The regulation of gas exploration, production and management: a life cycle analysis

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Mini-Dissertation submitted in partial fulfillment of the requirements for the degree *Magister Legum* in Environmental Law and Governance at the Potchefstroom Campus of the North-West University

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2014

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by

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Submitted in accordance with the requirements for the degree Magister Legum in Environmental Law and Governance at the North-West University (Potchefstroom Campus), South Africa

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November 2013

ACKNOWLEDGEMENTS

Prof Willemien du Plessis	for the patience, time and energy she invested in me as well as her endless wisdom and insight. It was an absolute privilege and pleasure being her student.
Mr Frik Badenhorst and Mr JP Meintjes	for taking the time on a Saturday morning in Johannesburg to assist me in explaining the practical side of a gas life cycle, as well as the applicable legislation within this cycle.
My parents, Johann and Salomé Henning	for all the opportunities they made possible for me, their unconditional love and the impeccable example they have set for me.
My dear friend	for believing in me, ceaselessly.
The Creator of All	for the great blessing of granting me the opportunity to do my part in protecting His creation. *Soli Deo Gloria*.

I don't want to be a product of my environment. I want my environment to be a product of me –The Departed

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LIST OF ABBREVIATIONS

AEES	Allowance for Energy Efficiency Savings 2011
CDMDA	Chief Director: Mineral Development and Administration
CMA	Catchment management agency
CPP	Coastal public property
DEA	Department of Environmental Affairs
DGAB	*Draft Gas Amendment Bill*, *2013*
DMR	Department of Mineral Resources
DOE	Department of Energy
DSCA	*Dumping at Sea Control Act* 73 of 1980
DT	Department of Transport
DWA	Department of Water Affairs
EIA	Environmental impact assessment
EMP	Environmental management plan
EMPr	Environmental management programme
GHG	Greenhouse gas
GTL	Gas-to-liquids
HSA	*Hazardous Substances Act* 15 of 1973
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardisation
LUPO	*Land Use Planning Ordinance* 15 of 1985
MHSA	*Mine Health and Safety Act* 29 of 1996
MLRA	*Marine Living Resources Act* 47 of 1998
MPCCLA	*Marine Pollution Control and Civil Liability Act* 6 of 1981
MPRDA	*Mineral and Petroleum Resources Development Act* 28 of 2002
MPRDAA	*Mineral and Petroleum Resources Development Amendment Act* of 2008
MPRDAB	*Mineral and Petroleum Resources Development Amendment Bill* 2013
NCCRWP	National Climate Change Response White Paper 2011
NEMA	*National Environmental Management Act* 107 of 1998
NEMAA	*National Environmental Management Amendment Act* 62 of 2008

NEMAQA	*National Environmental Management: Air Quality Act* 39 of 2004
NEMBA	*National Environmental Management: Biodiversity Act* 10 of 2004
NEMICMA	*National Environmental Management: Integrated Coastal Management Act* 24 of 2008
NEMWA	*National Environmental Management: Waste Act* 59 of 2008
NERA	*National Energy Regulator Act* 40 0f 2004
NERSA	National Energy Regulator of South Africa
NRTA	*National Road Traffic Act* 93 of 1996
NWA	*National Water Act* 36 of 1998
NWRE	National White Paper on Renewable Energy 2004
PASA	Petroleum Agency of South Africa
SABS	South African Bureau of Standards
SANS	South African National Standards
SOEKOR	Southern Oil Exploration Corporation
SPLUM	*Spatial Planning and Land Use Management Act* 16 of 2013
WPEP	White Paper on the Energy Policy of the Republic of South Africa 1998

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ABSTRACT

Gas exploration and production at sea and on land is a recent phenomenon in South Africa. The reason for the sudden interest in gas exploration and production on land is that it may prove to be a solution to the need for cleaner forms of energy and provides the possibility for South Africa to move away from coal-based energy. In order to achieve this transition while keeping economic development intact, South Africa is in need of a "greener" option. Gas is considered the most environmentally friendly fossil fuel and therefore provides South Africa with this much needed "greener" option. The uncertainty about the nature and extent of the environmental impacts regarding gas exploration and production suggests that an efficient and effective energy and environmental law and policy framework is still needed to regulate onshore and offshore gas exploration and production during all phases of its life cycle. It furthermore requires of the authorities that they establish and enhance environmental protection and sustainability during all gas exploration and production operations in order to ensure that the environmental impacts that may occur during such operations are addressed in a holistic and integrated manner. This study focuses on conventional gas.

South Africa's energy and environmental law and policy framework that regulates gas exploration does not cover the entire life cycle of onshore and offshore gas activities. It is of paramount importance that the current fragmentation in the country's existing energy and environmental regulatory framework be addressed and that a sufficient environmental governance regime, as envisaged in this study, is established. This will enable the administering agents to actively promote and maintain the welfare of the people, the ecosystems, the essential ecological processes and the biodiversity of South Africa, while promoting the utilisation of living natural resources on a sustainable basis to the benefit of all South Africans, present and future, as pledged in the *Constitution of the Republic of South Africa*, 1996.

Key words: *environmental law, energy law, South Africa, environmental governance, gas life cycle, onshore and offshore conventional gas exploration and production*

UITTREKSEL

Gaseksplorasie en produksie op see en op land is 'n onlangse verskynsel in Suid-Afrika. Die rede vir die skielike belangstelling in gaseksplorasie en produksie op land is dat dit die potensiaal bevat om 'n oplossing vir skoner vorme van energie te bied en bevat die moontlikheid vir Suid-Afrika om weg te beweeg van 'n steenkool-gebaseerde energie basis. Ten einde hierdie oorgang te bereik, sowel as om ekonomiese ontwikkeling te bevorder, het Suid-Afrika ‘n behoefte na 'n 'groener' opsie. Gas word beskou as die mees omgewingsvriendelike fossiel brandstof en daarom bied gas aan Suid-Afrika hierdie broodnodige 'groener' opsie. Die aard en omvang van die uitwerking op die omgewing ten opsigte van gaseksplorasie en produksie sal nog steeds vereis dat 'n doeltreffende en effektiewe energie en omgewingsreg en beleidsraamwerk van aanlandige en aflandige gasaktiwiteite se impak en aspekte te reguleer tydens elke fase van die aktiwiteite se lewensiklus. Dit vereis verder van die owerhede om die beskerming van die omgewing te vestig en te verbeter, sowel as die volhoubaarheid van al die gaseksplorasie en produksie bedrywighede ten einde te verseker dat die omgewingsimpakte wat mag voorkom gedurende sulke operasies in 'n holistiese en geïntegreerde wyse tydens elke fase van sy lewensiklus benader sal word. Die studie fokus op konvensionele gas.

Suid-Afrika se energie en omgewingsreg en beleidsraamwerk wat gaseksplorasie en produksie reguleer dek ongelukkig nie die hele lewensiklus van aanlandige en aflandige gasbedrywighede nie. Dit is van kardinale belang dat die huidige fragmentering in die land se bestaande energie en omgewingsregulatoriese raamwerk aangespreek moet word en dat 'n voldoende omgewingsbestuur regime, soos beoog in hierdie studie, geïmplementeer moet word. Dit sal owerhede in staat stel om op ‘n aktiewe wyse die welsyn van die mense, ekosisteme, noodsaaklike ekologiese prosesse en die biodiversiteit van Suid-Afrika, asook die benutting van lewende natuurlike hulpbronne op 'n volhoubare basis tot voordeel van alle Suid-Afrikaners, beide die huidige en toekomstige, te bevorder en te handhaaf, soos vereis deur die *Grondwet van die Republiek van Suid-Afrika*, 1996.

Sleutelwoorde: *omgewingsreg, energiereg, Suid-Afrika, omgewingsbestuur, gaslewensiklus, aanlandige en aflandige konvensionele gaseksplorasie en produksie*

1 Introduction

Gas exploration and production[1] at sea and on land is a recent phenomenon[2] in South Africa. The reason for the sudden interest in gas exploration and production is that gas may supply the need for cleaner forms of energy and that it provides the possibility for South Africa to move away from coal-based energy.[3] In order to cut down on greenhouse gas emissions while keeping economic development intact, South Africa needs to move away from coal to a "greener" option.[4] Gas is considered the most environmentally friendly fossil fuel[5] and exploring for it therefore provides South Africa with the possibility of moving on to this much needed "greener" option. There are various forms of gas that are explored and produced, for example, conventional and unconventional gas.[6] This study focuses on conventional gas.[7]

The most important tool available in the South African legal system to provide protection to the environment is section 24(b) of the *Constitution of the Republic of South Africa*, 1996 (the Constitution).[8] This is also the point of departure for an envisaged energy and environmental legal framework concerning gas exploration and production. According to section 24(b) the state must ensure that the

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1 See 2.1. Mr Frik Badenhorst and Mr JP Meintjes from Sasol Gas are sincerely thanked for their valuable input and time to explain the intricacies of gas exploration and production as well as the application of gas and petroleum legislation in this regard. Any mistakes or misrepresentations, however, are my own.

2 Creamer 2010 www.miningweekly.co.za.

3 *National Climate Change Response White Paper* 2011.

4 Strydom and King in *Fuggle and Rabie's Environmental Management in South Africa* 2.

5 Strydom and King in *Fuggle and Rabie's Environmental Management in South Africa* 779.

6 See 2.1. Conventional gas is exploited by way of conventional methods and unconventional gas by unconventional methods.

7 "Natural gas contains 90 to 99% hydrocarbons, which consist predominately of methane (the simplest hydrocarbon) together with smaller amounts of ethane, propane and butane. Natural gas also contains traces of nitrogen, water vapour, carbon dioxide, hydrogen sulphide and occasional inert gases such as argon or helium. Natural gases containing more than 50 g/m3 of hydrocarbons with molecules of three or more carbon atoms (C3 or higher) are classified as 'lean' gases". Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13.

8 Section 24(b) states the following - that everyone has the right -
(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
(i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

environment is protected while promoting enforceable economic and social development, amongst other matters.[9]

The process of making the transition from coal-based energy must be guided by policies based on section 24(b). The *White Paper on the Energy Policy of the Republic of South Africa,*[10] the *White Paper on Renewable Energy*[11] and the *National Climate Change Response White Paper*[12] form the policy framework for the life cycle of gas activities. Nel and Kotzé define a "life cycle" as "the planning and design phase, the procurement and contractual phases, the implementation phase with sub-phases such as construction; commissioning; operations; redesign; optimisation; expansion and modification; maintenance; decommissioning; dismantling; and rehabilitation."[13] In a gas life cycle the planning phase will more or less correspond to exploration activities,[14] the operational phase with production,[15] and the rehabilitation phase with the closure phase.[16]

According to all of these policies, alternatives for fossil fuels need to be found and the environmental consequences of energy use need to be addressed. During all of the phases of the life cycle, gas activities may affect the environment. Gas activities are regulated by energy and environmental legislation.

Gas exploration is regulated mainly by the *Mineral and Petroleum Resources Development Act*[17] (MPRDA), which focuses chiefly on gas exploration at sea. The MPRDA read with the *National Environmental Management Act*[18] (NEMA) chapter 5 provides that environmental impact assessments (EIA) as well as environmental management programmes (EMPr) need to be done for certain potentially harmful activities.[19] The MPRDA was amended by the *Mineral and Petroleum Resources*

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9 See also Glazewski *Environmental law* 5-10 – 5.21.
10 Henceforth WPEP 1998.
11 Henceforth WPRE 2004.
12 Henceforth NCCRWP 2011.
13 Nel and Kotzé in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 14.
14 See 4.
15 See 5.
16 See 6.
17 28 of 2002.
18 107 of 1998. NEMA was also amended by the National Environmental Management Second Laws Amendment Act 30 of 2013.
19 Chapter 5 NEMA. See also Humby 2013 *South African Law Journal* 60-84.

Development Amendment Act 49 of 2008 (hereafter MPRDAA) and the *National Environmental Management Amendment Act* 62 of 2008 (NEMAA). The MPRDAA is to be amended again by the *Mineral and Petroleum Resources Amendment Bill* [B15B-2013] (MPRDAB) and the NEMA by the *National Environmental Management Third Laws Amendment Bill* [B26B-2013]. The NEMAA amendments will come into operation 18 months after the MPRDA Amendment Act comes into operation, i.e. on 8 December 2014.[20] The whole system of EIA/EMPs is currently in flux and the amendments are considered to be quite confusing.[21] In future, exploration and production companies will have to apply for an environmental authorisation that will be issued with conditions that have to be complied with during the life cycle of the project.[22] Other environmental legislation may also be applicable.[23] If biodiversity is to be harmed the *National Environmental Management: Biodiversity Act*[24] (NEMBA) would be applicable,[25] whereas if gas exploration is undertaken on land, the *National Water Act*[26] (NWA) would be applicable, and at sea the *National Environmental Management: Integrated Coastal Management Act*[27] (NEMICMA), for example.[28]

The production phase deals with activities such as the actual production of gas, the transportation of the gas and the scope of the workers' involvement in the different stages of the process. The MPRDA, the *Gas Act*[29] and the *National Environmental Management: Air Quality Act*[30] (NEMAQA) will, for example, be applicable to deal with the regulation of these activities during this phase. The discarding or recycling of waste that was ignited during the production phase will be regulated by the *National Environmental Management*: *Waste Act*[31] (NEMWA), NEMAQA[32] and the MPRDA.[33] During the rehabilitation phase a company has to comply with the provisions in the

20 Proc 14 in GG 36512 of 31 May 2013, amended by Proc 17 in GG 36541 6 June 2013.
21 CER report 2013 www.cer.org.
22 Section 24 NEMA.
23 Nel and Du Plessis 2001 *SAJELP* 181-190.
24 10 of 2004.
25 See 4.1.5.
26 36 of 1998.
27 24 of 2008.
28 See 4.2.1
29 *Gas Act* 38 of 2001, the *Gas Act* is to be amended by the *Gas Act Draft Amendment Bill* 2013 see also 5.1.1 and 5.2.1.
30 39 of 2004, see also 5.1.3 and 5.2.2.
31 59 of 2008, see also 5.1.4.
32 See 5.1.3.
33 Also see 5.1.1.

Gas Act[34] and the MPRDA,[35] for example. If gas production is undertaken at sea various other laws will be applicable.[36] It is therefore necessary to determine whether or not all the environmental impacts of gas activities are regulated during the successive phases of a life cycle.

It seems that various departments (the Department of Environmental Affairs, the Department of Mineral Resources, the Department of Energy, the Department of Water Affairs and the Department of Transport) regulate gas activities in terms of different legislation. This may result in a fragmented regulatory framework that does not provide the necessary protection for the various phases of a gas exploration and production life cycle.[37] The exploration and production of gas are rapidly expanding, and in order to provide South Africa with a sustainable alternative to coal-based energy, legislation needs to match the progress in this field. It may be that South African energy and environmental law is not necessarily following this trend. The country's regulatory regime is fragmented and may not be able to establish a concerted and integrated approach to environmental governance.[38] The possible inability of legislation to fulfil the immediate needs to effectively monitor gas activities during their life cycle may negatively impact on the environment.[39]

The aim of this study is therefore to determine to what extent South African energy and environmental law regulates the impacts of the activities of conventional gas exploration, production and management during the phases of the life cycle of a project. In order to succeed in the main aim, the following subsidiary-aims are identified, namely (a) to provide a brief background to gas exploration and production by distinguishing between conventional and unconventional types of exploration and production and to align the life cycle approach to the gas exploration and production;

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34 *Gas Act* 38 of 2001, see also 6.1.1.
35 MPRDA 28 of 2002, see also 6.1.1.
36 See 6.2.
37 Kotzé 2006 *PER* 1-44.
38 A management process executed by institutions and individuals in the public and private sector to holistically regulate human activities and the effects of human activities in the total environmental (including all environmental media, and biological, chemical, aesthetic and socio-economic processes and conditions) at international, regional, national and local levels; by means of formal and informal institutions, processes and mechanisms embedded in and mandated by law, so as to promote the present and future interests human beings hold in the environment. Paterson and Kotzé *Environmental Compliance and Enforcement* 107.
39 See 2.4.

(b) to provide a brief overview of the policies that refer to gas exploration and production; (c) to discuss the energy and environmental legislation in relation to exploration, production and closure and (d) to make recommendations for South Africa.

A literature survey of relevant primary sources (legislation) and secondary sources such as journal articles, text books and electronically available texts was undertaken to achieve the aims of the study.[40]

In this study gas exploration, production and the foundations of the life cycle approach are briefly discussed as background, where after the applicable policies such as *the White Paper on Energy Policy of the Republic of South Africa*[41] (WPEP), the *National White Paper on Renewable Energy*[42] (NWPRE) and the *National Climate Change Response White Paper*[43] (NCCRWP) and their relation to gas will be discussed, followed by a discussion of the different phases of the gas life cycle, namely the exploration, production and closure phases,[44] in order to come to a conclusion and to make recommendations.[45]

2 Gas exploration and production, and the foundations of the life cycle approach

Before an explanation of the various policies and legislation controlling gas activities is provided, it is necessary first to provide a background to gas exploration and production and to explain what the life cycle approach entails. It is also necessary to determine what distinguishes conventional gas from other forms of gas for the purposes of this study. It is also necessary to align the life cycle approach to gas exploration, production and management activities in order to indicate the impact the regulation of these activities may have on the industry.

40 This study was concluded in November 2013. Where crucial, the study also refers to new publications or legislation post 2013 for clarity or inclusivity, even though it is not part of the formal study.
41 1998. Also see 3.1.
42 2004. Also see 3.2.
43 2011. Also see 3.3.
44 See 4-6.
45 See 7.

In this section reference will be made to the different types of gas exploration and production and the various types of gas, where after the life cycle approach will be discussed.

2.1 Types of gas exploration and production

The *Gas Act*[46] defines "gas" as

> all hydrocarbon gases transported by pipeline, including natural gas, artificial gas, hydrogen rich gas, methane rich gas, synthetic gas, coal bed methane gas, liquefied natural gas, compressed natural gas, re-gasified liquefied natural gas, liquefied petroleum gas or any combination thereof.[47]

This definition refers to conventional and unconventional gas. Conventional gas is natural (methane) gas that is produced by conventional methods, while unconventional gas is explored and produced by unconventional methods.[48] The Southern Oil Exploration Corporation (hereafter SOEKOR) initially used the conventional method of extracting gas during offshore exploration for gas in South Africa. The gas field that was found in the Mossel Bay was named the Mossgas gas field. The Mossgas project involves extracting natural gas from offshore fields.[49] In 2001 the company Mossgas was renamed PetroSA and partnered with SOEKOR to extract gas from these fields. The natural gas fields are exclusively used for gas-to-liquid production (hereafter GTL).[50] PetroSA's refinery at Mossel Bay uses a unique GTL method.

