Waste law and policy perspectives on municipal “land-fill to gas” CDM projects in South Africa

Mini-dissertation submitted in partial fulfilment of the requirements for the degree *Magister Legum in Environmental Law* at the North-West University (Potchefstroom Campus), South Africa

by

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Abstract

Landfilling has a negative impact *inter alia* on the environment. Landfill gas is for example released into the atmosphere. The waste sector releases high amounts of GHG concentrations (methane gas), proving that it has climate mitigation potential. By converting methane gas into electricity, South Africa could find a way to manage waste in a more effective manner by developing, for example, waste-to-energy projects. Such projects could contribute to the mitigation of GHG emissions in South Africa while generating alternative forms of electricity.

“Landfill-gas to energy" projects (LFG-to-energy projects) are established initiatives internationally and involve the generation of energy in the form of electricity from the incineration of waste. A number of larger municipalities in South Africa has already implemented or currently considers LFG-to-energy projects. Examples include the eThekwini Municipality which has installed the first LFG-to-energy project in South Africa in 2006.

Three mechanisms in the Kyoto Protocol have been designed to assist developed countries to achieve their emission reduction targets: emissions trading (ET), joint implementation and the Clean Development Mechanism (CDM). CDM projects, as defined under article 12 of the Kyoto Protocol, are jointly carried out by a developed country with a reduction target, and a developing country such as South Africa. By taking part in a CDM initiative, a developed country invests in a certified project that promotes sustainable development. This mechanism in a nutshell serves to assist developing countries through technology transfer and national revenue, for example, while contributing to compliance with the Kyoto Protocol in the host country. LFG-to-energy projects are examples of CDM projects that are being developed in South Africa in terms of the Kyoto Protocol. Given the policy drive to a low carbon economy and more extensive use of alternative energy sources, it is expected that the number of LFG-to-energy projects (be they CDM projects or not) will rise in years to come. This projection raises questions about the suitability of the existing law and policy framework to regulate and direct the life-cycle of LFG to energy projects.

The mini-dissertation questions by way of desktop research to what extent does domestic waste law and policy regulate LFG to energy CDM projects in local government in South Africa at present. The main objective is to identify and respond to specific gaps and any uncertainties in the existing law and policy framework.

Keywords: CDM; waste-management; LFG-to-energy; mitigation; waste law and policy.

Opsomming

Stortingsterreine het 'n negatiewe impak op die natuurlike omgewing. Gasse word onder andere gevorm in die rommel van stortingsterreine en word vrygelaat in die atmosfeer. Die afval-sektor is verantwoordelik vir die vrystelling van ‘n hoë aantal kweekhuis-gasse (KHG) (soos metaangas) en dit dui daarop dat hierdie sektor mitigasie potensiaal het. Suid-Afrika kan afvalbestuur meer effektief aanpak deur onder andere metaangas vas te vang en dan om te skakel in elektrisiteit. Afval-tot-energie projekte, beter bekend as *waste-to-energy projects*, dien as voorbeelde van die inisiatief om elektrisiteit op ‘n meer omgewings-vriendelike manier te vervaardig. Sulke projekte kan alternatiewe vorms van energie skep vir Suid-Afrika en ook bydrae tot die vermindering van KHG-vrystellings.

Die vestiging van die *Clean Development Mechanism* (CDM) ingevolge artikel 12 van die *Kyoto Protocol* skep verder ruimte vir hierdie soort projekte. Die CDM stel ontwikkelde lande in staat om om te belê in projekte deur middel van die oordra van tegnologie en kapitaal wat dan gevolglik gebruik word deur ontwikkelende lande om meer volhoubaar te ontwikkel. ‘n Goeie voorbeeld van reeds gevestigde en funksionerende CDM projekte is sogenaamde “afval-tot-energie”-projekte.

Gegewe Suid-Afrika se beleid om te beweeg na ‘n lae koolstof-ekonomie en meer gebruik te maak van alternatiewe energiebronne, word daar verwag dat die aantal afval-tot-energie projekte (of dit nou CDM-projekte is of nie) sal styg in die komende jare. Hierdie voorspelling laat vrae ontstaan oor die geskiktheid van die bestaande wetgewing en die beleidsraamwerk wat hierdie tipe projekte reguleer.

Hierdie skripsie vra tot watter mate word CDM “afval-tot-energie” projekte tans reguleer binne Suid-Afrikaanse wetgewing en beleid. Die hoofdoel is om spesifieke leemtes en onsekerhede in die bestaande wetgewing en beleidsraamwerk te identifiseer en te bespreek.

Soekwoorde: CDM; afvalbestuur; afval-tot-energie; mitigasie; afvalreg en beleid.

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May God bless you all.

DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis/dissertation/mini-dissertation is my own original work and that I have not submitted it previously in its entirety of in part to any other university.

Signature:

Date:

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List of abbreviations

CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CSIR	Council for Scientific and Industrial Research
COP/MOP	Conference of Parties/Meeting of the Parties to the UNFCCC
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DE	Department of Energy
DME	Department of Minerals and Energy
DOE	Designated Operational Entity
EDS	Environment, Development and Sustainability
EMP	Environmental Management Plan
ETS	Emission Trading System
EU	European Union
GHG	Greenhouse Gas
IMFO	Official Journal of the Institute of Municipal Finance Officers
IMIESA	Institute of Municipal Engineering of Southern Africa
INC	Intergovernmental Negotiating Committee for a Framework Convention on Climate Change
IPCC	UN Intergovernmental Panel on Climate Change

IPP	Independent Power Producer
IRP	Integrated Resource Plan
JEFS	Journal of Economic and Financial Sciences
JEL	Journal of Economic Literature
JESA	Journal of Energy in South Africa
JSAICE	Journal of the South African Institution of Civil Engineering
JSWTM	Journal of Solid Waste Technology and Management
MSW	Municipal Solid Waste
NDP	National Development Plan
NERSA	National Energy Regulator of South Africa
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:AQAA	National Environmental Management: Air Quality Amendment Act
NEM:PAA	National Environmental Management: Protected Areas Act
NEM:WA	National Environmental Management: Waste Act
NGO	Non-governmental Organisation
NWA	National Water Act
NWMS	National Waste Management Strategy
PDD	Project Design Document
PIN	Project Idea Note

PNAS	Proceedings of the National Academy of Sciences of the United States of America
PPP	Public Private Partnership
REFIT	Renewable Energy Feed-In Tariff
REIPPP	Renewable Energy Independent Power Producer Procurement Programme
RSER	Renewable and Sustainable Energy Review
SACN	South African Cities Network
SIDS	Small Island Developing States
TJED	The Journal of Environmental Development
UN	United Nations
UNDP	United Nation’s Global Development Network
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

The world is heading toward what is described as an "urban future" caused mainly by a growing population.[1] This development comes at a price considering for example that its main by-product, municipal solid waste (MSW),[2] is growing faster than urbanisation itself.[3] Research done by the World Bank indicates a steady increase in solid waste generated worldwide. Ten years ago 2.9 billion urban residents generated about 0.64 kg of MSW per day.[4] The same research indicates that this amount has since increased to 3 billion residents generating 1.2 kg of waste per person per day and that by 2025 this amount will increase to 4.3 billion urban residents generating about 1.42 kg of MSW per day. Clearly the amount of municipal waste being generated worldwide is steadily on the rise.[5] This poses various challenges to authorities such as environmental ministries and municipalities worldwide, one such challenge being the fact that the annual cost of solid waste management is expected to increase to $375 billion, with this amount expected to rise sharply especially in developing countries.[6]

South Africans generated more than 108 million tonnes of waste[7] in 2011 and only ten per cent of this amount was recycled.[8] Waste generation in the country is expected to increase at an expected rate of 2 to 3 per cent per annum due to population and economic growth.[9] Growing amounts of waste pose various challenges for municipalities specifically, including keeping up with the costs of effective waste management. The primary method of waste

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1 Bhagwandin *Waste Management and Minimisation Initiatives* 10.
2 MSW is a waste type that includes household waste and generally excludes hazardous waste.
3 World Bank *What a Waste 2012* 8.
4 World Bank *What a Waste 2012* 8.
5 Tran 2012 http://bit.ly/1wWfJmd.
6 Tran 2012 http://bit.ly/1wWfJmd.
7 This includes 59 million tonnes of general waste, 48 million tonnes of unclassified waste and 1 million tonnes of hazardous waste.
8 Bothma 2014 http://bit.ly/1OkT0Jv.
9 GN 270 in GG 35206 of 30 March 2012.

disposal of municipal waste around the world[10] and in South Africa[11] is landfilling. Of the 108 million tonnes of waste that were generated in South Africa in 2011, 98 million were disposed of at landfills.[12] Landfilling requires large areas of land (for example the Robinson Deep landfill in Johannesburg takes up about 124 acres of land)[13] and is specifically constructed with strict design requirements to accomodate rubbish. Waste that is sent to landfill sites incurs large costs to operate, manage and monitor, even after the closure of the site.[14] Landfill sites need to be licenced in terms of Part 5 of the *National Environmental Management: Waste Act* (NEM:WA). Owners of landfill sites are also required to submit documentation in terms of NEM:WA, including an industry waste management plan (if requested by the Minister regarding section 28)[15] and a waste impact report.[16] Not complying with legislative requirements could result in the owner of unauthorised landfill sites receiving financial penalties or imprisonment.[17] At present, many of the landfill sites in South Africa are unpermitted, which raises questions about the safety and suitability of the country's waste management facilities.[18]

Because of these problems, the authorities are searching for alternative options to treat waste. Yet, according to the *National Waste Management Strategy* (NWMS),[19] alternative waste treatment options in South Africa are scarce and more expensive than landfilling.[20]

The *Constitution of the Republic of South Africa,* 1996 (the Constitution) assigns the duty to provide waste management services such as refuse

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10 DOE *National Waste Information Baseline Report 2012* 14.
11 DEA *National Waste Information Baseline Report 2012* 14.
12 Bothma 2014 http://bit.ly/1OkT0Jv.
13 Davie 2014 http://www.mediaclubsouthafrica.com.
14 Emery *Waste Revolution Handbook* 20.
15 Section 28 of NEM:WA.
16 Section 66 of NEM:WA.
17 Section 68 of NEM:WA.
18 DEA 2010 *National Waste Management Strategy* 6.
19 DEA 2010 *National Waste Management Strategy* 5.
20 DEA 2010 *National Waste Management Strategy* 5.

removal, refuse dumps and solid waste disposal to local government.[21] The functions and powers of district municipalities specifically are outlined in section 84(1) of the *Local Government Municipal Structures Act*,[22] and include the regulation of waste disposal and the establishment and operation of waste disposal sites.[23] According to NEM:WA, provincial environmental departments are responsible for the management and licensing of General Waste Management Activities listed in terms of section 19 of the Act.[24] Despite having legislation that regulates waste management activities such as the legislation mentioned in terms of section 19 of NEM:WA, South Africa faces various challenges specifically with regards to landfilling.

In general, landfilling has a negative impact *inter alia* on the environment. For example, landfill gases are released into the atmosphere. These gases are made up mainly of methane (CH_4) and carbon dioxide (CO_2), of which methane is the more harmful to the ozone layer.[25] Methane released from landfill sites accounts for as much as twelve per cent of the total global methane emissions.[26] The release of gases such as methane into the atmosphere has led to the world's facing another global challenge in the form of climate change.[27]

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21 See chapter 4.2.2 of this study regarding local government's constitutional obligation towards waste management.

22 Act 117 of 1998.

23 District municipalities are responsible for solid waste disposal sites, including the regulation of waste disposal, as well as for the establishment, operation and control of waste disposal sites. Local municipalities are responsible for all environmental functions not aligned to districts while metropolitan municipalities are assigned to all environmental functions.

24 "Waste management activity" means any activity listed in Schedule 1 of NEM:WA and or published in the Gazette under section 19. This includes the accumulation and storage, as well as the collection, handling and recovery of waste.

25 Emery *Waste Revolution Handbook* 134.

26 Tran 2012 http://bit.ly/1wWfJmd.

27 Article 1 of the United Nations Framework Convention on Climate Change (UNFCCC) (1992).

Countries around the world must reduce all activities that contribute to climate change caused by human activities,[28] which is described as one of the most significant environmental challenges facing the world.[29] The United Nations Intergovernmental Panel on Climate Change (IPCC)[30] confirms in its *Fifth Assessment Report*[31] that climate change is largely caused by increases in anthropogenic greenhouse gases (GHGs) due to human activity. The results of this change are expected to be a natural environment that includes changing weather patterns and rising sea levels which could have a detrimental effect especially on developing and low-lying countries.[32]

South Africa has taken a national stance against activities that could lead to climate change, most notably in the form of the *National Climate Change Response White Paper,* which describes policies, strategies and plans to limit the output of GHGs and to adapt to the effects of climate change.[33] South Africa's response to climate change has two main objectives: to effectively manage climate change impacts, and to make a fair contribution to the global effort to stabilise GHG concentrations.[34] The government also acknowledges that the waste management sector possesses potential with regards to climate change, specifically with reference to the capture of methane gas.[35]

The waste sector releases large amounts of GHG concentrations (methane gas), proving that it has climate mitigation potential.[36] South Africa could find a way to manage waste in a more effective manner than at present, for

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28 Article 1 of the United Nations Framework Convention on Climate Change (UNFCCC) (1992).
29 Wara *Measuring the CDM's Performance and Potential* 1.
30 The IPCC is an organisation that was set up in 1988 to assess the scientific, technical and socio-economic information that relates to human-induced climate change.
31 IPCC *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.*
32 Dawson and Spannagle *Complete Guide to Climate Change* 96.
33 GN 757 in GG 34695 of October 2011.
34 DEA 2012 http://bit.ly/1xRmlNW.
35 See paragraph 4.5.6 of this study which discusses government policy that promotes mitigation in the waste management sector.
36 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation".

example converting methane gas into electricity. Such projects could contribute to the mitigation of GHG emissions in the country while generating alternative forms of electricity.[37]

"Landfill gas to energy" projects (LFG-to-energy projects) are established initiatives internationally,[38] and involve the generation of energy in the form of electricity from the incineration of waste. A number of larger municipalities in South Africa have already implemented or are currently considering LFG-to-energy projects.[39] Examples include the eThekwini Municipality, which installed the first LFG-to-energy project in South Africa in 2006,[40] and the City of Johannesburg, which later successfully implemented two LFG-to-energy projects: Robinson Deep landfill site and the Marie Louise project.[41]

The rise of LFG projects, in general, must be seen against the background of international pressure and developments *inter alia* to move towards less carbon-intensive economies. For example, the Kyoto Protocol, which was drafted in December 1997, is an international treaty to which 192 states are party.[42] The treaty accompanies the United Nations Framework Convention on Climate Change (UNFCCC), 1992, which binds its Parties to emission reduction targets.[43] The Protocol sets binding obligations on industrialised countries (listed in Annexes I and II) to reduce the emission of GHGs. However, South Africa does not (yet) have any binding targets in terms of the Protocol. Still, and relevant to the present discussion, the country has over time become part of some of the international mechanisms to reduce CO_2 levels worldwide – including carbon trade measures.[44]

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37 DEA *National Climate Change Response White Paper* page 32.
38 Emery *Waste Revolution Handbook* 133.
39 See paragraph 3.4.5 of this study for examples of CDM LFG-to-energy projects in South Africa.
40 Emery *Waste Revolution Handbook* 131.
41 Emery *Waste Revolution Handbook* 134.
42 See paragraph 2.2 of this study for a discussion of the Kyoto Protocol.
43 Articles 2 and 3 of the Kyoto Protocol.
44 This includes being a member of the UNFCCC and Kyoto Protocol.

There are three mechanisms in the Kyoto Protocol that are designed to assist developed countries to achieve their emission reduction targets: emissions trading (ET),[45] joint implementation,[46] and the Clean Development Mechanism (CDM).[47] CDM projects as defined[48] under article 12 of the Kyoto Protocol are jointly carried out by a developed country with a reduction target and a developing country such as South Africa. By taking part in a CDM initiative, a developed country invests in a certified project that promotes sustainable development and that is carried out in a developing country. This mechanism, in a nutshell, serves to assist developing countries through technology transfer and national revenue, for example, while contributing to compliance with the Kyoto Protocol in the host country. The background and features of CDM and its link to LFG-to-energy projects are discussed in more detail in chapter 2 of this study.

The South African government acknowledges the potential of benefitting from CDM initiatives. For the country to do so, it would require legislation within which CDM can be successfully established. A regulation[49] under section 25 of the *National Environmental Management Act* (the NEMA)[50] was gazetted on 24 December 2004, which established the Designated National Authority

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45 Faure and Peeters *Climate Change* 17 describe emission trading as a market-based approach and "the effective and efficient control of greenhouse gas emissions through the issuance of a restricted amount of tradable permits." Emissions Trading gives market participants the flexibility to fulfil their reduction commitment either by their own efforts or through the purchase of additional reduction certificates. It is also seen as an environmental regulation tool that allows a polluter to exchange emission rights to meet a given target. Also see Braun 2009 *AOS* 470 and Philander *Global Warming and Climate Change* 504.

46 Joint implementation involves a "bilateral deal in which countries with high costs of pollution abatement or environmental conservation invest in abatement or conservation in a country with lower costs, and receive credit for the resulting reduction in emissions or increase in conservation." See Jepma *Feasibility of joint implementation* 15.

47 See chapter 2 of this study, which focuses on CDM as a mitigation measure.

48 The definition of CDM in accordance with the Kyoto Protocol will be discussed in Chapter 2 of this study.

49 GN R1478 in GG 27142 of 24 December 2004.

50 National Environmental Management Act 107 of 1998 (hereafter NEMA).

(DNA). This was done *inter alia* to promote, evaluate and approve the operation of CDM projects in South Africa.[51]

Given the policy drive to a low carbon economy and a more extensive use of alternative energy sources,[52] it is expected that the number of LFG-to-energy projects (be they CDM projects or not) will rise in years to come.[53] This projection raises questions about the suitability of the existing law and policy framework to regulate and direct the life-cycle of LFG-to-energy projects. The number of CDM projects registered in the country is growing.[54] Yet critique levelled against the South African CDM market is that growth is too slow,[55] that applications are lengthy and expensive,[56] and that South Africa is a latecomer to CDM.[57] CDM in South Africa has been delayed by what is described as protracted environmental authorisation processes and detailed procurement legislation.[58]

While one would expect that the recently reformed waste law and policy, and the local government law framework in South Africa, would be flexible enough to cater for LFG-to-energy project regulation, it is necessary to determine to what extent the details of LFG-to-energy project impacts and CDM-specific requirements are provided for. The necessity lies in the perception that these projects can be successfully implemented if supported by an adequate regulatory system. The relevant South African law and policy sources to be evaluated for this purpose include: the NEM:WA; the Renewable Energy Independent Power Producer Procurement Programme (REIPPP); National Standards for the Extraction, Flaring or Recovery of

51 See paragraph 3.2 of this study for a discussion on the DNA in South Africa.
52 Paragraph 10.7 of the *National Climate Change Response White Paper*, 2012.
53 "A solid base exists for future CDM growth" - ASSA *Towards a low carbon city* 177.
54 360 CDM projects have been submitted to the DNA up to 19 March 2015 compared to 316 in February 2012, as viewed on the South African CDM Portfolio. See http://bit.ly/1Jtg2pn for the portfolio.
55 South Africa hosts only 0.65 per cent of the overall CDM pipeline projects, and features poorly when compared to China, India and Brazil. See ASSA *Towards a low carbon city* 176.
56 ASSA *Towards a low carbon city* 175.
57 Emery *Waste Revolution Handbook* 131.
58 Emery *Waste Revolution Handbook* 20.

