Foundation. This is similar to the contribution that GFI Mining South Africa makes out of gold mining revenue in terms of its social sustainable development obligation as prescribed by the South African mining legislative framework relating to sustainable development.

Environmental: The use of methane for electricity generation will result in a reduction in the generation of coal-based electricity and its associated environmental impacts. The project will also result in reduction of greenhouse gas emissions by eliminating the release of methane; which has a global warming potential; 21 times that of CO_2.

5.5 Omnia Fertilizer Limited Nitrous Oxide (N_2O) Reduction Project

The objective of the project activity is to reduce N_2O from the Nitric Acid plant. It involves the installation of an N_2O (Nitrous Oxide) catalytic destruction facility in the tail gas section of the process downstream of the absorption at Omnia Fertilizer Nitric Acid plant in Sasolburg. Catalytic reduction of N_2O occurs when the N_2O in the tail gas reacts, in the presence of a reducing agent, with the iron zeolite catalyst in the N_2O catalytic destruction facility. The reaction removes the oxygen from the N_2O molecules and forms one or more compounds. In this case, the reducing agent is the natural gas, comprised mostly of methane (CH_4).

Nitrous Oxide is an unwanted by-product gas generated from the manufacture of nitric acid. It is formed during the catalytic oxidation of ammonia. Over a suitable catalyst, a maximum 98% (Typically 92-96%) of the ammonia is converted to Nitric Oxide (NO_2). The rest is consumed by undesirable side reactions that lead to the production of N_2O, among other compounds. Waste N_2O gas from nitric acid production plants is typically released into the atmosphere as it does not have any economic value or toxicity at typical

emission levels. N_2O is however, an important greenhouse gas which has the Global Warming Potential (GWP) of 310.

The project is a large scale and chemical industry based. The methodology used is AM0028. The project cost is approximately R50 million, Omnia and its Board carried the cost. The project activity is located in Sasolburg, along the Metsimaholo Municipality in the Free State Province.

- ***Project* Development and Status in terms of CDM**

The PDD was submitted to the DNA on the 26th of July 2006. The PDD was approved by the DNA and issued with a Letter of Approval. The project was registered with the UNFCCC in May 2007 and the Nitrous Oxide (N_2O) abatement facility was commissioned in 2008. It was issued with 504862 CERs in January 2009. The projected emission reduction, as stated in the PDD was predicted to be 473 000tCO_2e per annum and this could still go up in excess of 500 000tCO_2e. The Nitric Acid Plant Facility had to run at reduced rates for the duration.

Omnia Fertilizer's core business is fertilizer to the agricultural sector and this determines the capacity that Nitric Acid facility should operate, hence the CERs are obtained by the reduction of greenhouse gas from this division. Omnia concluded a contract for the sale of the CERs with the World Bank and Rabobank from the Netherlands. Omnia sold 80% of the projected CERs in order to ensure return for the capital spent on the project. It also donated certain percentage of the CERs. The project has demonstrated great success in terms of CDM, as evident in the greenhouse gas emissions reduction; the EnviNox installation; the construction and commissioning as well as the subsequent issuance and selling of CERs.

- ***Project's Contribution to Sustainable Development***

Economic: The EnviNox technology that is used in the N_2O abatement project was supplied by UHDE, which is an international company. Jobs were created

with the initial erection of the N_2O reduction facility as well as sustainable employment in maintaining the reduction facility as well as in monitoring its performance.

Social: Omnia is a signatory to Responsible Care, thus it has commitment to social responsibility in its operations.

Environmental: From the nature of the project, the concentration of N_2O emitted by the Nitric Acid plant is reduced by at least 95% and thus improves the local air quality. Nitrogen Oxide (NOx) is also reduced using the same technology and complying with legislature. The current legislated limit for NOx is 200ppm; with the implementation of a project it has reduced this. The plant runs on average at less than 10ppm NOx. This had a significant impact on the environmental pollution.

- **Challenges and Solutions**

South Africa does not have any accredited DOE. DNV was used for validation of the project. All equipments had to be procured from outside the South African borders. Work had to be carried out for a retrofit, and most completed whilst the plant was online, in order not to adversely affect the demand on the fertilizer. A shutdown was held to complete tie-ins in the existing system in order to ensure commissioning and operation of the new facility.

Omnia established a project department within the group, to complete the task. It was able to complete the validation process, with the assistance of DNA. The implementation of the project has resulted to its Nitric Acid plant using the best technology in the world and UHDE patented EnviNox as a supplier of technology.

- **Lessons Learned and Recommendations**

The CDM process with the UNFCCC is intensive, and requires the involvement of number of stakeholders. The lack of DOEs in the country makes the CDM process even more difficult. It is recommended that considerable amount of resources and specialist be engaged in this process from the inception.

5.6 PetroSA Biogas-to-energy Project

The main objective of the project is to use the carbon finance leverage investment to facilitate the usage of previously flared biogas to generate electricity. The project is classified as an energy sector project and it uses AMS 1D version 9 methodology. It is located in Mossel Bay in the Western Cape Province. The project activity is owned by MethCap SPV1 and was developed by BioTherm Energy. Other partners include the NRG Investments. The project was financed by MethCap SPV1, Central Energy Fund (CEF) and NRG Investments.

➢ *Project Development and Status in terms of CDM*

The PDD was submitted to the DNA's office on the 22nd of December 2005. It was approved and issued with a Letter of Approval by the DNA. The project was then registered as a CDM project with the Executive Board in September 2006. The project has been commissioned 2008 and is currently in operation. It took approximately 3 years to commission as opposed to an expected 18 months. To date, 32730 tonnes of CERs have been issued with floating value due to an indexed CER price. The CERs have been sold to Statkraft.