Natural gas is also imported from Mozambique through the use of pipelines, and supplies Sasol's GTL process.[51] A prerequisite for the extraction of natural gas on land is, for example, the establishment of a comprehensive infrastructure, which

46 38 of 2001.
47 Section 1 *Gas Act*.
48 See the discussion that follows.
49 Strydom and Surridge in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 779.
50 Strydom and Surridge in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 779.
51 Strydom and Surridge in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 779.

includes the construction of drill sites, pipelines, and road and rail networks.[52] In the process of extracting natural gas at sea, platforms will have to be constructed. Once the operation moves onshore, infrastructure and pipelines will have to be erected.[53]

Unconventional gas resources are extracted by methods other than the traditional well method. Unconventional natural gas development is characterised by unique geologic attributes that make the reservoirs more challenging to exploit.[54] The formations are generally tighter or have a lower permeability and include tight gas, shale gas, hydrates and coalbed methane.[55] Hydraulic fracturing[56] in the Karoo is an example of an unconventional way of extracting gas.[57] Exploration activities in the Karoo will be conducted mostly in the central and southern parts of the main Karoo basin, and their purpose will be to evaluate the potential of shale gas. One of the methods that will be used in the Karoo in order to extract unconventional gas is the pumping of fluid at a high pressure into the wells in order to produce fractures in the shale rock formations. The sand in the fluid is then forced into the fractures in order to keep the fractures open[58] so that the gas can escape.[59] After the fracturing process takes place, the internal pressure from the underground geological formation forces the liquid back to the earth's surface in the form of return water.[60] The shale gas then escapes to the earth's surface where it is recovered from the return water. It is then processed and refined for further use.[61]

This study will focus on conventional gas. The identified natural gas reserves in Mozambique are expanding, and the increase in the capacity of the pipeline from Mozambique to South Africa Mozambique may result in the availability of

52 United States Environmental Protection Agency 2012 www.water.epa.gov.
53 See 2.2.
54 American Petroleum institute 2014 www.adventuresinenergy.org.
55 American Petroleum institute 2014 www.adventuresinenergy.org.
56 Hydraulic fracturing is a controversial technique. In order to extract gas from shale formations, energy companies drill thousands of meters below ground, then drill horizontally into a shale formation. The rig operators pump water and a mixture of chemicals into the shale at high pressures, fracturing rock formations and allowing gas to flow. Schellhase 2012 www.africanarguments.org.
57 Planting 2013 www.moneyweb.com.
58 Anon 2011 www.waterpollutionlawyers.com see also Dale, Khana and Vidic *et al* 2013 *Environmental Science and Technology* 5459-5466.
59 Anon 2011 www.cleanwater.org.
60 United States Environmental Protection Agency 2012 www.water.epa.gov.
61 Anon 2011 www.cleanwater.org.

significantly more gas in the future.[62] There is also the possibility of importing gas from Namibia and Botswana, should these countries decide to exploit their gas reserves.[63] However, South African companies are also investigating the exploration and production of other onshore natural gas fields. It is now necessary to determine how conventional gas activities relate to the life cycle approach.

2.2 The life cycle approach

Gas activities may be described from the point of view of a life cycle approach. The life cycle approach or the "cradle to grave" approach is illustrated in figure 1.

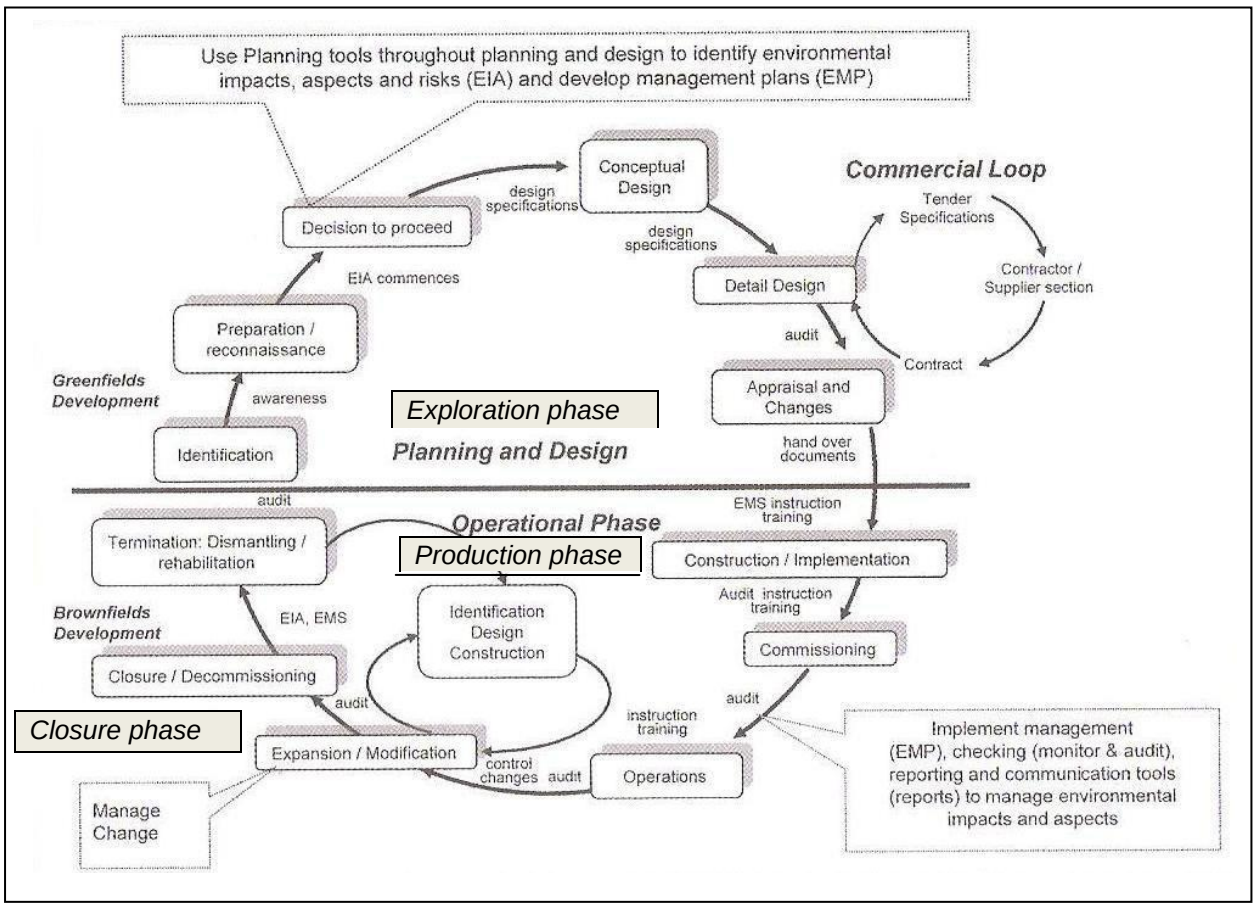

Figure 1: A systematic framework for a life cycle analysis[64]

62 Castel-Branco "What is the Experience and Impact of South African Trade and Investment on the Growth and Development of Host Economies?? A View from Mozambique" 4.

63 Strydom and Surridge in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 779.

64 Nel and Kotzé in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 14.

A typical life cycle has an identifiable start and end. It consists of principal phases as well as sub-phases with complex interfaces with other supporting processes.[65] The life cycle approach provides a systematic approach to evaluate all the different spheres and phases of a gas exploration venture with regard to environmental law and policies. During each of the phases of the life cycle of a project development in South Africa, the activities of a company will have to be regulated in terms of and in accordance with the country's energy and environmental laws and policies.[66] The life cycle approach may aid the study in determining to what extent the energy and environmental laws can regulate gas activities' impacts[67] and aspects[68] during the phases of its life. The life cycle is a holistic approach to environmental management because it makes the application of the legal framework possible in respect of the entire life cycle.[69] It is in line with sections 2, 23 and 24 of NEMA and is based on integrated environmental management and life cycle liability.

The life cycle starts with the planning phase. In relation to gas activities this will correlate with the exploration phase,[70] where gas companies use minimal invasive methods to determine if it is worthwhile to further explore the process of extracting and producing the gas in a specific place.[71] The exploration phase includes the reconnaissance, exploration and technical cooperation phases of a gas venture.[72] During this phase geologists and geophysicists conduct desktop studies to determine whether there are any promising geological formations that may indicate the presence of gas fields.[73] Various other types of surveys may also be undertaken, such as magneto metric surveys where the variations in the earth's magnetic field

65 Nel and Kotzé in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 14.

66 Louw *The environmental regulation of uranium mines in Namibia: a project life cycle analysis* 6.

67 ISO 14001:2004 defines an "environmental impact" as "any change to the environment, whether adverse or beneficial, wholly or partially, resulting from an organisation's environmental aspects, the latter signifying those elements of an organisation's [activities, products or services that can interact with the environment]".

68 ISO 14001:2004 defines an "environmental aspect" as an "element of an organisation's activities or products or services that can interact with the environment".

69 Louw *The environmental regulation of uranium mines in Namibia: a project life cycle analysis* 6.

70 See 4.

71 Nel and Kotzé in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 14.

72 See 4.

73 American Petroleum institute 2014 www.adventuresinenergy.org.

are determined with magnetometers that hang from airplanes and aerial photogrammetric surveys where photographs are taken by special cameras to distinguish between different land formations. None of these activities have an impact on the environment.[74] Once possible formations are identified the company will then undertake more intrusive studies. Krause describe these studies as follows:

> Seismic studies provide information on the general characteristics of the subsurface structure. Measurements are obtained from shock waves generated by setting off explosive charges in small-diameter holes, from the use of vibrating or percussion devices on both land and in water, and from underwater blasts of compressed air. The elapsed time between the beginning of the shock wave and the return of the echo is used to determine the depth of the reflecting substrata. The recent use of super-computers to generate three-dimensional images greatly improves evaluation of seismic test results.[75]

The seismic surveys gather useful information from geological structures and rock properties below the surface of land and water.[76] Onshore gas reconnaissance surveys determine whether or not the potential of gas reservoirs exists underground. During these seismic surveys use is made of trucks to carry the equipment that generates the seismic waves by way of shocks.[77] These actions may disturb animal and bird life in the area.

Offshore gas exploration also uses seismic surveys to conduct exploration. Offshore seismic surveys make use of ships with a cable attached to them which generates seismic waves which flow into the soil below the ocean. Based on how long the waves take to reflect back to the surface,[78] these seismic data are used to create a map of the geological structure beneath the surface. The presence of these ships in the ocean may disturb the marine life.[79] When all the necessary information has been gathered during the reconnaissance phase (information regarding the amount and availability of gas below the earth's surface), the geologists together with the engineers use this data to plan the best, most cost-effective way to access the reservoir during the production phase.[80] Once the surveys are completed exploratory

74 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13.
75 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 17.
76 American Petroleum institute 2014 www.adventuresinenergy.org.
77 American Petroleum institute 2014 www.adventuresinenergy.org.
78 American Petroleum institute 2014 www.adventuresinenergy.org.
79 See 4.2.
80 American Petroleum institute 2014 www.adventuresinenergy.org.

wells are drilled to determine if the gas is present and, if it is present, whether production will be commercially viable or not.[81] This is the exploration phase. The following environmental impacts may occur, namely an impact on the aquatic life with regard to offshore exploration and impacts on the biodiversity with regard to onshore seismic surveys.

Different types of drilling rigs are used during the production or operational phase. The land-based drilling rig is the most commonly used for the extraction of onshore gas,[82] whereas offshore extraction uses specially designed rigs which may be mounted on ships. These rigs can either float or be attached to the ocean bottom using traditional mooring and anchoring systems. The "drilling derrick" is used both onshore and offshore in order to position and support the drill string.[83] These rigs consist of a drill bit which uses conically shaped cutting surfaces to grind rock into particles. With regard to onshore drilling, drilling mud is added to the hole. The weight of the drilling mud keeps the hole open and cools the drill bit. Chemicals are added to the mixture.[84] This mixture also helps to release the pressure of any gas or fluids encountered along the way, to prevent a well from exploding.[85] Both onshore and offshore operations make use of casings during the drilling process. A casing made of steel is lowered into the hole and cemented into place.[86] The casing keeps the borehole open so that natural gas can be brought to the surface. The casing prevents gas and underground salt water from mixing, with regard to offshore gas extraction, and in the case of onshore drilling from entering and contaminating the

81 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13.

82 Getches-Wilkinson Center for Natural Resources, Energy, and the Environment 2014 www.oilandgasbmps.org.

83 The drill string consists of lengths of pipe fastened to one another and to the drill bit. The drill string transmits power from the top drive to the drill bit. Also see Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13.

84 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13 states that, for example, "Hydrofluoric acid, formic acid and acetic acid are also used, together with hydrochloric acid, depending on the type of rock or minerals in the reservoir. Hydrofluoric acid is always combined with one of the other three acids, and was originally used to dissolve sandstone. It is often called "mud acid", as it is now used to clean perforations which have been plugged with drilling mud and to restore damaged permeability near the well hole. Formic and acetic acids are used in deep, ultra-hot limestone and dolomite reservoirs and as breakdown acids prior to perforation. Acetic acid is also added to wells as a neutralizing buffer agent to control the pH of well stimulation fluids. Almost all acids have additives, such as inhibitors to prevent reaction with the metal casings and surfactants to prevent formation of sludge and emulsions."

85 Getches-Wilkinson Center for Natural Resources, Energy, and the Environment 2014 www.oilandgasbmps.org.

86 American Petroleum institute 2014 www.adventuresinenergy.org.

groundwater.[87] Cement is then pumped into the area between the casing and the side of the well. As the casing and the liner must remain in a well for quite an extensive period and their repair or replacement is rather costly, another string of pipes is placed in the well, through which gas is usually produced.[88] Nothing other than natural gas may enter the well.[89] A "Christmas Tree" is a device that is placed on the well at the surface.[90] It regulates the flow from the well into the pipelines that take the natural gas to facilities for processing and sale.[91]

Before any production can be undertaken, the site must be prepared, which may include amongst other things provision for bush clearing, road construction, docks, landings, the construction of “maintenance, housing and administrative facilities, gas and water separation equipment, gas transport, water and waste disposal facilities.”[92]

Natural gas must be separated from the other components before the gas can be sent to market. Gas may be removed by processing or burning.[93] Offshore, the sea water separated from the gas is tested to make sure that it does not contain any impurities that could harm marine life, and is then released into the ocean. The fact that most offshore platforms are situated in areas rich in marine life attests to the safety of this approach.[94] All aspects of the drilling operations must therefore be closely monitored to ensure efficient drilling and safety.[95] With regard to onshore activities, the air quality may be impacted should the methane or chemicals erupt

87 Getches-Wilkinson Center for Natural Resources, Energy, and the Environment 2014 www.oilandgasbmps.org.
88 American Petroleum institute 2014 www.adventuresinenergy.org.
89 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13, states: “Natural gas from gas and gas condensate fields is processed in the field to meet specific transportation criteria before being compressed and fed into gas pipelines. This preparation includes removal of water with driers (dehydrators, separators and heaters), oil removal using coalescing filters, and the removal of solids by filtration. Hydrogen sulphide and carbon dioxide are also removed from natural gas, so that they do not corrode pipelines and transportation and compression equipment. Propane, butane and pentane, present in natural gas, are also removed before transmission so they will not condense and form liquids in the system.”
90 Getches-Wilkinson Center for Natural Resources, Energy, and the Environment 2014 www.oilandgasbmps.org.
91 American Petroleum institute 2014 www.adventuresinenergy.org.
92 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13.
93 American Petroleum institute 2014 www.adventuresinenergy.org.
94 See 4 and 5.
95 See 5.

and lead to flaring. Due to the need to replace the casings, waste or even hazardous waste may also be generated.[96]

During the production process the following environmental impacts may occur, namely soil and water pollution following on gas leaks on land or in the sea, the escape of methane into the air, the hazardous chemicals that are mixed into the drilling mud may contaminate water on land and therefore impact on biodiversity or on marine life, and there is also the possibility of fires.[97]

During the production or operational phase, the extraction process must be performed in line with all the conditions, licences and legal requirements obtained. The licences that may be required include a water use licence or a waste management licence, for instance, if the production is executed on land. Apart from the licences, a gas company has a duty of care and must prevent contamination and reduce pollution whether on land or at sea.[98] The last phase is known as the closure or rehabilitation phase.[99] During this phase the company must comply with all the legal obligations and measures regarding the rehabilitation of the environment.[100] Harmful products and substances involved in the process should be monitored and managed throughout their life cycle.[101] In this phase the "wells are typically plugged with cement to prevent flow or leakage to the surface and to protect the underground strata and water. Equipment is removed and the sites of abandoned wells are cleaned up and returned to normal conditions."[102] The environmental impacts following on closure will mostly relate to post-closure pollution and ecological degradation.

After exploring the difference between conventional and unconventional gas and the life cycle approach as well as the impacts gas exploration and production may have on the environment, it is necessary to refer to the various policy documents in South

96 American Petroleum institute 2014 www.adventuresinenergy.org. See 5.
97 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 14.
98 See 5.
99 Nel and Kotzé in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 14. See 6.
100 See 6.
101 See 6.
102 Krause in Mager Stellman (ed) *Encyclopaedia of Occupational Health and Safety* 13.

Africa to determine if they make reference to gas exploration and production as an alternative source of energy. It is also necessary to determine if they address the environmental impacts these activities may have, and if they propose any measures in this regard.

3 Policy framework

The policy framework in relation to gas exploration consists of three important policies, the WPEP, the WPRE and the NCCRWP, which will be discussed in the following paragraphs.

3.1 The White Paper on the Energy Policy of the Republic of South Africa

The WPEP states that the successful exploitation of onshore and offshore gas would contribute to the growth of the economy[103] as well as provide a sufficient alternative to coal and oil. According to the WPEP it is therefore necessary to introduce an effective energy-regulatory framework in order to ensure the successful exploitation of these onshore and offshore gas resources.[104]

The WPEP first elaborates on what the policy framework entails.[105] According to the WPEP the responsibility lies with South Africa's government to ensure environmentally sustainable exploration and development of the natural gas resources to the benefit of all South Africans.[106] To ensure this the government will need to perform regulatory functions in respect of gas exploration, and promote the development of South Africa's gas resources by guaranteeing the consistence, stability[107] and international competitiveness of the tax regime and contractual arrangements.[108] Private sector investments and expertise in the extraction and development of the country's gas resources are also of paramount importance. The government furthermore has to promote research and technology in order to stimulate the development of South Africa's gas resources, retain the rights to

103 See 2.3.
104 WPEP 6.
105 WPEP 64.
106 Kidd *Environmental Law* 311.
107 WPEP 73.
108 WPEP 72.

natural gas offshore, establish integrated and holistic environmental management regarding onshore and offshore gas exploration and production activities, and ensure that the "polluter pays" principle is applied in the regulation and enforcement of environmental impact management measures and standards.[109]

The WPEP underlines the environmental benefits arising from natural gas as a source of energy.[110] These benefits will include[111] reduced GHG emissions, low particulate emissions, and high energy efficiency in combined-cycle applications. Gas-fired generation plants furthermore require less space than conventional coal-fired plants of the same capacity. There are numerous key policy challenges[112] facing the government, such as to ensure that gas transmission, storage and distribution operators do not adopt a monopolistic approach. A further challenge would be for the government to deal with all the international issues regarding gas transmission pipelines and trade, and to develop gas governance systems as well as the dimensions for these to operate.[113]

A regulatory regime where policies regarding the gas industry are being stated explicitly would assist the participants in the gas industry, which include potential participants and investors. The WPEP proposes that all functions regarding the transmission, storage, distribution and merchandising of gas should be implemented as separate undertakings which would require separate licences.[114] This would result in an increase in investor confidence and would promote industrial development.[115]

The WPEP states that interests in more than one element of the gas exploration and production process may be permitted in order to facilitate project development from the producer through transmission to distribution.[116] The WPEP proposes that in the event of the existence of common interests the licensing of such companies should be subject to the proof of functional separation between the companies. Therefore

109 Kidd *Environmental Law* 311.
110 See 2.1.
111 WPEP 73.
112 WPEP 73.
113 Kidd *Environmental Law* 311.
114 See the discussion on the *Gas Act* in chapters 4 and 5.
115 WPEP 74.
116 WPEP 75.

the WPEP proposes that distributors should be awarded licences for particular geographic areas to market a class of gas to small gas consumers. Licenced distributors will thus be required to deliver service to a particular standard as well as to disclose their operating information.[117]

Some countries have chosen to restrict the usage of gas to certain applications, as gas reserves may be limited and should be conserved. The WPEP states that such constraints have limited the growth of gas markets and hence the rate of production in the past, so no limitations will be placed on gas utilisation in South Africa.[118]

The WPEP therefore stresses the importance of the exploration and production of gas, but also indicates the possible constraints that should be considered when such ventures are to be undertaken.