Landfill Gas;[59] the *White Paper on the Renewable Energy Policy*[60] and South Africa's National Policy on the Thermal Treatment of General and Hazardous Waste, 2009.[61]

Against the background of the above, this study questions by way of desktop research to what extent domestic waste law and policy regulates LFG-to-energy CDM projects in local government in South Africa. The main objective is to identify and respond to specific gaps and any uncertainties in the existing law and policy framework.

Chapter 2 briefly focuses on the Kyoto Protocol and its importance in relation to CDM before turning attention to the background and features of CDM. LFG-to-energy projects in South Africa are subsequently discussed in chapter 3, as well as their connection with CDM development in the country. To initiate LFG-to-energy projects, the country needs efficient waste law and policy and both are examined in chapter 4. Conclusions are drawn in chapter 5.

59 GN 924 in GG 37086 of 29 November 2013.
60 GN 513 in GG 26169 of 14 May 2004.
61 GN R777 in GG 32439 of 24 July 2009.

2 CDM as mitigation measure in the Kyoto Protocol

2.1 Introduction

Part of the international community's response to climate change has been the adoption of the Kyoto Protocol (the Protocol). The rationale behind its adoption in 1997 was to reduce emissions of GHGs to a point where their concentration in the atmosphere can be stabilised at an agreed level that, according to the IPCC, will delay and reduce the adverse effects of climate change.[62] The key features of the Protocol are that it sets individual and legally binding targets for industrialised countries, and that it distinguishes between developed and developing countries as part of the notion that each country has "common but differentiated responsibility". The Protocol further provides for three market-based mechanisms to enable developed countries to reach their emission targets, namely joint implementation,[63] the CDM,[64] and emissions trading.[65] The flexibility mechanisms were introduced to allow developed countries to achieve a proportion of their commitments by earning credits for GHG emissions avoided or GHG removals achieved in other countries.[66] Joint implementation allows Annex I countries to pay for emission reductions additional to what otherwise would have occurred within other Annex I countries and then credit these reductions against their assigned units.[67] Emissions trading allows countries that have emissions units to spare to sell these to countries that are over their targets.[68]

As indicated earlier, this study focuses only on the CDM as one of the three market-based mechanisms in the Kyoto Protocol. The objective is to discuss the meaning, function and perceived shortcomings of the CDM as an international climate mitigation instrument in general, in order to lay the basis

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62 UNFCCC *Handbook* 17.
63 Article 6 of the Kyoto Protocol.
64 Article 12 of the Kyoto Protocol.
65 Article 17 of the Kyoto Protocol.
66 Article 17 of the Kyoto Protocol.
67 Wara *Measuring the CDMs Performance and Potential* 8.
68 Article 17 of the Kyoto Protocol.

for the South African-specific discussion in chapter 3. On the basis of the content of Article 12 of the Protocol read with the Marrakesh Accords,[69] this chapter also deals with the nature, requirements and process of a so-called "CDM project".

2.2 The Kyoto Protocol

In 1990 the United Nations General Assembly established the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC) with the goal of overseeing negotiations towards an international agreement to reduce GHG emissions. This led to the adoption of the UNFCCC at the United Nations Conference on Environment and Development in Rio.[70] Currently a total of 196 parties (195 states and one regional economic integration organisation) have signed and ratified the UNFCCC, which aims to prevent "dangerous anthropogenic interference with the climate system." [71] Two main groups exist within the convention: Annex I countries and non-Annex I countries. The first group consists primarily of countries from the developed world while the latter includes countries that still have developing economies. The UNFCCC set specific targets for developed countries, although there were some that described the targets as "ambitious."[72]

The most important example of one these protocols is the Kyoto Protocol. South Africa ratified the Kyoto Protocol on March 13, 2002 but, as indicated already, the government does not have any binding commitments arising from the Protocol, as it is still classified as a developing country (see chapter 1 of this study).

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69 The 7th Conference of the Parties, 29 October – 10 November 2001, Marrakesh Morocco.
70 The United Nations Conference on Environment and Development, 3 – 14 June 1992, held in Rio de Janeiro, Brazil.
71 UNFCCC 2014 http://bit.ly/1ujgxQ3.
72 Wara *Measuring the CDMs Performance and Potential* 7.

In 1997 COP 3[73] formally adopted the Kyoto Protocol which sets individual and legally binding targets for industrialised countries prepared to take steps to curb emissions within their territories.[74] Targets are met by establishing binding caps on emissions of GHGs (originally during the 2008 – 2012 period). Examples of these GHGs include *inter alia*: methane and nitrous oxide.[75]

The Protocol came into force on 16 February 2005 and has since been described as one of the most universally supported international agreements to date.[76] Like the UNFCCC, the Protocol distinguishes between developed and developing countries with the notion that each country has a "common but differentiated responsibility", which is identified by looking at each country's development and contribution to climate change.[77] Although it is universally supported, not all developed countries have ratified the Kyoto Protocol.[78] A lack of full international support for the Kyoto Protocol could have a negative impact on mitigation initiatives such as the CDM[79]. Without having any obligations in terms of the Protocol, developed countries could, for example, lack the necessary motivation to get involved in CDM investments. Still, as will be illustrated in chapter 3 of this study, developed countries such as Japan and Spain currently contribute to the establishment of CDM projects in South Africa by providing financial assistance, for example. Such arrangements typically form part of executing the responsibility of countries to take steps towards the mitigation of climate change.

The terms "mitigation" and "adaptation" denote the two kinds of responses to the threats associated with climate change, and their performance is

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73 The third Conference of the Parties to the UNFCCC, December 1997, Kyoto Japan.
74 UNFCCC *Handbook* 19.
75 Wara *Measuring the CDMs Performance and Potential* 7.
76 UNFCCC *Handbook* 20.
77 Schatz *Discounting the CDM* 707.
78 Australia and the United States of America are yet to ratify the original document.
79 See chapter 2.4.6 of this study for the discussion on the lack of international support for the Kyoto Protocol.

promoted in the Protocol. Adaptation is broadly defined as encapsulating those actions that help society adapt to the consequences of climate change.[80] It also refers to the ability of a system to adapt to these effects. Climate "mitigation" refers to stabilising GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.[81] This study, however, primarily focuses on mitigation interpreted as the drive to reduce the impact of climate change through GHG emission reductions. Waste-to-energy / landfill gas-to-energy is seen as being directed specifically at mitigation.

The Kyoto Protocol aims to assist Annex I parties (developed countries) in reaching their mitigation commitments through the establishment of the CDM. The CDM is typically overseen and governed by different structures. At the international level, these include the CDM Executive Board;[82] the Designated National Authority (DNA) and the Designated Operational Entity (DOE). These role-players are discussed later in the chapter and form an important part in the formation of CDM projects.[83]

2.3 The typical CDM project: features, requirements and role players

2.3.1 The identification and establishment of a CDM project

The CDM is established in terms of Article 12 of the Kyoto Protocol, and detailed CDM rules were established in 2001 with the adoption of the Marrakesh Accords. The principle international law framework for CDM thus comprises of the Protocol read with the Marrakesh Accords.

Article 12 of the Kyoto Protocol lays the foundation on which the concept of CDM is built and will, therefore, be discussed in this chapter.

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80 UNFCCC 2015 http://unfccc.int/adaptation/items/4159.php.
81 UNFCCC *Handbook* 74.
82 The role of the CDM Executive Board is that of one that provides supervision on behalf of the Conference of the Parties, and this is also confirmed in Article 12 of the Kyoto Protocol.
83 See paragraph 2.3.2 of this study.

2.3.1.1 Article 12 of the Kyoto Protocol

CDM can be described as a market-based trading mechanism that allows emission-reduction projects in developing countries to earn certified emission reduction credits. The mechanism also commits all parties to promoting sustainable development in developing nations by taking all practicable steps to facilitate and finance the transfer of environmentally sound technologies that lead to a reduction in GHG emissions.[84] Investments such as these allow developed countries to earn emissions credits by investing in emission-reducing projects in developing nations.[85]

Sustainability is an important objective of the Kyoto Protocol, and the CDM, therefore, also aims to help host countries to achieve specific goals regarding sustainable development in general.[86] The term "sustainability" as it is used in the Kyoto Protocol is criticised by some writers, however, as being too vague, since it is largely undefined by the Protocol.[87] The interpretation of "sustainability" is thus left to the DNA of the host country.[88] Another objective of the Kyoto Protocol is for CDM to mitigate and thus reduce GHG emissions and achieve reduction commitments.[89]

Article 12 of the Protocol states as follows: the purpose of the CDM is to assist non-Annex I parties to achieve sustainable development goals whilst contributing to Annex I countries in achieving their reduction commitments as outlined in Article 3 of the Protocol.[90] Article 12 of the Protocol states further that a party not included in Annex I will benefit from project activities that result in certified emission reductions.[91] Parties included under Annex I may

84 Article 10(c) of the Kyoto Protocol.
85 Philander *Encyclopedia of Climate Change* 258.
86 Article 12(2) of the Kyoto Protocol.
87 Wara *Measuring the CDMs Performance and Potential* 9. Also see chapter 2.4.3 of this study for the discussion on obscurities in the pursuit of "sustainable development."
88 The DNA is discussed in paragraph 2.3.2.2 below.
89 Article 12(2) of the Kyoto Protocol.
90 Article 12(2) of the Kyoto Protocol.
91 Article 12(3)(a) of the Kyoto Protocol.

use certified emission reductions resulting from project activities to contribute to compliance with their commitments in terms of Article 3.[92]

On the basis of Article 12, developing countries are provided the opportunity to develop in ways that do not lead to higher carbon offsets,[93] whilst Annex I countries can achieve reduction targets by investing in carbon-offset projects and then obtain credits in the form of Certified Emissions Reductions (CERs). The discussion around CERs is important due to the fact that it explains why developed countries would invest in local CDM projects.

The developed country will most likely purchase international credits in cases where they are cheaper than domestic reductions.[94] CERs enable the investor country to use the CERs to avoid reducing its own discharges by the designated proportion of its emissions-reduction responsibilities[95] and can be exchanged on a one-to-one basis with each other, with each credit defined as one metric tonne of CO_2.[96] In this way developed countries cut the cost of meeting their emissions targets by taking advantage of opportunities to reduce GHGs that cost less in other countries.[97]

2.3.1.2 The Marrakesh Accords

The 2001 Marrakesh Accords serve as the "rulebook" for the flexibility mechanisms.[98] Along with Article 12 of the Kyoto Protocol, the Marrakesh Accords establish three primary requirements for CDM projects: 1) sustainable development; 2) it should be supplementary; and 3) it should provide additionality.[99] A CDM project developer can be awarded credits, but it needs to undergo certain steps to ensure its legitimacy. All of these steps

92 Article 12(3)(b) of the Kyoto Protocol.
93 A carbon offset is defined as a "measurable avoidance, reduction or sequestration of carbon dioxide or other GHG emissions." Defined by: National Treasury *Carbon Offsets Paper* 12.
94 Schatz *Discounting the CDM* 708.
95 Latin *Climate Change Policy Failures* 89.
96 Schatz *Discounting the CDM* 708.
97 Philander *Encyclopedia of Climate Change* 258.
98 Schatz *Discounting the CDM* 708.
99 Schatz *Discounting the CDM* 709.

form part of the approval process, and if they are not executed properly the project can be discredited by the CDM Executive Board.

Various organisations may develop and organise CDM projects. These include government bodies, municipalities, financial institutions, private sector companies and non-governmental organisations (NGOs).[100] Four types of CDM projects exist: large-scale project activities; small-scale project activities, afforestation and reforestation project activities; and small-scale afforestation and reforestation activities.[101] Examples of the types of activities include: solar electrification, cleaner transportation methods and methane recovery. For the purpose of this study, only methane recovery in the form of waste-to-energy projects is attended to.

2.3.2 The role players in CDM projects

A number of domestic and international structures have been set up to oversee the successful running and approval of CDM projects. The Conference of the Parties/Meeting of the Parties (COP/MOP) is responsible for the authority and guidance of CDM projects. Other key institutions will be discussed below.

2.3.2.1 The CDM Executive Board

A decision was taken at COP 7[102] to establish a CDM Executive Board, which consists of ten members.[103] The board has the responsibility to supervise and handle the day-to-day administration of the CDM, and has to report directly to the COP.[104]The Executive Board is responsible for the validation and creating a registry of CDM projects, as well as for the

100 UNDP *The CDM: A user's guide* 20.
101 Couth *et al* 2011 *RSER* 400.
102 The 7th Conference of the Parties, 29 October – 10 November 2001, Marrakesh, Morocco.
103 One from each of the five United Nations regional groups, one from the Small Island Developing States (SIDS), and two members each from Annex I and non-Annex I Parties.
104 UNFCCC *Handbook* 40.

accreditation of operational entities. Therefore, before a project can be classified as a CDM project it first needs to be cleared by the Executive Board. The Executive Board also has the important responsibilities of issuing verified CERs, and developing and maintaining a CDM registry, as well as the establishment of committees, panels or working groups to assist in the performance of its functions.[105]

2.3.2.2 Designated National Authority

A regulation under section 25 of NEMA[106] established the South African DNA within the (then) Department of Minerals and Energy (now the Department of Energy (DE)). Each country has its DNA, the primary tasks of which are to authorise and approve potential CDM projects and to determine if these projects are likely to achieve the goals set for achieving sustainable development in the country.[107] The DNA also has to supply a letter of approval to CDM participants. This letter confirms that the CDM project is contributing to sustainable development, that the country has ratified the Kyoto Protocol, and that the participation in CDM is voluntary.[108] Once a project has received approval from the DNA, the approval is sent to the CDM Executive Board to oversee the registration of the project.

2.3.2.3 Designated Operational Entities

A designated operational entity (DOE) is defined as an independent auditor who is accredited by the CDM Executive Board. [109] DOEs assess whether a potential project meets all eligibility requirements of the CDM and are usually private sector entities, of which 48 have been accredited.[110]

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105 UNDP *The CDM: A user's guide* 22.
106 GN 721 in GG 27788 of 22 July 2005.
107 Fuggle and Rabie *Environmental Management in South Africa* 1067.
108 UNFCCC Designated National Authorities http://bit.ly/1utCI5T.
109 UNFCCC List of DOEs http://bit.ly/1x1aRea.
110 UNFCCC List of DOEs http://bit.ly/1x1aRea.

2.3.3 The CDM project life cycle

After the project has been identified, certain steps need to be taken to ensure the legitimacy of the CDM project. Project developers[111] of the host country initiate what is called the CDM project life cycle. It is important that the host country has ratified the Kyoto Protocol before the project life cycle can proceed,[112] and that the host country has expressed willingness to participate in the proposed CDM project.[113] The proposed project needs to contribute successfully to sustainable development in the host country by providing technologies that are not necessarily available in the country.[114] Another important requirement is that of additionality.[115] Project developers need to provide proof that GHG emissions will be reduced when implementing the CDM project, and that these emissions will be lower than the current scenario without a CDM project. In other words, the CDM must produce positive results in comparison with the "business-as-usual" scenario.

2.3.3.1 Project Idea Note

The next step is to have a Project Idea Note (PIN)[116] submitted to carbon credit buyers and to have it acknowledged by the UNFCCC so that the development of the CDM project can start. Even though the PIN is not a strict requirement in the CDM process, it represents an inexpensive opportunity to receive feedback from potential buyers without engaging in the formal CDM process.[117] A typical PIN will contain information on the type and size of the project; its location; the amount of GHG reductions expected; evidence of

111 These can be private companies, NGOs, governments or international investors.
112 Decision 17/COP 7 Modalities and Procedures for a CDM 20.
113 UNDP *The CDM: A user's guide* 25.
114 UNDP *The CDM: A user's guide* 25.
115 A four-step process is normally used to demonstrate that the project is additional: 1) an assessment of the legal requirements, 2) an investment analysis, 3) a barrier and common practice analysis and 4) a check on the credibility of the baseline.
116 The development of a PIN is not a strict requirement of the CDM process. In other words, a project can register successfully without compiling a PIN.
117 UNDP *The CDM: A user's guide* 24.

additionality; the financial structure and the projected contribution to sustainable development.[118]

2.3.3.2 Project design

The project design stage focuses on developing a project concept and consists of three elements: 1) a project design document (PDD), 2) the development of a methodology and 3) stakeholder consultation.

A PDD is developed by the project developer or owner and is an essential document that needs to be validated[119] and registered[120] by the CDM Executive Board before the project can earn CERs. Unlike the PIN, the PDD is compulsory, and no CDM project can function without one.[121] Apart from the PDD, two other documents are required for a CDM to be registered, namely: the validation report from the DOE and the letter of approval from the DNA.

The DOE reviews the PDD to ensure that the project meets the needs for validation, and the PDD is also used as the basis when consulting with potential stakeholders and investors.[122] Preparing a PDD can be a complex task, and the document must include: a general description of the project activity; the application of a baseline methodology; an indication of the duration of the project activity, and a description of a monitoring methodology and plan.[123] Other contents include an estimation of the GHG emissions by their sources, the details of the potential environmental impacts, and comments submitted by stakeholders.[124]

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118 UNDP *The CDM: A user's guide* 24.
119 Validation is the process of confirming that the project meets the requirement of CDM.
120 The point where a project activity is accepted as a CDM project by the CDM Executive Board.
121 UNDP *The CDM: A user's guide* 26.
122 CDM Rulebook 2014 http://bit.ly/1pPTFHQ.
123 UNFCCC *Guidelines for completing CDM-PDD* 13.
124 UNFCCC *Guidelines for completing CDM-PDD* 13.

The project developer needs to identify a baseline and monitoring methodology that would assist with the calculation of the CERs generated by a CDM project. A project methodology will enable the developer to establish rules that guide the establishment of an emission baseline and to determine project additionality as well as the calculation of expected emissions.[125] Stakeholder participation requires that project developers ensure that the CDM process is transparent by giving the public and local stakeholders access to information on the proposed projects.[126] The project developers also need to supply evidence that the project's activities will not adversely impact local communities and the environment.[127] Stakeholders include individuals, communities, and other groups that will be affected by the project.

2.3.3.3 National approval

The proposed CDM project must receive national approval from the host country before it can be registered in accordance with the UNFCCC and the Kyoto Protocol. The assessment and approval of these projects is the responsibility of the DNA.[128] The DNA needs to supply a letter of approval that must confirm that the proposed project will contribute to achieving sustainable development in the country.[129]

2.3.3.4 Validation

Once the PDD is complete, it needs to be independently evaluated by an accredited DOE.[130] The DOE reviews the PDD and letter of approval as supplied by the host country. This is followed by on-site visits by the DOE as

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125 UNFCCC *CDM Methodology Booklet* 2.
126 Hueberger *et al* 2006 *EDS* 46.
127 UNDP *The CDM: A user's guide* 46.
128 Parties participating in the CDM shall designate a national authority (the DNA) for the CDM. Decision 3/CMP.1, Annex, paragraph 29.
129 Decision 3/CMP.1, Annex, paragraph 40(a).
130 Approved by the CDM Executive Board.

well as interviews with the stakeholders involved.[131] The public is also involved, being given an opportunity to comment on the PDD for 30 days after it has been made available on the UNFCCC's or DOE's website. Although the process sounds straightforward, it can be complex and expensive with validation costs in 2011 ranging from R300 000 to over a million Rand.[132] The CDM is a long and expensive process.