➢ *Project's Contribution to Sustainable Development*

Economic: The project makes contribution towards national economic development by supporting the aims of the white paper on energy efficiency and renewable energy. It adds to the South Africa's energy supply; adds an Independent Power Producer; leads to energy diversity as well as creating a source of renewable energy. The project created between 60-100 jobs during the construction phase and two full time employments in operation and maintenance phase.

Social: The project provides a pay-out of royalty by MethCap SPV 1 to Eden District Municipality. This payment has been earmarked specifically for poverty alleviation in poor region. The royalty is expected to be in the order of R100

000 per annum and will also leads to social upliftment initiatives as defined and chosen by the local authority.

Environmental: The project will be more energy efficient and will also displace some of the national grid's emissions in South Africa.

➢ *Challenges and Solutions*

The project activity has experienced the following challenges:

- The project activity was the 1st of its kind in South Africa; hence it was difficult for it to enter the carbon market.
- The electricity tariffs in South Africa are among the lowest in the world, thus new renewable energy generation developers need an off-taker agreements that are significantly higher than the current prices. It is almost impossible for the new energy players to find an off-taker willing to pay electricity prices higher than the Eskom's tariffs.
- Eskom is reluctant to sign Power Purchasing Agreements with potential private generators that are unable to compete with the current Eskom generators. The main obstacle is that any potential new entrant is evaluated with the low Eskom generation costs instead of being evaluated against the long run marginal costs of new generation.
- Only a few IPPs currently exist, Kelvin Power Station, which was sold by the City of Joburg in November 2001 and Friedenheim, which a hydro facility owned by the Friedenheim Irrigation Board.
- IPPs experience other challenges such as financial viability of the projects; obtaining licences, permits, Record of Decision (ROD) as well as approvals which are bureaucratic and time-consuming.
- Due to lack of transaction volume, there is limited capacity in the legal fraternity to provide contractual and legal advice.
- Exchange rate risk makes it difficult for foreign companies or investors to invest. Most hardware needed for energy projects has to be imported and paid for in hard currency. The Rand is however at a much stronger level and more stable than it was 3 or 4 years ago.

- There is a lack of capacity to operate and maintain renewable energy assets and in other instances; it would be costly to use services of expatriate technicians.

Some of the challenges were overcome through carbon finance; assiduous work and creative structuring.

➢ ***Lessons Learned and Recommendations***

The CDM is harder than one thinks and establishing energy projects in South Africa poses a very big challenge. It is recommended that the DNA approval process run parallel to the Environmental Impact Assessment rather than subsequent in order to save time.

5.7 **Durban Landfill Gas to Electricity**

The project is owned and developed by eThekwini Municipality. It involves the extraction of the landfill gas which is mainly comprised of methane and carbon-dioxide. The gas is burnt in the engines which in turn drive the generators to produce electricity which is fed to the local municipal grid (see Figure 6 a picture of Durban landfill below). The project makes use of AM0010 methodology, which involves extraction of gas from landfill. Gas is used as a fuel in spark ignition engines to drive generators to produce electricity and excess gas flared in an enclosed flare. The project is located in Kwa-Zulu Natal Province, along the eThekwini Municipality in the Marianhill and Bisasar Road Landfills.

Figure 6: Durban Landfill Gas

- ***Project Development and Status in terms of CDM***

The investigations commenced as early as 2002. The project commenced in July 2003 and Durban Solid Waste was instrumental in motivating for the establishment of the DNA. The PDD was submitted to the DNA on the 25th of April 2006 and was issued with a Letter of Approval. The project commenced in July 2003. Marianhill was commissioned in December 2006 and registered with the UNFCCC by the CDM EB in December 2006. Bisasar landfill was commissioned in March 2008 and was registered with the UNFCCC in March 2009. Both landfill sites have been commissioned and have been operational for 3 to 4 years. The project is expected to generate 300 000 CERs per annum. CERs were forward sold to Trading Emissions Plc until December 2012. The project has cost R105 million to develop and its operating cost is R8 million per year.

- ***Project's Contribution to Sustainable Development***

Economic: The project is the 1st of its kind in Africa as the technology has been transferred from Austria and United Kingdom. The project received a French Development Bank Loan, capital investment of R100 million which boosted the local economy and had created 11 permanent jobs as well as 250

temporary jobs. The project has also generated income for the city of eThekwini from the sale of electricity and CERs.

Social: A trust fund is currently being set up and 4 civil engineering students have received bursaries. Jobs have been created as explained above.

Environmental: The project reduces approximately 300 000 tons of GHGs per year. It also reduces odour emissions from landfill sites. The reduction of the escaping gas from the landfill allows for regeneration of vegetation.

- ***Challenges and Solutions***

The CDM process is creating cash flow challenges as the verification process is very prohibitive. The difficult task of verifying the project has led to CERs not yet verified, thus no cash is flowing to the projects which in turn place them at risk. The solution is to confirm that GHG emissions are being reduced and a report has to be written for approval.

- ***Press Coverage and Project's Success***

The project has won the Globe Energy Award for 2009 and it is also the Platinum Winner of Impumelelo Innovations Awards 2010.

- ***Lessons Learned and Recommendations***

The Environment Impact Assessment authorisation and the registration with the UNFCCC are lengthy, thus create cash flow problems. The use of new technologies in South Africa is also a learning curve. It is recommended that the UNFCCC make the CDM process more user friendly and faster as loss of revenue could have negative implications for projects.