3.2 The White Paper on Renewable Energy

The White Paper on Renewable Energy's views on the importance of incorporating and developing renewable energy into South Africa's energy mix are extremely relevant in terms of reducing GHG emissions, for example. The government's vision for the role of renewable energy in its energy economy is: "an energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy throughout South Africa, thus contributing to sustainable development and environmental conservation." With a never-ending demand for energy and growing environmental concerns regarding fossil fuels, the development of renewable energy supply schemes is important for promoting the diversity of domestic energy supplies[119] and avoiding energy imports. Although gas is not regarded as a source of renewable energy, this may explain the sudden interest in gas exploration on land, for it may prove to be a solution for the energy

117 WPEP 75.
118 WPEP 76.
119 Regarding the domestic use of energy, the government is promoting the use of other kinds of energy in households, such as gas. The use of gas in households has the advantage of decreasing air pollution emissions, compared with burning coal or wood. Many campaigns were launched during the 2006 electricity crisis to urge people to switch to gas. A recent study showed that 89% of those households which had converted to gas continued to use it after the crisis. Gas has therefore proven itself to be a safe option for people to use in all areas, from rural and informal settlements to the suburbs. Kidd *Environmental law* 215.

crisis[120] and may provide the possibility for South Africa to move away from coal-based energy. Gas will contribute to the WPRE's objectives to promote the move towards "greener" energy in order to reduce the negative impacts of a coal-based energy base through reducing the emission of GHG, for instance.[121] This was given added impetus by the Johannesburg Plan of Action of 2002, which included the following goals:

> Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost effective energy technologies, including fossil fuel technologies and renewable energy technologies, [and] with a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognising the role of national and voluntary regional targets.[122]

The potential shift to natural gas as a significant contributor to the energy mix needs to be evaluated within the context of the availability of local and regional gas reserves. The WPRE indicates that the energy content of the known gas reserves is a fraction of that of the known coal reserves. But even if the exploitation of gas could not entirely negate South Africa's dependency on coal, it could prove to be a worthy contender, should it be promoted together with other energy resources.[123]

The move towards "greener" energy will be successful only if a properly managed plan of action is implemented that will provide efficient incentives and support for the sustainability of the gas exploration industry. An important aspect that must be considered with regard to gas exploration is that new energy technologies often have higher investment costs, but their operation and maintenance costs are significantly lower than the fossil-based energy technologies.[124] This has the result that numerous new energy technologies cannot compete on a cost effective basis with

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120 The WPRE defines the term "renewable energy" as follows: renewable energy harnesses naturally occurring non-depletable sources of energy, such as solar, wind, biomass, hydro, tidal, wave, ocean current and geothermal, to produce electricity, gaseous and liquid fuels, heat or a combination of these energy types.

121 Natural gas is generally considered to be a "cleaner fuel" as it produces lower GHGs than coal and oil. WPRE 21.

122 WPRE 1.

123 Strydom and Surridge in Strydom and King *Fuggle and Rabie's Environmental Management in South Africa* 2.

124 Strydom and Surridge in Strydom and King *Fuggle and Rabie's Environmental Management in South Africa* 779.

South Africa's fossil-based energy technologies.[125] On the other hand, recent significant cost reductions with regard to new energy technologies have made it easier for new energy incentives to compete with fossil based energy technologies.[126]

Factoring new types of energy into South Africa's energy base is naturally the objective and goal of the WPRE.[127] Key issues that must be evaluated regarding the incorporation of gas as a "greener" energy source are some of the following. The technology related to new types of energy remains expensive compared with that related to conventional bulk energy supplies that are used by rural areas or industries. Cost-effective methods must therefore be explored in order to make gas a viable and competitive substitute for coal.[128] The WPRE further focuses on the need for financial,[129] legal, regulatory and organisational challenges[130] to be overcome for the successful implementation of "greener" energy in the form of gas, and to develop the international[131] and national market for it. Open access to crucial energy infrastructure such as the national electricity grid, certain liquid fuels and gas infrastructure must be ensured to achieve implementation successfully.[132]

Further mechanisms are introduced by the WPRE to promote and develop the incorporation of new types of energy sources into industries and domestic environments. These mechanisms are known as financial and fiscal instruments, as well as legal instruments. The main goal of these financial and fiscal instruments, according to the WPRE, is to develop and urge the implementation of sustainable

125 Kidd *Environmental law* 215.
126 Strydom and Surridge in Strydom and King *Fuggle and Rabie's Environmental Management in South Africa* 780.
127 WPRE 3.
128 Government will promote the incorporation of all stakeholders in energy governance with the objective of achieving equitable and sufficient participation. WPRE 22.
129 Pricing policies will be based on an efficient assessment of the entire economic, social and environmental costs and potential benefits of policies, plans, programmes, projects and activities of energy production and utilisation. WPRE 23.
130 Government will provide functions within the constitutional framework to aid institutions and spheres of government to sufficiently achieve their goals and targets of a function within the context of energy policy. WPRE 11.
131 Government must be aware of its shared responsibility towards global and regional issues and act according to the principles contained in relevant policies and applicable regional and international agreements. WPRE 12.
132 Equitable access must be adequately provided for people to have access to basic services in order to meet their needs and ensure human wellbeing. Each generation has a responsibility not to infringe future generations' rights in order to satisfy their present wellbeing. WPRE 12.

energy by way of establishing financial and fiscal instruments. Further objectives to achieve and support the above mentioned goal entail the following: to ensure that a substantive amount of national resources are invested in new types of energy technologies in proportion to their potential and investments in other energy supply options.[133] Furthermore to broaden present state financial support strategies and institutions by developing innovative approaches to the establishment of financing mechanisms for providing new energy systems as well as to facilitate the creation of an investment to attract foreign and local investors.[134]

An analysis of the present financial system and an evaluation of the implementation barriers new types of energy face determine the opportunities for appropriate financial[135] and fiscal instruments/incentives[136] in order to stimulate the development of new, cleaner energy technologies.

The rapid growth of the energy industry may deliver social, economic and environmental benefits to South Africa.[137] The successful incorporation of new types of energy sources that can compete on an international level will have the prospects of attracting investments among the global community.[138] On a national level, the introduction of new types of energy, such as gas, has the potential to instigate industrial development and employment opportunities through establishing industrial development that may prove to be more cost effective and thus prove to be a competitive commodity internationally.[139]

The WPRE proposes methods to minimise the effect of climate change and to explore other ways of generating energy (such as the use of gas, although this is not a renewable source of energy) apart from South Africa's primary dependence on coal.[140] What is of importance is that this White Paper clearly indicates government's

133 Kidd *Environmental law* 213.
134 Kidd *Environmental law* 215.
135 Financial instruments would be subsidies and green certificates, for example. WPRE 23.
136 Fiscal instruments would include low interest loans and tax rebates, for example. WPRE 23.
137 Strydom and Surridge in Strydom and King *Fuggle and Rabie's Environmental Management in South Africa* 780.
138 Kidd *Environmental law* 213.
139 Strydom and Surridge in Strydom and King *Fuggle and Rabie's Environmental Management in South Africa* 778.
140 See 2.1.

commitment towards the introduction of greener options of energy as part of the South African energy mix.

As the WPRE indicates that the use of gas may contribute to minimising the effects of climate change, it is necessary to discuss the NCCRWP.

3.3 The National Climate Change Response White Paper

> The average temperature of the Earth has been increasing more than natural climatic cycles would explain. This episode of "global warming" is due to human activity. It began with the industrial revolution, two centuries ago, and accelerated over the last 50 years. Fossil fuel burning is mostly responsible, because it releases gases (particularly carbon dioxide) that trap infrared radiation. This "greenhouse effect" creates a whole system disturbance, that we call climate change.[141]

The NCCRWP stresses that the chief cause of climate change is human activity.[142] This is why there is urgency in the quest to find methods to repair the historic damage as well as to implement measures to reduce present and future actions which have caused climate change (the use of coal-based energy, for example) which people have become so accustomed to.[143] The NCCRWP promotes an economy that is fuelled by cleaner forms of energy.[144] Gas may prove to be an alternative to South Africa's popular and harmful coal-based energy,[145] as gas exploration and production activities may have a positive impact in contributing to the NCCRWP objective of addressing climate change and finding ways of reducing GHG emissions in South Africa.

South Africa follows an integrated approach[146] with regard to addressing the issue of climate change by making use of adaptation and mitigation methods to ensure climate change resilience. The reduction of GHG emissions will be successful only

141 GRIDA date unknown www.grida.no.
142 Kyoto Protocol 1997.
143 NCCRWP 5.
144 Richardson (ed) *Local Climate Change Law* 82.
145 Strydom and King *Fuggle and Rabie's Environmental Management in South Africa* 2.
146 Rumsey and King in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 1065.

should mitigation and adaptation work together to ensure climate change resilience.[147]

Adaptation and mitigation are key themes discussed in all climate change-related conferences, treaties and negotiations.[148] As South Africa is particularly vulnerable to the impacts of climate change[149] the incorporation of adaptation measures in national policy relating to environmental governance is crucial. If a proposed activity has the capacity to contribute to the effects of climate change either negatively or positively, the activity needs to be assessed. It would therefore be necessary to determine how gas exploration and production ventures impact on climate change in order to determine what adaptation and mitigation measures would be needed. Adaptation is defined by the Intergovernmental Panel on Climate Change (IPCC) as "the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities."[150]

The NCCRWP focuses on various adaptation issues such as water, agriculture, health and biodiversity.[151] All of these issues may directly be linked to the gas exploration and production activities, depending on whether they will be undertaken on land or at sea.[152] People in rural areas mostly rely on ground water, springs and rivers. Private industries thus have the responsibility, in the planning phase, to consider what the long-term effect of a gas exploration activity on the people, ecosystems and economy may be.[153] Possible impacts include, for example, fishermen no longer being able to rely on their marine stocks for a living. Accidents during the production process may cause severe harm not only to the environment

147 NCCRWP 17.
148 Lyster (ed) *In the Wilds of Climate Law* 43.
149 South Africa's vulnerability with regard to health, to the provision of water, in its rangelands, its maize farms, its commercial forestry and its biodiversity. The Western Cape would experience impacts on issues such as water resources, the coastal ecology and biodiversity. It is important to note that pipelines at the coast may be impacted by climate change. Rumsey and King in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 1048-1062.
150 IPCC 2001. See also IPPC *Report: Climate Change 2014 Impacts, Adaptation and Vulnerability* (released 30 March 2014) http://www.ipcc.ch/report/ar5/wg2/.
151 NCCRWP 14.
152 See 2.1.
153 See 4.1 and 4.2.

but also to human health and well-being.[154] The agricultural sector is the largest consumer of water in the land and would be very vulnerable should a gas exploration activity take place near an agricultural area.[155] If a development is near an agricultural area, it may negatively impact on farmers, as they need the water for irrigation purposes. In the short term, industries have a responsibility to make sure that the farmers or any other community near a development will have access to sufficient and "safe" water; in other words, water that is not harmful to their well-being.[156] When climate change occurs, that would mean that there would be even less water available, and there are unlikely to be additional or alternative water sources. It is therefore necessary to determine the long-term effect of gas exploration and production in the light of possible climate change. For example, will future land users have enough water or usable water once the gas venture is no longer in operation.

Biodiversity and ecosystems are also very vulnerable[157] and therefore it is necessary for industries to be aware of the consequences of their proposed gas ventures for ecosystems in the long run, especially in the light of possible climate change. Industries may, for example, have a duty to rehabilitate and restore natural systems in order to improve their resilience to the impacts of climate change.[158]

Gas companies will therefore have to take the possible impacts of climate change into account when planning for rehabilitation.[159] It has to be kept in mind that the environment can never be rehabilitated to the way it was, but a gas company would have to attempt to rehabilitate it so that it would once again be a people-friendly habitat with no pollution or ecological degradation.[160]

The negative impacts of climate change further include the deterioration of the socio-economic standing of the most vulnerable communities, as climate change may have

154 On 20 April 2010 an explosion on the Deepwater Horizon drilling rig killed 11 men and sent millions of gallons of oil gushing into the Gulf of Mexico, resulting in an environmental disaster. Carus and Warden 2010 www.theguardian.com.
155 Vidic, Brantley and Abad *et al* 2013 *Science* 6134.
156 NCCRWP 17.
157 NCCRWP 19.
158 NCCRWP 19. See 6.1 and 6.2.
159 NCCRWP 15.
160 See 6.

consequences in terms of food security and the nutritional status of individuals within these communities.[161] This may be true with regard to food found on land or in the marine environment. Air pollution by the methane emitted during the gas extraction process will contribute to an increase in GHG, which may result in harming the surrounding community's health or the environment.[162] Industries therefore have a responsibility to reduce their emission of GHGs[163] and to operate in such a manner that they do not cause serious harm, and this responsibility may affect an industry financially.

The long-term plans of South African industries may have to include the introduction of new technology for energy generation. It is a fact that for the foreseeable future, oil and coal will continue to be relied on for the energy needs of companies, for economic development, and for domestic use.[164] However, companies must plan to develop non-carbon energy sources or other "greener" energy sources such as gas to reduce their reliance on fossil fuels which emit GHGs. Technology development[165] and licensing would therefore be important issues to address mitigation according to the NCCRWP. The private sector, therefore, has to increase the momentum of its research and development in carbon mitigation and clean technology in energy generation, alongside the efforts undertaken under the UNFCCC.[166]

Market-based instruments[167] such as tax incentives may be regarded as key motivators for industries to switch to other forms of energy such as gas in their production and operating systems. An example of a tax incentive is the regulations on the Allowance for Energy Efficiency Savings (AEES),[168] for example. The introduction of additional tax incentives or disincentives in the case of gas exploration and production activities when they use specific technology may for example motivate industries to introduce gas as an alternative form of energy.

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161 NCCRWP 18.
162 See 2.1
163 NCCRWP 13.
164 Strydom and King *Fuggle and Rabie's Environmental Management in South Africa* 779.
165 NCCRWP 45.
166 NCCRWP 44.
167 NCCRWP 39.
168 Allowance for Energy Efficiency Savings 2013 - GN R 971 in Government Gazette 37136 9 December 2013.

The NCCRWP stresses the importance of the introduction of measures to adapt to or to mitigate climate change or to move towards climate change resilience, for example, by introducing new or other forms of energy or new technology. The NCCRWP does not spell out how climate change resilience is to be achieved, but indicates the programmes that need to be followed, as well as stating that all laws and policies will have to be adapted. The policy framework indicates only what needs to be done and not how it is to be done, but states that legislation and policies have to be adapted to address climate change issues.

It is now necessary to determine if the energy and environmental legislation addresses the goals contained in the policy documents, such as environmental protection during the gas life cycle.

4. Exploration phase

The energy and environmental regulatory framework contains various provisions and requirements with regard to the initial phase of developing gas activities. In this section the energy and environmental provisions and requirements regarding onshore and offshore gas exploration will be discussed,[169] as the first phase in the life cycle of a gas venture. This discussion will be followed by a discussion of the production and closure phases. The legislation applicable to onshore and offshore differ and therefore a distinction between onshore and offshore exploration will be made. In the case of offshore gas exploration, only laws that apply additionally to the onshore gas exploration laws will be discussed. Onshore gas exploration will be discussed first.

4.1 Onshore gas exploration

As indicated,[170] gas reconnaissance and exploration activities may have an impact on biodiversity. In the following paragraphs the regulation of the reconnaissance and exploration activities will be discussed, as well as legislation referring to biodiversity.

169 Reference will be made to present and future environmental and energy law, to sketch a realistic view of the existing position as well as the direction in which the legislature may be steering.

170 See 2.

4.1.1 Authorisation of reconnaissance and exploration activities

The definition in the MPRDA of "petroleum" includes gas:

> "petroleum" means any liquid, solid hydrocarbon or combustible gas existing in a natural condition in the earth's crust and includes any such liquid or solid hydrocarbon or combustible gas, which gas has in any manner been returned to such natural condition, but does not include coal, bituminous shale or other stratified deposits from which oil can be obtained by destructive distillation or gas arising from a marsh or other surface deposit.

As indicated above,[171] gas exploration can be undertaken onshore or offshore. The application for gas reconnaissance and exploration activities is dealt with in Chapter 6 of the MPRDA, headed "Petroleum exploration and production."[172] The Act distinguishes between a reconnaissance permit,[173] a technical cooperation permit[174] and an exploration right.[175] The application for a reconnaissance permit will be discussed first.

Any person who wishes to apply to the Minister for a reconnaissance permit must lodge the application at the office of the designated agency,[176] in the prescribed manner,[177] together with the prescribed application fee.[178] The designated agency must accept an application for a reconnaissance permit if no other person holds a technical co-operation permit, exploration right or production right for gas over any part of the area.[179] The Minister must issue a reconnaissance permit if the applicant has access to financial resources and has the technical ability to conduct the

171 See 4.
172 Section 69 to 90 MPRDA.
173 "Reconnaissance operations" refers to "any operation carried out for or in connection with the search for a mineral or petroleum by geological, geophysical and photo geological survey and includes any remote sensing techniques, but does not include any prospecting or exploration operation" section 1 MPRDA.
174 Issued in terms of section 76.
175 Section 1 of the MPRDA defines an exploration right as the "re-processing of existing data, the acquisition and processing of new-found seismic data or any other related activity to define a trap to be tested by drilling, logging and testing, including extended well testing of a well with the intention of locating a discovery." Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.
176 Section 74(1)(a) MPRDA.
177 Section 74(1)(b) MPRDA.
178 Section 74(1)(c) MPRDA.
179 Section 74(2)(b) MPRDA.

proposed reconnaissance survey,[180] and on the condition that the reconnaissance will not cause unacceptable pollution, ecological degradation or damage to the environment.[181] The applicant must also have the ability to comply with the relevant provisions of the MHSA[182] as well as any relevant provision of the MPRDA.[183] If the designated agency accepts the application, the designated agency must notify the applicant in writing to submit the relevant environmental reports in terms of NEMA[184] and to notify and consult with any affected party.[185] Once the reconnaissance permit is granted, the holder of such a permit is obliged to actively conduct reconnaissance operations in the relevant area in accordance with the reconnaissance programme[186] and comply with the terms and conditions of the permit, as well as all relevant provisions of the MPRDA and any other law.[187] If the application does not comply with the requirements of this section, the designated agency must notify the applicant in writing together with the reasons for the refusal and return the application.[188]

Sometimes gas exploration companies will also apply for technical cooperation permits. Technical cooperation is necessary where large areas have to be surveyed and where it is too expensive to do it alone. Technical cooperation also allows the company access to records held by the Department of Mineral Resources. The process that must be followed in order to apply for a technical co-operation permit is very similar to the process of applying for a reconnaissance permit.[189] After reviewing the applicant's application, the Minister may issue a technical co-operation permit if the Minister is satisfied that the applicant has access to financial resources and has the technical ability to conduct the proposed technical co-operation study,[190] that the applicant's estimated expenditure is compatible with the intended

180 Section 75(1)(a) MPRDA. Subsection (a) has been replaced by section 54 of the MPRDAA 49 of 2008.
181 Section 75(1)(c) MPRDA. Subsection (c) has been replaced by section 54 of the MPRDAA 49 of 2008.
182 Section 75(1)(d) MPRDA.
183 Section 75(1)(e) MPRDA.
184 Section 74(4)(a) MPRDA.
185 Section 74(4)(b) MPRDA. Subsection (4) has been replaced by section 53 (d) of the MPRDAA .
186 Section 75(5)(a) MPRDA
187 Section 75(5)(b) MPRDA.
188 Section 74(3) MPRDA. Subsection (3) has been replaced by section 53 (c) of the MPRDAA.
189 Section 76 MPRDA.
190 Section 77(1)(a) MPRDA.