2.3.3.5 Registration

When registered, the CDM Executive Board formally accepts a CDM proposal, and it requires that a registration fee be paid. A registration request may be submitted to either the CDM Executive Board or a Voluntary Climate Exchange Market. Successfully registering a CDM project requires many steps to be taken, including a completeness check done by the UNFCCC Secretariat and a review by the Registration and Issuance Team.[133]

2.3.3.6 Monitoring and implementation

Implementation of the project can begin after it has been registered by the CDM Executive Board. Once the project gets started, it remains the responsibility of the project developers to keep up to date records by measuring the emissions reductions achieved during the operational phase of the project.[134] Emissions reductions will be issued based on what is contained in the monitoring report issued by the developers. Every project should implement a GHG reductions monitoring plan and make use of a GHG monitoring methodology that has been approved by the CDM Executive Board.[135]

131 Carbon Market Watch 2014 http://bit.ly/1sAQjTD.
132 DNA *Annual Report* 2011.
133 Carbon Market Watch 2014 http://bit.ly/1sAQjTD.
134 Carbon Market Watch 2014 http://bit.ly/1sAQjTD.
135 DNA *Annual Report 2011* 13.

2.3.3.7 Credit issuance

Once the project is certified it can start earning CERs after sending a request to the CDM Executive Board. CERs are equal to the amount of emissions that have been reduced. For example if 10 000 tonnes of $C0_2$ have been reduced, then 10 000 CERs are issued.[136] The report containing information on the amount of emissions needs to be submitted to the CDM Executive Board for certification, after which the CERs are transferred to the CDM registry account of the project participant.[137]

2.4 Some weaknesses of CDM as a market-based mechanism

2.4.1 Introduction

The CDM as a flexibility instrument is not without its faults and weaknesses. These include contextual uncertainties about what lies ahead with regards to the climate negotiations (thinking for example of scientific uncertainty that discourages nations to take negotiations more seriously), certain terms that remain too vague (for example "sustainable development")[138] and the difficulty of demonstrating certain criteria, such as "substantial improvement". In the face of these uncertainties, CDM runs the risk of being reduced in scope or size or being halted completely.[139]

2.4.2 Uncertainties surrounding the second commitment period

The first commitment period of the Kyoto Protocol has not been without its difficulties. Critics note that the Protocol has failed to meet its objectives and the fact that the initial targets have not been met.[140] It is the second

136 CDM Watch *The CDM Toolkit* 14.
137 CDM Watch *The CDM Toolkit* 14.
138 See paragraph 2.4.3 of this study.
139 Brohé *EDS* 321.
140 Caillaud and Demange 2014 *JEL* 2.

commitment period that could have an important impact on the future of CDM projects.

The second commitment period of the Kyoto Protocol started with the Doha Amendment,[141] which formalises commitments for the period 2013 – 2020. As of 17 August 2015, 41 countries (including South Africa)[142] have ratified the Doha Amendment. The amendment will enter into force when three-quarters (144) of the parties to the Kyoto Protocol have submitted instruments of acceptance. Fewer countries are likely to commit to the second period than the first, and developed countries such as Japan, USA and Canada are yet to submit instruments of acceptance to the Doha amendment.[143] Formal commitments for a post-2020 regime will be made in 2015 at COP21.[144] Notably, a lack of ambition toward committing to the second commitment period could contribute to less interest in developing CDM projects in a developing country.[145]

Uncertainty about the future of the Kyoto Protocol[146] inevitably also results in uncertainty about the future of CDM. Progress cannot be made in developing countries if there is no demand for carbon credits in developed countries.[147] Further uncertainties have been caused by the decision of the European Union (EU) to limit the permissibility of UN carbon credits and ban them altogether from 2020. Experts have warned that this could signal the end of the international offset market.[148] Through its Emission Trading System (ETS) Europe is essentially the only existing market for carbon credits,

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141 Doha Amendment to the Kyoto Protocol (2013-2020).
142 South Africa ratified the Doha amendment to the Kyoto Protocol to the UNFCCC on 7 May 2015.
143 As of 17 August 2015.
144 21st Session of the Conference of the Parties to the UNFCCC, to be held from 30 November to 11 December 2015 in Paris, France.
145 Brohé *EDS* 305.
146 Many countries are currently reluctant to commit to the Doha amendment. A total of 144 instruments of acceptance are required for the entry into force of the Doha amendment to the Kyoto Protocol. As of 17 August 2015 only 41 countries have ratified. See UNFCCC 2015 http://bit.ly/1xB0wH4.
147 Brohé *EDS* 305.
148 Vitelli 2014 http://bloom.bg/1v29BIg.

because the USA did not ratify the Protocol and large (but "developing") economies such as China and India[149] have no binding obligations under the Protocol.[150] Making matters worse is the fact that the EU remains one of few major economies committed to carbon trading.[151] The failure of certain governments to provide firm guarantees to continue with carbon trading has also led to the system's being described as "essentially collapsed" and the statement that the CDM is in dire need of rescue.[152] Critics have slammed the EU cap-and-trade system, saying that the oversight is weak, the distance between firms verifying projects and those profiting from them is insufficient, and many of these projects would have proceeded in any case.[153]

COP 18 gave a sign of hope to supporters of CDM projects with confirmation that the second phase of the Kyoto Protocol would run from January 2013 to December 2020.[154] This also means that CDM projects can carry on as normal, which would avoid stagnation. Uncertainty could unfortunately still exist with certain Annex I countries being reluctant to make commitments to the second period.[155]

2.4.3 Obscurities in the pursuit of "sustainable development"

As explained in paragraph 2.2 of this study, two main objectives when establishing a CDM project include that it should contribute to sustainable development[156] in the host country and that emission reductions should be

149 China is the largest economy in the world while India features in the top ten. See the World Bank list at http://data.worldbank.org/datacatalog/GDP-ranking-table and the International Monetary Fund list at http://www.imf.org/external/data.htm.
150 Although possessing large economies, China and India are still seen as developing countries and therefore do not have any binding commitments in terms of the Protocol.
151 Harvey 2012 http://bit.ly/1GNZ9YG.
152 Harvey 2012 http://bit.ly/1GNZ9YG.
153 Schiller 2011 http://bit.ly/1u0JbUq.
154 King 2015 http://bit.ly/1Jt6fzF.
155 For example, the USA is yet to ratify the Protocol. China has not committed to absolute emission reductions and Japan will not take part in the second phase of the Kyoto Protocol.
156 Article 12.2 of the Kyoto Protocol states that the purpose of the CDM is to assist Parties not included in Annex I to achieve sustainable development.

"additional".[157] It is not the task of the CDM Executive Board but rather of a host country to establish whether CDM projects will contribute to sustainable development. Critics complain that the concept of "sustainable development" is left largely undefined by the Protocol, and that the host country DNA should determine what should qualify as standards and criteria for projects to qualify as contributing to "sustainable development".[158] This broad definition of sustainable development also makes it difficult to assess the actual impact of CDM projects in the host country. The Marrakesh Accords confirm that "it is the host Party's prerogative to confirm whether a CDM project activity assists it in achieving sustainable development".[159] This allows developing countries to define "sustainable development" as they wish, and that could hamper arriving at a definition applicable to all countries. However, it is also argued that strict sustainability standards could lead to a smaller supply of low-cost CERs; therefore the price of CERs could be much higher.[160] Criticism has been levelled against CDM projects with certain publications claiming that CDM that is "'left to market forces" does not significantly contribute to sustainable development.[161]

Sutter and Parreno[162] analysed sixteen different CDM projects worldwide with the goal of identifying whether these projects meet two main objectives: 1) contributing to GHG emission reductions, and 2) contributing to sustainable development. The study (conducted in 2005) reached the conclusion at the time that most of the sixteen registered projects were contributing to one of the two objectives, but not to both of them.[163] In fact, the researchers found that according to their methodology less than two per-

157 Article 12.5 of the Kyoto Protocol states that emission reductions from CDM projects must be real and additional.
158 Wara *Measuring the CDMs Performance and Potential* 15.
159 Procedures and Mechanisms relating to compliance under the Kyoto Protocol: Marrakesh Accords.
160 Sutter *Sustainability check-up for CDM projects* 70.
161 Olsen *The CDM's Contribution to Sustainable Development* 14.
162 Sutter and Panero *Does the current CDM deliver its sustainable development claim?* 16.
163 Sutter and Panero *Does the current CDM deliver its sustainable development claim?* 16.

cent of the credits generated in the sixteen projects contributed significantly to sustainable development in the host country.[164] This links, perhaps, with Schneider's opinion that "sustainable development" is a broad concept/ideal.[165] Developing countries can each define their sustainable development criteria for CDM projects according to their sovereign requirements, and these definitions are often vague and not strictly applied.[166]

2.4.4 Demonstrating "substantial improvement"

Another problem described as a "fundamental flaw"[167] in the system is identifying when exactly a project becomes "additional". When the number of CDM projects started to increase rapidly in 2005, the regulatory capacity to apply the additionality test was not up to standard, and it was only in 2007 that the CDM Executive Board introduced the "Registration and Issuance Team" and UNFCCC Secretariat staff were able to check whether additionality was taking place.[168] Despite greater monitoring, analysts still found that a relevant number of registered CDM projects were not additional. Schneider[169] found that many registered projects did not provide the necessary requirements to be additional, and concluded that about forty per cent of projects and twenty per cent of the CER volumes were unlikely to be additional.[170] The study done by Schneider on 93 registered CDM projects arrived at the conclusion that the current tools for demonstrating additionality were in need of "substantial improvement", and that projects are in need of credible and documented evidence when demonstrating additionality.[171] Schneider further believes that the requirement of additionality will never be

164 Brohé *EDS* 313.
165 Schneider *Is the CDM fulfilling its environmental and sustainable development objectives?* 46.
166 Brohé *EDS* 312.
167 Haya 2015 http://bit.ly/1XdfflS.
168 Michaelowa *Strengths and weaknesses of CDM* 50.
169 Schneider A*ssessing the additionality of CDM projects* 242.
170 Michaelowa *Strengths and weaknesses of CDM* 50.
171 Schneider *Assessing the additionality of CDM projects* 242.

perfect.[172] There is also the belief that the concept of additionality is too difficult to handle for project developers and that the current methods used to demonstrate additionality are not effective enough.[173] This questions both the effectiveness of "additionality" as a requirement for registration, and the environmental integrity of the concept as whole. Admittedly, there are projects that have been approved but without providing conclusive proof that they will be additional.[174] "Free-riding" projects could be allowed to a certain extent, but this could also result in higher global GHG emissions and fewer benefits for sustainable development in host countries.[175] Schneider is of the opinion that a policy decision regarding how many "free-riding" projects (projects that prove not to be additional) should be approved is needed and that the strengthening of project assessment by the CDM Executive Board is also needed to retain the integrity of the CDM.[176] The main problem with the term "additional" seems to be the fact that it is almost impossible to determine what would have happened without the project and if emission reductions would have taken place in any case.[177]

2.4.5 Lack of international support

Another possible crippling factor is the lack of support for mitigation commitments (such as the Kyoto Protocol) from developed countries. As noted earlier, the USA is yet to ratify the Kyoto Protocol, while other developed governments choose to pledge less support for the fight against climate change by not committing to the second period of the Kyoto Protocol.[178] The Australian government is another developed country that

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172 Schneider *Assessing the additionality of CDM projects* 243.
173 Brohé *EDS* 309.
174 Alexeew *et al An analysis of the relationship between the additionality of CDM projects and their contribution to sustainable development* 15.
175 WWF *No Time To Waste* 4.
176 Schneider *Is the CDM fulfilling its environmental and sustainable development objectives?* 45.
177 Sutter *Sustainability check-up for CDM projects* 57.
178 See paragraph 2.4.2 of this study.

has come under much scrutiny for its lack of plans to mitigate climate change and its implementation of regressive climate policies.[179] Governments that deny the link between changing weather patterns and global warming such as Australia, do not want, *inter alia*, to jeopardise their economic growth in the name of taking action against climate change.[180] In fact, the former Australian Prime Minister Tony Abbott has stated that he has always been against a carbon tax or an emission trading scheme.[181] Emission trading schemes include CDM projects, and according to the Australian Prime Minister, they could harm the economy and not help the environment. Australia's lack of commitment is also evidence in the fact that the world's highest producer of emissions per capita in 2012, and recently scrapped its carbon tax.[182] Another world leader, Canada, withdrew from the Kyoto Protocol in 2011 because its emissions had risen by nearly 30 per cent and it wanted to avoid paying penalties.[183] The lack of commitment displayed by developed countries such as Canada and Australia could negatively impact the development process of and initiatives for CDM projects. Investors more often than not originate in developed countries, and a lack of belief that climate change is a reality would demotivate any public or private organisations wanting to get involved in mitigation mechanisms such as the CDM. Developing country governments could also lose interest in mitigation and choose rather to focus on other immediate issues, such as poverty and health.

2.5 Concluding remarks

The CDM was established in terms of the Kyoto Protocol with the aim of mitigating climate change. It is officially established by article 12 of the

179 Readfern 2014 http://bit.ly/1Q40gcR.
180 Hurst 2014 http://bit.ly/1oGia6y.
181 Hurst 2014 http://bit.ly/1oGia6y.
182 Leber 2014 http://bit.ly/1w6DaJ5.
183 Hurst 2014 http://bit.ly/1oGia6y.

Protocol and is supported by the Marrakesh Accords. CDM projects have rules set out that govern their eligibility and are overseen by an independent body in the form of the Executive Board. South Africa has ratified both the Kyoto Protocol and the Doha amendment and thus established its support for CDM.

This chapter has illustrated that the CDM is an international instrument with specific international standards and requirements that need to be met before it can be operational in South Africa, for example. The chapter has also illustrated that this process can be lengthy with many steps to be taken before a project can be regarded as operational. Certain weaknesses may influence the successful development of CDM in South Africa, including the vagueness of the terminology and uncertainties surrounding the future of successful international climate negotiations.

3 CDM and LFG-to-energy project developments in South Africa

3.1 Introduction

The number of existing CDM projects in South Africa that have been submitted to the DNA amount to 360.[184] This includes 222 PINs and 138 PDDs. Of the 138 PDDs, 90 have been registered by the CDM Executive Board and 12 have been issued with CERs. The number of CDM projects has increased significantly over the years, as becomes obvious when comparing the present number to 2011 when only 21 were registered, with 8 of them receiving CERs.[185] The first CDM project in South Africa, the *Kuyasa Low-cost Urban Housing Energy Project,* was registered on 27 August 2005 and involved the installation of solar water heaters in Reconstruction and Development Programme (RDP) houses in Cape Town.[186] The first CDM LFG-to-energy project in South Africa, the *Durban LFG-to-energy project – Marrianhill* and *La Mercy* Landfills*,* was registered on 15 December 2006 and has since been successfully run and issued with 33431 CERs in 2013.[187]

3.2 The Designated National Authority of South Africa

3.2.1 Legislation establishing the DNA in South Africa

Regulations establishing the DNA for South Africa were published in 2005 in the *Government Gazette*, in accordance with NEMA.[188] These regulations determine that the responsibilities of the DNA are awarded to the Director-General of the (then) Department of Minerals and Energy.[189]

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184 *South African CDM Projects Portfolio* 19 March 2015, viewed at http://bit.ly/1Jtg2pn.
185 DE *CDM Status Review* 2011.
186 UNFCCC 2014 http://bit.ly/1uwyBkR.
187 UNFCCC 2014 http://bit.ly/1viXvcC.
188 GN R721 in GG 27788 of 22 July 2005.
189 In 2009 it was established that the Department of Minerals and Energy would be divided into the Department of Mineral Resources and the Department of Energy. The DNA now falls under the authority of the Department of Energy.

The duties of the South African DNA as contained in the regulations include: considering applications; issuing a letter of approval to project proponents; facilitating the participation of the South African public in CDM activities; promoting the successful establishment of CDM projects in the country; and monitoring and reporting to the Minister of Energy.[190] The regulations also establish a "steering committee" for the DNA, which consists of ten members from various national departments with a representative from the Department of Energy serving as the chairperson. The steering committee has various important duties to perform in assisting the DNA, which include *inter alia* providing supervision and advice with regard to the operations of the DNA; approving the CDM project evaluation and approval procedure; and facilitating procedures that ensure the effective functioning of the DNA. The steering committee also has the responsibility for reviewing the performance of the DNA every three years and making recommendations for the implementation of the CDM in South Africa.[191]

The guidelines for evaluation and approval procedures for CDM projects are contained in the regulations.[192] These include establishing sustainable development criteria and making the evaluation and approval procedures available to the public. The procedures regarding the letter of approval are also outlined in the regulations.[193] The contents of a letter of approval are also listed and include amongst others: a statement that the country is a signatory to the Kyoto Protocol; a statement that the DNA is authorised to issue the letter of approval; a statement that the project is voluntarily; confirmation that the project will contribute to sustainable development and authorisation for the project proponent to participate in the CDM project.[194] Procedures concerning appeals against decisions of the Steering Committee

190 GN R721 in GG 27788 of 22 July 2005.
191 Paragraph 5 of GN R721 in GG 27788 of 22 July 2005.
192 Paragraph 6 of GN R721 in GG 27788 of 22 July 2005.
193 Paragraph 7 of GN R721 in GG 27788 of 22 July 2005.
194 Paragraph 7 of GN R721 in GG 27788 of 22 July 2005.

or the Director-General are also outlined in the regulations, as well as the financing of the DNA.[195]

3.2.2 Identifying sustainable development within a CDM project

Chapter 2 of this study has considered the problem with the definition of sustainable development.[196] The chapter also points out that the criteria for sustainability are determined by the DNA of the host country. The South African DNA has established amongst others an approval procedure to be followed when evaluating if a project meets the sustainability criteria for South Africa in terms of the Kyoto Protocol.[197] The then Department of Minerals and Energy released a document providing the criteria to be used by the DNA in evaluating whether or not a project contributes to sustainable development. The document, named the *Sustainable Development Criteria for Approval of the CDM Projects by the DNA,* was released in October 2004.[198] The three core criteria as identified by the document are development in the economic, social and environmental fields. In terms of social development, the project needs to contribute to factors such as the delivery of basic services, poverty alleviation and social equality. The economic criteria require that development takes place by means of effective technology transfer, healthy foreign investment and a healthy impact on the cost of energy. Environmental development must take place without negatively affecting natural resources or causing deleterious impacts on biodiversity and ecosystems, and any pollution should be avoided as far as possible at all times.[199]

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195 Paragraph 4 of GN R721 in GG 27788 of 22 July 2005.
196 See paragraph 2.4.3 of this study.
197 Department of Energy 2014 http://bit.ly/1fDrB5x.
198 Department of Energy *Development Criteria for Approval of the CDM Projects by the DNA 2004.*
199 See chapter 4 of this study for the discussion regarding environmental legislation applicable to CDM LFG-to-energy projects in South Africa.