5.8 Bethlehem Hydro Project

The objective of the project is to produce clean energy to supply to Eskom and Dithlabeng Municipality. The Bethlehem Hydro Project is owned by Bethlehem Hydro (Pty) Ltd. The project Developer is Nuplanet Project Development (Pty)

Ltd and it has collaborated with HYDROWSAA, which is a broad based black women's group as a Black Economic Empowerment (BEE) partner. The project was developed by constructing two hydro plants in Bethlehem area, totalling 7MW in size. Sol Plaatjie is a 3MW dam wall scheme, which was commissioned in 2009 and Merino was commissioned in July 2010 and it is a 4MW run-of-river scheme. The hydro Power generation project makes use of the AMS I.D methodology. The project is located in the Free State Province, Bethlehem Area in the Dithlabeng Municipality.

- ***Project Development and Status in terms of CDM***

The PDD was submitted to the DNA on the 11th of October 2005 and was issued with a Letter of Approval. The project was registered with the UNFCCC on the 8th of October 2009. The project has been commissioned and both generators of the project are running, however due to some downtime on Merino, it is not running at full capacity. The project was planned to have been completed in 3 years but it took 6 years. It has cost R10 million in development costs and was financed by a private equity, (BEE) investors and long-term debt by the Development Bank of Southern Africa (DBSA). The project is expected to generate 34 712tCO_2e CERs per annum. The Bethlehem Hydro has an emissions reduction purchase agreement with Statkraft Market in Netherlands.

- ***Project's Contribution to Sustainable Development***

Economic: The project will contribute to foreign earnings for South Africa via the carbon credit sales revenue.

Social: Over 150 jobs were created for a two year period of construction and 3 permanent jobs. The project also has 37% shareholding by Black Economic Empowerment (BEE) woman's group and has 2 female board members.

Environmental: Hydro Power generation involves the non-consumptive use of water and the water standard has been upheld as there is no pollutants

released into the As river from the power plant. In addition, the plants produce clean energy which reduces GHG emissions.

- ***Challenges and Solutions***

The project has experienced challenges in the time-consuming legislative processes; especially the water use license which took 36 months.

- ***Press Coverage and Project's Success***

The Bethlehem Hydro Project has generated a lot of positive press coverage in various print and electronic media, including Engineering News, Water Power magazine as well as a range of other online publications and newspapers. More information on the extent of the press coverage can be accessed at www.bethlehemhydro.co.za or www.nuplanet.co.za. In addition, the project has won several prestigious awards, including:

- Best Renewable Energy Project in Africa, 2010.
- Africa Energy Awards Top 10 best small hydro projects in the world, 2009.
- International Water Power and Dam Construction Energy Project of the year 2008.
- Green Project of the Year, 2006. Development Bank of South Africa.

- ***Lessons Learned and Recommendations***

The CDM process is unpredictable and is subject to frequent changes resulting from the CDM EB decisions.

5.9 Enviroserv Chloorkop Landfill Gas Recovery Project

The objective of the project is to extract landfill gas at the site and combust the landfill gas by flaring. The EnviroServ Chloorkop Landfill Gas Recovery Project is owned and developed by Enviroserv Waste Management (Pty) Ltd. It is funded by Japan Carbon Finance (JCF),

Limited. The Landfill site has been used for the disposal of municipal solid waste since 1997, receiving about 1 500 to 1 700 tons of waste per day or approximately 396 000 to 448 800 tons per annum; assuming 22 workdays per month. This is based on recorded tonnage data from 1997 to December 2006 with a gap in 2002. Waste accepted includes general (or domestic) waste, garden waste, soil and builder's rubble. To date, four cells have been constructed and used for the disposal of waste.

Landfill gas consists of approximately 50% methane, which has a global warming potential 21 times greater than CO_2. Through the destruction of methane, the emissions of greenhouse gas are reduced. The project will involve the installation of vertical wells and horizontal collectors for the extraction of landfill gas. Vertical wells will be installed by auguring into the existing waste body when a cell reaches final grade. Horizontal collectors involve the excavation of trenches into the waste at intermediate intervals before a cell reaches final grade. In both cases, perforated piping will be installed in gravel backfill for collection of landfill gas under a vacuum.

The vertical wells and horizontal piping will be connected to one or more headers and a blower for centralized gas collection; the collected gas will be combusted using one or more flares. Vertical wells and pipe work will go out on civil tender to a contractor, whilst the horizontal wells will be constructed by Enviroserv. The flare and ancillary equipment will be put out on tender.

It is the intention of EnviroServ to develop a project for utilisation of the landfill gas after better definition of gas quantity and quality, and the investigation of the economic viability and feasibility of alternative use of the captured gas.

- ***Project Development and Status in terms of CDM***

The PDD was submitted to the DNA on the 20th November 2006 and was issued with a Letter of Approval. The project was then registered with the UNFCCC on the 27th April 2007. The project falls under the waste management sector and makes use of the version 02 of AM0011 methodology which is a Landfill gas recovery with electricity generation.

The project is located at Enviroserv Chloorkop Landfill along the Ekurhuleni Metropolitan Municipality in Gauteng Province. It is in operation and is currently generating CERs by flaring the gas. The electricity generation facility has not yet been implemented. The project was expected to start generating CERs from 01st July 2007 but it only started generating CERs in February 2008 due to the delays in the installation of flaring devices. The project has a crediting period of 7 years and is reducing 188 390 tonnes of CO_2e per annum. A contract has been agreed upon with Japan Carbon Finance on the sale of CERs.