technical co-operation study and the duration of the technical co-operation programme,[191] and that the applicant is not in contravention of any relevant provision of the Act.[192] Once the Minister grants the permit, the holder of a technical co-operation permit has the exclusive right to apply for and be granted an exploration right in respect of the area to which the permit relates.[193] The holder of a technical co-operation permit must actively carry out the technical co-operation study in accordance with the technical co-operation work programme[194] and comply with the terms and conditions of the technical co-operation permit, the relevant provisions of the Act, and any other law.[195]

Any persons or companies that wish to conduct gas exploration ventures may apply for an exploration right by lodging their applications at the office of the Petroleum Agency SA (Pty) Ltd (hereafter PASA,[196] in future the Regional Manager), in the prescribed manner,[197] including a prescribed non-refundable application fee.[198] The application has to be accompanied by a plan of the land requiring the exploration right.[199] The Regional Manager will accept an application for an exploration right if all of the above mentioned requirements are met[200] and if no other person holds a technical co-operation permit,[201] exploration right or production right[202] for petroleum

191 Section 77(1)(b) MPRDA.
192 Section 77(1)(c) MPRDA.
193 Section 78(1) MPRDA.
194 Section 78(2)(a) MPRDA.
195 Section 78(2)(b) MPRDA.
196 PASA has been designated by the government as the official agency responsible for the promotion and regulation of South Africa's petroleum resources. PASA promotes the exploration for onshore and offshore oil and gas resources and their optimal development on behalf of government. The Agency regulates exploration and production activities, and acts as the custodian of the national petroleum exploration and production database. Its role was statutorily endorsed in June 2004 in terms of the MPRDA section 71 and regulation 2(1) of the MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004). The MPRDAB [B15B-2013] will repeal PASA and designate all duties to the Minister or Regional Manager depending on the circumstances.
197 Section 79(1)(b) MPRDA states that the application has to comply with Form M contained in Annexure I of the MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004).
198 Section 79(1)(c) MPRDA. In terms of regulation 75(2)(c) of the MPRDA regulations the application fee for an exploration right is R500 (onshore) and R1000 (offshore).
199 The plan has to comply with the generally accepted standards and information prescribed in regulation 2(2) of the MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004).
200 Section 79(2)(a) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.
201 A technical co-operation permit entitles the holder to apply exclusively for and be granted an exploration right in respect of the area to which the permit relates. Section 78(1). Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.

or gas over any part of the area.[203] If the application does not comply with the prerequisites, the Regional Manager must notify the applicant of the receipt of the application accompanied by written reasons within 14 days of the application.[204] If the Regional Manager accepts the company's application, he or she must notify the applicant to notify any affected party[205] and to submit a report indicating compliance with the environmental authorisation.[206] After accepting the applicant's application the Regional Manager has to make it known that an application for an exploration right has been received[207] and that all interested and affected parties may submit any comments regarding the application within 30 days.[208] If any objections arise from the affected parties, the Regional Manager is required to refer the objection to the Regional Mining Development and Environmental Committee (hereafter the RMDEC) to evaluate the substance of the objections and advise the Minister thereon.[209]

The Minister may then proceed to grant the exploration right if the applicant has access to financial resources[210] and has the technical ability to conduct the proposed exploration operation optimally in accordance[211] with the exploration work programme.[212] The estimated expenditure must furthermore be compatible with the

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202 The granting of a production right takes place to enable the holder to undertake production operations in respect of petroleum. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-27.

203 Section 79(2)(b) MPRDA.

204 Section 79(3) and section 71(b) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.

205 Section 79(4)(a) MPRDA. A registered interested and affected party is entitled to comment, in writing, on all submissions and draft reports made to the authority in charge by the applicant or the environmental assessment practitioner. The party may raise issues believed to be of significance regarding the application.

206 Section 39 regulating the EMP in terms of of the MPRDA (dealing with mine environmental management in future environmental programmes in terms of section 24 of NEMA) was repealed and transferred to chapter 5 of NEMA (s 24N) in terms of the MPRDAA. See 1 and 2. Section 79(4)(b) MPRDA.

207 Section 69(2) read together with section 10(1)(a) and section 71(b) MPRDA.

208 Section 69(2) read together with section 10(1)(b) and section 71(b) MPRDA.

209 Section 69(2) read together with section 10(2) and section 71(b) MPRDA

210 Truter 2013 *Without Prejudice* 20-21.

211 Section 80(1)(a) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.

212 Section 1 of the MPRDA defines an exploration work programme as the approved programme that indicates the petroleum operations to be conducted on the exploration area during the timeframe of the granted exploration right, including the details regarding the different activities, phases, and equipment to be used and estimated expenditures. See also regulation 30(1) and (2) of the MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004).

intended operation and the duration of the exploration work programme[213] for which the Minister is requested to issue an environmental authorisation.[214] The ability of the applicant to comply with the applicable provisions of the MHSA,[215] any other relevant provisions of the MPRDA[216] and the terms and conditions of the technical co-operation permit, if applicable, will also be evaluated.[217] If the applicant's application does not meet the above mentioned requirements, the Minister is not allowed to grant an exploration right.[218] If this is the case, the Minister must inform the applicant of his/her decision and the reasons for the decision.[219] An exploration right is subject to the terms and conditions set out by the MPRDA and is valid for the period specified in the right, which will not exceed three years.[220]

Once the Minister has granted the application, this right entitles the applicant to bring onto the land any plant, machinery or equipment, and to construct or lay down any surface;[221] also to explore on or under that land for gas for which such a right has been granted[222] and remove and dispose of any gas substance found during the applicant's course of exploration.[223] The company or person entitled to such exploration may furthermore carry out any activity related to exploration that does not contravene any of the provisions found in the MPRDA.[224] All of the above mentioned rights regarding the scope of an exploration right will be lawful only if the holder of this right has an exploration right and an EMPr,[225] and has notified the owner or lawful occupier of the land.[226]

213 Section 80(1)(b) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.
214 Section 80(1)(c) MPRDA.
215 29 of 1996. Section 80(1)(d) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9. I acknowledge the role the MHSA plays in the life cycle of a gas exploration activity but for purposes of this study, in particular the restrictions as to length, I have not conducted research into this legislation.
216 Section 80(1)(e) MPRDA.
217 Section 80(1)(f) MPRDA.
218 Section 80(3) MPRDA.
219 Section 80(4) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.
220 Section 80(5) MPRDA read together with regulation 29 of the MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004).
221 Section 5(3)(a) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.
222 Section 5(3)(b) MPRDA.
223 Section 5(3)(c) MPRDA.
224 Section 5(3)(e) MPRDA.
225 Section 5(4)(a) MPRDA. See also Humby 2013 *South African Law Journal* 60-84.
226 Section 4(c) MPRDA.

A company is obliged to conduct its exploration in accordance with its exploration programme,[227] as well as to carry out its activities in accordance with its approved plan and to meet the requirements of the exploration right, the Act, and the conditions in the environmental authorisation.[228]

If any activities are undertaken that are not covered in the process but that are listed activities in terms of the NEMA EIA Listing Notices (GN R544 and 545 of 18 June 2010),[229] the gas production company must obtain additional environmental authorisations before these activities may commence (for example the building of roads).

Imminent changes to South Africa's gas regulatory framework could have a significant impact on gas development, should industry be allowed to proceed with exploratory drilling. The MPRDAB has attracted some concern, especially regarding the disbanding of PASA as an independent sector regulator. The MPRDAB delegates all functions of the PASA to the Regional Manager at regional level, which would have some practical implications should the gas sector move forward with exploration and development.[230] Exploration areas for gas development can cover more than one region, with current applications for gas exploration spanning numerous provinces.[231] This means that gas companies will have to submit the same application to several regional managers. In other words, once a right is granted, companies will have to submit their data, reports and samples for one project to more than one regional manager. There will be no single point of entry and compliance requirements will be inconsistent, which is why an independent petroleum regulator is recognised as best practice worldwide. In the light of the possible development of the natural gas sector, PASA should be retained.[232]

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227 Section 78 MPRDA. The MPRDAB 2013 includes a section stating that a company will have to submit a technical co-operation permit for recording to the Mineral and Petroleum Titles Registration Office.

228 Section 82 MPRDA. The MPRDAB has included a 60-day timeframe in which the applicant can lodge the application at the Mineral and Petroleum Titles Registration Office.

229 In GG 33306 of 18 June 2010.

230 See 2.1.

231 African development report *Oil and Gas in Africa* 36.

232 Moolman 2013 www.miningweekly.com.

4.1.2 Biodiversity

If any activity concerning gas exploration may have the potential to harm species or ecosystems, the NEMBA will be applicable and a company will have to apply for an additional authorisation for the commencement of its activity in terms of the Act. As indicated, the risk during the reconnaissance and exploration activities may be slight, and a more serious risk may exist once construction for production is undertaken.[233] However, the gas exploration activities may have some impact on biodiversity. The Minister lists four qualities of species and ecosystems which must be protected under the NEMBA, such as critically endangered, endangered, vulnerable and protected species and ecosystems.[234] The reason why companies must apply for a permit in order to conduct certain activities such as gas exploration in certain areas is to protect the ecosystems and species which may be harmed. The mere use of machinery during gas exploration may contribute to harming biodiversity by disturbing ecosystems due to the destruction of the ecology of the area where the machinery will be placed and used.[235]

Provisions with regard to the regulation of the issuing of permits authorising restricted activities that may be harmful to species or ecosystems man be found in terms of section 87.[236] A permit to authorise an activity such as gas exploration that may be harmful to ecosystems or certain species must consist of the following details, namely the purpose for which it is issued, the period for which it will remain valid, and any other matters that may be prescribed. An issuing authority may furthermore request the applicant to provide any additional information.[237] The additional information may be in the form of an EIA and/or a risk assessment to be conducted by expert evaluators.[238] The Minister may before granting the application

233 See 2. Companies or individuals must apply for a permit granting them certain rights to engage in activities that may to a certain extent harm the area's biodiversity. Section 57(1) NEMBA.
234 Section 53 NEMBA.
235 See 2.2.
236 Section 87 NEMBA. S 1 defines "restricted activities".
237 Section 88(a) NEMBA.
238 Section 89 NEMBA states that before issuing a permit, the issuing authority may in writing require the applicant to furnish it, at the applicant's expense, with an independent risk assessment or such expert evidence as the issuing authority may determine.

require of the company to comply with certain conditions in order to provide protection to the environment.[239] Based on the assessments provided by the companies the Minister will then accordingly issue a permit unconditionally, or issue it subject to conditions,[240] or refuse a permit.[241] It is important to remember with regard to a permit issued in terms of the NEMBA that it does not absolve the holder or any other person from complying with the provisions of any other law that may prove to be applicable.[242] Therefore the Minister may on the receipt of an application prohibit the carrying out of gas exploration activities that may cause extensive harm to listed species or to the ecological flow of the environment.[243]

The NEMA provides the option of aligning a decision in instances where listed or specified activities require environmental authorisation and an authorisation in terms of another act.[244] Based on a written agreement, authorities may exercise their powers jointly by issuing either separate decisions or integrated environmental authorisations, if all the provisions of all relevant statutes are met. An integrated authorisation can therefore be regarded as an authorisation/permit/licence in terms of a specific environmental management act, for example, NEMBA. The competent authority may regard an approval in terms of another statute to be an environmental authorisation, provided it adheres to section 24(4).

4.2 Offshore gas exploration activities

Several authorisations are also needed for offshore activities, including reconnaissance permits, technical cooperation permits and exploration rights.[245] As indicated, offshore reconnaissance and exploration activities may have an effect on the marine environment, Only the legislation or measures that have not been referred to will be discussed, such as the NEMICMA. In this section the different authorisations relating to offshore reconnaissance and exploration will be discussed as well.

239 Section 88(b) and section 90(1)(c) NEMBA.
240 Section 88(c) and section 90(1)(b) NEMBA.
241 Section 88(d) NEMBA.
242 Section 90(2) NEMBA.
243 Section 57(1) NEMBA.
244 Section 24L NEMA.
245 See 4.1.1.

4.2.1 Authorisations for offshore operations

As indicated, “gas” is incorporated in the definition of petroleum in the MPRDA,[246] and an application for the authorisation of reconnaissance permits, technical cooperation permits and exploration rights for offshore gas must also be made in terms of the MPRDA.[247] The process for a reconnaissance or technical cooperation permit and the application for an exploration right are similar to the application for onshore gas.[248] The scope of other legislative measures will vary due to the difference in impacts on the environment between onshore and offshore gas exploration.[249]

NEMICMA regulates coastal activities in the coastal zone.[250] Where an environmental authorisation for coastal activities[251] is required in terms of Chapter 5 of the NEMA, NEMICMA prescribes additional factors that the authorities should take into account when considering the authorisation, such as the representations made by the applicant and interested and affected parties,[252] past compliance of the applicant regarding similar authorisations,[253] if and to what extent coastal public property,[254] the coastal protection zone[255] or coastal access land[256] will be

246 Section 1 of the MPRDA.
247 See 4.1.1.
248 See 4.1.1.
249 See 4.1.1 and 2.
250 The “coastal zone” is widely defined in s 1 to include “coastal public property, the coastal protection zone, coastal access land and coastal protected areas, the seashore, coastal waters and the exclusive economic zone and includes any aspect of the environment on, in, under and above such area.”
251 Coastal activities are those listed or specified in terms of Chapter 5 of NEMA which take place in the coastal zone Section 1 NEMICMA.
252 Section 63(1)(a) NEMICMA.
253 Section 63(1)(b) NEMICMA.
254 "Coastal public property" means coastal public property referred to in section 7, which consists *inter alia* of coastal waters (“coastal waters” means marine waters that form part of the internal waters or territorial waters of the Republic referred to in sections 3 and 4 of the *Maritime Zones Act* 15 of 1994 respectively), land submerged by coastal waters, the seashore, any admiralty reserve owned by the State, any State-owned land declared to be CPP in terms of section 8 of the NEMICMA and any natural resources in the CPP, the exclusive economic zone (“exclusive economic zone” means “the exclusive economic zone of the Republic referred to in section 7 of the *Maritime Zones Act* 15 of 1994), or any harbour, work or installation owned by an organ of state.”
255 "Coastal protection zone" means “the coastal protection zone contemplated in section 17 to enable the use of land adjacent to CPP or land that plays a role in a coastal ecosystem to be managed, regulated or restricted in order *inter alia* generally to protect the CPP and avoid

affected,[257] the estuarine management plans, applicable coastal management programmes in the area,[258] the socio-economic impact of the activity,[259] the possible impact of the activity applied for on the coastal environment[260] as well as the cumulative impact with existing activities,[261] and the likely impact of coastal environmental processes on the proposed activity.[262] Offshore gas activities will most probably mainly take place in coastal property, but such activities may affect coastal protection zones and estuaries.

The licensing authority is not allowed to issue an environmental authorisation if the activity applied for is situated within a coastal protection zone and is inconsistent with the purpose for which a coastal protection zone is established as set out in section 17,[263] or is likely to cause irreversible or long-lasting damage to any aspect of the coastal environment that cannot be sufficiently mitigated,[264] or is likely to harm dynamic coastal processes[265] or the achievement of any coastal management objective.[266] On the other hand, the competent authority may grant an environmental authorisation, notwithstanding the abovementioned, that does not meet the criteria if the nature of the proposed activity or development requires it to be located within the coastal protection zone,[267] such as the installation of gas pipelines, and if the proposed activity will provide important services to the public in using the coastal protection zone or a coastal protected area.[268] Public interest, according to section 64, is also an important aspect to review with regard to an authorisation that will or

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natural hazards in the coastal zone." According to section 16 NEMICMA the coastal protection zone includes DOO.

256 "Coastal access land" means land designated as coastal access land by the relevant local municipality in a bylaw in order to secure public access to the CPP in terms of section 18(1), read with section 26.

257 Section 63(1)(c) NEMICMA.

258 Section 63(1)(d) NEMICMA.

259 Section 63(1)(e) NEMICMA.

260 Section 1 NEMICMA "coastal environment" means the environment within the coastal zone.

261 Section 63(1)(f) NEMICMA.

262 Section 63(1)(g) NEMICMA.

263 Section 63(2)(b) NEMICMA.

264 Section 63(2)(d) and (e) NEMICMA.

265 Section 63(2)(f) NEMICMA. "Dynamic coastal processes" means all natural processes continually reshaping the shoreline and near shore seabed and includes wind and wave action, currents, tidal action and river flows. Section 1 NEMICMA.

266 Section 63(2)(g) NEMICMA.

267 Section 63(3)(a) NEMICMA.

268 Section 63(3)(b) NEMICMA. A coastal protected area which is defined in the NEMICMA as a protected area is situated wholly or partially within the coastal zone and is managed by, or on behalf of, an organ of state, but excludes any part of such a protected area that has been excised from the coastal zone in terms of section 22 of the NEMICMA.

will not be granted. Although the competent authority has a responsibility to ensure that the issuing of authorisations is consistent with the objectives of the NEMICMA,[269] the insertion of section 3 provides the possibility of free reign in authorising applications by the licensing authority if such an authorisation can be proved to be in the public interest.[270]

According to NEMICMA, a change in circumstances with regard to an authorisation would also require an amendment, revocation, suspension or cancellation[271] in order to meet the Republic's international obligations.[272] The issuing authority may, whenever it is in the interests of the protection or development of the coastal zone, give written notice to the holder of an authorisation of the amendment, revoking, suspending or cancelling of the authorisation.[273] When exercising the power to amend, withdraw or suspend an authorisation, the issuing authority must consider all aspects referred to in section 68 with the necessary changes.[274] The issuing authority must also consult with all Ministers, MECs or municipalities whose areas of responsibility will be affected by the exercise of the powers[275] and must give notice of his/her intention of exercising his/her power.[276] A person who is dissatisfied with any decision taken to issue, refuse, amend, suspend or cancel an authorisation may lodge a written appeal against that decision.[277] It is therefore necessary for gas exploration companies to thoroughly determine the impacts that offshore reconnaissance and exploration activities will have on the environment, such as the

269 Section 63(5) NEMICMA.
270 Section 63(2)(g) read together with section 64 of the NEMICMA that sets out the conditions on which the authority may grant environmental authorisations based on the public interest. The conditions are such as the following - if the activity is in the interests of the community despite the harmful effect it is likely to cause to the coastal zone, provided that irreversible or long-lasting effects must be mitigated as far as possible.
271 Section 68(1)(c) NEMICMA see also Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
272 Section 68(1)(d) NEMICMA.
273 Section 68(4) read together with section 68(5) NEMICMA that says that, should the issuing authority exercise the powers under subsection (4), subsection (2) will be applicable with necessary changes.
274 Section 68(7) NEMICMA.
275 Section 53(1)(a) NEMICMA and Chapter 3 of the Constitution dealing with co-operative governance.
276 Section 53(1)(b), (c) NEMICMA sets out the procedure of going about notifying all possible affected parties in the *Gazette to* invite them, within no less than 30 days of such notice, to submit written representations or objections to the proposed exercise of power, as well as to provide sufficient information to enable members of the public to do so.
277 Section 74 of the principal NEMICMA is amended by substituting subsection (2) for the words preceding paragraph (a) in the Draft NEMICMA Amendment Bill.

presence of ships in the ocean and the use of equipment to produce seismic information, for example.[278] Based on a consideration of the likelihood of precipitating these impacts, a company may have to apply for an authorisation in terms NEMICMA.

4.2.2 Biodiversity

In terms of NEMBA, "biological diversity" or "biodiversity" includes the

> variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.[279]

Thus, the NEMBA will be applicable to any activity concerning offshore gas exploration which may have the potential to harm species or ecosystems such as marine life.[280] A gas company will therefore have to apply for authorisation for the commencement of its activity in terms of this Act. An offshore gas exploration company must apply for a permit in order to conduct certain offshore activities such as gas exploration in order to protect the offshore ecosystems and/or species which may be harmed.[281]

Companies or individuals must apply for permits granting them certain rights to engage in activities that may to a certain extent harm an area's biodiversity.[282] The Minister may require of the company to comply with certain conditions as stated in the discussion of applications for onshore gas exploration in terms of the NEMBA, in order to provide protection to the environment, before it grants the application.[283] It is important to remember with regard to a permit issued in terms of the NEMBA that it does not absolve the holder or any other person from complying with the provisions of any other law that may prove to be applicable to offshore gas exploration.[284]

278 See 2.
279 Section 1 NEMBA.
280 McLean and Glazewski in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 482.
281 See 4.1.5.
282 Section 57(1) NEMBA.
283 Section 88(b) and section 90(1)(c) NEMBA.
284 Section 90(2) NEMBA.