3.2.3 Approval process as conducted by the DNA

A project requires approval from the host country before it can receive registration and international accreditation from the CDM Executive Board.[200] As briefly explained before,[201] the assessment of projects for host country approval is the responsibility of the DNA. The project developer can have its project approved in one of two ways: voluntary screening or mandatory submission.[202]

3.2.3.1 Voluntary screening

If the developer chooses to partake in voluntary screening, he/she must submit a PIN and application to the DNA. Feedback can be requested from the DNA in the form of comments or assistance in project development. The DNA will inform the developer of the results of the initial screening within 30 days of submission of the PIN. The letter within which the DNA replies, confirms that on the basis of the information it has received, the project does not show any violations per the project approval criteria. This does not qualify as final approval from the DNA, however.[203]

3.2.3.2 Mandatory submission

The project developer now submits the project details in the form of a PDD that should have already been validated by a DOE.[204] The DNA will submit the PDD on its website[205] for thirty days for public comment. Once thirty days have passed all of the recommendations and comments received from the public are sent to the DNA advisory board. If successful the project will be issued with a letter of approval signed by the Director-General of the DE.

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200 Department of Energy 2014 http://bit.ly/1xyrN8f.
201 See paragraph 2.2.2 of this study.
202 View the full approval process document as supplied by the Department of Energy at http://bit.ly/11snXVk.
203 DE *CDM Status Review 2011* 37.
204 *Carbon Check* is the only validated DOE in Africa and is located in Johannesburg. View more at http://www.carboncheck.co.za.
205 Department of Energy 2014 http://bit.ly/1vjpLMr.

3.3 Some opportunities and constraints of CDM in South Africa

This part of the chapter focuses in brief on why South Africa can be considered a worthy destination for CDM projects and on some of the challenges that exist when developers want to establish a CDM project on South African soil. Within the overall context of this study, the objective is accordingly to show why CDM projects are highly feasible in South Africa, and also what could hamper the possible development of these projects.

3.3.1 CDM Potential

3.3.1.1 A country in need of renewable energy

In its review of the CDM, the Department of Energy lists the fact that South Africa is heavily reliant on fossil fuels as one of the reasons why the country is a good destination for CDM investment.[206] The country has a coal-intensive energy system and is Africa's biggest producer of coal.[207] South Africa also has a *per capita* emission rate that was well above the global average in 2010.[208] Electricity-intensive development has also contributed to a relatively large quantity of emissions that added up to approximately 463,235,220 metric tonnes of CO_2 in 2000.[209] This is high, especially when comparing with the figures for other developing countries. Adding to the concern is the fact that South Africa is one of the top twenty countries measured by absolute carbon dioxide emissions and is contributing to about ten tonnes of emissions per year.[210] South Africa's generous quantity of coal reserves further means that electricity remains relatively cheap and fossil fuels remain an attractive source of energy for the country.

Despite the abundance of coal and the new coal-fired developments, the country is in need of alternative energy sources as it aims to reduce its

206 DE *CDM Status Review 2011* 18.
207 According to the World Coal Association. View statistics at http://bit.ly/1L9oTxG.
208 Pegels *Green Industrial Policy in Emerging Countries* 126.
209 National Treasury *Carbon offsets Paper 2014* 23.
210 Masondo 2014 http://bit.ly/1ATLsWH.

reliance on fossil fuels to about fifty per cent of its energy mix in 2050, which is a reduction of about eighty per cent compared to 2014.[211] The South African government acknowledges that the use of fossil fuels leads to the release of high amounts of GHGs, which then causes climate change.[212] Therefore, the main opportunities for successful mitigation lie, at least in part, in energy efficiency and making use of less emissions-intensive methods and market-based instruments such as emissions trading schemes.[213] This intensifies the need to identify projects and developments that provide alternative forms of energy without compromising the environment. Despite this need, electricity generated from renewable energy contributed only about 1.2 per cent to the national mix in 2010.[214]

3.3.1.2 An abundance of natural resources

South Africa is suffering from electricity supply shortages and a greater use of renewable energy could reduce its dependence on coal as the dominant source of energy.[215] South Africa can be seen as one of the most modern countries in Africa and is a good investment destination, generally, for various reasons. The country accounts for approximately 25 per cent of Africa's Gross Domestic Product (GDP) and provides 45 per cent of Africa's mineral production, and fifty per cent of the continent's purchasing power.[216] The Johannesburg Securities Exchange (JSE) is rated among the top twenty stock exchanges in the world by market capitalisation proving that the country has obtained global confidence.[217] South Africa can also claim to be one of the countries with the best infrastructure in Africa, with extensive road

211 Doom 2014 http://bloom.bg/MpMjaK.
212 DME *White Paper on Renewable Energy* 2003 vi.
213 DEA *National Climate Change Response White Paper* 26.
214 Edkins *et al South Africa's renewable energy policy roadmaps* 18.
215 Pegels *Green Industrial Policy in Emerging Countries* 126.
216 DE *CDM Status Review 2009* 22.
217 DE *CDM Status Review 2009* 22.

networks, the largest port on the continent, and the largest telecommunications market.[218]

The *White Paper on Renewable Energy* (2003)[219] sets a target of 10 000Gwh[220] of energy to be produced from renewable energy sources by 2013. The sources are mainly wind, biomass, solar and small-scale hydro. In 2013 the DE proceeded to develop a renewable energy strategy for the integration of renewable energies into the energy economy.[221] The DE increased its effort to make more use of renewable energy by developing the Integrated Resource Plan (IRP) in 2010. The government planned to increase electricity capacity in terms of the IRP by making use of renewable energy technologies instead of fossil fuels.[222] This process initiated the Renewable Energy Independent Power Producer Procurement Programme (REIPPP). The programme was designed to contribute to a target of 3725 MW to be generated from renewable resources The REIPPP considers a number of renewable technologies, including landfill gas that could produce the 25 MW of energy that was allocated to it.[223] According to the programme, bidders (the independent power producers) are invited to make bids in accordance with the amount of MW's they plan on producing per project, in other words: how large is the project in terms of much electricity is to be produced.[224]

South Africa generates a great deal of waste that is mostly being sent to landfill.[225] The *National Waste Management Strategy* (NWMS) indicates that waste treatment (such as LFG-to-energy) is preferred instead of disposal at landfills.[226] The *National Climate Change Response White Paper* also

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218 DE *CDM Status Review 2009* 22.
219 DME *White Paper on Renewable Energy 2003* 12.
220 Gwh refers to Gigawatt Hour.
221 DE 2013 http://bit.ly/1GkHWZD.
222 DME *White Paper on Renewable Energy 2003* 12.
223 DE 2012 http://www.ipprenewables.co.za.
224 DE 2012 http://www.ipprenewables.co.za.
225 See chapter 1 of this study.
226 DEA *NWMS* 10.

acknowledges the GHG mitigation potential of the waste management sector, including waste-to-energy opportunities.[227] The waste management sector contains specific gaps (tonnes of waste being sent to landfills) and opportunities (in terms of GHG mitigation) within which CDM projects can develop.

This illustrates that South Africa has favourable conditions to establish CDM projects. Eskom is currently struggling to provide enough energy to South Africans.[228] The country is currently crippled by an energy crisis with load shedding becoming a daily occurrence, which leads to a lack of economic growth due to businesses losing billions of rand each year.[229] These worrying factors provide opportunities for renewable energy projects such as CDM LFG-to-energy to flourish.

3.3.1.3 A supportive set of laws and policies

The South African government has developed a number of strategic plans and legislation that aim to support sustainable development and a greener economy.

The National Development Plan (NDP) aims to achieve a transition to an environmentally sustainable carbon economy over short-, medium- and long-term horizons.[230] The NDP further promotes planning and strategies that will lead to a low-carbon economy, for example, the Integrated Resource Plan (IRP). Furthermore, the NDP has set the target of procuring at least 20 000MW of electricity in 2030, decommissioning 11000MW of ageing coal-fired power stations, and stepping up investments in energy-efficiency.[231]

227 DEA National Climate Change Response White Paper 32.
228 See paragraph 3.3.2.1 of this study for more information on Eskom and South Africa's dependence on coal.
229 Paton 2015 http://bit.ly/1zIazL.
230 Msimanga and Sebitosi 2014 *Renewable Energy* 422.
231 National Planning Commission *National Development Plan 2030* 36.

In terms of mitigating climate change, the NDP aims to reduce carbon emissions from the electricity industry and to improve energy efficiency.[232]

CDM projects focus on the supply of renewable energy and, therefore these projects link up with energy policy and legislation. This includes the *Electricity Regulation Act*,[233] which provides the basis for issuing the licence for generation, transmission and distribution.[234] In 2009 the National Energy Regulator of South Africa (NERSA)[235] announced a renewable energy feed-in tariff[236] (REFIT), which gave a big boost to support for renewable energy by allowing IPPs to enter the energy market by producing electricity at predetermined prices.[237] By doing this the government acknowledged that Eskom does not have the capacity to meet the country's energy demand.[238] Feed-in tariffs (FITs) are described as the most widely used government support mechanism for accelerating private investment in renewable energy generation.[239] The South African government began exploring FITs for renewable energy in 2009 by initiating the REFIT system, but changed to an auction system in 2011 in response to political and legal challenges.[240] This gave birth to the Renewable Independent Power Producer Procurement Programme (REIPPP), which is hailed worldwide as a model for renewable energy procurement.[241] The REIPPP is established in terms of section 34(1) of the Electricity Regulation Act[242] and it gives the minister the capabilities *inter alia* to determine: that new generation capacity is needed,[243] the types of energy sources from which electricity must be generated,[244] and that the

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232 National Planning Commission *National Development Plan 2030* 38.
233 The Electricity Regulation Act 4 of 2006.
234 DE *CDM Status Review 2009* 24.
235 NERSA is a regulatory authority that was established by section 3 of the National Energy Regulator Act, Act 40 of 2004.
236 Feed-in tariffs is a scheme that pays people for creating their own electricity.
237 Pegels *Green Industrial Policy in Emerging Countries* 130.
238 Montmasson-Clair and Ryan 2014 *JEFS* 508.
239 Eberhard *et al* South Africa's IPP 4.
240 Eberhard *et al* South Africa's IPP 5.
241 Montmasson-Clair and Ryan 2014 *JEFS* 507.
242 The Electricity Regulation Act 4 of 2006.
243 Section 34 (1)(a) of the Electricity Regulation Act.
244 Section 34 (1)(b) of the Electricity Regulation Act.

electricity produced may be sold only in a prescribed manner.[245] The REIPPP also gives opportunities to potential suppliers of electricity to submit competitive bids and then allow the project to supply electricity into the grid if it is chosen.[246]

The REIPPP has generated a total of 64 renewable energy IPPs that include wind, solar, landfill gas and biomass energy technologies.[247] The Minister has determined (in accordance with section 34 of the *Electricity Regulation Act* referred to above) that 3725 MW could be generated from renewable energy sources to ensure the continued supply of electricity. The REIPPP bidding process started in 2011 consisting out of five rounds. Bid evaluation consists of a two-step process. Firstly bidders have to satisfy minimum threshold requirements in six areas: environment, land, commercial and legal, economic development, financial and technical.[248] Secondly, bidders have to satisfy requirements regarding job creation, ownership, management control, socioeconomic development and the provision of prices.[249]

During the first two bidding windows, the Minister indicated that 25MW would be reserved for LFG-to-energy projects, yet no successful (LFG-to-energy) bids were awarded in this category.[250] 18MW of electricity was allocated to LFG-to-energy projects after the third round of bidding.[251] In total, 3916MW of electricity has been allocated to renewable energy projects that will supply energy into the local grid. This amount consists mostly of wind- (1984MW) and solar power (1499MW). With regards to LFG-to-energy, 18MW of electricity allocated, was allocated to the "Johannesburg landfill gas-to-electricity" scheme, which is also a registered CDM project.[252] The winning

245 Section 34 (1)(c) of the Electricity Regulation Act.
246 Eberhard *et al* South Africa's IPP 4.
247 Eberhard *et al* South Africa's IPP 4.
248 Eberhard *et al* South Africa's IPP 13.
249 Eberhard *et al* South Africa's IPP 13.
250 Eberhard *et al* South Africa's IPP 13.
251 Montmasson-Clair and Ryan 2014 *JEFS* 510.
252 The project is described in paragraph 3.3.4 of this study.

bidders of the fourth round of the bidding process were announced on 16 April 2015, and 15MW was allocated to a landfill-gas project.[253]

The Johannesburg landfill gas-to-electricity project's successful bid to access the national grid demonstrates that the REIPPP could play an important part in the utilisation of CDM LFG-to-energy projects. Allowing grid access could make the project seem more feasible, thus making it much more attractive to potential investors. Renewable energy technologies are seen as clean, low-carbon options, and form part of government's climate change mitigation and green economy strategies.[254]

3.3.2 CDM setbacks

This part of the study aims to investigate why the CDM mechanism has not achieved better success locally, by looking at some of the setbacks it has received in South Africa. Two areas of concern are identified, namely the Eskom monopoly of the energy market in South Africa, and the country's lack of development with regards to alternative forms of energy.

3.3.2.1 The Eskom monopoly

Electricity generation in South Africa is dominated by the state-owned utility, Eskom, which supplies approximately 95 per cent of the country's electricity.[255] It is estimated that 93 per cent of South Africa's electricity is generated from coal-fired power stations and five per cent from nuclear power.[256] The large quantity of cheap fossil fuels (in the form of coal) in South Africa allows Eskom to charge lower prices than suppliers in other countries, thereby making coal a more popular source than renewable energy sources such as landfill gas-to-energy.[257] Eskom owns the bulk of the

253 Willis 2015 http://bit.ly/1PopMJr.
254 Montmasson-Clair and Ryan 2014 *JEFS* 507.
255 DE 2015 http://bit.ly/1RP4QZQ.
256 Msimanga and Sebitosi 2014 *Renewable Energy* 421.
257 South Africa is one of the four cheapest electricity producers in the world. DE 2015 http://bit.ly/1RP4QZQ.

electricity market due to the country's supply-oriented energy policy and Eskom's self-financing capacity.[258] Because of the country's dependence on fossil fuels, Eskom continues to make sound financial gains and the electricity supplier made a net-profit of R13.2 billion in 2012 mostly on the basis of income from residential users.[259] What this means is that South Africa is heavily dependent on one utility to supply its energy. This utility still makes use mostly of fossil fuels, especially coal. Although Eskom has initiated renewable energy projects in the past,[260] it continues to develop and construct power stations that make use of coal.[261]

CDM LFG-to-energy projects might not be directly linked to Eskom and the supply of energy, but these projects serve as an examples of alternatives to fossil fuels such as coal. The country currently depends on Eskom for the bulk of its energy needs, and Eskom should be doing more to incorporate renewable energy into the national grid. CDM projects could potentially be more successful if South Africa were not so heavily dependent on one supplier of electricity, but rather had a network of independent electricity suppliers

This stranglehold that Eskom possesses may be exacerbated with the news that the government has decided to abandon the *Independent System Market Operator* (ISMO) Bill.[262] The ISMO Bill aimed to restructure the electricity sector by establishing a state company that would buy electricity from private and public producers and then sell it at wholesale prices.[263] For example, a private company could establish a CDM waste-to-energy project and then sell the electricity to the company created by the ISMO Bill. This

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258 Kim *Sustainable Development and the CDM: A SA case study* 4.
259 Greenpeace *The Eskom Factor* 14.
260 For example, see the Sere wind-farm project in the Western Cape, which was completed in January 2015 and is running at a capacity of 100 MW. Eskom 2015 http://bit.ly/1fWvvH5.
261 This is evident with the construction of two giant new coal-fired power stations in Limpopo (Medupi) and Mpumalanga (Kusile).
262 Paton 2015 http://bit.ly/1zIazLg.
263 Paton 2015 http://bit.ly/1zIazLg.

would also have helped to overcome the current monopoly held by Eskom over the energy sector. Some writers are concerned that the scrapping of the ISMO Bill continues to make it difficult for independent power producers to enter the energy market and that the lack of legislation like the ISMO Bill ensures that competition cannot take place between the state and privately-owned producers.[264]

CDM LFG-to-energy projects need investment in order to function successfully. Investment can be made attractive only if the host country welcomes alternative forms of energy. As already suggested,[265] South Africa has short-, medium-, and long-term plans and policies that welcome the introduction and better implementation of energy projects that are sustainable, climate-friendly, and that lead to a low-carbon economy. One then needs to ask if the implementation of these policies have been successful to the point that for example CDM LFG-to-energy would be welcomed into the energy market. In 2010 renewable energy contributed less than one per cent of all the energy in South Africa.[266]

De Jong *et al* identify the challenges to renewable energy in South Africa and described them in four categories: political, economic, social and technological.[267] De Jong *et al* argues that current policies in South Africa are not doing enough to "unwed the country from its coal dependency." It is also argued that South Africa does not have financial incentives that promote low-carbon electricity as is the case in other countries.[268] With regards to LFG-to-energy, government has committed itself to being more carbon-friendly, yet the waste sector is not being influenced much by climate policy at this stage. This might demotivate municipalities from considering the establishment of LFG-to-energy projects.

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264 Paton 2015 http://bit.ly/1zIazLg.
265 See paragraph 3.3.1.2 of this study.
266 De Jongh *et al* 2014 *JESA* 15.
267 De Jongh *et al* 2014 *JESA* 16.
268 De Jongh *et al* 2014 *JESA* 16.

3.3.2.2 Several sets of applicable regulations

The approval system for a CDM LFG-to-energy project can be a lengthy and costly process.[269] In short, the approval process includes the completion of a PDD, the proposal of a new baseline, the use of an approved methodology, validation followed by registration of the project activity, and then certification of the activity, all of which takes place before the issuance of CERs. The approval process is a whole project cycle on its own. CDM projects in South Africa have in effect two project life cycles to complete, the second being compliance with the applicable environmental law.

A typical CDM LFG-to-energy project would, for example, require environmental authorisations if it triggers certain activities in terms of NEMA.[270] Because it deals with waste management, it has to comply with NEM:WA and needs to obtain the appropriate waste licencing. There are also Norms and Standards that need to be adhered to in terms of waste regulation.[271] Chapter four of this study further discusses the different types of local legislation that could apply to CDM projects locally. The problem identified here is that CDM projects have to go through countless numbers of documents, registrations, applications, approvals and regulations. Owners of CDM projects would have to involve both local (environmental law) and international (CMD) experts. The long, costly and possibly uncertain process could be demotivating to international investors.

3.4 Landfill gas-to-energy in South Africa

The following part of the study focuses on how CDM LFG-to-energy projects have started to take shape in South Africa. Firstly, however, one must look at the important role that landfilling still plays in the country, indicating that there are potential and opportunities to invest in LFG-to-energy plants at these

269 See paragraph 2.3.3 of this study.
270 GN 983 - 985 in GG 38282 December 2014.
271 See chapter 4 of this study.

sites. When analysing the landfill situation in South Africa, one realises that it there are causes for concern, as it is a form of waste management that faces various challenges that will also be discussed below.

3.4.1 South Africa's dependence on landfilling

Chapter one of this study emphasised the important role that landfilling plays in South Africa. Although the NWMS implements a waste hierarchy that requires that the disposal of waste should be the last option to be implemented when managing waste, landfill sites still play a prominent role in South Africa today.[272] Despite being the most familiar waste management option in South Africa, landfilling and waste management as a whole face various challenges, including a shortage of accurate data as well as ailing waste infrastructure. Statistics in 2011 showed that there were 1203 landfill sites[273] in the country, of which 43.6 per cent had been issued with a licence in accordance with legislation.[274] It is questionable whether the remaining percentage of unpermitted landfill sites are maintained or operated in accordance with the Minimum Requirements for Waste Disposal by Landfill.[275] 90 per cent of waste was sent to landfill in 2011,[276] thus making it safe to conclude that South Africa is heavily reliant on landfill as a waste management option.