- ***Project's Contribution to Sustainable Development***

Economic: The project will result in foreign direct investment through sales of CERs. In addition, the project will contribute to economic development by creating new markets or strengthening existing markets within the country for goods and services required by the project.

This project will be developed and operated in accordance with the laws and regulations of South Africa. This will demonstrate to the international carbon trading market that South Africa is one of the prime destinations for CDM projects and will thus assist to attract

additional sustainable foreign investment into the country.

Social: The project will generate jobs and build capacity which would not have occurred. A technician has been hired to operate the plant on a daily basis and temporary employees are used for ad-hoc jobs. Landfill personnel have received training related to the gas recovery operation. A Labour and safety condition on the site has improved due to the reduction in the risk of fire and explosion of the landfill.

Environmental: The project will reduce air pollution. The collection and destruction of methane gas will reduce greenhouse gas emissions and reduce the impact of landfill operation on air quality. The project will also result in improved protection of groundwater resources in the vicinity of the landfill since the gas extraction wells will be equipped for leachate removal.

- ***Challenges and Solutions***

There have been delays in the approval of technical reviews/ verification process.

- ***Press Coverage and Project's Success***

An article about the project was published in the Resource Magazine.

- ***Lessons Learned and Recommendations***

It is recommended that delays in time for the approval of technical reviews, reports and other submitted documentation be reduced. The approval process needs to be reviewed and optimised if possible.

6 CDM HIGHLIGHTS FOR 2010

6.1 International highlights

6.1.1 Registered CDM Projects

Asia is by far the most dominant region in the CDM Market, accounting for 77% of all registered CDM projects. Latin America is second with 20%, while Africa covers less than 2% of projects (Figure 8 below indicates regional contribution of registered projects as of end of 2010 (up to date statistics on CDM projects is available on www.unfccc.int).

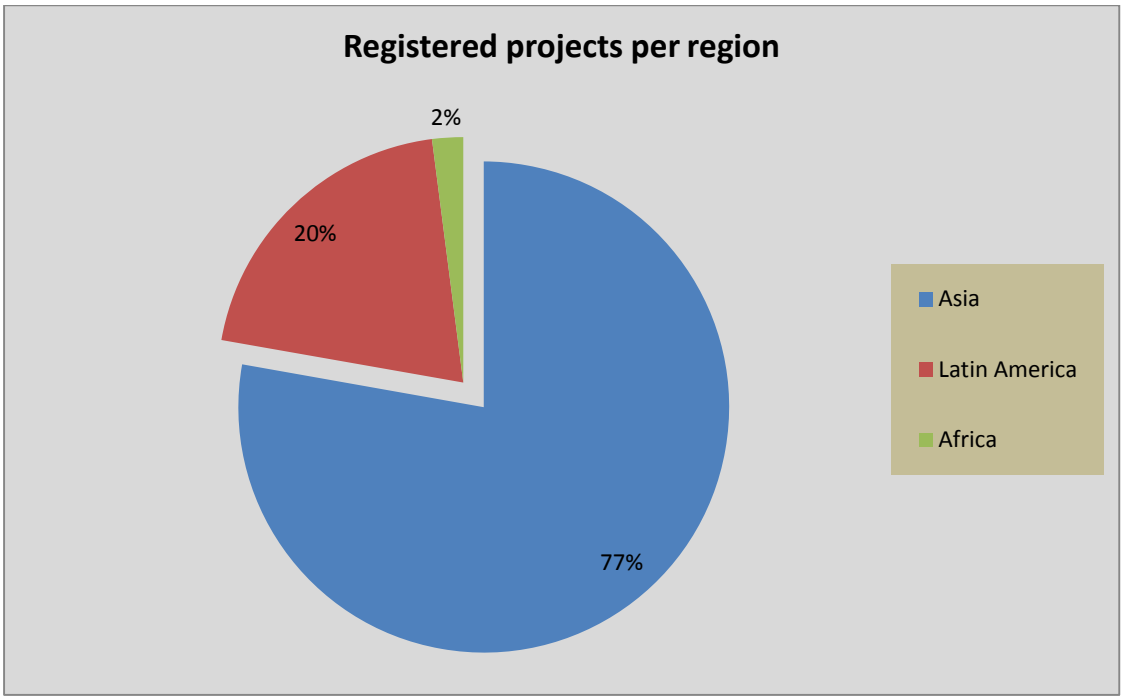

Figure 7: Registered project with the EB by end of 2010, Source: www.unfccc.int

The dominance of Asia in the CDM reflects the huge market shares of China and India. China alone accounts for almost 40% of all CDM projects and is expected to generate over 60% of all CERs annually. A number of challenges including the political, technical, financial and legal barriers have prevented Africa until now from participating and benefitting adequately from the CDM.

The recent introduction of the programme of activities (PoA) under the CDM is expected to greatly enhance the opportunities for African Countries to access the CDM.

6.1.2 **CERs issued by host party**

China is at the top accounting for 51.14% of the total 448,858,231 CERs issued in 2010, followed by India at 17.71%, Korea 12.88%, Brazil 9.61%, Mexico 1.54% and other countries account for 7.11% collectively.

6.1.3 **CDM International Photo and Video Contest 2010**

UNFCCC Secretariat launched the CDM International Photo and Video Contest 2010, on the theme "Changing Lives". The contest intended to raise awareness about the clean development mechanism and it was looking for photos and videos that tell an interesting CDM story, about the creation of new jobs, the greening of industry, or the development of rural services and infrastructure.