Should the carrying out of gas exploration activities cause extensive harm to listed species or to the ecological flow of the environment, the Minister may on receipt of an application prohibit offshore gas exploration activities.[285]

5. Production phase

If the reconnaissance and exploration phases are completed successfully and all the necessary authorisations have been obtained, the company may move into the operational/production phase. It is during this phase that the most significant environmental impacts may occur.[286] It is again necessary to make a distinction between onshore and offshore operations, as different legislative measures apply. Some legislation may overlap with the planning/exploration phase and will only briefly be referred to.

5.1 Onshore gas production

During the operational phase, production activities may impact on water, air quality and biodiversity, and generate waste, and therefore proper measures pertaining to the transport of gas either by way of pipelines or by road or rail need to be in place. In the following paragraphs the production phase relating to the authorisations a gas company must obtain pertaining to water use, air pollution, waste, biodiversity and transportation will be discussed.

5.1.1 *Pre-construction authorisations*

5.1.1.1 Production right

The holder of an exploration right is entitled to apply for a production right[287] regarding the specific gas exploration area, as well as the right to remove and dispose of any gas samples found during exploration.[288] He or she must lodge the

285 Section 57(1) NEMBA.
286 See 2.
287 Section 82(1)(a) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.
288 Section 82(1)(c) is subject to section 20 of the MPRDA that sets out the provisions regarding the removal of bulk samples.

application at the office of Regional Manager;[289] in the prescribed manner;[290] and together with the prescribed non-refundable application fee.[291] The Regional Manager may accept an application for a production right if no other person holds a technical co-operation permit, exploration right, or production right for gas over any part of the area applied for.[292] The Minister may furthermore grant a production right if the applicant has access to financial resources and has the technical ability to conduct the proposed production operation optimally;[293] the estimated expenditure is compatible with the intended production operation and the duration of the activity;[294] the production will not cause unacceptable pollution, ecological degradation or damage to the environment;[295] the applicant can comply with the relevant provisions of the MHSA;[296] the applicant is not in contravention of any relevant provision of the MPRDA;[297] and the applicant has complied with the terms and conditions of the exploration right.[298] If the application does not comply with the requirements of this section, the Regional Manager must notify the applicant in writing and return the application.[299] If the Regional Manager accepts the application, he or she must notify the applicant in writing, consult with interested and affected parties, to submit environmental reports as required in terms of NEMA for approval within 180 days from the date of the notice in terms of section 39.[300] A production right is subject to prescribed terms and conditions and is valid for the period specified in the right, which periods may not exceed 30 years.[301]

Any holder of a production right who wishes to apply to the Minister for the renewal of a production right must lodge an application.[302] An application for the renewal of a production right must state the reasons as well as the period for which the renewal is

289 Section 83(1)(a) MPRDA.
290 Section 83(1)(b) MPRDA.
291 Section 83(1)(c) MPRDA.
292 Section 83(2)(b) MPRDA. Subsection (2) has been amended and a para. *(c)* has been added by section 61 *(a)* and *(b)* , respectively, of the MPRDAA 49 of 2008.
293 Section 84(1)(a) MPRDA.
294 Section 84(1)(b) MPRDA.
295 Section 84(1)(c) MPRDA.
296 Section 84(1)(d) MPRDA.
297 Section 84(1)(e) MPRDA.
298 Section 84(1)(f) MPRDA.
299 Section 83(3) MPRDA. Subsection (3) has been replaced by section 61 *(c)* of the MPRDAA 49 of 2008
300 Subsection (4) has been replaced by section 61 *(d)* of the MPRDAA 49 of 2008.
301 Section 83(4) MPRDA.
302 Section 85(1) MPRDA.

required;[303] be accompanied by a detailed report reflecting the production results;[304] be accompanied by a report reflecting the extent of compliance with the requirements of the environmental authorisation, rehabilitation to be completed and the estimated cost thereof;[305] and include a detailed production work programme for the renewal period.[306] The Minister may grant the renewal of a production right if the holder of the production right has complied with the terms and conditions of the production right and is not in contravention of any relevant provision of the Act or any other law,[307] the requirements of the prescribed social and labour plan[308] or the prerequisites of the environmental authorisation (previously the EMPr).[309]

5.1.1.2 Environmental authorisations

The gas production company may also have to obtain environmental authorisations in terms of NEMA, as the regulations made under the NEMA identify large-scale or highly polluting activities as requiring both scoping and an EIA report.[310] Drilling for natural gas will trigger listed activities under the NEMA, the most notable being activity 24 of Notice 1 of GN R544,[311] "the transformation of land bigger than 1000 square metres in size to residential, retail, commercial, industrial or institutional use…", and activity 4 of Notice 2 of GN R545,[312] requiring a full EIA, "the construction of facilities or infrastructure for the refining, extraction or processing of gas, oil or petroleum products with an installed capacity of 50 cubic metres or more per day…" therefore including gas pipelines as well, as these pipelines are longer than 1000 metres in length and have a capacity of more than 700 cubic metres.[313]

303 Section 85(2)(a) MPRDA.
304 Section 85(2)(b) MPRDA.
305 Section 85(2)(c) MPRDA.
306 Section 85(2)(d) MPRDA.
307 Section 85(3)(a) MPRDA.
308 Section 85(3)(c) MPRDA.
309 Section 85(3)(d) MPRDA. See also Humby 2013 *South African Law Journal* 60-84.
310 GN R544-545 in GG 33306 18 June 2010.
311 GN R544 in GG 33306 18 June 2010.
312 GN R545 in GG 33306 18 June 2010 – Listing Notice 2 sets out the activities in respect of which the procedure for scoping and an EIA must be followed.
313 GN R545 in GG 33306 18 June 2010 – Listing Notice 2 sets out the activities in respect of which the procedure for scoping and an EIA must be followed.

5.1.1.3 Rezoning

Before an area can be prepared for production, the developer has to determine whether the area has to be rezoned.[314] There are certain procedures that need to be followed in order to rezone the land for use as "mining" or "industrial" land.[315]

The Land Use Planning Ordinance 15 of 1985 (hereafter the LUPO)[316] of the Western Cape, for example, incorporates the notion of future spatial planning by making provision for structure plans. The LUPO governs the control and regulation of land use falling within municipal areas, and came into force in July 1986. The municipal council or the premier is allowed to refuse or grant an application for rezoning by an owner of land, in terms of the LUPO.[317] A rezoning application must be written and handed to the municipal manager, who must ensure that the application is advertised, and if objections are made, must ensure that these are submitted to the applicant.[318] The application and all the relevant documents need to be submitted to the council, which is obliged to notify the owner of any conditions and its decision.[319] A rezoning will be discontinued after two years if the land is not used as permitted by the rezoning. In the case where the land sustains a fall in value as a result of a rezoning contrary to the owner's wishes, compensation may be claimed.[320] Two of the categories for rezoning are mining and industrial.

In determining if an applicant for a production right would require consent from a municipal authority to conduct production operations, it is necessary to determine if the potential production activity will take place on an area which is situated within a certain municipal area, or if the municipality has extended its town planning scheme to incorporate the land on which the production activity will be conducted and has zoned it accordingly.[321] It would be interesting to see if onshore production would be

314 Van Wyk *Planning Law* 362.
315 The development will have to coincide with the municipal Integrated Development Plans. Van Wyk *Planning Law* 327.
316 To be repealed by the *Western Cape Land Use Planning Act* 3 of 2014 - PN 99 in PG 7250 of 7 April 2014.
317 Section 6 LUPO.
318 Section 11 LUPO.
319 Humby 2013 *South African Journal on Human Rights* 651-665.
320 Van Wyk *Planning Law* 344.
321 Sections 6 and 11 LUPO.

regarded as "mining" or "industry" for the purposes of rezoning. If a production company's land is not appropriately zoned, this could result in the relevant municipality's issuing a directive to the holder to cease production operations while the municipality evaluates and decides on the granting of the zoning.[322]

Two recent cases concerning mining and municipal zoning that signal significant developments regarding planning law in South Africa are the *Mtunzini Conservancy v Tronox KZN Sands (Pty) Ltd*[323] (hereafter the *Mtunzini* case) and the *Maccsand (Pty) Ltd v City of Cape Town and Others*[324] (hereafter the *Maccsand* case).[325] The appeal in the *Maccsand* case did not succeed due to the fact that the land in question should have been zoned prior to the granting of the mining right and permit in terms of the MPRDA.[326] The difference between the matter in *Maccsand* and *Mtunzini* was that the mining right that was granted to *Mtunzini* had been issued in terms of the *Minerals Act* and KwaZulu-Natal had no zoning regulations at the time when the right was granted.[327] The *Maccsand* case states that a mining right issued in terms of the MPRDA would require zoning approval by the municipality which has jurisdiction over the land where the holder intends to conduct mining activities.[328] The new *KwaZulu-Natal Planning and Development Act* 6 of 2008 makes provision for the zoning of land for mining.[329] In effect a community or a land holder would be able to prevent gas production by refusing to give permission for the rezoning of his or her land from agriculture to mining or industry (depending on how "gas production" would be interpreted for the purposes of zoning) should the provincial legislation permit it.

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322 Section 16 LUPO.
323 2013 JDR 0026 (KZD).
324 2012 (4) SA 181 (CC).
325 Paterson 2010 *South African Public Law* 692-697. Also see Paterson 2011 *South African Public Law* 566-567.
326 Humby 2013 *Stellenbosch Law Review* 55-72.
327 Humby 2013 *South African Journal on Human Rights* 651-665.
328 Humby 2013 *South African Journal on Human Rights* 651-665. Also see Paterson 2010 *South African Public Law* 692-697; and Humby 2013 *Stellenbosch Law Review* 55-72.
329 Identified 11 "Land Use Category", 33 "Generic land use types" and 72 "Detailed variations of the Generic Type" – intended as "zonings". It also identified possible additional land use categories (related to hospitality, tourism, agriculture and residential categories). Furthermore it included rural land use descriptions as related to traditional authority areas. KZN LUMS Guidelines for Municipal Schemes (March 2012). See also Paterson 2010 *South African Public Law* 692-697.

However, it is not only provincial spatial planning laws that need to be considered. The recent *Spatial Planning and Land Use Management Act*[330] (hereafter the SPLUM) states that the spatial planning system in South Africa consists of a number of components. Firstly a spatial development framework needs to be prepared and adopted by the municipal, provincial and national spheres of government. Development principles, standards and norms that are needed in order to guide land development, land use management and spatial planning as well as the organisation and facilitation of land use through the mechanism of land use schemes form some of the components. The final component is processes and procedures for the preparation, submission and consideration of applications for the development of land.[331] Section 30 of the SPLUM[332] confirms the judgment of the *Maccsand*-case.[333] It would therefore be necessary for gas companies to determine whether or not the areas where their onshore gas production activities will take place are zoned appropriately.[334]

5.1.1.4 Gas activities

In order to construct gas transmission, liquefication or regasification facilities or to provide storage and distribute or trade gas, an onshore gas company must apply for a licence.[335] The National Energy Regulator of South Africa (hereafter the NERSA)[336] determines if a production company's activities are in need of a licence.[337] If the NERSA prescribes the filing of a licence, a gas company's application must include the following: the name, principal place of business and

330 *Spatial Planning and Land Use Management Act* 16 of 2013.
331 Section 4 SPLUM.
332 16 of 2013. See also Paterson 2011 *South African Public Law* 566-567.
333 Paterson 2010 *South African Public Law* 692-697. See also Humby 2013 *Stellenbosch Law Review* 55-72.
334 Humby 2013 *South African Journal on Human Rights* 651-665.
335 Section 15(1) and 28(1) *Gas Act*.
336 NERSA can be regarded as a licensing authority regarding the *Gas Act* and the *Petroleum Pipelines Act* 120 of 1977. The objective of the *National Energy Regulator Act* 40 of 2004 (hereafter NERA) is to establish a NERSA to regulate electricity, piped gas and the petroleum pipeline industries (section 2). There are a few prerequisites to which NERSA's decisions must comply. For example, they must be consistent with the Constitution as well as with any other relevant laws, the decisions must be in the public interest, and they must have been reached by a procedurally fair process where affected persons have the opportunity to submit their views, facts and evidence to the NERSA. Therefore all decisions of the NERSA and the reasons therefor must be available to the public. If a person is affected by a decision, he/she may appeal to the High Court against the decision. Section 10 NERA.
337 Section 15(3) *Gas Act*.

particulars of the owners if the applicant is not a natural person,[338] a description of the proposed facility to be constructed, the specific type of gas that will be traded,[339] and maps to demonstrate the trading relations if applicable.[340] It is also the responsibility of the applicant to provide and submit to the NERSA any further information related to the activities that would commence.[341] Plans specifying the extent to which a company would be able to comply with related labour, health, safety and environmental legislation are also requested in the process of the issuing of a licence.[342] After a period of 60 days in which the NERSA has evaluated the application and found no further objections to the application,[343] the NERSA may grant a licence to the applicant, if the application meets the specific objectives of the application for a licence such as the national interest, the promotion of regional growth or any other social objective. The NERSA must provide the applicant with a copy of its decision as well as a separate list of the factors on which the decision was based.[344]

The *Draft Gas Amendment Bill* (hereafter DGAB) may prove to provide the necessary legislative framework to regulate onshore gas activities. The Department of Energy (hereafter DOE) had reviewed the *Gas Act* in order to address the Act's fragmented nature and to deal with compliance issues.[345] The plan to refine the act is due to an increase in the demand for cleaner and new forms of energy.[346]

338 Section 16(2)(a) *Gas Act*.
339 Section16(3)(a) *Gas Act*.
340 Section 16(2)(d) *Gas Act*.
341 Section 28(2) and (3) *Gas Act.* The rules regarding petroleum gas licence applications GN R1251 in GG 32849 31 December 2009 set out that an application will include a NEMA authorisation or proof of application, as well as plans to insure compliance with applicable labour, health and environmental legislation, and all applicable legislation, operating and technical standards, codes and specifications regarding offshore gas exploration. Nel and Du Plessis 2001 *SAJELP* 181-190.
342 Section 16(2)(f) *Gas Act*.
343 Section 19(1)(a) and (b) *Gas Act*.
344 Section 19(2) *Gas Act*.
345 At a stakeholder meeting for the DGAB, this was given as one of the reasons why the Department of Energy deems it necessary to amend the *Gas Act*.
346 The objectives of the *White Paper on Renewable Energy* 2004 and the *National Climate Change Response White Paper* 2011 are to promote the use of renewable energy sources in order to reduce the negative impacts coal or other fossil fuels have on the environment. See also Kotzé 2006 *PER* 1-44.

After a gas production company has applied for the licences and they have been granted, the company will have to monitor its activities in order to ensure compliance with the conditions and authorisations contained in the licences.

5.1.2 Operational or production phase

5.1.2.1 Conditions in licences and the MPRDA

Once all the authorisations are in place and the construction is completed, gas production may commence. During this operational or production phase one of the most important obligations of the gas production company is to comply with the conditions in its authorisations. A company is, for example, obliged to execute its production in terms of the law, legislation, its environmental authorisation, EMPr (if required) and social and labour plan.[347]

Regulation 63 of GN 527[348] issued in terms of the MPRDA states that a gas company will be obliged to meet all legal requirements for the generation and production of pollution and waste, to avoid residue at its source and where it cannot be avoided reduce, reuse and recycle it, or where possible responsibly and sustainably dispose of it.

5.1.2.2 Inspections

The production company may be visited by various inspectors to determine if it complies with the conditions in its authorisations and whether or not it transgresses any of the law applicable to it. For example, in terms of the *Gas Act* any person authorised thereto in writing by the NERSA may enter any property on which a licensed activity is taking place and inspect any facility, equipment, machinery, book, account or other document found,[349] and may require any person to furnish the NERSA with such information as may be necessary for the proper application of the

347 Section 86 MPRDA see also Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9. The MPRDAB includes compliance with the conditions of the environmental authorisation and the prescribed social and labour plan.

348 GN 527 in GG 26275 23 April 2004, amended by Regulation 1288 in GG 26942 29 October 2004.

349 Section 29(1)(a) *Gas Act.*

Gas Act.[350] The NERSA may furthermore require that the accuracy of any information obtained be verified on oath or by way of a solemn declaration.[351] No information obtained by the NERSA in terms of the *Gas Act* which is of a non-generic, confidential, personal, commercially sensitive or proprietary nature may be made public or otherwise disclosed to a person without the permission of the person to whom that information relates, except in terms of an order of the High Court.[352]

The DGAB clarifies the NERSA's role in monitoring and enforcing compliance in the processes and stages that involve gas. It also aims to ensure the security of energy supply and to increase access to affordable energy services in a safe manner. *The Gas Act* focuses on piped natural gas, landfill gas and unconventional gas like shale gas, coal bed methane, amongst other products, methods of transportation, and related new technologies.[353] The DGAB will furthermore align activities and provide enhancements that will aid in the attainment of the objectives set out in the *Gas Act*,[354] by replacing the previous term of "transmission, storage, distribution, liquefaction and re-gasification facilities or convert infrastructure into such facilities" with "infrastructure or convert any other infrastructure into gas infrastructure,"[355] thus broadening the term used to describe which activities are in need of a licence, thus incorporating all activities related to gas.

Gas production companies will in future receive environmental authorisations in terms of the NEMA, which will bring them under the scope of the environmental

350 Section 29(1)(b) *Gas Act.*
351 Section 29(2) *Gas Act.*
352 Section 29(4) *Gas Act.* GN 962-963 in GG 29258 29 September 2006 states that in terms of the *Gas Act* a company must allow an authorised person to enter and inspect its premises. The authorised person may request the submission of information from a holder of a licence and if the information contains confidential information, the authorised person must be informed about the confidentiality of the information.
353 Activity 49 in GN R544 in GG 33306 furthermore includes the expansion of facilities or infrastructure for the bulk transportation of dangerous goods in gas form. The bulk transportation could therefore include reference to a gas pipeline serving to transport gas.GN R544 in GG 33306 18 June 2010.
354 Which will include the promotion of efficiency, effectiveness, sustainability, development and the operation of gas transmission, storage, distribution, liquefaction and regasification facilities and the provision of efficient, effective and sustainable gas transmission, storage, distribution, liquefaction, re-gasification and trading services (a proposed amendment in the DGAB replaces this paragraph with the term "gas infrastructure" in order to include a wider variety of activities) as well as the facilitation of investments in the gas industry. Section 2 of the *Gas Act*.
355 The amendment of section 15 in the DGAB.

management inspectorate. The NEMA has similar provisions as the *Gas Act* in this regard.[356] In future the Minister of Mineral Resources will appoint his or her own environmental mineral resource inspectors in terms of the NEMA and they will report to him or her.[357]

5.1.3 Water use

The MPRDA acknowledges the integration of the NWA in terms of section 5(3)(d), which states that

> subject to the *National Water Act*, water from any natural spring, lake, river or stream situated or flowing through such land or from any excavation previously made and used for exploration purposes. The holder of an exploration right may sink a well or borehole required for use relating to exploration on such land.

The NWA[358] authorises all water applications, subject to certain exceptions.[359] The Act provides for authorisations including a general authorisation to use water by notice published under section 39,[360] a permissible water use under schedule 1 of the Act, a controlled activity under section 37, and a section 21 water use licence.