One must keep in mind that obtaining accurate and up-to-date waste data is complicated by the fact that few municipalities have adequate and accurate waste data collections in place.[277] In 2006 it was estimated that there were

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272 See chapter 1 of this study for waste statistics in South Africa.
273 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" 11, estimates the number of waste handling facilities in 2015 to be more than 2000, with a significant portion of these facilities being unpermitted. (Unpublished; on file with author).
274 Friedrich *Waste Management* 1015.
275 Issued by the Department of Water Affairs & Forestry in 1998, the document outlines the procedures, actions and information that may be required from an applicant when applying for a landfill permit.
276 See paragraph 3.4.1 of this study.
277 CSIR *Municipal Waste Management* 45.

15 000 unrecorded and unregulated dumping sites.[278] In 2008 it was found that only 68.9 per cent of municipalities collected waste data, thus making it difficult to find an accurate summary of overall municipal waste data.[279] The lack of accurate information on waste management makes it even harder to make accurate calculations about the amount of waste that is generated and the amount of methane that is released into the atmosphere.[280] The lack of landfill statistics is one of many challenges facing the country with regards to the efficient management of waste. Waste management as a whole in South Africa also suffers from under-pricing as well as declining waste infrastructure and a lack of capital investment and maintenance.[281]

3.4.2 LFG-to-energy as a form of waste management

Despite their popularity in South Africa, landfills are not sustainable,[282] and it is argued that many municipalities do not have the financial capacity or available land to build new landfill sites.[283] Another problem associated with landfilling is the amount of methane that is released into the atmosphere. The methane content found in landfill gas is said to be 21 times more potent than carbon dioxide as a greenhouse gas.[284] The waste management sector contributes about three per cent of global emissions and two per cent of South African emissions.[285] Landfilling is the largest contributor of GHGs in the waste management sector, followed by composting and then the

278 DEA *State of the Environment 2006* 35.
279 Friedrich *Waste Management* 1015.
280 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author) argues that there is limited understanding of the main waste flows because the submission of data by municipalities and landfill owners is not obligatory and the data that is submitted is sometimes found to be unreliable and contradictory.
281 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).
282 Hope 2015 http://bit.ly/1GLDpdy.
283 Purser and Cohen 2014 *JSWTM* 291.
284 Jewaskiewitz 2010 *Civil Engineering* 19.
285 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).

incineration of waste.[286] Landfilling could also have an adverse impact on the environment, and it is described as environmentally regressive, a disastrous management of natural resources and even socially unacceptable.[287] It causes groundwater pollution, and foul-smelling air pollution, amongst other undesirable things.

The fact that South Africa aims to move away from landfill as a waste management option suggests that it needs to be replaced by environmentally friendly solutions such as incineration and recycling.[288] Development, however, has been slow, and in 2012 it was found that of the permitted landfill sites,[289] five were sites with LFG collection and flaring and only three collected and generated electricity from LFG.[290]

The NWMS has set a target of 25 per cent recyclables diverted from landfill sites for re-use, recycling or recovery by 2016.[291] A country such as South Africa, heavily reliant on coal, is in need of a waste management process that can add relief to fossil fuel use, contribute positively to GHG emission reductions, and achieve the goals of the NWMS, a process for example, such as the CDM LFG-to-energy projects that will be discussed below.[292]

3.4.3 Examples of CDM LFG-to-energy projects in South Africa

The following section briefly discusses some of the CDM LFG-to-energy projects that have already been established in South Africa. All of these projects are situated in areas that fall in the jurisdiction of large municipalities. They have already been registered by the CDM Executive Board and most of them are currently operational.

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286 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).
287 Buckingham and Theobald *Waste Minimisation Strategies* 140.
288 DEA *Municipal Solid Waste Tariff Strategy 2012* 6.
289 See paragraph 3.4.1 of this study.
290 Friedrich *Waste Management* 1016.
291 DEA *NWMS* 6.
292 Friedrich *Waste Management* 1014.

The discussion below gives a brief description of each landfill site focussing also on the two necessary requirements needed for successful CDM registration, namely sustainability and additionality.[293]

3.4.3.1 Durban Landfill-Gas – Bisasar Road

Durban is home to three landfill sites that are equipped with LFG-to-energy plants. The eThekwini Bisasar Road landfill, the largest of the three, was opened for operation in 1980 and issued with a permit in 1996.[294] It was also the first landfill gas CDM project to be registered and verified in Africa in 2009,[295] and received a crediting period valid until 2016. The Bisasar site is based in Durban, seven kilometres from the central business district, and receives general municipal solid waste, garden refuse and construction waste.[296] The landfill site currently collects up to 2 500 tonnes of waste per day and will be operational until at least 2020. The Bisasar site collects waste and recovers the methane gas to produce electricity, and is run by the eThekwini Municipality. This electricity is then fed into the municipal grid and replaces electricity that the municipality is currently buying from other suppliers.[297] The landfill site is located close to a residential area and the project, therefore, aims to contribute to sustainable development by improving the air quality of surrounding areas by reducing the amount of LFG that is released into the atmosphere.[298] By displacing electricity from the grid, the project reduces emissions related to coal-fired power production.[299]

293 See paragraph 2.3.1 of this study.
294 eThekwini Municipality *Project Summary Document: Durban LFG to electricity* 2.
295 Rooth and Trois *RSER* 392.
296 Rooth and Trois *RSER* 393.
297 UNFCCC 2015 https://cdm.unfccc.int/Projects/DB/TUEV-SUED1214927681.45.
298 PDD of the Durban Landfill-Gas Bisasar Road 3. View the PDD at http://bit.ly/1VBqlQS.
299 PDD of the Durban Landfill-Gas Bisasar Road 3. View the PDD at http://bit.ly/1VBqlQS.

The PDD of the project states that it qualifies as additional because it upgrades the current methane recovery system.[300] The PDD further states that in the absence of the project, less than one per cent of the gas produced at the landfill would be collected and flared, and that LFG-to-energy cannot be created in the absence of the CDM project.[301] This is because energy generation by the project is more costly that the continued purchase of electricity from Eskom.

3.4.3.2 Durban Landfill-Gas-to electricity project – Marianhill and La Mercy Landfills

The Marianhill and La Mercy (closed in 2006) landfill sites are also based just outside Durban and were established in 1997 and 1980 respectively. The Marianhill site receives 550 to 850 tonnes of waste per day and is expected to be operational until 2022.[302] The project is made possible through carbon finance with several countries worldwide contributing through investment, including the Netherlands, Finland, Germany, Japan and France.[303]

All three landfill sites involved activities listed in the Regulations of NEMA and had to undergo an Environmental Impact Assessment (EIA).[304] A combined EIA was conducted for all three sites, and separate applications were done for environmental authorisation for each location.[305]

The project was registered in 2006, is currently operational, and was already issued with CERs back in 2013.[306]

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300 PDD of the Durban Landfill-Gas Bisasar Road 11. View the PDD at http://bit.ly/1VBqlQS.
301 PDD of the Durban Landfill-Gas Bisasar Road 11. View the PDD at http://bit.ly/1VBqlQS.
302 UNFCCC 2015 http://bit.ly/1Fn37EP.
303 PDD of Durban Landfill-Gas-to electricity project 1. View the PDD at http://bit.ly/1Og3N3N.
304 Detailed information on the EIA process can be viewed on the PDD and can be accessed at http://bit.ly/1FcwXjj.
305 UNFCCC 2015 http://bit.ly/1XouKIy.
306 South African CDM Portfolio 2014. View the document at http://bit.ly/1vFpVPx.

3.4.3.3 The Ekurhuleni Landfill Gas Recovery Project

The Ekurhuleni Municipality initiated LFG-to-energy projects at four of its landfill sites, registered in October 2010. Weltevreden, Rietfontein, Rooikraal and Simmer & Jack produce more than 4000 tonnes of waste per day and could supply a minimum of 4 MW electricity or 2800 homes between the four landfills, whilst reducing 34 8678 tonnes of CO_2.[307]

According to the PDD submitted by the developers of the project, the project will result in foreign investment through the sale of CERs and will generate jobs locally.[308] The PDD further claims that the project will result in reduced air pollution, reduced air nuisances and improved health and safety for workers.[309] These reasons are given to substantiate the project's sustainability claims.

The PDD claims that the project is additional because it would lead to very high costs, making it financially unviable if it is not registered as a CDM project activity.[310] No regulations or legislation requires the municipality to recover energy from waste, which is another element of additionality that the PDD tries to prove. It is also very unlikely that legislation requiring LFG to be captured will be passed during the term of the project, as it is not yet common practice in South Africa to capture LFG at landfills.[311]

3.4.3.4 The Nelson Mandela Bay Metropolitan's (NMBM) Landfill Gas Project

The project consists of two landfill sites, Arlington and Koedoeskloof, and was registered by the CDM Executive Board on 24 May 2012.[312] It involves

307 UNFCCC 2015 http://bit.ly/1KuVQtW.
308 PDD of The Ekurhuleni Landfill gas Recovery Project 2. View the PDD at http://bit.ly/1NenUCv.
309 PDD of The Ekurhuleni Landfill gas Recovery Project 2. View the PDD at http://bit.ly/1NenUCv.
310 PDD of The Ekurhuleni Landfill gas Recovery Project 15. View the PDD at http://bit.ly/1NenUCv.
311 PDD of The Ekurhuleni Landfill gas Recovery Project 18. View the PDD at http://bit.ly/1NenUCv.
312 DE *South African CDM Portfolio* 2014. View the document at http://bit.ly/1vFpVPx.

the use of waste and LFG to generate electricity with a generation capacity of 9MW.[313] As in the case with Johannesburg,[314] the project is run by a private company called ETA Energy.[315] Arlington is the largest landfill site in the NMBM and the two landfill sites are expected to produce LFG for at least 20 to 25 years after closure.[316]

The PDD claims that the project will develop in a sustainable manner because waste is used to generate energy and all development will comply with the IWMP.

Regarding aditionality, as is the case with the other projects identified in this study, one of the main arguments is that the projects are additional because no law or regulation obliges the landfill site to have LFG collected or converted into energy.[317] It is also stated that the project can continue without the financial support obtained through the CDM.[318]

3.4.3.5 Enviroserv Chloorkop Landfill Gas Recovery Project

The Enviroserv Chloorkop landfill site is located in Gauteng and falls under the Ekurhuleni Municipality. The project was registered in April 2007 and is funded by Japan.[319] The site, which is privately owned, receives 1700 tonnes of waste per day. The operational agreement of the project is finalised and CERs have been issued since late 2008.[320]

The project claims that it will contribute to sustainable development by attracting foreign investment, generating jobs and reducing pollution.[321] The

313 DE *South African CDM Portfolio* 2014. View the document at http://bit.ly/1vFpVPx.
314 See paragraph 3.4.4.4 of this study.
315 PDD of the NMBM Landfill Gas Project 2. View the PDD at http://bit.ly/1ilieJS.
316 PDD of the NMBM Landfill Gas Project 2. View the PDD at http://bit.ly/1ilieJS.
317 PDD of the NMBM Landfill Gas Project 15. View the PDD at http://bit.ly/1ilieJS.
318 PDD of the NMBM Landfill Gas Project 17. View the PDD at http://bit.ly/1ilieJS.
319 UNFCCC 2015 https://cdm.unfccc.int/Projects/DB/DNV-CUK1171370021.04/view.
320 DE *South African CDM Portfolio* 2015. View the document at http://bit.ly/1Jtg2pn
321 PDD of the NMBM Landfill Gas Project 3. View the PDD at http://bit.ly/1ilieJS.

reduction in pollution will lead to less GHG emissions a diminution of odour nuisances and an improvement in local air quality.[322]

The project developers state that the project is additional because no local legislation exists forcing landfills to capture and convert LFG to energy. Whether this qualifies as “additional” could be open for debate, because most of the other projects discussed in this chapter prove additionality by stating that it is not required by South African law for landfills to capture LFG, and thus the projects are out of the ordinary.

3.4.3.6 The Joburg Landfill Gas to Energy Project

The Joburg Landfill Gas to Energy Project consists of five sites: Marie Louise, Robinson Deep, Linbro Park, Goudkoppies and Ennerdale. The project involves the installation of flaring systems and electricity generation from the landfill sites. Electricity generation has not yet started, but 18MW has been allocated to Ener-G systems (the developer of the project)[323] through the REIPPP to transfer electricity into the national grid. What makes this project unique is the fact that unlike other projects, this project involves a private company and not the local municipality.

The project aims to contribute to sustainable development in South Africa by capturing and destroying LFG resulting in a reduction of CO_2 emissions. Once this is done, the captured LFG will be fed to electricity generation plants that will lead to the displacement of coal-based electricity from the national grid.

The contents of the project PDD[324] contents imply that the project is additional because there is no mandatory requirement in South African legislation that every landfill site must actively capture, flare or destroy LFG.

322 PDD of the NMBM Landfill Gas Project 3. View the PDD at http://bit.ly/1ilieJS.
323 *Ener-G Systems* is an international company specialising in landfill gas extraction. See http://www.energ-group.com.
324 PDD of The Joburg Landfill Gas to Energy Project 13. View the PDD at http://bit.ly/1EEeKvV.

The prevailing system at South African landfill sites is venting the LFG to ensure that the concentration of methane stays below hazardous levels, or no to install any capturing system.[325] For the power plants to be connected to the grid, the plant has to be licensed by NERSA in accordance with electricity legislation.[326] This will be described in detail in chapter 4 of this study.

3.5 Waste-to-energy projects functioning without the CDM

Many of the excising LFG-to-energy projects in South Africa would find it very difficult to operate were it not for the financial injection provided by the CDM.[327] This is because the CDM plays an important role by allowing developed countries to supply the needed funding to sustain renewable energy projects. The Kyoto Protocol will however only continue until 2020 which therefore leaves an uncertain future for the CDM and its LFG-to-energy projects post-2020. Although the question concerning post-2020 funding does not have a short answer and it deserves a in depth study of its own, this particular study (with the focus not being on 2020 and beyond) will only briefly discuss and suggest one source of funding that can be used if CDM investment is no longer an option. One option could be to make use of the funds provided by a Green Fund which has been established by the DEA. The Green Fund is a national fund aimed at supporting South Africa's transition towards a green economy by facilitating investment in green initiatives.[328] The Developmental Bank of Southern Africa has been appointed as the implementing agent for the Green Fund under the auspices of the DEA and the National Treasury. The Fund will only support initiatives which would not have been implemented without its support and the project must prove that there is a funding gap.[329] The Fund also requires that projects be additional, as is the current requirement of projects to be

325 PDD of The Joburg Landfill Gas to Energy Project 13. View the PDD at http://bit.ly/1EEeKvV.
326 Clause 8(I)(a)The Electricity Regulation Act 2006.
327 See 3.4.3. of this study.
328 DEA 2015 http://bit.ly/1TDPDiV.
329 DEA 2015 http://bit.ly/1TDPDiV.

registered in terms of the CDM.[330] The Green Fund is likely to assist LFG-to-energy projects if the projects contribute to key focus areas of the Fund such as energy efficiency and renewable energy. Potential applicants and investees of the Green Fund are drawn from both the private sector as well as the public sector. Public sector applicant can include municipalities that are currently operating landfill sites or LFG-to-energy projects**.**[331]

Although the Green Fund could provide the needed funding to operate LFG-to-energy projects, the absence of developed countries' investment could leave a gap with regards to technology transfer and the needed expertise could fall short. However the end of the CDM does not necessarily mean that developed countries will not be available to assist countries like South Africa in developing with technology transfer and the needed expertise. When considering post-2020 options, it is thus important to establish where assistance is to come from both in terms of funding, the exchange of expert know-how and the needed technology.

3.6 Concluding remarks

Whilst chapter 2 of this study discussed the overall process regarding CDM-project establishment, chapter 3 has focused on the creation of the DNA in South Africa and its requirements. The establishment of a local DNA is a requirement in terms of the formal rules of the CDM. Government has, therefore, released regulations establishing the local DNA within the Department of Energy with the task of assessing local CDM projects.[332]

This chapter has also briefly discussed the local approval process done by the DNA. What becomes apparent here is that CDM projects established in South Africa require approval from within the Department of Energy. CDM

330 See 3.4.3 of this study.
331 DEA 2015 http://bit.ly/1TDPDiV.
332 DE 2015 http://bit.ly/1tboCpj.

projects such as LFG-to-energy have an impact on the environment which means that the project requires authorisations *inter alia from* the DEA as well.

This brings us to one of the setbacks of the CDM in South Africa. As discussed in this chapter, CDM projects need to undergo various approval processes before they can be registered and be fully operational. This is a lengthy procedure and therefore also costly. As will be discussed in chapter 4 of this study, the approval process gets longer once various environmental authorisations need to be done in terms for example of NEMA and NEM:WA. Another setback is the fact that South Africa is heavily reliant on coal and on Eskom, a state-owned entity that controls almost all of the energy market. CDM projects are renewable energy suppliers that will need ways to access the national grid in a cost-effective manner.

One of the possible options for successfully accessing the grid is the REIPPP, which has allocated 18MW of electricity to the Johannesburg landfill gas-to-electricity project. One of the goals of LFG-to-energy is to supply electricity, and in a country that has a shortage of power, it becomes more important that CDM LFG-to-energy reap the benefits of projects like REIPPP. Once again this requires a bidding process that also leads to an additional application and approval process that needs to be gone through by the project developers. The proliferation of these application and approval processes could demotivate international investment in CDM projects.

However, the fact that South Africa has an abundance of natural resources and a need for a renewable energy market could make it easier to motivate investors to get involved in local CDM projects.

This chapter has also briefly looked at CDM LFG-to-energy projects that are currently operational in South Africa. The projects are hosted by large municipalities only, with the Durban Landfill-Gas project being the oldest and largest project. The implementation feedback of these projects illustrates that CDM LFG-to-energy projects can be successful in South Africa despite what

can be described as a very long and costly bureaucratic procedure.

4 The waste law and local government law and policy framework applicable to CDM LFG-to-energy projects

4.1 Introduction

This chapter specifically investigates by way of desktop research the extent to which domestic waste law and policy regulate LFG-to-energy CDM projects in local government in South Africa. This is done through an overview of the legislation and policy directly and indirectly applicable to CDM LFG-to-energy projects in South Africa.

The chapter focuses on the constitutional obligations placed on government in relation to environmental management as well as the international commitments placed on the legislature; for example, commitments in terms of the Kyoto Protocol. An overview is provided of the principles that lay the foundation of the environmental law framework applicable to CDM LFG-to-energy projects in South Africa. These principles are found mainly in NEMA, with their origins to some degree being found in international environmental law. Other relevant principles such as the "duty of care" principle are also found in NEM:WA. The focus of this chapter then moves on to the project life cycle of a CDM LFG-to-energy project. Attention is paid to the legislation and policies applicable to the life cycle of CDM projects, but more specifically LFG-to-energy projects. The chapter concludes by taking a view on whether South Africa possesses adequate legislation and policy provisions to successfully and responsibly implement CDM LFG-to-energy projects.

4.2. The constitutional context

The Constitution in itself does not directly regulate CDM projects or waste management, but it provides the context within which the regulation and approval of CDM projects should take place. This is done in two ways; firstly by establishing an environmental right and secondly by regulating South Africa's obligations in terms of international agreements such as the Kyoto Protocol.