Kuyasa Low-Cost Urban Housing Energy Project (0079) and Durban Landfill-gas-to-electricity project–Marrianhill and La Mercy Landfills (0545) were nominated for South Africa. The winners were recognized in a ceremony hosted by UNFCCC Executive Secretary Christiana Figueres in Cancún, Mexico, on the 1st December 2010. The First Place went to: Boris Bronger (Installing Energy-Efficient Light Bulbs) in India Second Place: Júlio Alberto Pavese (Lages Methane Avoidance Project) in Brazil and Third Place: Christos Anagnostopoulos (Zafarana Wind Power Plant Project) in Egypt. DNA would like to congratulate all the winners for 2010.

6.1.4 **DOEs Performance**

The number of accredited Designated Operational Entities (DOEs) as of December 2010 was 37 worldwide which make their services more costly. The

capacity of the DOEs is a major concern in the CDM project cycle. Carbon Check, a local company has requested for accreditation in 2009 and as of end December 2010 it was still awaiting accreditation by EB. In order to become accredited as an operational entity for CDM, an operational entity must meet the criteria contained in 3/CMP.1, Annex, Appendix A, these documents are available on www.unfccc.int. These criteria include basic organisational as well as operational criteria, for example:

- Be a legal entity (either a domestic legal entity or an international organization) and provide documentation of this status;
- Employ a sufficient number of persons having the necessary competence to perform validation, verification and certification functions relating to the type, range and volume of work performed, under a responsible senior executive;
- Have the financial stability, insurance coverage and resources required for its activities;
- Have sufficient arrangements to cover legal and financial liabilities arising from its activities;
- Have documented internal procedures for carrying out its functions including, among others, procedures for the allocation of responsibility within the organization and for handling complaints. These procedures shall be made publicly available

6.2 National highlights

6.2.1 Project Status

As of December 2010, 193 CDM projects were submitted to the DNA since 2004. These include 157 Project Identification Notes (PINs) and 36 Project Design Documents (PDDs). Out of 36 PDDs, 19 are registered by the CDM Executive Board as CDM projects and 6 of these were issued with CER's). Figure 8 below highlights projects submission trend of PINs and PDDs to the DNA since its inception in 2004.

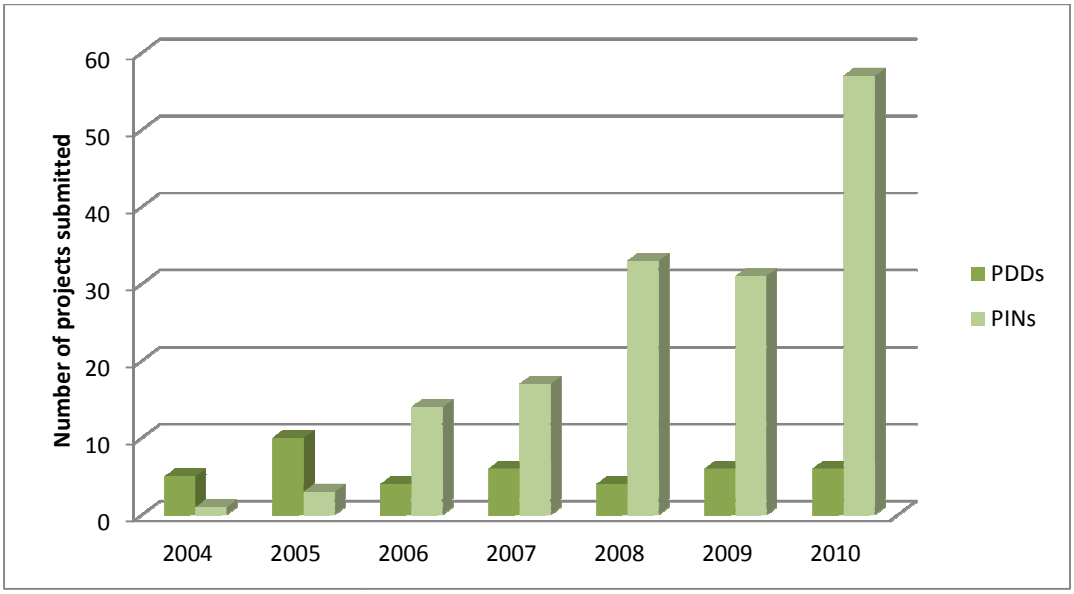

Figure 8: Project Submission Trend, Source: DNA

Over the years the numbers of submissions have gradually increased, however the number of PINs remains higher than the PDDs. For the year under review 52 PINs were submitted as compared to only 7 PDDs.

Projects submitted to DNA in 2010 have the potential to reduce 66 442 627 tons of CO_2e per annum. The PDDs have the potential to generate 171 8445 tCO_2e per annum whereas the PINs have the potential to generate 64 724 182

tCO_2e per annum. The figure 9 below highlights the expected number of CERs on PINs and PDDs submitted in 2010.