Gas activities may trigger a section 21 water use. Section 21(e), for example, refers to controlled activities that are identified in section 37(1) and declared under section 38. Section 21(g) refers to waste that is disposed of in a manner that may be detrimental to a water resource. Onshore gas production companies may remove, pollute, discharge or dispose of water found underground or dispose of waste that may be detrimental to a water resource. If that would be the case they will have to apply for a water use licence.[361] The responsible authority may issue a notice requiring persons to apply for licences for the water use, should a licence be

356 Section 31A-Q NEMA. See in this regard Paterson and Kotzé *Environmental Compliance and Enforcement* 107. *Environmental Law* 63. Glazewski J *Environmental law* 32 Feris 2006 *PER* 1- 18.

357 Clause 1 the to be amended and inserted ss 1 and 31BB National Environmental Laws Third Amendment Bill [B26B-2013].

358 36 of 1998.

359 Section 22(1) NWA.

360 NWA.

361 Section 27-30 NWA.

necessary during the production phase.[362] This notice would include the identification of the water resource and the water use in question,[363] where licence application forms may be obtained,[364] the address to which licence applications must be submitted,[365] the closing date for licence applications,[366] a stipulation of the application fee, and such other information as the responsible authority considers appropriate.[367]

The contamination and pollution of water during onshore gas extraction and production remains a huge issue in a country where water security[368] may become a crucial issue in the future.[369] The possible contamination and/or pollution of water are linked to many issues besides the impact on the environment. These issues include the health and well-being of people, as well as economic issues.[370] Therefore it is necessary for the Department of Water Affairs (the DWA)[371] to take into account a number of considerations before issuing a water licence or a general authorisation.[372] These considerations would include the following: current lawful water uses, the need to amend past discrimination, the efficient and beneficial use of water in the public interest, the socio-economic impact of the water use or the failure of the authorisation thereof, any catchment management strategies that may be applicable to the water resource, the quality of the water resource, present and future investments made by the water user, the strategic value of the water use to be authorised, the quality of the water in the water resource which may be relevant for

362 Section 21 NWA. Kidd *Environmental Law* 167.
363 Section 43(2)(a) NWA.
364 Section 43(2)(b) NWA.
365 Section 43(2)(c) NWA see also Kidd *Environmental Law* 167.
366 Section 43(2)(d) NWA.
367 Section 43(2)(e) NWA.
368 South Africa's agriculture sector provides employment or income for an estimated 8.5-million people, and either indirectly or directly accounts for 60% of the country's water use. This use is followed by that of the municipal domestic sector, which uses 27%. The municipalities registered water losses in 2013 of 37% and in cases where no records were kept, it was estimated that this loss reached 50%. Regarding irrigation and domestic schemes, losses were 60%. The mining, energy and industrial sectors last year used only 2.5%, 2% and 3%, respectively, of the available water in South Africa. Odendaal 2013 www.engineeringnews.co.za.
369 See the NCCRWP and 3.3.
370 Statistics show that for every one job created in the water sector, another five would be created in other industries. Odendaal 2013 www.engineeringnews.co.za. See 2.3.3.
371 Kidd *Environmental Law* 69.
372 Section 27 NWA.

purposes regarding the Reserve,[373] meeting international commitments, and the probable duration of any activity for which the water use is to be authorised.[374]

The responsible authority may attach further conditions before granting a general authorisation or licence[375] relating to the protection of the water resource in question, the stream flow regime, other existing and potential water users, water management,[376] return flow and the discharge or disposal of waste[377] in the case of a controlled activity,[378] in the case of taking or storage of water,[379] in the case of stream flow reduction activities[380] which are necessary to achieve the purpose for which the licence was issued, in order to ensure compliance with the provisions of the Act. With regard to the water needed to conduct gas exploration ventures, section 30 of the NWA requires the furnishing of security by the applicant. It stipulates:

> A responsible authority may, if it is necessary for the protection of the water resource or property, require the applicant to give security in respect of any

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373 Section 1(1)(xviii) NWA.

374 GN R77 in GG 32935 12 February 2010 must also be incorporated, as these regulations aimed at the protection of water resources regulate the use of water for 'mining' and other related activities.

375 Section 29 NWA. Also see Kidd *Environmental Law* 167.

376 Specifying management practices and general requirements for any water use, including water conservation measures; requiring the monitoring and analysis of and reporting on every water use and imposing a duty to measure and record aspects of water use; specifying the measuring and recording devices to be used; requiring the preparation and approval of and adherence to a water management plan; requiring the payment of charges for water use as provided for in Chapter 5; requiring the licensee to provide or make water available to a person specified in the licence; and in the case of a general authorisation, requiring the registration of the water use with the responsible authority and the payment of a registration fee as a pre-condition of that use. Section 29(1)(i)-(vi).

377 Specifying a water resource to which it must be returned or other manner in which it must be disposed of; specifying permissible levels for some or all of its chemical and physical components; specifying treatment to which it must be subjected before it is discharged; and specifying the volume which may be returned. Section 29(1)(i)-(iv).

378 Specifying the waste treatment, pollution control and monitoring equipment to be installed, maintained and operated; and specifying the management practices to be followed to prevent the pollution of any water resource. Section 29(1)(i)-(ii).

379 Setting out the specific quantity of water or percentage of flow which may be taken; setting out the rate of abstraction; specifying the method of construction of a borehole and the method of abstraction from the borehole; specifying the place from where water may be taken; specifying the times when water may be taken; identifying or limiting the area of land on which any water taken from a resource may be used; limiting the quantity of water which may be stored; specifying locations where water may be stored; and requiring the licensee to become a member of a water users association before water may be taken. Section 29(1)(i)-(ix).

380 Specifying practices to be followed to limit stream flow reduction and other detrimental impacts on the water resource; and setting or prescribing a method for determining the extent of the stream flow reduction caused by the authorised activity. Section 29(1)(i)-(ii).

> obligation or potential obligation arising from a licence to be issued under this Act.

Should the extraction of natural gas occur in a water scarce area, the notion of a "Reserve" is applicable in terms of Chapter 3 of the NWA. The NWA lays down stringent water licensing criteria as well as criteria for the determination of a "Reserve".[381] The NWA defines a "Reserve" as the quantity and quality of water required –

> to satisfy basic human needs by securing a basic water supply, as prescribed under the *Water Services Act*[382] for people who are now or who will, in the reasonably near future, be –
>
> (i) relying upon;
> (ii) taking water from; or
> (iii) being supplied from,
> (iv) the relevant water resource; and to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.[383]

A Reserve consists of two components, namely a basic human needs component and an ecological component.[384] The notion of a Reserve applies to all water resources, including groundwater and wetlands.[385] The NWA gives the basic needs component and the environmental component equal status.[386] The Minister is obliged to determine[387] the Reserve for all or part of a water resource as soon as is reasonably practicable.[388] The NWA provides for a "preliminary determination" to be made if the classification structure for water resources is not yet in place.[389] The responsible authority may therefore authorise the use of water before the various strategies, classification and resource quality objectives have been determined, but not before the preliminary Reserve has been quantified.[390] The fact is that, in considering the granting of a licence in terms of the NWA, the DWA has to consider

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381 See 2.1.
382 108 of 1997.
383 Section 1(1)(xviii) NWA see also Kidd *Environmental Law* 167.
384 Principle 9 of the Fundamental Principles.
385 See the definition of "water resource".
386 Par 5.2.2 of the White Paper.
387 Kidd and Retief in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 1022.
388 Section 16(2) NWA. Kidd *Environmental Law* 167.
389 Section 17 NWA.
390 Section 22(5) NWA. Kidd and Retief in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 1022.

the human factor,[391] such as the needs of agriculturalists to use water to irrigate their crops and their animals, as well as the ecological aspect of the Reserve. The amount of water to be used in the process of production will therefore play a crucial factor in the allocation of a water use licence, as will the fact that some water will be re-used, some flow back into the normal stream after treatment, and some be pumped back into the well.[392]

A gas company will furthermore be obliged in terms of the NWA to adhere to the National Water Resources Strategy, which is vital for the proper protection, use, development, conservation, management and control of water resources.[393] In addition, the essential requirements listed for the granting of licences[394] specify a number of conditions to which a licensee must comply, and the critical review periods during which compliance with the licence may be reviewed must be specified.[395] Furthermore, the Reserve of each water source that is determined by the Minister must be excluded during the process of gas production.[396]

Should it be necessary to build dams in order to store water, the Minister has the power of discretion to pronounce a dam built by a mine to be a safety risk,[397] which will mean that the gas company will be obliged to have a professional investigate the safety of the dam at the gas company's own expense and to present the Minister with a report thereon. The owner of the dam may also be required to make repairs or changes to the dam in order to ensure its safety.[398]

If the applicant or holder of a water use right does not comply with the conditions of the licence in terms of the NWA, those rights could be terminated.[399] The person can also be sentenced to a penalty such as a fine.[400] The holder of a water use right can

391 Day in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 855.
392 See 2.
393 Thompson *Water Law* 248.
394 Section 28 NWA. Kidd *Environmental Law* 167.
395 Section 49 NWA. These specified intervals must be intervals of not more than five years.
396 Section 5, 12 and 16 NWA. Kidd *Environmental Law* 167.
397 Section 117 NWA.
398 GN R1560 in GG 10366 25 July 1986 states that a mine must follow the measures set out in section 118 NWA to ensure the safety of a dam.
399 Section 54 NWA. Kidd and Retief in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 1022.
400 Chapter 5 of the NWA

furthermore be held criminally liable[401] to a sentence of five years' imprisonment, a fine or both, if the person did not comply with the prerequisites in terms of the licence, did not register lawful water use, or did not register any dams with safety risks.[402]

5.1.2.3 Water and environmental pollution and degradation

Section 19 of the NWA and section 28 of NEMA make provision for both the implementation of the precautionary and polluter pays principles. Section 19 deals with water resources while section 28 has a broader scope and focus on the environment and a broader definition of pollution.[403] In the case of water, both the precautionary principle and the polluter pays principle apply.[404] The application of these principles is to be found in section 19 NWA and section 28 of the NEMA. The owner of land, the person in charge of the land or the lawful occupier of the land (including a gas plant after authorisation has been given) that undertakes any activity or process on the ground or any other situation that may lead to the pollution of water resources in terms of section 19(1) is obliged to take all reasonable measures to prevent the pollution. Section 19[405] further applies to historical, current and future pollution and requires a gas production company to take all reasonable measures to avoid the occurrence or continuing of contamination.[406] If a company does not comply with these measures the *Catchment Management Agency* (hereafter CMA) may issue a directive to a company, ordering it to comply with these measures.[407] Any activity or process that leads to irreversible contamination or damage should be

401 Section 151(1) NWA.
402 Section 151(1) NWA. If the holder of the water licence is guilty of a second transgression, such an infringement could result in 10 years imprisonment, a fine or both.
403 S 1 of the NEMA. The definition of "environment" includes water – see also Bosman, Kotzé and Du Plessis 2004 *SAPL* 411-421.
404 Section 2 NEMA.
405 Section 19 can be regarded as an extension of section 28 NEMA.
406 Kotzé in Paddock *et al* (eds) *Compliance and Enforcement in Environmental Law* 481.
407 The non-compliance with guidelines in terms of section 19 NWA came to light as a judicial question in the case between *Minister of Water Affairs & Forestry v Stilfontein Gold Mining Ltd & Others* 2006 (5) SA 333 (W). The court ruled that a mining company is obliged to apply the guidelines in terms of section 19 NWA not only in terms of the legislation, but also because they have a constitutional duty in terms of section 24 of the Constitution. The respondents were found guilty of *mala fide* behaviour in refusing to apply the guidelines. Also see *Kebble v Minister of Water Affairs* (2007) SCA 111 (RSA) [unreported]; *Harmony Gold Mining Company Ltd v Regional Director: Free State Department of Water Affairs* (971/12) [2013] ZASCA 206 (4 December 2013). See also Humby 2013 *South African Law Journal* 60-84; Feris 2006 *PER* 1-18; Kotzé and Lubbe 2009 *SAJELP* 49-77.

discontinued and may not merely be reduced or controlled more effectively.[408] A CMA may order any person or company who fails to comply with the reasonable measures mentioned in section 19(1) to embark on taking these measures before a given date[409] or to persistently continue with those measures[410] or to complete them before a given date.[411] In the case that a person or company should fail to comply, or complies inadequately, the CMA may take the measures it considers necessary to remedy the situation.[412] This would mean that the CMA may recover all costs[413] jointly and severally from any person who is/was responsible for, or contributed in any way to pollution,[414] or hold the owner[415] or the person in control[416] of the land at the time liable for the present pollution or the occurrence of historic pollution, as well as any person who negligently failed to prevent the activity or the process being performed or undertaken.[417]

Similarly, section 28(1) of the NEMA places an obligation on a gas company to take reasonable measures to prevent any contamination or damage to the environment, to stop the pollution or damage if it persists, and to prevent the repetition of pollution or damage.[418] Sections 28 of the NEMA's provisions apply to the extent to which pollution or damage is authorised by law or cannot be reasonably avoided or stopped. In such instances a company will be obliged to reduce and rehabilitate the pollution or damage to the environment. Section 28, together with the principles contained in section 2 of the NEMA, includes the following: the performance of integrated environmental management taking into account the fact that all elements of the environment are interrelated,[419] following and maintaining environmental justice,[420] being responsible for environmental health and safety throughout the life

408 Section 19(3) NWA. Kidd *Environmental Law* 167.
409 Section 19(3)(a) NWA.
410 Section 19(3)(b) NWA. Kidd and Retief in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 1022.
411 Section 19(3)(c) NWA.
412 Section 19(4) NWA.
413 Section 19(5) but acting under section 19(4) NWA.
414 Section 19(5(a) NWA. Kidd and Retief in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 1022.
415 Section 19(5)(b) NWA.
416 Section 19(5)(c) NWA.
417 Section 19(5)(d)(i) and (ii) NWA.
418 Du Plessis and Kotze *Stellenbosch Law Review* 174.
419 Section 2(4)(b) NEMA.
420 Section 2(4)(c) NEMA.

cycle,[421] taking into account the interests of all parties during decision making,[422] and rehabilitating the environment wherever damage has been caused.[423] Non-compliance with a directive or polluting the environment is an offence.[424]

The NWA regulates not only the use of water, but also the discarding of various substances and waste into water sources.[425] In terms of GN R704[426] a gas company in charge of an activity will be obliged to take reasonable measures to prevent any waste or water containing waste from polluting or potentially polluting these water sources. Reasonable measures must be introduced for the design, building and maintenance of water systems. Reasonable measures must furthermore be put into place to control the flow of any surface water or flood water during the process. Reasonable measures should be taken regarding the design, construction, maintenance and use of any dam or residue deposits or stockpiles used for the disposal or storage of residue. Reasonable measures must be taken to prevent erosion from any remnant deposits or stock found on site and ensure that any water used during the extraction process must be recycled to the point of practical possibility. A water system must also be kept clean of any obstruction that may affect its effectiveness.[427]

5.1.2.4 Control of emergency incidents

Where unforeseen incidents take place, such as where a hazardous chemical ingredient contaminates a water source or is likely to pollute it and may have deleterious effects on the health of those who drink the water, both section 20 of the NWA and section 30 of the NEMA apply. The company must report the incident as soon as possible to the Department, the South African Police Service and the CMA.[428] The company will furthermore be obliged to take all reasonable measures to control, reduce and eliminate such pollution, must undertake a cleaning procedure to

421 Section 2(4)(e) NEMA.
422 Section 2(4)(g) NEMA.
423 Section 2(4)(p) NEMA.
424 Feris 2006 *PER* 1-18.
425 Bosman and Kidd in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 658.
426 In GG 20119 4 June 1999.
427 Section 26 NWA.
428 Section 20 NWA.

repair the effects of the incident, and must undertake all necessary measures as prescribed by the CMA.[429] The NEMA, section 30, also makes further provision for the control of emergency incidents.[430] It imposes on the responsible person various duties regarding the occurrence of emergency incidents, such as the following: to report the incident to the specified authorities and to take all reasonable measures in order to contain and minimise the effects the incident has on the environment as well as any risks to the health, safety and property of persons, to embark on clean-up procedures, to remedy the effects of the incident, and to evaluate the present and future effects of the incident on the environment and public health. The relevant authority may direct the responsible person to take remedial measures.

The risk of water pollution exists when a gas venture is undertaken and gas companies must therefore ensure that all authorisations are in place, that it complies with the conditions in its authorisations, that it undertakes reasonable measures to prevent pollution and/or degradation, and that where pollution occurs it is rehabilitated or remedied.

It is also necessary to determine how air quality is regulated.

5.1.4 Air quality management

The impacts due to the activities of industries are mainly attributed to atmospheric deposition such as emergency incidents that occur due to flaring and explosives as well as the disposal of effluents.[431] The air quality impacts during gas production include methane that may escape and result in flaring.[432] Methane, a component of natural gas as well as a GHG, can also be emitted into the atmosphere when natural gas is not burned completely.[433] Methane can also be emitted through leaks and

429 Section 20 NWA.

430 An "incident" is an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detrimental to the environment, whether immediate or delayed. As numerous chemicals are used during the extraction of gas, such as methane, which is flammable, emergency incidents may occur in terms of section 30 NEMA.

431 Du Plessis 1986 *SA Tydskrif vir Natuurwetenskap en Tegnologie* 38. See also Dale, Khana and Vidic *et al* 2013 *Environmental Science and Technology* 5459-5466.