4.2.1 Establishment of the environmental right

Section 24 of the Constitution serves as the cornerstone of environmental law in South Africa as it gives every citizen a fundamental right to an environment that is not harmful to their health or well-being.[333] Government is obliged in terms of section 24(b) to develop "reasonable legislative and other measures" that protect the environment for the benefit of present and future generations.[334] This has resulted in an extensive law and policy framework that influences, *inter alia,* development and initiatives such as CDM LFG-to-energy projects. The sources of this framework include *inter alia* legislation such as NEMA, NEM:WA and legal requirements such as the National Standards for the Extraction, Flaring or Recovery of Landfill Gas.[335]

As said on several occasions in this study, one of the key requirements for the international acceptance of CDM projects is that they should contribute to sustainable development. The Constitution calls for the pursuit of ecological sustainable development. The Constitution also provides that everyone has the right to have the environment protected for the benefit of future and current generations.[336] This must be done through "reasonable legislative and other measures" that prevent pollution[337] and promote conservation.[338] Development should take place while promoting justifiable and social development.[339] Section 24 thus lays the foundation on which the rest of South African environmental legislation is built, and therefore also conceptually determines the way in which CDM LFG-to-energy projects should be regulated.

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333 Section 24(a) of the Constitution.
334 Section 24(b) of the Constitution.
335 GNR 924 in GG 37086 of 3 August 2004.
336 Section 24(b) of the Constitution.
337 Section 24(b)(i) of the Constitution.
338 Section 24(b)(ii) of the Constitution.
339 Section 24(b)(iii) of the Constitution.

4.2.2 Local government's constitutional obligation toward waste management

Along with an environmental right, the Constitution also assigns legislative competence to the national and provincial government with respect to the environment, including pollution control.[340] The Constitution establishes national legislative and exclusive competence;[341] provincial legislative and exclusive competence[342] and local authority competence. Municipalities may, for example, make and administer by-laws with regards to matters listed under part B of schedules 4 and 5 of the Constitution. In accordance with the Constitution, it is the responsibility of municipalities to provide refuse removal, refuse dumps and solid waste disposal facilities.[343] What this means is that CDM LFG-to-energy projects (such as waste management facilities) fall within the area of responsibility of local government. Municipalities must further assist their national and provincial counterparts in managing waste based on an inclusive reading of sections 7(2), 24 and 152(1)(b) and (d) of the Constitution.[344] To the extent that the establishment of waste disposal facilities is the constitutionally stated responsibility of local government, a CDM LFG-to-energy project a) will be established with the assistance of the municipalities and b) must comply with the relevant municipal by-laws. As discussed earlier in the study, many CDM LFG-to-energy projects in South Africa are established and hosted by large

340 Section 146 of the Constitution.
341 National parliament may pass legislation on any matter, including a matter listed under schedule 4 of the Constitution.
342 Provincial legislatures may pass legislation on matters listed under schedule 4 and 5 of the Constitution.
343 Part B of Schedule 5 of the Constitution.
344 This requires local government to ensure the delivery of services to communities in a sustainable manner and to promote a safe and healthy environment.

municipalities[345] including the City of Johannesburg Municipality,[346] the Ekurhuleni Municipality[347] and eThekwini Municipality.[348]

4.2.3 International agreements in South Africa

South Africa has made various commitments toward international agreements, including the UNFCCC and the Kyoto Protocol.[349] Once so decided by the National Assembly and National Council of Provinces, the country is bound by an international agreement.[350] An international agreement becomes law when it is enacted into national legislation.[351] This suggests that the Constitution creates the necessary space for the inclusion of international law obligations in South African law.

Section 24 emphasises ecologically sustainable development and natural resource protection and therefore creates the constitutional space for mitigation instruments such as the CDM. The duty to enact international obligations and the division of waste related functions among the three spheres of government further forms part of the way in which the Constitution applies to CDM projects.

4.3 Founding legal principles

South Africa possesses three mechanisms in law that provide protection to the environment. The first, as already pointed out, is the overarching constitutional environmental right.[352] The second and third mechanisms are environmental framework legislation and specific environmental legislation.[353] NEMA is South Africa's environmental framework legislation that gives effect

345 *South African CDM Projects Portfolio* 19 March 2015, viewed at http://bit.ly/1Jtg2pn.
346 See paragraph 3.4.5.6 of this study.
347 See paragraph 3.4.5.3 of this study.
348 See paragraph 3.4.5.2 of this study.
349 See chapter 2 of this study.
350 Section 231(2) of the Constitution.
351 Section 231(4) of the Constitution.
352 Van der Linde "National Environmental Management Act 107 of 1998" 193 – 221.
353 For example NEM:WA.

to section 24 of the Constitution, and was developed to provide co-operative environmental governance and integrated environmental management by establishing a general framework for decision-making affecting the environment.[354]

Before the discussion moves on to how the said legislation directly influences CDM LFG-to-energy projects, this study first looks at the legal principles that find application to potentially harmful developments such as CDM projects.

Section 2 of NEMA sets out the environmental management-principles which are considered to be central to environmental management in South Africa.[355] These principles are applicable throughout the Republic[356] and serve as the general framework within which environmental management and implementation plans must be formulated.[357] CDM LFG-to-energy projects will have an influence on the state of the environment and, therefore, the life cycle of these projects should be aligned with the principles found in section two of NEMA.

International law and South African environmental law offer a range of principles applicable to CDM. For our current purposes, focus is placed on the principle of sustainable development[358] due to its being a vital requirement of all CDM projects.[359] Other international law principles that feature in NEMA include *inter alia* the precautionary principle,[360] the "polluter pays" principle[361] and the principle of good governance.[362] These principles are not addressed in any detail in this study but are incidentally applicable.

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354 Humphris *South Africa's Law and Policy Framework for the Regulation of the CDM* 23.
355 Van der Linde "National Environmental Management Act 107 of 1998" 193 – 221.
356 Section 2(1) of NEMA.
357 Section 2(1)(b) of NEMA.
358 NEMA defines 'sustainable development' as "the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations."
359 See chapter 2 of this study.
360 Section 2(4)(b) of the Constitution.
361 Section 2(4)(p) of the Constitution.
362 Section 2(4)(f) and (k) of the Constitution.

Sustainable development is an internationally set requirement for CDM projects. Sustainable development is also listed as one of the principles found in chapter 2 of NEMA.[363] Developing in a sustainable manner requires that government and project developers consider all relevant factors in a development, including the avoidance[364] of the following: the disturbance of ecosystems,[365] pollution and degradation of the environment;[366] and any other negative impacts on the environment as well as on people's environmental rights.[367]

It should be borne in mind that "sustainable development" is not only a principle supported in NEMA and the Kyoto Protocol, but also a requirement of the DNA in South Africa.[368] CDM is a mechanism that was designed as a mitigation instrument to support sustainable development by minimising pollution and environmental degradation through the introduction of green- and energy-efficient technologies, such as LFG-to-energy projects.[369] CDM projects such as LFG-to-energy, therefore, cannot, to all intents and purposes, function lawfully if they it do not do so in a sustainable manner, in terms of both international rules (as stipulated by the UNFCCC)[370] and local environmental principles as determined by legislation such as NEMA.

Other principles found in both the UNFCCC and NEMA are the precautionary principle[371] and the duty to prevent and mitigate environmental damage.[372] The latter principle can be linked to section 28 of NEMA, which places a duty of care on any person who has caused significant damage to the environment. Every person that has caused or is likely to cause such

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363 Section 2(3) of NEMA.
364 In a case where environmental impacts cannot be avoided, they must be minimised and remedied.
365 Section 2(4)(a)(i) of NEMA.
366 Section 2(4)(a)(ii) of NEMA.
367 Section 2(4)(a)(vi) of NEMA.
368 See chapter 2 of this study.
369 Humphris *South Africa's Law and Policy Framework for the Regulation of the CDM* 24.
370 Article 3.1 of the UNFCCC.
371 Article 3.2 of the UNFCCC and section 2(4)(a)(vii) of NEMA.
372 Article 3.2 of the UNFCCC and section 2(4)(a)(i),(ii) and (vii) of NEMA.

degradation has the obligation to exercise a duty of care and thus is responsible for the remediation of any environmental damage that has been caused.[373] This includes taking reasonable steps to prevent pollution or environmental degradation from occurring or continuing; or if pollution cannot be reasonably avoided it should be minimised and rectified.[374] Reasonable steps, for example, might include investigating the impact that the project could have on the environment,[375] educating employers about the environmental risks of their work,[376] and ceasing or controlling any activity that poses an environmental risk.[377]

NEM:WA also makes provision for the duty of care in the waste management sector. Section 16 of NEM:WA establishes a general duty of care which is applicable to all waste treatment facilities.[378] In accordance with NEM:WA, any holder of waste (in this case the CDM LFG-to-energy project owner) is obliged to take reasonable measures to avoid toxicity in the waste accumulated, for example.[379] Reasonable steps must also be taken to reduce, re-use, recycle and recover waste.[380] Section 16 thus requires any handler of waste to take reasonable steps to deal with waste in accordance with the steps of the waste management hierarchy.[381] A duty of care is applicable if the establishment of a CDM LFG-to-energy project may potentially lead to the pollution of a water resource. Section 19 of the *National Water Act* (NWA)[382] places a duty of care on the project owners by

373 Section 28 of NEMA.
374 Section 28(1) of NEMA.
375 Section 28(3)(a) of NEMA.
376 Section 28(3)(b) of NEMA.
377 Section 28(3)(c) of NEMA.
378 Section 1 of NEM:WA defines a "waste treatment facility" as any site that is used to accumulate waste for the purpose of storage, recovery, treatment, reprocessing, recycling or sorting of that waste.
379 Section 16(1)(a) of NEM:WA.
380 Section 16(1)(b) of NEM:WA.
381 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).
382 National Water Act 36 of 1998.

stating that they must take reasonable measures to prevent any such pollution from occurring, continuing or recurring.[383]

Local government by-laws on waste management should also be adhered to when conducting a waste management activity. For example, the City of Johannesburg requires that a duty of care be exercised when the recovery of waste is taking place.[384] Waste treatment facilities are required to ensure that the treatment of the waste is less harmful to the environment than the disposal of such waste.[385]

CDM projects aim to mitigate climate change and have the goal *inter alia* of leaving a positive influence on the environment.[386] The environmental right established in the Constitution has led to the enactment of several different forms of legislation that aim at protecting each person's environmental right. Environmental laws such as NEM:WA provide the background for the development of CDM projects such as LFG-to-energy projects in a direct and indirect manner.

4.4. The waste legislation framework applicable to CDM LFG-to-energy projects

This part of the chapter focuses on the legislation that regulates CDM LFG-to-energy projects by means of the principles already discussed and additional regulatory provisions.

4.4.1 NEMA

Environmental authorisations are an important instrument used to give effect to the objectives of South African environmental law and the principles found

383 Section 19(1) of the NWA.
384 Section 20 of Waste Management By-Laws published in Provincial Gazette Extraordinary 216 of July 2013.
385 Section 20(2) of Waste Management By-Laws published in Provincial Gazette Extraordinary 216 of July 2013.
386 See chapter 2 of this study.

in section 2 of NEMA.[387] The Minister of Environmental Affairs has listed activities that require environmental authorisation depending on the type of activity. The new set of EIA Regulations came into effect on 8 December 2014.

Listing Notice number 983 contains a set of listed activities that may be triggered due to the nature of a specific LFG project and the associated infrastructure required to be established. Possible activities include:

- "The development of facilities for the generation of electricity from a renewable source." On condition that the electricity output is more than 10MW but less than 20MW or the output is 10MW or less but the total extent of the facility covers an area in excess of one hectare.[388] The largest CDM LFG-to-energy project in Africa, the eThekwini Bisasar Road landfill, generated 7MW of electricity in 2014.[389] Therefore one can conclude that it is unlikely that any CDM LFG-to-energy project in South Africa (at this stage) could produce more than 10MW and acquire an environmental authorisation in terms of the listed activity above;[390]

- The development of facilitates or infrastructure for the transmission and distribution of electricity. In this case, it would be inside an urban area (as most landfill sites for general waste are found here) with a

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387 Section 24 of NEMA determines that the potential consequences for or impacts on the environment of listed activities or specified activities must be considered, investigated and reported on to the relevant authority, except in respect of those activities that may commence without having to obtain an environmental authorisation in terms of NEMA.

388 Activity number one of GN 983 in GG 38282 December 2014. The same applies in activity number one of GN 984, only in this case the electricity output must be 20MW or more.

389 SACN *A Case for Municipal Solid Waste Management* 18.

390 This is also applicable to activity number 36 of GN 983, which refers to the expansion of facilities for the generation of electricity from a renewable resource. This is in a case where electricity output will be increased by 10MW or more; or the development footprint will be expanded by one hectare or more, which is unlikely when looking at the current stage of development of CDM LFG-to-energy projects in South Africa.

capacity of 275 kilovolts of more.[391] Activity number 47 lists the expansion of facilities or infrastructure for the transmission of electricity where the capacity will exceed 275 kilovolts and the development footprint will increase.[392] Keep in mind that this is the case if the LFG is used to generate electricity, because it may be used only for flaring or to burn waste etc. and

- The expansion or changes to existing facilities for any process or activity where such expansion or changes will result in the need for a permit or licence or amendment to a permit or licence in terms of legislation governing emissions or pollution.[393] This can be applicable to existing landfill sites that build new infrastructure to develop CDM LFG-to-energy projects. These activities are excluded, however, in cases where the activity is listed in terms of the list of waste management activities published in terms of section 19 of NEM:WA. As will be discussed later, CDM LFG-to-energy falls within this category and thus does not require an additional authorisation in terms of NEMA.[394]

Listing Notice number 984 contains the following activities that could be relevant to CDM LFG-waste-to-energy projects:[395]

- The development of facilities for any process or activity which requires a permit or licence in terms of provincial or national legislation governing the release of emissions or pollution.[396] However, the list

391 Activity number eleven of GN 983 in GG 38282 of 4 December 2014.
392 Activity number 47 of GN 983 in GG 38282 of 4 December 2014.
393 Activity number 34 of GN 983 in GG 38282 of 4 December 2014.
394 See category C of GN 921 in GG 37083 November 2013 which lists the "Recovery of landfill Gas" as an activity listed in terms of NEM:WA. Therefore, this activity does not fall within the description of activity number 34 in GN 983 in GG 38282 December 2014.
395 GN 984 in GG 38282 of 4 December 2014.
396 Activity number 6 of GN 984 in GG 38282 of 4 December 2014.

excludes activities which are listed in terms of section 19 of NEM:WA, which includes *inter alia* LFG-to-energy activities;[397]

- The commencing of an activity, which requires an atmospheric emissions licence in terms of section 21 of NEM:AQA. CDM LFG-to-energy could require an atmospheric emissions licence, depending on whether or not the facility is used to incinerate waste, for example.[398]

Listing notice number 985 contains requirements that can differ depending in which province the project is situated. The following activities could be relevant to CDM LFG-to-energy projects:[399]

- The development of a road wider than four metres with a reserve less than 13.5 metres;[400]

- The widening of a road by more than four metres, or by the lengthening of a road by more than one kilometre.[401]

The above-mentioned activities could be triggered in cases where the road is lengthened or widened for example to accommodate trucks that transport waste to and from the landfill site or is lengthened in order for it to reach the LFG plant. One should bear in mind that the listed activities found in listing notice number 985 are likely not to be triggered due to their mostly being applicable to special areas such as nature reserves and other areas where landfill sites are generally not found. These include *inter alia* protected areas identified in terms of the *National Environmental Management: Protected Areas Act* (NEM:PAA),[402] areas within ten kilometres of national parks or world heritage sites and areas zoned for use as public open space. In other words, these areas are likely to be considered sensitive and need to be

397 Category C of GN 921 in GG 37083 of 29 November 2013
398 See paragraph 4.5.3 of this study.
399 GN 985 in GG 38282 of 4 December 2014.
400 Activity number four of GN 985 in GG 38282 of 4 December 2014.
401 Activity number 18 of GN 985 in GG 38282 of 4 December 2014.
402 Act 57 of 2003.

protected by legislation. It is, therefore, unlikely that a landfill site and/or LFG-to-energy plant will be constructed in these areas due to its environmental sensitivity.

It is important that every CDM LFG-to-energy also adheres to local government law when applying for environmental authorisations. The City of Cape Town, for example, requires that any person who undertakes a recovery activity (which could be LFG-to-energy projects) obtain accreditation from the City,[403] supply written reports to the waste management officer[404] as well as conduct an environmental impact assessment, and draw up an integrated waste management plan in terms of national or provincial legislation.[405]

4.4.2 The National Environmental Management: Waste Act

Waste management activities are regulated by NEM:WA. The NEM:WA[406] or "Waste Act" was developed under the NEMA as a specific environmental management Act (SEMA). The purpose of the Act is, *inter alia,* to improve the regulation of waste in South Africa and to secure ecologically sustainable development while promoting economic and social development, in order to give effect to section 24 of the Constitution.[407] The Act also places minimum requirements on any person who undertakes an activity which produces waste or a person who handles waste which has already been produced.[408] The Act places a responsibility on the State to put in place various measures (through the different organs) to implement measures that reduce the production of waste, and to ensure that waste is re-used, recycled and recovered in an environmentally sound manner before it is treated and

403 Section 13 (3) of the City of Cape Town Municipality Integrated Waste Management By-Law 2009.
404 Section 13 (4) of the City of Cape Town Municipality Integrated Waste Management By-Law 2009.
405 Section 13 of the City of Cape Town Municipality Integrated Waste Management By-Law 2009.
406 Act 59 of 2008.
407 See paragraph 4.2.1 of this study.
408 DEA *Waste Act Made Easy* 8.

disposed of.[409] It is, therefore, important that any waste treatment facility, specifically in this case any CDM LFG-to-energy project, should achieve the objects of NEM:WA.

Chapter 2 of the Waste Act consists of two parts. Part One establishes the National Waste Management Strategy, which contains little direct reference to LFG-to-energy projects, as will be discussed below. Part Two of the Waste Act contains provisions on national and provincial norms and standards as well as waste service standards.

Section 9 of the Waste Act places a responsibility on municipalities to deliver and provide waste management services, including waste disposal services such as landfill, that do not conflict with section 7 or 8 of the Waste Act.[410] Municipalities also have the responsibility to adhere to national norms and standards,[411] and to integrate their waste management plans with their integrated development plans.[412] Municipalities are also given the powers to establish local standards regarding waste management in the form of by-laws.[413] This includes setting local standards for managing waste at waste disposal facilities (such as landfills)[414] and waste treatment facilities (such as LFG-to-energy projects).[415]

The next part of this chapter recaps the legislation and steps that are necessary for a LFG-to-energy site to operate legally. It is necessary for the purpose of this study to note that in the case of CDM LFG-to-energy projects, it is the landfill site that requires a licence. The LFG-plant requires no licence and is regulated only by the national standards which are discussed below.

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409 Section 3 of NEM:WA.
410 Section 9(1) of NEM:WA.
411 Section 2(a) of NEM:WA.
412 Section 2(b) of NEM:WA.
413 Section 9(3) of NEM:WA.
414 Section 9(3)(b) of NEM:WA.
415 Section 9(3)(c) of NEM:WA.