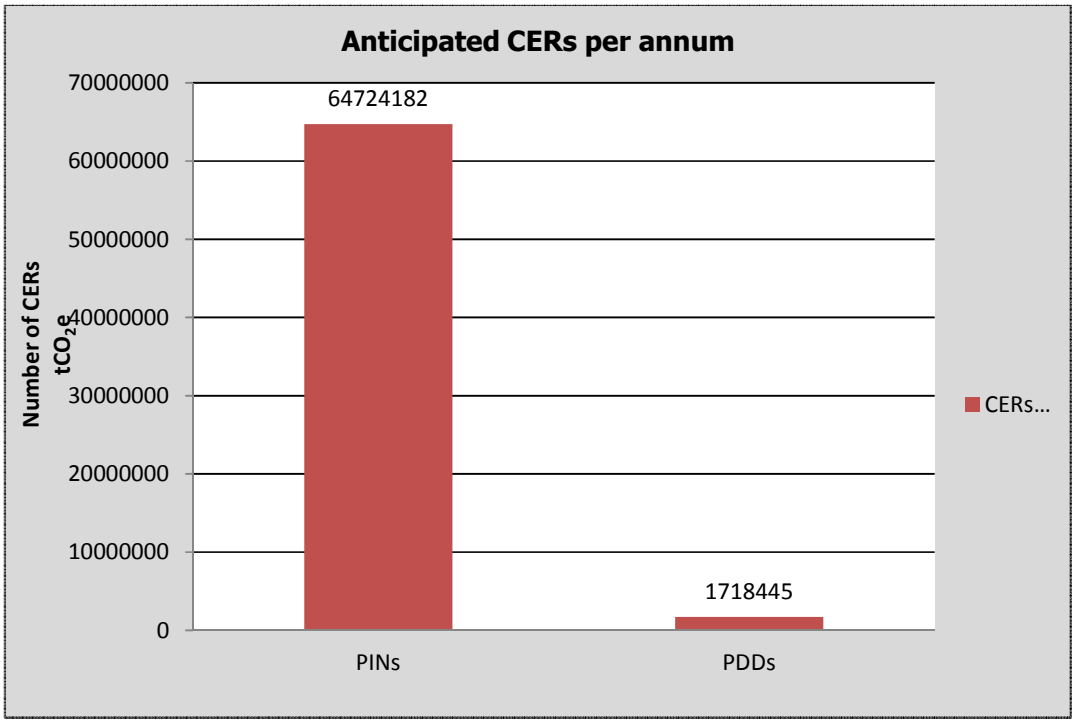

Figure 9: Number CERs expected per annum from 2010 submissions, Source: DNA

6.2.2 **Project Registration**

Two projects were registered in 2010 with the CDM EB, these are:

i. Ekurhuleni Landfill Gas Recovery Project (3677), the project was registered on the 26 October 2010, with the potential to generate 243 629 tCO_2e per annum;

ii. Fuel switch project on the Gluten 20 dryer of Tongaat Hulett Starch Pty (Ltd) Germiston Mill" (3398), the project was registered on the 25th December 2010; with the potential to generate 8 360 tCO_2e per annum.

- **Sustainable Development**

CDM project contribution to Sustainable Development (SD) is one of the requirements for host country approval. Based on the information on the PDDs the anticipated number of jobs is 1 749 and for PINs is 13 738 jobs, please note that figures includes both permanent and temporary jobs. Below is a monthly breakdown on a number of jobs anticipated on projects submitted in 2010.

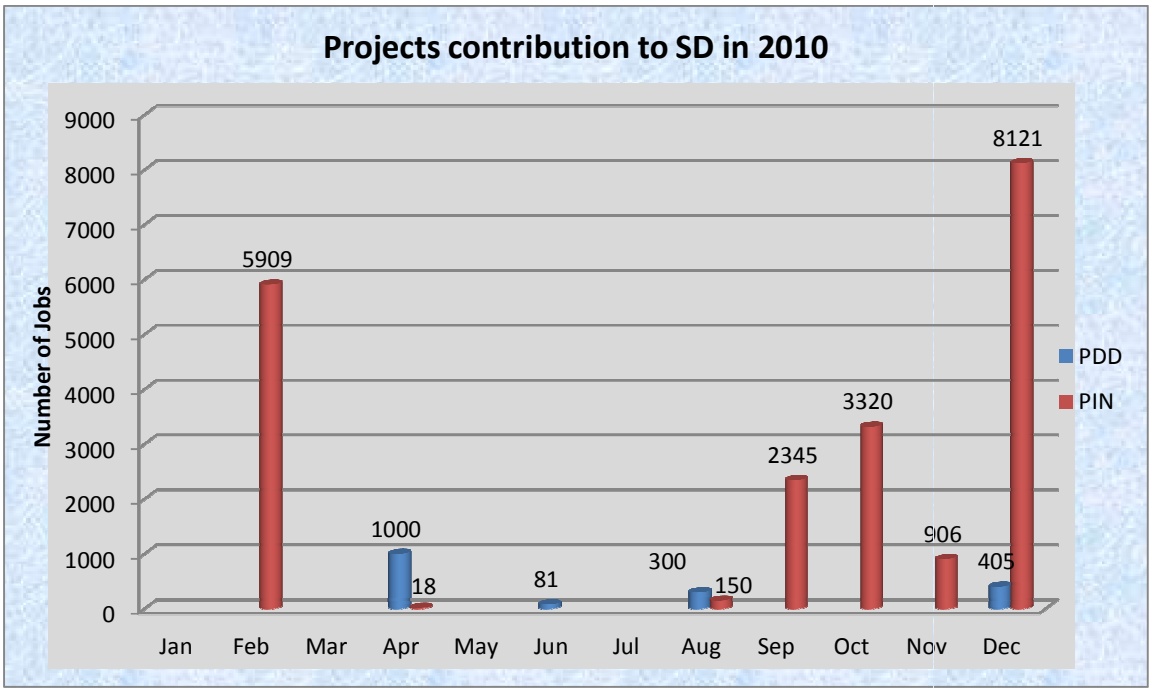

Figure 10: Anticipated NO. Of jobs per month, Source: DNA

6.2.3 Requests for Registration

New England Landfill Gas to Energy Project (3249) has requested registration with the EB. It has the potential to generate 53 652 tCO_2e per annum.