432 See 2.

433 Von Blottnitz, Fedorsky in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 582.

losses during transportation.[434] In transporting the gas during the production phase to communities for domestic use, the trucks or railway locomotives that would be used may have an effect on the air quality due to their petrol, diesel or coal emissions.[435]

Air pollution may have a negative impact on human health, the environment and the economy.[436] The main legislation controlling air quality is the NEMAQA. The objectives[437] of NEMAQA are to protect and enhance the quality of air in the country through preventing air pollution and ecological degradation. The Minister has publish a notice in the *Government Gazette* which lists activities which result in atmospheric emissions that could have a significant detrimental effect on the environment and on the quality of people's health, social conditions, economic conditions, ecological conditions or cultural heritage.[438] If the gas production activity is in future included as a listed activity, the generator of that activity must apply for a licence in terms of section 21. The extraction and production of gas is a listed activity,[439] which means that no person or company may undertake gas extraction or production activities without an emission licence or an atmospheric emission licence.[440]

A gas production company will have to apply for a licence to the licensing authority[441] of the area where the listed activity will be carried out.[442] This application must be accompanied by the prescribed processing fee as well as the documentation and information required by the licensing authority.[443] In the process of applying for a licence, an applicant must take appropriate steps to bring the application to the

434 Von Blottnitz, Fedorsky in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 582.
435 See 5.
436 Von Blottnitz, Fedorsky, Bray in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 581.
437 Section 2 NEMAQA. Also see Kidd *Environmental Law* 159.
438 Section 21(1) NEMAQA read together with GN 248 in GG 33064 31 March 2010. The list was amended by listed activity 4, 6 and 26 of GN R923 in GG 37085 29 November 2013.
439 Section 21(3) NEMAQA states that a notice must contain the minimum standards of emission from a listed activity. GN 248 in GG 33064 31 March 2010 therefore classifies the petroleum industry as a category 2 listed activity. Listed Activity 4, 6 and 26 of GN R923 in GG 37085 29 November 2013.
440 Section 22 NEMAQA. The NEMAQA Amendment Bill 2013 proposes an insertion of clause 12 which states that not complying with section 28 of the Act would be offence.
441 Section 36 NEMAQA.
442 Section 37(1) NEMAQA.
443 Section 37(2) NEMAQA. See also Kidd *Environmental Law* 159.

attention of relevant organs of state and interested persons, and must provide the opportunity for public participation in the process of reaching decisions.[444] In order to inform these parties, a notice must be published in at least two newspapers circulating in the area where the listed activity is to be conducted.[445] Factors to be taken into account by the licensing authority in granting a licence would be whether or not the application meets the minimum standards regarding the pollution likely to be caused and its effect, the best practical environmental remedies available, section 24 of the NEMA, and any tradable emission scheme. The applicant's submissions must be accompanied by any objections from affected parties, and must be aligned with any guidelines issued by the Minister or MEC.[446] After evaluating the application, the licensing authority can either grant or refuse it.[447] In granting the application[448] the licensing authority will have made sure that the application correlates with the other provisions of the NEMAQA, applicable national and provincial legislation and policies, section 24 of the NEMA, and the national environmental management principles.[449] Should the application be successful the licensing authority will issue a provisional atmospheric emission licence.[450]

When the successful applicant complies with the conditions in the provisional licence for six months a permanent licence will be issued.[451] Integration of the licence with other authorisations may be done if the holder approaches the licensing authority to vary the licence either by attaching, substituting, removing or amending additional conditions or requirements.[452] A gas production company will be obliged to keep records of air quality and emissions/gases during the gas exploration process.[453] The

444 Section 38(2) NEMAQA.
445 Section 38 NEMAQA. Kidd *Environmental Law* 159.
446 Section 39 NEMAQA.
447 Section 40(1) NEMAQA see also Kidd *Environmental Law* 159.
448 Section 40(2) NEMAQA.
449 Section 2 NEMA.
450 Section 41(1) NEMAQA.
451 Section 41(2) NEMAQA. Section 41 of the NEMAQA will be amended by the NEMAQA Amendment Bill by adding the following subsection: "(3) A provisional atmospheric emission licence is valid for a period of one year from the date of the commissioning of the listed activity".
452 Section 46 NEMAQA. Kidd *Environmental Law* 159.
453 Section 21(3) NEMAQA states that a notice must contain the minimum emission standards from a listed activity. GN 248 in GG 33064 31 March 2010 therefore classifies the petroleum industry, the production of gaseous and liquid fuels, as well as petrochemicals from gas as category 2 listed activities. This can be read together with GN R544 in GG 33306 18 June 2010, which includes the expansion of facilities for the refining, extraction or processing of gas or petroleum products where the capacity of the facility will be increased (activity 48), as

Minister must determine the manner in which records of air quality and emissions/gases should be kept.[454]

If equipment is used or an activity is conducted during the gas life cycle that may pose a threat to the environment, the National Minister or MEC has further the authority to act on his or her discretion to declare the equipment or activity as controlled equipment or a controlled activity. Such equipment or such an activity will therefore be obliged to meet higher standards and be subject to stricter monitoring.[455] The Minister has published a draft Government Notice to give notice of the declaration of controlled emissions, of which methane was one.[456] Once a substance is declared a controlled emission, the gas production company will have specifically to control its emission to ensure minimum damage to the environment.[457] Restrictions can also be placed on the controlled emission.[458] A gas production company will also have to submit a pollution prevention plan.[459] The gas production company will have to implement proper monitoring and the collection of all relevant information regarding its emissions and the amount thereof, and disclose them to the authorities, including the extent of the air pollution during the process. In order to assist the gas production company with the management of air emissions it would be wise to appoint an officer to manage the gas production process and to control the level of hazardous emissions.[460]

In addition, the air quality officer may demand that an atmospheric impact assessment, in the prescribed form, be undertaken. An atmospheric impact assessment will specifically refer to the effect of the emission on the environment. If a gas company is guilty of supplying the licensing authority with false or misleading

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well as the expansion of facilities or infrastructure in order to transport dangerous goods in gas form, outside an industrial complex (activity 49). Listed Activity 4, 6 and 26 of GN R923 in GG 37085 29 November 2013.

454 Section 12 NEMAQA. Kidd *Environmental Law* 159.

455 Section 23 NEMAQA.

456 GN 171 in GG 37421 of 14 March 2014.

457 Section 26 NEMAQA.

458 Section 27 NEMAQA.

459 Section 29 NEMAQA. Von Blottnitz, Fedorsky and Bray in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 581.

460 Section 30 NEMAQA. Von Blottnitz, Fedorsky, Bray in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 581.

information to obtain an atmospheric emission licence,[461] the owner of the company will be liable[462] to a fine or imprisonment or both to enforce the compliance of the prerequisites of the licence granted.[463]

5.1.5 Waste management

As indicated, some waste is generated during the production process as chemicals are used to extract gas, and also some equipment may have outlived its production purposes. Waste is defined as any substance, regardless of whether it must be reduced, reused, recycled or recovered, that no one wants any more or which is no longer required, and must be treated or disposed of as waste as identified by the Minister in terms of a notice in the *Government Gazette*.[464] A gas production company as the holder of waste is obliged to take all reasonable measures to avoid the generation thereof, or where it cannot be avoided, to minimise the toxicity and the amount of waste generated; to reduce, reuse, recycle and recover the waste; where waste is disposed of to treat and dispose of it in an environmentally friendly way; to manage it in such a way that it does not endanger health or the environment; to prevent an employee from disregarding the law; and to prevent the waste from being used for an unauthorised purpose.[465]

Companies who wish to conduct gas exploration activities which will include the storage of waste, the reuse, recycling and recovery of waste, the treatment of waste, the disposal of waste, the storage and the construction, expansion or decommissioning of facilities and associated structures and infrastructure need to apply for a licence in terms of the NEMWA. Waste management activities are placed into two categories (A and B) for which waste management licences must be obtained. Category A lists activities for which a licence must be obtained and for which a basic assessment in terms of the NEMA must be undertaken. Category B activities on the other hand have to do with activities pertaining to hazardous waste, which include the reuse, recycling and recovery of waste, the treatment of waste, the

461 Section 51 NEMAQA. See 4.1.3.
462 Section 52 NEMAQA.
463 See 4.1.3.
464 Section 1 NEMWA. See 4.1.4 for a differentiation between category A and category B waste in terms of the NEMWA.
465 Section 16 NEMWA.

disposal of waste on land, and the construction of facilities and associated infrastructure. In respect of category B, the applicant must conduct a NEMA scoping and an environmental impact report as part of the application. Applications for waste management licences must be submitted to the national Department of Environmental Affairs (the DEA) in the case of hazardous waste, whereas in the case of general waste the application must be submitted to the relevant provincial environmental department. With regard to onshore gas production, the process will mostly generate category B waste, as various chemicals will be used during the process which may be hazardous, but the provisions for category A waste may also be applicable in some instances during the gas life cycle.

Listed activities[466] are performed during the process of extracting onshore gas, thus a gas production company will be obliged to lodge an application for a waste management licence to ensure minimal damage to the environment. In order to obtain a waste management licence a company must commence by lodging an application with the licensing authority.[467] The licensing authority has the right regarding the issuing of a permit to require the applicant to provide the authority with any further information that may be connected to the application,[468] to conduct its own investigation on the effect that the waste management activity may have on people's health and the environment,[469] welcomes comments from an organ of state that has an interest in the application,[470] and must provide the applicant with the opportunity to make representations on any opposing statements or objections to the application.[471]

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466 Listed activities 4, 6 and 26 of GN R923 in GG 37085 29 November 2013. Also see Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.

467 Section 45(1) NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.

468 Section 47(1)(a) NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.

469 Section 47(1)(b) NEMWA.

470 Section 47(1)(c) NEMWA, read together with section 47(2), states that the applicant has a responsibility to bring the application to the attention of any relevant organs of state, interested persons and the public. Section 47(3) requests that a notice to notify the previously mentioned parties should appear in at least two newspapers in the area in which the waste management activity would commence. Section 47(4) furthermore sets out the contents of this notice such as - the nature and purpose of the applied waste management licence, particulars of the waste management activity, and where any further information on the activity can be found etc.

471 Section 47(1)(d) NEMWA. Bosman Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.

After obtaining all necessary and further information as well as conducting his/her own investigation, the licensing authority must take into account all relevant factors,[472] which include the need for and/or alternatives available for the waste management activity,[473] the review of similar waste management activities and their licensing status,[474] the possibility of pollution being caused or being likely to be caused by the activity, and the effect or possible effect of that pollution on the environment, health, economic conditions and national heritage.[475] Further factors include any amplified risks regarding the environment and health issues that may arise as a result of the activity that will be undertaken,[476] whether the applicant is a fit and proper person,[477] the applicant's submissions,[478] submissions from organs of state, interested persons and the public,[479] and any further guidelines the licensing authority would like to add to the applicant's application.[480] After the licensing authority has thoroughly evaluated the above mentioned, he/she can grant, refuse[481] or reject[482] the applicant's application.[483] For the licensing authority to grant a licence,[484] the licensing authority would have reached the conclusion that the

472 Section 48 NEMWA.

473 Section 48(c)(i) and (ii) NEMWA These alternatives are important to review in order to assess their potential to prevent, abate or mitigate pollution and to protect any aspect that may be harmed by the undertaking of the waste management activity.

474 Section 48(1)(a) NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.

475 Section 48(1)(b) NEMWA.

476 Section 48(1)(d) NEMWA. Bosman Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.

477 Section 48(f) NEMWA read together with section 59. A person may be regarded as not being "fit and proper" if the person is found to have violated the NEMWA, the NEMA or other environmental laws, or is in the possession of a suspended or revoked waste management licence due to his/her lack of compliance.

478 Section 48(g) NEMWA.

479 Section 48(h) NEMWA.

480 Section 48(i) NEMWA.

481 Section 49(5)(a) and (b) states that a refused application which is substantially similar to a previous application may be resubmitted only if the new application contains fresh material and/or information not previously submitted or a period of three years has passed since the original application was made.

482 Section 49(6) NEMWA states that an application which is rejected may be amended and resubmitted for reconsideration.

483 Section 49(1) NEMWA. Section 49(4)(a)-(c) states that the licensing authority must within 20 days after s/he has reached a decision notify the applicant of his/her decision and provide written reasons for the decision. If the decision is to grant the application, the authority must instruct the holder of the licence to notify any persons who have objected to the application and provide the reasons for the issuing of the licence.

484 Section 50(2) NEMWA states that the licensing authority may issue a single waste management licence in the case where the applicant will undertake more than one waste

application is consistent with the NEMWA and applicable integrated waste management plans in terms of the NEMWA,[485] relevant national and provincial environmental management policies,[486] the principles[487] in terms of the NEMA,[488] relevant industry[489] or other waste management plans,[490] and any standards or prerequisites in terms of the NEMWA or the waste management licence.[491]

A waste management licence is subject to all of the conditions and prerequisites the licensing authority, Minister or MEC[492] might specify in the licence.[493] The applicant must therefore comply with the conditions contained in the licence. A waste management licence may include a reference to the following:[494] the waste management activity,[495] the area where it will be undertaken,[496] the name of the person to whom it is issued[497] and of the licensing authority,[498] the timeframe in which the licensed activity will be active,[499] the period for which the licence is valid, the period in which the holder of the licence may apply for the renewal of the licence,[500] and the period when the licence may be reviewed,[501] as well as the amount and type of waste that is allowed to be generated, handled, processed, stored, re-used, recycled, recovered or disposed of,[502] and any further operating requirements relating to the management,[503] monitoring, auditing and reporting of the waste.[504] The licence may contain conditions on how to regulate all of these

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management venture in the same area. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.

485 Section 49(3)(a) NEMWA.
486 Section 49(3)(b) NEMWA.
487 Section 2 of the NEMA.
488 Section 49(1)(c) NEMWA.
489 Section 49(1)(d) NEMWA.
490 Section 49(1)(e) NEMWA.
491 Section 49(1)(f) NEMWA.
492 Section 50(1)(c) NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.
493 Section 50(1)(b) NEMWA. See 4.1.4
494 Section 50(1)(a) NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.
495 Section 51(1)(a) NEMWA.
496 Section 51(1)(b) NEMWA.
497 Section 51(1)(c) NEMWA.
498 Section 51(1)(f) NEMWA.
499 Section 51(1)(d) NEMWA.
500 Section 51(1)(e) NEMWA.
501 Section 51(1)(g) NEMWA.
502 Section 51(1)(h) read together with (2)(a) NEMWA. A licence may specify certain conditions in respect of the reduction, re-use. recycling and recovery of waste.
503 Section 51(1)(j) NEMWA.
504 Section 51(1)(k) NEMWA.

activities such as the requirement for financial security,[505] for remediation,[506] for establishing committees for the participation of interested and affected parties,[507] the decommissioning of a waste disposal facility[508] and an EMPr subject to the licensing authority's satisfaction.[509] The company needs to comply with the requests of any environmental management inspector carrying out his or her duties in terms of the NEMA[510] and that relate to the terms and conditions of the waste management licence, for example.[511]

A licensing authority must review a waste management licence at intervals set out in the licence, or when circumstances demand that a review would be deemed necessary.[512] The licensing authority must then inform the holder of the waste management licence, in writing, of any proposed review and the reason for such a review if the review is undertaken at an interval other than that provided for in a waste management licence.[513] For the purposes of the review a waste management officer may require the holder of the waste management licence to compile and submit a waste impact report such as that contemplated in section 66.[514]

With regard to the storage of waste, it is also necessary for a gas production company to take note of interrelated water systems, the interrelation being mainly between surface water and groundwater.[515] The disposal of waste water may have an effect on various water sources, on the quality of soil and on biodiversity.[516] If a gas company stores waste during the process of extracting and producing the gas, the company will be obliged to take the following measures: the containers in which the waste is stored must be kept intact for the safe storage of the waste, adequate measures must be taken to prevent an accidental spill or leakage, it should not be

505 Section 51(2)(f) NEMWA.
506 Section 51(2)(e) NEMWA.
507 Section 51(2)(c) NEMWA.
508 Section 51(2)(b) NEMWA.
509 Section 51(2)(d) NEMWA.
510 Section 11 NEMA.
511 Section 51(2)(g) NEMWA.
512 Section 53(1) NEMWA. See 4.1.5.
513 Section 53(2) NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.
514 Section 53(3) NEMWA.
515 Perkins 2011 *Nature* 17.
516 Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 705.

possible for the waste to be blown away, a nuisance such as odour, visual impacts and the breeding of vectors must be prevented, as must pollution to the environment and damage to health, if applicable.[517]

As with the NEMAQA, an environmental management inspector appointed in terms of the NEMA has the discretion to demand that a waste impact assessment be submitted to him/her in its required form and within the prescribed period, if the inspector suspects on good grounds that the company has violated the law or any condition of the licence that may lead to or has led to negatively impacting on the health of people and the environment.[518] A gas production company which conducts an activity involving the reduction, re-use, recycling or recovery of waste must therefore, before undertaking that activity, ensure that the activity is not harmful to the environment[519] and must use as few natural resources as possible in the disposal of such waste, unless otherwise provided for in the NEMWA.[520]

Where chemicals are used in the production process, *the Hazardous Substances Act*[521] (hereafter the HSA) will apply. The HSA regulates all aspects that may be hazardous to the environment or human health during the production phase.. An inspector will have to investigate Group 1, 2, 3 and 4 hazardous substances. The inspector will monitor a company's compliance with the law, licensing, conditions and other obligations, and if the company fails to comply with its obligations the inspector may issue a compliance notice with further conditions and requirements.[522] In terms of section 9A an inspector has the discretion to prohibit for an indefinite period the use of any group of hazardous materials, equipment, vehicle or any other object that may be related to or be deemed to be part of a violation of the law. A ban will temporarily prohibit the export, sale, disposal, lease, use, application or installation of any group of hazardous substances. Such inspections therefore seek to increase companies' compliance with legislative provisions and their licences.

517 Section 21 NEMWA. See 2.
518 Section 66 NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.
519 Section 17(1)(b) NEMWA.
520 Section 17(1)(a) NEMWA.
521 15 of 1973.
522 Section 8 HSA.

It is therefore necessary for a gas production company as the holder of a waste licence to take all reasonable measures to avoid the generation of waste, or where it cannot be avoided, to minimise the toxicity and the amount of waste generated; to reduce, reuse, recycle and recover the waste in an environmentally friendly way; to manage it in such a way that it does not endanger health or the environment, and to prevent the waste from being used for an unauthorised purpose.[523] Hazardous substances must be handled in accordance with the prescribed measures.

The transportation of gas is also important to ensure the protection of people and the environment when waste is transported during the production phase.

5.1.6 Transportation

During the production process various forms of the transport of gas may be used, such as a pipeline, road or rail, and the same is true of the transport of waste.

The gas production company needs a licence to construct gas pipelines and to operate them.[524] Inspectors may inspect the premises and gas pipelines to determine if the company complies with all the conditions.[525] The licensee (the gas production company) must consult and coordinate with the authority in whose area of jurisdiction the pipeline in question is situated.[526] A gas supplier company, as licensee, may lay and construct pipes for the distribution of gas under or over any street, and may repair, alter or remove any pipes that were laid or constructed within its licensed area of supply.[527] The licensee will thus be responsible for any restoration which may be necessary.[528] Any pipe, meter, fitting or apparatus belonging to a gas supplier company as a licensee and which is lawfully placed or installed upon any premises in order to transport the gas which is not in the licensee's possession will remain the property of the licensee.[529] An authorised person may enter any premises to which gas is or has been supplied and

523 Section 16 NEMWA.
524 See 5.1.1 for a discussion of the application procedure.
525 See 5.1.2.
526 Section 33(2) Gas Act.
527 Section 33(1)*a) Gas Act.*
528 Section 33(1)(b) *Gas Act.*
529 Section 33(4) *Gas Act.*

transported in order to inspect, repair, replace or alter any pipe, meter, fitting, or work[530] in ascertaining the quantity of gas consumed,[531] or where a gas supply is no longer required, to remove any apparatus belonging to such a licensee such as a pipe, meter, fitting etc which belongs to the gas production company as a licensee.[532]

In terms of the NEMWA, a person transporting waste on behalf of a gas company must take all reasonable measures to ensure safe transportation. If the waste is transported to discard it, the person who is responsible must ensure that the place where the waste will be dumped is authorised for that purpose. If hazardous waste is transported from one place to another the owner of the place where the loading will take place must issue a written confirmation that he/she accepts the waste.[533]

The *National Road Traffic Act*[534] (hereafter the NRTA) classifies the transporting of dangerous goods into different classes which indicate the hazard of the goods, as explosives, gases, flammable liquids, flammable solids, oxidizers, toxic and infectious substances, radio actives, corrosives and miscellaneous goods. GN R265[535] states that an operator in charge of transporting dangerous goods on a South African road must be registered.[536] Compliance will be determined by the quantity and type of classified substances that are transported. Training for both light and heavy vehicle drivers transporting dangerous goods is essential.[537] Consignors of dangerous goods must ensure that the dangerous goods transported on a vehicle are compatible as prescribed in SANS 10231-2006.[538] In terms of the NRTA the Minister may appoint a dangerous goods inspector or inspectorate.[539] The inspector or inspectorate is subject to the powers and duties set out in section 55(1)(a) in relation to the transportation of prescribed dangerous goods.[540] In terms of regulation

530 Section 33(5)(a) *Gas Act.*
531 Section 33(5)(b) *Gas Act.*
532 Section 33(5)(c) *Gas Act.*
533 Section 25 NEMWA.
534 93 of 1996.
535 GN R265 in GG 36338 12 April 2013.
536 In respect of a vehicle to which regulations 273 to 283 (Chapter VIII) apply as contemplated in regulation 274.
537 In terms of regulation 280/117(e) (heavy) and SANS 10231-2006 (light).
538 SANS 10231 (2010) Transport of dangerous goods: operational requirements for road vehicles.
539 Section 55(1)(a) NRTA.
540 Section 55(2) NRTA.