4.4.3 National Standards for the Extraction, Flaring or Recovery of Landfill Gas

The general duty of care is applicable to all waste activities including CDM LFG-to-energy projects. The nature of these projects provides that they could pose a greater environmental risk, and they therefore, they require a higher level of regulatory control. To date,[416] no legislation forces any landfill site in South Africa to capture harmful gases such as methane, and then convert it into electricity. This has led the DEA to release the National Standards for Extraction, Recovery or Flaring of Landfill Gas (the National Standards)[417] which have been published in terms of section 19(3)(a) of NEM:WA.[418] The National Standards regulate the extraction, flaring and recovery of landfill gas in order to prevent potential negative impacts on the environment,[419] as well as to encourage the implementation of landfill gas-to-energy projects.[420] The effect that the National Standards have on the establishment of CDM LFG-to-energy projects is important as it has resulted in projects of this type no longer requiring the EIA process in accordance with section 24 of NEMA, and waste management licences are no longer needed.[421]

4.4.4 National Policy on Thermal Treatment of General and Hazardous Waste

Government has accepted thermal waste treatment as an adequate waste management and energy recovery option in South Africa.[422] This was

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416 September 2015.
417 GN 924 in GG 37086 of 4 November 2013.
418 Section 19 deals with listed waste management activities. S19(1) states that a minister may publish a list of waste management activities that have, or are likely to have a detrimental effect on the environment. S19(3)(a) states that this notice must indicate whether or not a waste management licence is required to conduct the activity and if not, the requirements or standards that must be adhered to when conducting the waste management activity.
419 GN 924 in GG 37086 of 4 November 2013 2.
420 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).
421 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).
422 GN 777 in GG 32439 of 24 July 2009 6.

confirmed with the release of the National Policy on the Thermal Treatment of General and Hazardous Waste, which provides the framework within which thermal waste treatment technologies are to be implemented.[423] The policy is seen as a way to facilitate a move away from landfill and thus to fulfilling a part of the objective of the national waste hierarchy. Through this policy, government aim *inter alia* to integrate LFG-to-energy as a waste management option in South Africa that is in line with the waste management hierarchy and to move away from landfilling as the only waste disposal option.[424] Government also aims to promote waste management options that allow for the recovery of energy from waste in order to relieve pressure from non-renewable resources.[425] Another important objective is the promotion of the advancement of technology through the international transfer of technology and experience to South Africa.[426] This could include, for example, the Kyoto Protocol, and more specifically technology that is transferred by means of CDM projects. With this policy government would also like to demonstrate South Africa's commitment to reducing GHG emissions, making specific mention of methane generation from landfills and thus contributing to the country's meeting its international obligations in terms of the Stockholm[427] and Basel[428] Conventions.[429]

Government resolved to implement the policy *inter alia* by ensuring that procedures are put in place for the efficient and integrated consideration of environmental authorisations required for thermal waste treatment

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423 GN 777 in GG 32439 of 24 July 2009.
424 Section 4.1 of GN 777 in GG 32439 of 24 July 2009.
425 Section 4.4 of GN 777 in GG 32439 of 24 July 2009.
426 Section 4.8 of GN 777 in GG 32439 of 24 July 2009.
427 The Stockholm Convention on Persistent Organic Pollutants (POPs). The Convention aims to clean up excising stockpiles, dumps and POPs making use *inter alia* of incineration.
428 The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal 1989 aims at the reduction and minimisation of hazardous wastes, and the treatment and disposal thereof as close to their source as possible.
429 Section 4.8 and 4.10 of GN 777 in GG 32439 of 24 July 2009.

applications.[430] The DEA also planned on continuing to develop the necessary regulatory tools[431] relevant to thermal waste technologies. This led, for example, to the release of the Nationals Standards for the extraction, flaring or recovery of landfill gas. Schedule four of the National Policy on Thermal Treatment of General and Hazardous Waste sets out the minimum conditions applicable to LFG-to-energy plants with regards to environmental authorisation. The conditions are divided into the following categories: general, operational management, air quality management, waste management and monitoring and reporting.

4.5. The CDM LFG-to-energy project life cycle

4.5.1 The planning phase

The following part of the chapter will look at what needs to be done, in terms of NEM:WA, before a CDM LFG-to-energy project is initiated. As stated earlier in the chapter, the environmental responsibilities placed on government by the Constitution have led to the establishment of a regulatory hierarchy of control. The first field in the hierarchy is applicable to all waste management activities, including CDM LFG-to-energy projects.[432]

LFG-to-energy projects deal with waste management and, therefore, have to be properly licenced in accordance with South African waste legislation.[433] Most of the landfill sites that are developing waste-to-energy plants were already licenced a long time ago. This part of the chapter will recap the legislation and the steps that are necessary for a LFG-to-energy site to operate legally.

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430 Section 6.5 of GN 777 in GG 32439 of 24 July 2009. In terms of different legal requirements within its mandate, i.e. NEMA, NEM:WA or NEM:AQA.

431 For example legislation, norms, sector guidelines and authorisations.

432 Nel and Alberts “An Introduction to Environmental Management” in Fuggle and Rabie 2nd ed King N and Strydom H Juta.

433 Section 45(1) of NEM:WA states that a person who requires a waste management licence must apply for the licence by lodging an application with the licencing authority.

The Minister has published a list of waste management activities that have, or are likely to have, detrimental effect on the environment. The list was originally published in 2009[434] in terms of section 19(2) of NEM:WA. This list was repealed in 2013 and replaced with a new list.[435]

The list divides waste management into three categories:

- Any waste management activity listed under Category A must conduct a basic assessment process set out in the Environmental Impact Assessment Regulations made under section 24(5) of NEMA.[436] Category A lists *inter alia* the recycling and recovery of waste, and the treatment and disposal of waste;

- Category B of the listed activities requires that each person undertaking waste management activities must conduct a scoping and environmental impact report. These activities include *inter alia* the reuse and recovery of waste, the treatment of waste and the disposal of waste on land; and

- Any person wishing to commence or undertake an activity listed under Category C must comply with the relevant requirements or standards determined by the minister *inter alia* in the Standards for Extraction, Flaring or Recovery of Landfill Gas.[437] The waste management activities listed under Category C are the storage of waste and the recycling and recovery of waste. The last mentioned activity specifically lists "the extraction, recovery or flaring of landfill gas."

LFG-to-energy projects thus fall under Category C and require no Basic Assessment or full EIA or scoping report, as is the case with category A and B projects. The LFG-to-energy plant has to comply with the Standards listed

434 GN 718 in GG 32368 of 24 July 2009.
435 GN 921 in GG 37083 of 29 November 2013.
436 As part of a waste management licence application contemplated in section 45 of NEM:WA.
437 GN 924 in GG 37086 of 29 November 2013.

by the Minster only.[438] These Standards determine *inter alia* that (during the preparation and operational phase), a landfill site wanting to develop an LFG project must identify and list all of the environmental aspects of the project, as well as any negative influence that the project could have on the biological and socio-economic environments.[439] Another important requirement is that of an Environmental Management Plan (EMP) that addresses all the requirements of the national standards,[440] as well as a pollution prevention plan[441] in accordance with NEM:AQA.[442]

4.5.2 The construction phase

The national standards contain requirements for extraction systems, flaring systems and LFG-to-energy systems. In terms of LFG-to-energy systems, the national standards require *inter alia* that the electricity generating plant be fenced off, limitation of access to the plant must be limited and specified noise reduction standards must be met. Design specifications for the gas combustion and power generating systems are also listed in the national standards. The standards also include general construction requirements such as the supervision of a registered professional engineer, warning signage, onsite fuelling and requirements for dug up waste.

4.5.3 The operational phase

As is the case with the construction phase, the operational phase distinguishes between LFG extraction and flaring systems as well as LFG-to-energy plants. The operational requirements regarding LFG-to-energy plants list only six requirements. These include instructions that LFG should be

438 National Standards for the extraction, flaring or recovery of landfill gas.
439 GN 924 in GG 37086 of 29 November 2013 5(1)(a).
440 The objectives of an EMP would include to identify the possible environmental impacts of the proposed activity and to develop measures that minimise and mitigate these impacts. See DEA *Environmental Management Plans* 7.
441 A pollution prevention plan must include *inter alia:* a full description of the activity, details of the current methods used to monitor and measure GHGs and any plan to improve such measures, as well as descriptions of how and over what period GHGs will be reduced.
442 GN 171 in GG 37421 of 14 March 2014.

sealed off completely and flared during maintenance. Any liquid or solid waste must be handled and stored in a way that does not cause damage to the environment. Gas extracted from the landfill must be used to run the electricity generating engine or engines. These engines must be fitted with silencers and engine performance must be frequently monitored.[443]

General requirements must be in place to prevent risks prior to the commencement of the incineration activity. These include *inter alia* that an approved Environmental Authorisation is obtained in terms of section 24 of NEMA as well as all other national/provincial/local licences and permits, authorisations and permissions.[444] The project should also take place at a suitable location with adequate amounts of water and power supply. Other general requirements include having: qualified employees, adequate emergency and record keeping procedures, and stakeholder dialogues.

The LFG-to-energy requires a site-specific Operational and Environmental Management Plan. This plan should address *inter alia* the roles and responsibilities of persons involved in the project, health and safety procedures, maintenance programmes and record keeping procedures.[445]

The facility must be designed in such a way that it does not give rise to significant levels of ground-level air pollution. Other requirements regarding air-quality management found in GN 777 include having the appropriate measurement equipment and meeting the set standards. All measurement results must be recorded in a Quarterly Emissions Monitoring Report[446] to

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443 In the case of small boilers: GN 831 in GG 36973 of 1 November 2013 declares a small boiler as a controlled emitter in terms of section 23(1) of NEM:AQA, and also establishes emission standards for small boilers in terms of section 24 of NEM:AQA.

444 Section 11.2.1 of section 4.1 of GN 777 in GG 32439 of 24 July 2009.

445 Section 11.3 of GN 777 in GG 32439 of 24 July 2009.

446 The contents of the report are to include *inter alia* the daily results of monitoring parameters, emission measurements and evaluations of any forms of non-compliance in terms of the appropriate legislation.

enable the verification of compliance with permitted operating conditions and air emission standards.[447]

All waste management activities, specifically those related to the storage and handling of waste, must take place in accordance with the Department of Water Affairs' Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste.[448] This includes other applicable national standards for wastes and future guidelines, standards or legislation related to waste.[449] Specific criteria for waste storage areas are also listed, including *inter alia* storage vessels and procedures for the loading and offloading of waste. With regards to LFG-capture, suitable vapour filtration and capture equipment must be in place to minimise the impact on the surrounding environment.[450] The last section of the National Policy requires that quarterly audits be performed containing information on compliance with the environmental authorisation, air emission standards, and the waste types treated at the plant, amongst other issues, and a report on the state of the infrastructure used at the plant.[451]

This has also led to government's publishing a list of activities that result in atmospheric emissions[452] in terms of NEM:AQA.[453] The notice contains minimum emission standards that apply to both permanently operated plants and experimental plants with a design capacity equivalent to that of a listed activity.[454] It also contains details on compliance monitoring and reporting requirements.[455] Category eight of the notice applies to all facilities where

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447 Section 11.4.13 of GN 777 in GG 32439 of 24 July 2009.
448 2nd edition, 1998.
449 Section 11.5.1 of GN 777 in GG 32439 of 24 July 2009.
450 Section 11.5.2 of GN 777 in GG 32439 of 24 July 2009.
451 Section 11.6 of GN 777 in GG 32439 of 24 July 2009.
452 List of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage.
453 GG 964 in GN 35894 of 23 November 2012.
454 GG 964 in GN 35894 of 23 November 2012.
455 The Atmospheric Emission Licence holder is expected to submit an emission report to the National Air Quality Officer within a specified timeframe.

general and hazardous wastes are treated by the application of heat, as in the case of the burning of waste.[456]

4.5.4 The decommissioning phase

Requirements during the decommissioning phase include that a rehabilitation plan for the site is developed. The national standards also require *inter alia* that all gas engines or generators be removed they are no longer to be used on the site, and reused in other LFG-to-energy projects. The owner of the facility, including the subsequent owner of the facility, remains responsible for any adverse impacts on the environment, even after operations have come to an end. Other requirements listed under the decommissioning phase include what to do with the use of topsoil, remaining construction infrastructure and rubble.

In particular cases, the project could be ordered by the minister to remediate the land on which it was situated. In these cases, the National Norms and Standards for the remediation of Contaminated Land and Soil Quality are applicable. These norms and standards[457] were published in terms of NEM:WA[458] to provide a uniform national approach to determining the contamination status of an investigation area, to limit uncertainties with regards to the assessment on a contaminated area, and to provide minimum standards regarding environmental protection measures.[459] These measures are applicable to any site or land owner who undertakes site assessment or remediation activities in terms of NEM:WA.[460] Keep in mind that these procedures are required only once a site assessment report has been requested as a result of an investigation done in terms of section 36 of NEMA.

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456 "Thermal treatment" is defined in the Notice as incineration, co-processing and other high-temperature treatment of hazardous and general waste.
457 GN 331 in GG 37603 of 2 May 2014.
458 Section 7(2)(d) of NEM:WA.
459 Section 2 of GN 331 in GG 37603 of 2 May 2014.
460 Section 3 of GN 331 in GG 37603 of 2 May 2014.

All landfill sites must be permitted before they can be considered to be legally closed. Proper closure involves *inter alia* the application of final cover, topsoiling, vegetating, and drainage maintenance. In the case of poor landfill siting, remedial work will be required.[461] Section 13 of the Minimum Requirements for Waste Disposal by Landfill set out the procedures regarding rehabilitation, closure and end-use. These include *inter alia* prior notification to the relevant departments such as the DEA, the submission of a Closure Report[462] and the implementation of an end-use plan.[463]

The National Norms and Standards for the Storage of Waste lists the requirements to be implemented during the decommissioning phase of the activity. These include *inter alia* that the site must be rehabilitated, and the submission of a rehabilitation plan[464] for the site to the DEA one year before the closure of the site.[465] The owner (including the subsequent owner) of the site remains responsible for any adverse impacts on the environment, even after operations have ceased.[466]

4.5.5 General requirements

Training and capacity building are other requirements set by the National Standards.[467] It is required that all personnel on site (including visitors and temporary as well as permanent contractors) undergo a safety, health and environmental induction. This should capacitate personnel to be able to identify, prevent and minimise actions that are likely to cause adverse impacts on the environment as a result of the implementation of the LFG-to-

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461 See the National Norms and Standards for the remediation of Contaminated Land and Soil Quality.
462 The Closure report contains details regarding rehabilitation measures, management, inspection, monitoring and maintenance plans.
463 The end-use plan refers to its after-use; for example how the land will be used after the closure of the landfill site.
464 The rehabilitation plan must indicate the measures for rehabilitating areas within the facilities and the manner in which the waste resulting from the decommissioning activities will be managed.
465 Section 20(1) and (2) of GN 926 in GG 37088 of 29 November 2013.
466 Section 20(5) of GN 926 in GG 37088 of 29 November 2013.
467 Section 8 of GN 924 in GG 37086 of 29 November 2013.

energy project. All emergency incidents are expected to be managed and reported in accordance with section 30 of NEMA.[468]

Section 10 of the National Standards contains monitoring and reporting requirements. Construction of the LFG-to-energy facility can commence only once the DEA has been informed and the facility has been registered in the Departmental database.[469] Registration applications should include details such as the identity of the owner of the facility, the area where the facility is situated, the size of the facility, and the location of the facility in terms of the name of the local municipality.[470] A CDM LFG-to-energy project is also obliged to give access to relevant authorities in order that they may conduct audits or site inspections,[471] and to give them access to relevant documents such as records of hazardous waste which were removed from the site.[472] The initiation of a gas well and air quality monitoring programme should take place so that gas extraction can be effectively monitored.[473] The owners of the LFG-to-energy project are also expected to compile an annual environmental performance audit, which should contain details *inter alia* of compliance with the above-mentioned standards, compliance with local government requirements, compliance with the EMP of the project, and compliance with the air quality plan of the project.[474]

A CDM LFG-to-energy project that complies with the National Standards described above is not exempted from complying with any other requirements stipulated in other sector legislation. For example, gaseous emissions from the flaring and electricity generation processes must comply with the requirements of NEM:AQA (see the discussion below).[475]

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468 Section 9 of GN 924 in GG 37086 of 29 November 2013.
469 Section 10(1) of GN 924 in GG 37086 of 29 November 2013.
470 Section 10(2) of GN 924 in GG 37086 of 29 November 2013.
471 Section 10(3) of GN 924 in GG 37086 of 29 November 2013.
472 Section 10(4) and (7) of GN 924 in GG 37086 of 29 November 2013.
473 Section 10(5) and (6) of GN 924 in GG 37086 of 29 November 2013.
474 Section 10(10)) of GN 924 in GG 37086 of 29 November 2013.
475 Act 39 of 2004.

It is important to note that electricity supply is also regulated by certain municipalities. The City of Cape Town has released an electricity supply by-law that contains a specific provision *inter alia* on*:* applications for supply, tariffs and fees, principles on the resale of electricity and the right to disconnect a supply.[476] It is important that CDM LFG-to-energy projects wanting to connect to the grid adhere to local government law such as this.

Many CDM LFG-to-energy projects were lawfully in existence before the release of the National Standards and these projects may continue to operate as originally stipulated in the original approval, authorisation or licence application.[477]

4.5.6 Waste policy in South Africa

4.5.6.1 The National Waste Management Strategy

A CDM LFG-to-energy plant focuses on the "treatment" of waste.[478] Although the waste hierarchy found in the NWMS states that waste avoidance and recycling should be prioritized above waste treatment, the irony exists that waste avoidance receives the least amount of resources and implementation efforts.[479] The South African *status quo* regarding the waste management hierarchy reflects a situation where the disposal of waste is the most popular method, which is in contradiction of the NWMS objective of having it as the least popular.[480] Despite waste treatment not being the favoured option (with regards to the NMWS objective), CDM LFG-to-energy projects continue to develop in South Africa, as was illustrated in the previous chapter.

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476 City of Cape Town Electricity Supply By-Law *Provincial Gazette* 6727 April 2010.
477 Section 13 of GN 924 in GG 37086 of 29 November 2013.
478 Section 1 (b) of NEM:WA defines "treatment" as any method, technique or process that is designed to remove, separate, concentrate or recover a hazardous or toxic component of a waste.
479 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).
480 Alberts "Waste Management in South Africa: Challenges and Opportunities for Climate Change Mitigation" (Unpublished; on file with author).

Any waste management project such as CDM LFG-to-energy needs to take government's strategy regarding waste management into regard when establishing the project. This includes the NWMS which was established in accordance with the Waste Act.[481] Organs of the state, such as local government, are obliged to give effect to the NWMS.[482] The NWMS has set certain goals with the objective of changing South African waste management for the better, and it binds all organs of state in all spheres of government.[483] The NWMS identifies various challenges regarding waste management in South Africa.[484] The challenges identified by the NWMS include *inter alia* a lack of waste treatment options (which could include LFG-to-energy) as well as adequate and compliant waste management facilities.[485] In order to address these and other challenges, the NWMS has identified eight goals to be met by 2016.

The NWMS does not make much direct reference to waste treatment or waste-to-energy projects, however. Instead, it focuses on implementing the waste hierarchy, which sees minimisation, re-use and recycling all being favoured options above treatment and disposal. The first goal of the NWMS is to promote waste minimisation, re-use, recycling and the recovery of waste. This requires that 25 per cent of recyclables be diverted from landfill sites for re-use, recycling or recovery.[486] The NWMS does state, however, state that energy recovery, such as biogas projects and "methane gas capture from landfills", should take place for waste types that cannot be re-used or recycled.[487] The NWMS thus sets the goal of establishing a standard for waste disposal to landfill along with guidelines for thermal waste treatment.