6.2.4 Carbon Trade Deal

The DNA would like to congratulate Gold Fields on successfully signing a carbon trade deal with a European Energy Trading Company for its CDM project on

methane gas and electricity generation at Gold Fields Beatrix Gold Mine in the Free State province. The project has the potential to generate around 5MW of electricity and it will sell 1,700,000 CERs to European energy trading company until 2016.

Figure 11: Beatrix methane extraction and electricity generation project

The project has two phases: Phase I of the project, which has been completed involved installation of a methane extraction system underground and flares above the surface. Phase II involves installation of power plant that will convert the methane into electricity. This plan is currently in final feasibility.

The project has a positive impact economically, environmentally and socially through the sale of CERs, lower CO_2 emissions and a safer underground

working environment for workers. Source: www.goldfields.co.za. On the 25th May 2010, London-based Energy Risk magazine recognised the project as the "Deal of the year" for 2010 in its annual energy risk awards. It also contributed towards Gold Fields jointly winning the Carbon Disclosure Project award for the carbon disclosure Project (original published by 25 Degrees Africa's Independent Energy Publication).

6.2.5 **Renewable Energy Feed-In-Tariff**

The announcement of the Renewable Energy Feed-In Tariff (REFIT) programme has stimulated interest in the renewable energy market and CDM. DNA has seen an increase in uptake of CDM in the renewable sector. The graph (Figure 12) below indicates a gradual increase in the number of renewable projects submitted to the DNA between September and December 2010 as compared to other sectors.

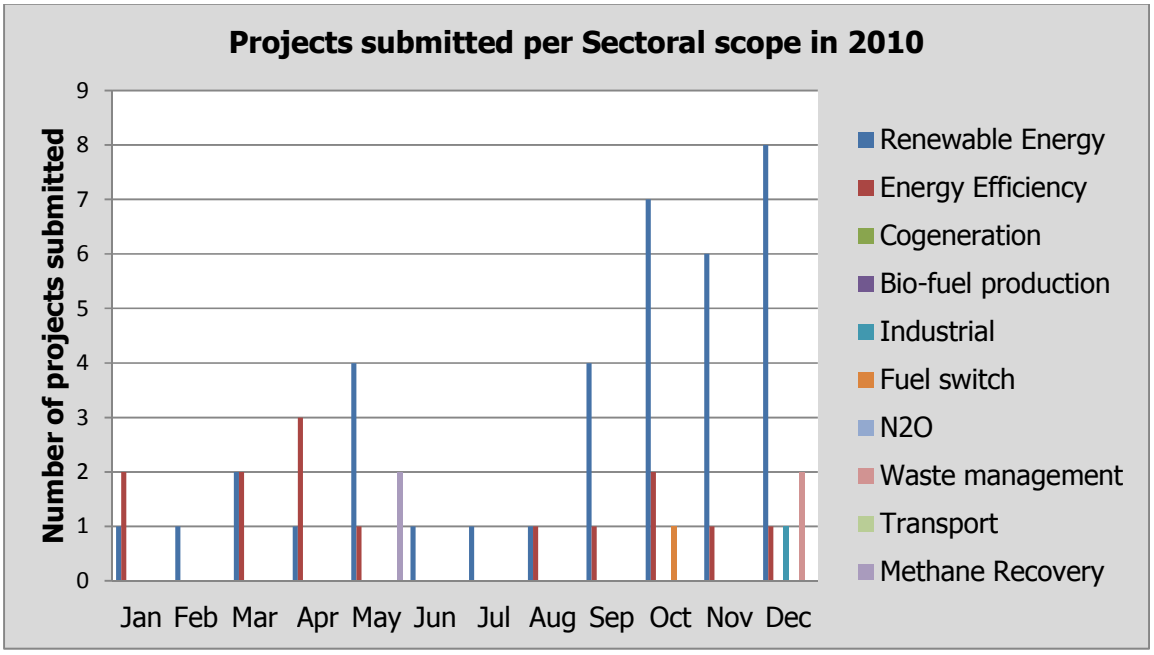

Figure 12: Projects submission by Scope, Source: DNA

A number of project Developers have also approached the DNA seeking clarity on the implication of the REFIT on the CDM additionality concept. According to the guidance issued by the CDM Executive Board in its 16th meeting, REFIT is classified as E- Policy[1], as explained in the guideline if a policy was promulgated after 11 November 2001, project developers do not have to consider such policy when developing a baseline scenario for a proposed CDM project activity. Based on the guideline the REFIT programme would not have a negative impact on CDM implementation.

6.2.6 **Project Developer's perspective on CDM process**

The DNA engaged several project developers to get their views on challenges, successes and the future of CDM. Some of views expressed are highlighted below:

- The CDM is a very rules-based mechanism, thus it is very complex and this is one of the challenges surrounding the development of projects under CDM. It is therefore important to understand that rules and to ensure that projects are developed in line with the requirements so as to reduce the risk of disqualification.
- The rules are continually updated and need to be monitored closely.
- The CDM has its own language which makes it difficult for businesses to unpack.
- Inefficiencies by Designated Operational Entities (DOEs) and the UNFCCC it's a concern for project developers. The timeframes for project approval are still long and project registration can take over a year to achieve.
- CDM process needs to be streamlined.