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481 The Minister was obliged by section 6(1) of NEM:WA to establish a waste management strategy within two years after section 6 of the NEM:WA took effect.
482 DEA *NWMS* 5.
483 Section 6(3)(a) of NEM:WA.
484 In total, ten challenges are identified by the NWMS.
485 DEA *NWMS* 6.
486 DEA *NWMS* 6.
487 DEA *NWMS* 22.

4.5.6.2 Integrated Resource Plan for Electricity

The Integrated Resource Plan for Electricity (IRP) was published in 2010 as a twenty-year electricity plan. The plan proposes an energy source "mix" for South Africa to consist *inter alia* of 48 per cent baseload coal energy, fourteen per cent nuclear energy, and sixteen per cent renewable energy.[488] The need for renewable energy opens the market for CDM projects that generate electricity such as LFG-to-energy projects. The IRP is not a plan that deals with the energy needs for the country, however, nor does it make any specific mention of LFG- or waste-to-energy projects as a renewable energy option.

4.5.6.3 National Climate Change Response White Paper

The National Climate Change Response objectives include the effective management of climate change impacts in South Africa through interventions that build the country's social, economic and environmental resistance.[489] The White Paper acknowledges the GHG mitigation potential of the waste management sector, including waste-to-energy projects within the solid-waste management sector with specific reference to the capture and conversion of methane gas.[490] In this White Paper the DEA also identifies eight near-term priority flagship programmes,[491] including a "Waste-related GHG Emission Mitigation Action Plan" aimed *inter alia* at measurable GHG reductions.[492] However, no specific plan of this sort has been released yet.

4.7 Concluding remarks

South African law and policy contain provisions that are directly and indirectly applicable to the regulation of CDM LFG-to-energy projects. The regulation

488 Humphris *South Africa's Law and Policy Framework for the Regulation of the CDM* 34.
489 DEA *National Climate Change Response White Paper* 11.
490 DEA *National Climate Change Response White Paper* 32.
491 The eight flagship programmes aim to address: water conservation; renewable energy; residential energy efficiency; transport; carbon capture; adaptation research and waste management.
492 DEA *National Climate Change Response White Paper* 32.

provides the DNA with a legal mandate to oversee CDM projects. The process and requirements are discussed in chapter 2 of this study, and concern the successful registration of projects as part of the CDM. Chapter 4 illustrates how projects CDM LFG-to-energy are regulated (indirectly) by environmental legislation once they are registered by the DNA. The local regulatory framework places little focus on CDM and more on the regulation on the LFG-to-energy side of the project. The CDM requirements are mostly regulated by the DNA and the Executive Board, whilst the mangement of the projects themselves is guided by local legislation. The local regulatory framework does, however, have an indirect influence on CDM LFG-to-energy projects.

Section 231 of the Constitution places a responsibility on Government to honour treaty obligations such as the Kyoto Protocol. Examples of Government's honouring this commitment include the National Climate Change Response White Paper and the regulations establishing the DNA in terms of NEMA. Keep in mind that this does not force local government to implement CDM projects. One can see from here that there is very little legislation that directly regulates CDM beyond, the LFG-to-energy side of the project.

The Constitution assigns the responsibility for waste management (and, therefore, CDM LFG-to-energy) to local government. It also establishes the environmental right, thus making it necessary to enact NEMA, which sets out the environmental principles that should guide the way that CDM LFG-to-energy projects are regulated. NEMA does not regulate CDM or LFG projects directly, but contains a list of principles that should influence the way these projects function. NEMA also lists certain activities that require environmental authorisations, and it is possible that CDM LFG-to-energy projects could trigger some of these requirements.

LFG-to-energy focuses on waste management, and therefore this chapter has focused mostly on legislation governing waste. As is the case with

NEMA, NEM:WA does not regulate CDM projects directly. The National Norms and Standards for the extraction, flaring or recovery of landfill gas does, however directly influence the way in which LFG-to-energy projects are run, including requirements during the project's life cycle as well as the fact that projects of this kind do not require any waste licence.

Government has expressed its support for the thermal treatment of waste by publishing its National Policy on Thermal Treatment of General and Hazardous waste. Apart from that, there is very little legislation or policy that has a direct influence on CDM LFG-to-energy projects.

In terms of policy, the NWMS acknowledges that too much waste is being sent to landfill, but no mention is made of CDM projects and only brief mention is made of waste-to-energy as an alternative form of managing waste. The Integrated Resource Plan for Electricity focuses on renewable energy, but rather on solar- and wind-power as opposed to waste management. Lastly, the National Climate Change Response White Paper provides that a Waste-related GHG Emission Mitigation Action Plan will be developed; but, this has not realised yet. Despite the White Paper acknowledging that the waste sector has mitigation potential, no law in South Africa forces landfill owners to capture methane gas.

The lack of domestic legal reform with direct influence on CDM forces owners/developers of CDM LFG-to-energy projects to be guided by waste legislation and policies. As is the case in the rest of Africa, South Africa has limited legal and institutional frameworks that govern CDM projects directly.[493] There is legislation and policy that regulates waste-to-energy projects in the country, however. These include *inter alia:* NEMA, NEM:WA and the National Norms and Standards for the extraction, flaring or recovery of landfill gas, as well as the National Policy on Thermal Treatment of

493 Olawuyi argues that virtually all African countries lack legislation specifically designed to manage CDM projects. See Olawuyi "Beautifying Africa for the CDM" 262 – 284.

General and Hazardous waste (directly). LFG-to-energy also needs to meet the standards set by legislation such as the NWA and NEM:AQA.

The Kyoto Protocol and the DNA of South Africa primarily regulate the registration and authenticity of CDM LFG-to-energy projects in South Africa and local legislation has little direct influence on CDM waste-to-energy projects specifically.

5 Conclusion

This study set out to question to what extent domestic waste law and policy regulates CDM LFG-to-energy projects in South Africa. In so doing, the study also examined the international element of these projects, i.e. requirements in terms of the Kyoto Protocol that must be met before a CDM can be fully accredited. It was shown *inter alia* that CDM LFG-to-energy projects are regulated both locally and internationally. These and other findings are discussed below.

5.1 Overview of discussion

The study firstly examined CDM as a mitigation instrument in the Kyoto Protocol and also examined what responsibilities South Africa has after ratifying the Protocol.[494] As developing country South Africa has no obligations with regards to the Protocol, but has voluntarily committed to meeting specific targets regarding the mitigation of and adaptation to climate change. Chapter 2 of this study mostly focuses on CDM projects as a whole, with chapter 3 shifting the focus to a specific type of CDM project, i.e. LFG-to-energy.

The decision to focus on LFG-to-energy projects was made firstly because government has recently acknowledged that the waste management sector possesses mitigation potential with regards to its voluntarily commitments to the Kyoto Protocol. Secondly, landfilling has become a waste management option that South Africans are too dependent on. South Africa is in need of alternatives methods of managing waste that could be effective only if regulated by an efficient regulatory framework. Lastly, the waste management sector has several of these regulations with regards to the management of waste, yet it remains unclear how waste treatment facilities such as LFG-to-energy are regulated, especially if these facilities function through CDM investment.

494 See paragraph 2.2 of this study.

5.2 Overview of findings

The study has found that CDM can be used by South Africa by means of being one of the three mechanisms[495] that was designed to assist developed countries to achieve their emission targets.[496] In terms of article 12 of the Kyoto Protocol, developed countries with reduction targets can invest in local CDM projects and in return receive CERs.[497] The study also found that the CDM is regulated not only by the Kyoto Protocol, but also by the Marrakesh Accords.[498] The last mentioned lay down the specific rules for the CDM project life cycle and establishes three important requirements for CDM projects: they must be conducive to sustainable development, they must be are supplementary, and they must prove to be additional. The study focused especially on the issue of sustainable development by highlighting in chapter 4 that local legislation such as the Constitution and NEMA require that all developments in South Africa should develop in a sustainable manner.

The CDM is regulated by various bodies including the CDM Executive Board and this study has discussed the roles and responsibilities of each of the role players with regards to the registration of CDM projects.[499] It was found that CDM project developers have to meet various requirements before a project can be fully accredited. This includes *inter alia* submitting various documents to the authorities, including the PDD.[500] On examining the PDDs of local CDM LFG-to-energy projects it was found that the PDDs contained information such as proof of their bringing out sustainable development, their additonality, and evidence having conducted of public consultations, as well as of their meeting of the requirements set by local legislation. The study also

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495 This study focuses on only one of the three mechanisms, i.e. the CDM. The other two are joint implementation and emission trading. See paragraph 2.2 of this study.
496 See chapter 1 of this study.
497 See paragraphs 2.2 and 2.3 of this study.
498 See paragraph 2.3 of this study.
499 See paragraph 2.2.3 of this study.
500 See paragraph 2.3.3.2 of this study.

discussed other requirements for CDM approval set by the Executive Board such as: registration, validation and national approval.[501]

The CDM has been criticised in the past, and some of its weaknesses have been listed in this study. They include uncertainty about the new commitment period to the Kyoto Protocol, which is set to start in 2020.[502] Another problem found was that certain developed countries show a lack of interest in committing to the projected second period.[503] These two concerns were discussed in an attempt to decide if the CDM is likely still to be a mitigation instrument in future. Other concerns include the fact that one of the main requirements of "sustainable development" is the fact that it has no universal definition. This has led to the position where each county needs to arrive at its own definition, meaning that there is no universal application of this important requirement.

Chapter 3 of this study set out to examine current CDM and LFG-to-energy developments in South Africa. This was done firstly by examining the local DNA established in terms of the Kyoto Protocol.[504] The DNA was established by regulations released in terms of NEMA and operates within the Department of Energy. Here the study noted that the regulation of CDM LFG-to-energy is therefore the responsibility of two different departments: the Department of Energy and the Department of Environmental Affairs. The study looked at what the responsibilities of the local DNA are, which include *inter alia* an approval process consisting of voluntary screening and the mandatory submission of the PDD.[505]

In chapter 2 the study examined the weaknesses of CDM projects internationally, and chapter 3 lists the opportunities and constraints of CDM projects specifically in South Africa. The country has enough solar and wind

501 See paragraph 2.3.3 of this study.
502 See paragraph 2.4.1 of this study.
503 See paragraph 2.4.6 of this study.
504 See paragraph 3.2.1 of this study.
505 See paragraph 3.2.3 of this study.

capacity to successfully generate renewable energy. The study also found that South Africa sends most of its waste to landfill.[506] This means that South Africa has enough resources to accommodate renewable energy CDM projects. The study highlighted the fact that South Africa (in accordance with the *White Paper on Renewable Energy*) needs more electricity to be generated from renewable energy sources such as CDM projects.[507] Government has established a platform for private electricity suppliers to access the national grid employing the REIPPP. The study found at least one CDM LFG-to-energy project that has gained through the REIPPP, i.e. the Johannesburg landfill gas-to-electricity project. However, there is, no legislation or regulation obliging CDM projects to access the grid through the REIPPP or any other programme. Certain municipal by-laws can, however, regulate independent suppliers' access to the grid, and this study used the City of Cape Town as an example.[508]

The study examined the Eskom monopoly, and how the coal-dependant energy producer owns most of the energy market in South Africa, therefore, making it difficult for independent power producers to access the grid at cost-effective prices. chapter also noted that the approval process for CDM projects can be long and costly. Various applications need to be done to various bodies including the DNA and the CDM Executive Board.

Chapter 4 of the study illustrated that apart from the authorisations listed, approval also needed to be obtained *inter alia* from the Department of Environmental Affairs, which entailed applying various environmental authorisations and/or waste licences. Bear in mind that this could also include abiding by various local government by-laws. The study used a CDM LFG-to-energy as an example to illustrate the different kinds of authorisations that are required to run the project, and found that various environmental law frameworks to be applicable. These include NEMA with its listed activities,

506 See chapter 1 of this study.
507 Edkins *et al South Africa's renewable energy policy roadmaps* 18.
508 See paragraph 4.4.2 of this study.

NEM:WA with its waste licencing, and NWA and NEM:AQA. It was found that very little law and few policy measures are directly applicable to the regulation of CDM-LFG-to-energy projects in South Africa. In fact, only the National standards for the extraction, flaring or recovery of landfill gas and the National Policy on Thermal Treatment of General and Hazardous Waste seem to be the closest to the direct regulation of LFG-to-energy projects. Although municipalities such as Johannesburg and Cape Town do have by-laws concerning waste management, only Johannesburg has certain clauses regulating waste 'treatment'.

One can come to the conclusion that starting a CDM project requires one to explore many different avenues to obtain the authorisations needed. The bodies that grant these authorisations are not always within the same department, as in the case of the Department of Energy and the Department of Environmental Affairs. This could cause confusion and uncertainty, and sorting it out would require the help of experts from the different departments.

In conclusion, this study will supply a brief evaluation of the strengths and weaknesses of the existing regulatory framework regarding LFG to energy CDM projects in South Africa. The objective is to evaluate the status of the current regulatory framework regarding locally-based CDM LFG-to-energy projects and to determine if local law is sufficient to regulate these specific types of projects effectively.

5.2.1 Strengths

- Government has released regulations establishing a DNA in South Africa. This has led to the creation of a body with the goal to promote, evaluate and approve the operation of CDM projects. This is an important development for CDM growth in South Africa because *inter alia* CDM projects require national approval before they can be fully registered by the UNFCCC.

- The Constitution of South Africa indirectly supports the CDM. The highest law in the country binds government to international agreements such as the Kyoto Protocol. This is also the reason government has released regulations in support of CDM.

- The term “sustainability” as it is used in the Kyoto Protocol is described as being too vague. Each country is required to develop its own definition of “sustainable development” and South Africa’s own definition is found in section one of NEMA.

- Government policy has acknowledged that waste-to-energy projects have mitigation potential. This includes *inter alia* the *National Climate Change Response White Paper*.

- The release of Nationals Standards for the extraction, flaring or recovery of landfill gas regulates the project life cycle of CDM LFG-to-energy projects, making it easier to operate within the laws of the country, and under the national standards no further waste licencing is required regarding listed activities.

- CDM projects bear a duty of care and sustainable development. These projects, therefore, are subject to the duty of care principles found in NEMA, NEM:WA and other legislation such as the NWA.

- South Africa possesses favourable conditions for the development of CDM projects. The country has enough wind and solar-power and is currently has the problem that too much waste is being sent to landfill and not disposed of using alternative methods such as LFG-to-energy. Along with a shortage of electricity supply, this creates a gap in the market fort CDM LFG-to-energy projects.

- South Africa has already established CDM LFG-to-energy projects, the first being the Durban Landfill-Gas – Bisasar Road site that was established back in 2006 and is still running successfully today.

5.2.2 Weaknesses

- There is no legislation in South Africa that directly regulates CDM LFG-to-energy projects. Instead, the projects are regulated by two government departments: the Department of Energy (DNA) and the Department of Environmental Affairs (NEMA and NEM:WA etc.). Whether this can be seen as a weakness is debatable because of the fact that the future of the CDM might not last longer than 2020. Legislation that directly regulates CDM LFG-to-energy projects could however assist in quickening the establishment projects by integrating the international requirements set by the Kyoto Protocol and local requirements in terms of both the DEA and DE. Integrating the current requirements set by the different departments involved could lessen the administrative hurdles that need to be negotiated in order to get permission to run the project.

- Waste management is the responsibility of local government.[509] There are no by-laws regulating CDM or LFG-to-energy projects despite the fact that metropolitan municipalities such as Johannesburg and Cape Town host CDM LFG-to-energy projects. Effective by-laws could ensure that projects run in an effective manner. These by-laws can for example oblige all (large) landfill sites to collect methane gas or use waste in other ways to create renewable energy and therefore contributing to a green economy.

- Government acknowledges the mitigation potential of the waste management sector in the *National Climate Change Response White Paper*, yet the NWMS contains few or no plans to address this problem by using CDM or waste-to-energy projects. The NWMS or any other policy related to waste management must contain detailed plans on how and where waste can be converted into electricity and

509 See paragraph 4.2 of this study.

list landfill sites that are best suited to do this. At this stage most policies like the NWMS only contain brief references to the potential of waste-to-energy projects, yet there are no concrete plans on how this renewable energy-technology can be utilised by local municipalities. The potential of the conversation of methane gas is therefore under-utilised.

- CDM projects need to go through a long and costly process before being regarded as fully operational. This includes obtaining registration and validation through various steps such as applying to the DNA and variously obtaining the needed authorisation and licences in terms of the environmental legislation.

- Waste law in South Africa only regulates landfilling only. There is no waste legislation that regulates CDM LFG-to-energy projects. The closest to direct regulation is the National Standards for the extraction, flaring or recovery of landfill gas, although it must be said that not all LFG-to-energy projects have to form part of the CDM.

5.3 Recommendations and remaining areas of research

The regulation of CDM and specifically CDM LFG-to-energy projects should rather be done by one department or one set of regulations. This should make the application process less complicated and time-consuming for developers.

If the regulation of CDM cannot be assigned to one department, regulations should be released to provide easy administrative linkages between relevant departments such as the Department of Energy, the Department of Environmental Affairs and local government.[510]

510 Olawuyi “Beautifying Africa for the CDM” 262 – 284.

Government must do more to acknowledge the climate change mitigation potential that the waste management sector possesses, for example, releasing the "Waste-related GHG Emission Mitigation Action Plan" referred to in the *National Climate Change Response White Paper*. The plan must contain strategies regarding the effective implementation of mitigation programmes in the waste management sector such as CDM LFG-to-energy.

Local government, specifically metropolitan municipalities, should develop by-laws that focus on CDM LFG-to-energy project development. All metropolitan municipalities host at least one CDM LFG-to-energy project yet no by-laws promote the use of sustainable energy projects in the waste sector such as CDM or LFG-to-energy. By-laws or government policy (such as the NWMS) could, for example, create standards that oblige large landfill sites must make use of "green" technologies such as the capturing and conversion of methane gas to energy. This would enable developers to know what to do in terms of developing a CDM projects as typical CDM LFG-to-energy projects have various requirements that can cause confusion and be very time-consuming.

5.4 Conclusion

As government continues to proclaim its support for sustainable development, it is important that "green" projects such as CDM LFG-to-energy continue to develop. This can happen only if supported by a legislative framework that regulates this kind of project effectively. This study recognises the benefits that CDM LFG-to-energy possesses for mitigation in the waste management sector. It is submitted, however, that there is not much waste law regulating projects of this kind directly, and one has to look to a very broad legislative framework. Local government plays an important role in the hosting and regulating of CDM LFG-to-energy projects, and at this stage this is not reflected in local government by-laws, for example. It is submitted that South Africa has effective waste laws that can regulate LFG-to-energy projects. What is needed, however, is a regulatory framework

consisting of law or policy that bridges the gap between the regulation of the CDM and waste-to-energy projects. CDM LFG-to-energy exercises many international principles including the need to promote sustainable development and the duty of care. Effective regulation of this initiative could result in South Africa getting closer to achieving its legally entrenched climate mitigation goals as well as its environmental protection goals.

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TO WHOM IT MAY CONCERN

11 November 2015

I hereby certify that I have edited the language of a masters' dissertation by Stephen Nel entitled "Waste law and policy perspectives on municipal 'land-fill to gas' CDM projects in South Africa."

I am Professor Alan Brimer, DLitt (UPE), Professor Emeritus of UKZN.

Yours faithfully,

Alan Brimer