Challenges listed above are further aggravated by the lack of decision on the second commitment period under the Kyoto. Time is running out for project

[1] National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g., public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs).

developers to get projects registered particularly as it can take more than a year for a project to be registered.

6.2.7 **CDM promotion activities**

The DNA conducted 4 workshops: two provincial workshops;for Gauteng and Western Cape, and two sector workshops, one on Carbon finance and the other on the Carbon flow software. Copies of the presentations are available on the website www.energy.gov.za. These workshops aimed at facilitating information exchange, creating awareness on CDM related issues, strengthening the development of projects development and helping potential parties to generate additional revenues through the implementation of CDM projects.

7 CONCLUSION

Clean Development Mechanism is an important component of climate change mitigation and it provides a real opportunity for companies to monetise the benefits of taking early action on climate change. CDM projects also have wider sustainable development benefits, notable in the areas of job creation, skill development and technology transfer.

South Africa has a large number of potential mitigation opportunities which could qualify for the CDM and generate CERs. As of December 2010, 193 CDM projects were submitted to the DNA of which 157 were Project Idea Notes (PINs) and 36 were Project Design Documents (PDDs). Out of 36 PDDs, 19 have been registered by the CDM Executive Board as CDM projects and 6 projects have already been issued with Certified Emission Reduction certificates. The PDDs have the potential to generate 171 8445 tCO_2e per annum whereas the PINs have the potential to generate 64 724 182 tCO_2e per annum.

As per the PDDs submitted in 2010, the anticipated number of jobs is 1 749 and for PINs is 13 738 jobs, please note that figures includes both permanent and temporary jobs. Six of the registered South African CDM projects have been issued with CERs for different verified periods. Out of these six; four have been issued more than once. Analysis of the project pipeline also shows that whilst there is a diverse range of project types, renewable energy projects are dominant.

The regulation frameworks such as Environmental Impact Assessment, water permits, power purchase agreements, UNFCCC project registration process particularly validation has affected a range of CDM project activities. It is worth emphasizing that some of these barriers are not unique to South Africa alone but are common to the CDM sector as a whole.

Africa is still lacking behind accounting for only 2% and compared to Asia reflecting 77% and Latin America with 20%. This is as a result of lack of driving force such as conducive environment for project development, operational REFIT and esteemed financial instruments to assist CDM project development.

A Multi-stakeholder engagement is required for a successful CDM implementation, thus Government and organizations need to ensure that they have a clear understanding of the opportunities around the CDM and the potential for it to support the sustainable development of the country. There is a need of esteemed financial instruments to assist project development

The South African DNA is committed to encouraging and supporting other stakeholders to explore CDM or future carbon reducing opportunities in the country. This will only be achieved if other stakeholders actively engage in the process.

8 References

Department of Environmental Affairs, 2009. **National Greenhouse Gas Inventory South Africa (1990 to 2000)**. Pretoria.

The World Bank, 2008: **State and Trends of the Carbon Market 2008**, Washington, D.C., World Bank Institute.

The World Bank, 2010: **State and Trends of the Carbon Market 2010**, Washington, D.C., World Bank Institute.

Pew Center on Global Climate Change, 2008: **The European Union's Emissions Trading System in perspective.** Massachusetts Institute of Technology

Point Carbon, 2009. **Carbon 2009: Emission trading coming home.**

http://www.climate-connect.com

www.dea.gov.za

www.dbsa.org

www.global-greenhouse-warming.com

www.energy.gov.za

www.ipcc.ch

www.nersa.org.za

www.treasury.gov.za

www.pointcarbon.com

www.unfccc.int

www.ipcc.int

www.**25degrees**.net

9 Abbreviations

BEE	Black Economic Empowerment
CDM	Clean Development Mechanism
CDM EB	Clean Development Mechanism Executive Board
CERs	Certified Emission Reductions
CEF	Central Energy Fund
CFLs	Compact Fluorescent Light-bulbs
CH_4	Methane
CSP	Concentrated Solar Power
CMP	Conference of Parties serving as Meeting of Parties
CO_2e	Carbon Dioxide Equivalent
COP	Conference of Parties
DBSA	Development Bank of South Africa
DEA	Department of Environmental Affairs
DIRCO	Department of International Relations and Cooperation
DME	Department of Minerals and Energy
DNA	Designated National Authority
DoE	Department of Energy
DOE	Designated Operational Entity
DWA	Department of Water Affairs
EEDSM	Energy Efficiency Demand Side Management Programme
EIT	Economies in Transition
ERU	Emission Reduction Units
EU-ETS	European Union Emissions Trading Scheme

GWP	Global Warming Potential
HFCs	Hydro fluorocarbons
IGCCC	Intergovernmental Committee on Climate Change
IPCC	Intergovernmental Panel on Climate Change
IRP	Integrated Resources Plan
IPPs	Independent Power Producers
JCF	Japan Carbon Finance
JI	Joint Implementation
LoA	Letter of Approval
LDCs	Least Developed Countries
LEDs	Light Emitting Diodes
LoNO	Letter of No Objection
N_2O	Nitrous Oxide
NCCC	National Committee on Climate Change
NERSA	National Energy Regulator of South Africa
OECD	Organisation for Economic Co-operation and Development
PDD	Project Design Document
PFCs	Per Fluorocarbons
PIN	Project Identification Note
PNCP	Pilot Cogeneration Programme
REFIT	Renewable Energy Feed-In-Tariff
ROD	Record of Decision
SF6	Sulphur hexafluoride
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change

2010

SOUTH AFRICAN DESIGNATED NATIONAL AUTHORITY
DEPARTMENT OF ENERGY
2010