281(2), the driver of a vehicle referred to in regulation 274(1) shall produce on demand a professional driving permit and a document containing the route to be followed by the vehicle, planned in accordance with Code of Practice SABS 0231.[541]

5.2 Offshore gas production

In addition to the conditions stipulated in permits for onshore activities to regulate the prevention of pollution and waste control, the NEMICMA should also be taken into account as regulating pollution at sea. Once the production stage is reached, a platform is erected at sea to commence with the extraction and production of gas. During this phase the most environmental damage may occur if the gas production company does not exercise reasonable care. The impacts may be on the aquatic life or water resources, air quality may be impacted upon, and waste may be generated.[542]

5.2.1 Authorisation of production activities

The gas company will have to apply for a production right in terms of the MPRDA. The same procedure is followed as in the case of onshore applications. The gas company will have to undertake a basic assessment and an EIA depending on the circumstances. The requirement of having to undertake an EIA is necessary to aid the licensing authority in his/her decision-making as well as the applicant in understanding the potential impacts that the proposed activity may have on the environment.[543]

The Gas Act does not explicitly differentiate between onshore and offshore activities. It may therefore be inferred that the process to be followed in applying for a licence for offshore gas production would be applicable should the gas production company want to construct gas transmission, liquefication or regasification facilities or provide storage and distribute or trade gas when the gas operations extend from sea to

541 SABS Code of practice 0231 "Transportation of dangerous goods: operational requirements for road vehicles" whenever he or she is operating a vehicle referred to in regulation 274(1).
542 See 2.
543 See 4.1.1.

land.[544] It is then up to the NERSA to determine if a company is in need of a licence. It is also the responsibility of the applicant to provide and submit to the NERSA any further information related to the offshore gas exploration activities that would commence.[545] Plans specifying the extent to which a company would be able to comply with related labour, health, safety and environmental legislation[546] are also requested in the process of the consideration of a licence.[547]

Gas companies may need access to coastal zones to install infrastructure such as pipes etc. In order to install pipelines or to reach gas platforms, employees of gas companies may have to erect structures on coastal public property or may have to drive onto the beach.[548] The company will need permission to undertake these activities. In terms of the NEMICMA, the company must obtain a lease or concession[549] on coastal property for the construction or erection of any structure on or in coastal public property. The application for a lease and concession must be lodged in the case of offshore gas exploration in the prescribed manner.[550] The granting of a coastal lease and concession to the applicant will not relieve the holder from the responsibility to obtain any other coastal authorisations that may be required in terms of the NEMICMA[551] or other legislation, and to comply with those legislative measures.[552]

The NEMICMA Amendment Bill [B8D-2013] replaces the heading for section 66 of the principal Act with the "terms of coastal use permits".[553] A coastal use permit may be awarded for a fixed period of time, renewable only once, whereafter a new

544 Section 15(1) and 28(1) *Gas Act*.
545 Section 28(2) and (3) *Gas Act.* Rules regarding gas licence applications GN R1251 in GG 32849 31 December 2009 set out that an application will include a NEMA authorisation or proof of application, plans and the ability to comply with applicable labour, health and environmental legislation as well as all applicable legislation, operating and technical standards, codes and specifications regarding offshore gas exploration.
546 Nel and Du Plessis 2001 *SAJELP* 181-190.
547 Section 16(2)(f) *Gas Act*. See 4.1.1.
548 See 2.
549 It is proposed that section 65 of NEMICMA be amended by the *NEMICMA Amendment Draft Bill* (GN 840 in GG 34781 25 November 2011) to refer to permits rather than to leases and concessions.
550 Section 65(4) NEMICMA.
551 Section 65(5)(a) NEMICMA.
552 Section 65(5)(b) NEMICMA.
553 The *NEMICMA Amendment Draft Bill* (GN 840 in GG 34781 25 November 2011).

application must be lodged.[554] The application for a coastal use permit must be subject to all of the conditions determined by the Minister and must be accompanied with a user charge determined by the Minister.[555] Section 83 of the principal Act will be amended to include the procedures regarding the lodging and consideration of applications for coastal authorisations such as the following:[556] the conditions with which applicants must comply in lodging their applications,[557] the application fees payable,[558] the procedures that must be followed in order to consult with organs of state and other interested and affected parties,[559] the authorities whose consent is necessary to grant coastal authorisations,[560] the procedures that must be followed to raise an objection regarding an application,[561] the various factors that must be taken into account in evaluating these applications,[562] the various circumstances that must be taken into account regarding the refusal or approval of permits,[563] and the bidding process to be followed for the award of coastal authorisations.[564] Before the Minister gives notice of his final decision regarding the application, he/she may require the applicant to provide any additional information, including the results of any further studies undertaken.[565] Once a licence is obtained, a production company has a duty to ensure that compliance is being monitored throughout the production process, in order to ensure that the production company performs its activities in line with the conditions and authorisations that were issued in terms of its licence.

5.2.2 Operational phase

During operations the gas production company will have to comply with the conditions in the production right.[566] It will also have to comply with the conditions set

554 Section 66(1)(a) must be performed in terms of section 65(3) and (4) NEMICMA.
555 Section 66(1)(c) must be performed in terms of section 65(1)(b) NEMICMA.
556 Section 83(1)(a) NEMICMA. Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
557 Section 83(1)(a)(i) NEMICMA see also Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
558 Section 83(1)(a)(ii) NEMICMA.
559 Section 83(1)(a)(iv) NEMICMA.
560 Section 83(1)(a)(v) NEMICMA.
561 Section 83(1)(a)(vi) NEMICMA.
562 Section 83(1)(a)(viii) NEMICMA.
563 Section 83(1)(ix) NEMICMA.
564 Section 83(1)(x) NEMICMA see also Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
565 Section 64(2) NEMICMA.
566 See 5.1.1.

by NERSA.[567] Conditions may differ, however, as the conditions of onshore and offshore activities are not the same.[568] Once the production right has been granted by the Minister in terms of the MPRDA, the applicant is entitled to commence with developing underground or under-sea infrastructure which may be required for the purposes[569] of extracting petroleum for which such a right has been granted,[570] and to remove and dispose of any petroleum substance found during the applicant's course of extraction.[571] As with the onshore operations, the platform may be visited by inspectors appointed in terms of the Gas Act, the NEMA and the MPRDA.[572]

The NEMICMA specifically incorporates the duty of care provided for in section 28 of the NEMA and applies it, subject to the necessary changes, to any impact caused by any person that may have an adverse effect on the coastal environment.[573] It also allows the Minister to determine impacts or activities which may be presumed to cause harmful effects until the contrary is certain. Whereas section 28 of the NEMA applies to everyone, section 58 refers especially to a user of and the operator of a pipeline that ends in the coastal zone.

In terms of the NEMICMA, officials monitor that permit conditions are being complied with and that any assumptions made during the authorisation review and site selection process were sufficient to provide the necessary protection to the environment and human health.[574] It is essential that such monitoring programmes have clearly defined objectives. The issuing authority may amend, revoke, suspend or cancel an authorisation issued in terms of the NEMICMA in cases where the holder of the authorisation fails to comply with a condition in terms of the authorisation[575] and if it is in conflict with a coastal management programme or objective.[576]

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567 See 5.1.1.
568 See 2.
569 Section 5(3)(a) MPRDA.
570 Section 5(3)(b) MPRDA.
571 Section 5(3)(c) MPRDA. See 5.1.1
572 See 5.1.2.
573 Section 58 NEMICMA.
574 Section 15 NEMICMA.
575 Section 68(1)(a) NEMICMA. Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
576 Section 68(1)(b) NEMICMA.

5.2.3 Air quality management

Some gas flaring may occur on platforms and methane may escape.[577] Should this occur, the air will be polluted and its quality will be damaged The same procedures in applying for an atmospheric emission licence in terms of NEMAQA would in this case also be applicable to offshore gas production activities.[578] NEMAQA applies to the exclusive economic zone and continental shelf of the Republic.[579] As indicated previously, gas production is a listed activity in terms of the NEMAQA[580] and the offshore gas production company must apply for a national or provincial atmospheric emission licence, depending on where the activity is situated.[581]

5.2.4 Biodiversity

If the offshore pipelines default and result in a gas leak[582] this could create an immense explosion that would release gas and associated condensates[583] into the sea, polluting the water and so harming marine fauna and flora.[584] A gas production company will therefore have to apply for authorisation for the commencement of its activity in terms of the NEMBA. An offshore gas production company must apply for a permit in order to conduct certain offshore activities such as gas production in order to protect the offshore ecosystems and/or species which may be harmed.[585] The mere use of machinery during gas production could contribute to harming

577 See 2.
578 See 4.1.3.
579 Section 54 NEMAQA.
580 Section 21(3) NEMAQA states that a notice must contain the minimum emission standards from a listed activity. GN 248 in GG 33064 31 March 2010 therefore classifies the petroleum industry as a category 2 listed activity, and it is incorporated as a listed activity 4, 6 and 26 in terms of GN R923 in GG 37085 29 November 2013.
581 Section 22 NEMAQA. GN 248 in GG 33064 of 31 March 2010, category 2: petroleum industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass. The list was amended by GN R923 in GG 37085 29 November 2013 to include any gas production activities or impacts in terms of 4, 6 and 26.
582 See 2.
583 The substance known as condensate can be defined as unrefined petrol and diesel. McLean and Glazewski in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 482.
584 See 2. This includes marine mammals, birds and benthic communities, the creation of sediment plumes, and conflict with the fishing industry. McLean and Glazewski in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 481.
585 See 4.1.5.

biodiversity by disturbing local ecosystems due to the destruction of the area where the machinery is placed and used.

5.2.5 Pollution prevention and waste management

There are various acts regulating offshore waste. These acts include the *Dumping at Sea Control Act*[586] (hereafter the DSCA), the *Marine Pollution Control and Civil Liability Act*[587] (hereafter the MPCCLA), the NEMICMA and the *Marine Living Resources Act* (hereafter MLRA). The DSCA defines dumping as deliberately disposing of any substance at sea from any vessel, platform or other man-made structure, by incinerating it or depositing it in the sea, and includes the disposal of any vessel, platform or other man-made structure at sea.[588]

As vessels, platforms or other man-made structures will be used to conduct offshore gas production, the DSCA will be applicable. If a gas production company wants to dispose of waste at sea it must apply to the director-general for a permit to do so.[589]

Schedule 3 of the DSCA sets out the characteristics and composition of the substance to be dumped, the method of deposit and the general considerations that must be taken into account before a permit may be issued. Firstly, the characteristics and composition of the substance to be dumped must be taken into account before a permit may be issued. These characteristics will include the following: the total amount and composition of the substance to be dumped; the form (whether solid, sludge, liquid or gaseous); the properties and persistence regarding the physical, chemical, biochemical and biological nature of the substance, and the toxicity thereof. Secondly the characteristics of the dumping or disposal site and the method of deposit that will be taken into account will be such as the location in relation to other areas such as amenity and fishing areas and exploitable resources; the quantity of disposal within a certain timeframe; the extent of the possible harm caused by the proposed method of release; the topography, geochemical and geological characteristics and biological productivity of the area; current disposals in

586 73 of 1980.
587 6 of 1981.
588 Section 1 DSCA.
589 See 5.2.1.

the dumping or disposal area and the effects thereof; any scientific proof of the consequences the dumping or disposal for which the permit is sought may have on the environment. Thirdly, the general considerations regarding the issuing of a permit would include all possible effects on marine life, fish and shellfish culture, fish stocks and fisheries, and on seaweed harvesting and culture, as well as on other uses of the sea, and the availability of alternative land-based methods of disposing which may be less harmful than disposing at sea.[590]

The NEMICMA also regulates the dumping of waste from vessels but excludes the disposal or storing of types of material from the bed or subsoil generated by the extraction or production of "mineral resources" that will include gas.[591] The DSCA may, however, be applicable in this regard as it does not exclude production activities. Any person or company who dumps,[592] deliberately disposes of[593] or loads[594] any substance onto any vessel, platform or other man-made structure, during the extraction of offshore gas shall be guilty of an offence in terms of the DSCA unless the substance in question was dumped as a reasonable step with regard to the present circumstances.[595] The onus of proving any exception, exemption or qualification rests upon the accused.[596] Where dumping has taken place, the person in charge of the platform or other man-made structure in question has a duty to report these actions to the director-general and furnish all information thereto.[597]

An application for any such permit shall be made in such a manner and contain such information as may be prescribed by regulation.[598] After consulting with a Standing Committee,[599] the director-general may on application and after taking into account

590 Schedule 3 of the DSCA.
591 Section 1 NEMICMA.
592 Section2(1)(a)(b)(i) DSCA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
593 Section 2(1)(b)(iii) DSCA.
594 Section 2(1)(b)(ii) DSCA.
595 Section 2(1)(c)(ii) DSCA.
596 Section 2(2) DSCA. Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
597 Section 2(5) was amended by section 3 of DSCA 73 of 1995. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
598 Section 3(2) DSCA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
599 The Standing Committee consists of persons appointed by the Minister for the purposes of Section 3 DSCA.

the factors set out in schedule 3 grant a special permit[600] or a general permit[601] authorising the dumping[602] or disposal at sea,[603] on such conditions as the director-general may think fit to attach to such a permit, of any vessel,[604] platform or other man-made structure[605] that will be erected at sea by offshore gas production in order to efficiently conduct a company's offshore production process.

The MPCCLA defines an "offshore installation" as

> a facility situated wholly or partly within the prohibited area and which is used for the transfer of harmful substances from a ship or a tanker to a point on land or from a point on land to a ship or tanker or from a bunkering vessel to a ship or a tanker, and includes any exploration or production platform situated within the prohibited area.[606]

If it is necessary to extract gas offshore, companies will erect a platform or structure and the Act will apply, as section 1 of the MPCCLA includes any production platform. Should an offshore gas production company desire a certificate regarding a tanker that can carry more than 2000 tons of oil in bulk as cargo that may arrive at an offshore installation, a gas production company will have to apply for this certificate, in writing, to the Authority in terms of section 13(2)(a).[607] No person, however, may operate an offshore installation unless a pollution safety certificate is issued in terms of the MPCCLA.[608] An offshore gas company may apply in writing for such a certificate, where the Authority may upon receipt of the application issue a pollution safety certificate in the prescribed form, if the application complies with all the conditions relating to the operation of the offshore installation.[609] No pollution safety certificate may be issued if the offshore installation does not comply with the conditions and requirements of the construction and operation thereof. The application must be accompanied by the prescribed details as well as any further

600 Section 3(1)(a) DSCA.
601 Section 3(1)(b) DSCA
602 Section 3(1)(a)(i) read together with section 3(1)(b) DSCA.
603 Section 3(1)(a)(ii) read together with section 3(1)(b) DSCA.
604 "South African vessel" means any vessel registered in the Republic in terms of the *Merchant Shipping Act* 57 of 1951, or deemed to be so registered.
605 Section 3(1) is amended by section 3 of Act 73 of 1995.
606 Section 1 MPCCLA.
607 Section 14(1)(a) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
608 Section 24(1) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
609 Section 24(3) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.

particulars required by the Authority and the prescribed application fee.[610] If the Authority is satisfied that there will be a contract of insurance or other financial security for an amount contemplated in section 13(1) with regard to the vessel or platform in question, throughout the period for which the certificate is to be issued, a certificate may be granted to the applicant in the prescribed form.[611] If the Authority is of the opinion that the applicant providing the insurance or other financial security will not be able to meet its obligations in terms of the agreement or in the midst of other circumstances to cover the owner's liability for any loss, damage or costs, the Authority may refuse to issue a certificate.[612]

If at any time after a certificate has been issued to the offshore gas production company and the Authority is of the opinion that due to a change in the circumstances a doubt regarding the provision of insurance or other financial security[613] has arisen, the Authority may cancel the certificate and notify the offshore gas production company of the cancellation. A copy of every certificate and notice issued by the Authority will be sent to every principal officer, who will make these copies available for public inspection.[614] Should a company's certificate be cancelled, the offshore gas production company to whom the certificate was issued must return it within a period of thirty days as from the date of such a request.[615]

The holder of an office designated by the Minister to the person, as well as any police official,[616] may enter any place in which he suspects that a substance contravening the MPCCLA is kept or loaded. S/he may then inspect the substance and examine all books and documents[617] found on the premises of such a place or vessel[618] if s/he reasonably suspects that an offence under the MPCCLA has been committed or is about to be committed. Any person who hinders, obstructs or assaults the designated person or police official[619] or fails to comply with any lawful

610 Section 14(1)(b) MPCCLA
611 Section 14(2) MPCCLA.
612 Section 14(3) MPCCLA.
613 Section 14(4)(a) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
614 Section 14(5) MPCCLA.
615 Section 14(6) MPCCLA.
616 As defined in section 1 of the *Criminal Procedure Act* 51 of 1977.
617 Section 5(1)(a) DSCA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
618 Section 5(1)(b) DSCA.
619 Section 5(4)(a) DSCA.

demand made by this person or official shall be guilty of an offence.[620] Any authorised person may furthermore enter and perform all necessary acts to ensure compliance with the MPCCLA, or for undertaking any investigations in order to determine whether any pollution of the sea by a harmful substance has occurred and whether it would be possible to remove the pollution in question and to erect temporary work necessary to remove such pollution. The authorised person may furthermore for the purpose of determining whether or not any provision or condition under the Marine Pollution Acts is not being complied with enter and cross any other land only if the person's entry will be into a building, enclosed space[621] and will result in as little damage, loss or inconvenience as possible while exercising his/her powers.[622] Any person who prevents, obstructs or hinders the entry or the exercising of the authorised person's powers in the performance of his or her functions under this Act shall be guilty of an offence.[623]

If the company in charge of an offshore installation refuses or fails to perform his or her functions within the specified timeframe allowed by the Authority, or in terms of any applicable act,[624] or refuses or fails to comply with a certain condition in terms of section 21(2),[625] the Authority may take responsibility for the performance of such an act or the compliance with a certain condition. This may result in the taking over of the control of the involved offshore installation by the Authority. All expenses incurred by the Authority to enforce compliance will be deemed to be costs referred to in section 9(1)(b).[626]

Gas companies may also have to consider the MLRA.[627] One of the objectives of the MLRA is to protect the fauna and flora and the physical features on which they depend or[628] to diminish any conflict that may arise from competing uses in that regard. The Act will be applicable if gas extraction and production activities are to be

620 Section 5(4)(b) DSCA.
621 Section 8(1)(a) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
622 Section 8(1)(b) MPCCLA.
623 Section 8(2) MPCCLA.
624 Section 22 (1)(b) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
625 Section 22(1)(c) MPCCLA.
626 Section 22(2) MPCCLA.
627 47 of 1998.
628 Section 43(1)(a) MLRA.

undertaken in marine protected areas.[629] The Minister may declare an area to be a marine protected area. If the Minister does so, no person may without permission take or destroy any fauna and flora,[630] dredge, extract sand or gravel, discharge or deposit waste or any other polluting matter, or in any way disturb, alter or destroy the natural environment,[631] construct or erect any building or other structure, on or over any land or water within that marine protected area[632] or carry on any activity which may adversely impact on the ecosystems of that area[633] or in any other marine protected area.[634]

During the operational phase a gas production company therefore has to comply with the conditions set out in its authorisations, allow inspectors to monitor its activities, manage its waste and prevent pollution, protect biodiversity and the marine living resources, and rehabilitate any damage caused. It seems that sufficient environmental controls exist to monitor the activities of a gas production company during the operational phase. However, the enforcement of these measures is undertaken by different government departments, namely the DEA, the DMR etc, a fact which may hamper a coordinated effort in the absence of cooperative governance.

If a gas production company has had an impact on the environment, the company will be obliged to rehabilitate the detrimental effect which its operation has caused. There are specific measures a company has to comply with if it wants to terminate its operations. These measures are dealt with in the closure or rehabilitation phase of a gas activity's life cycle.

629 Section 43(1)(c) MLRA.
630 Section 43(2)(b) MLRA.
631 Section 43(2)(c) MLRA.
632 Section 43(2)(d) MLRA.
633 Section 43(2)(e) MLRA.
634 Section 43(3) MLRA. The Minister may, after consultation with the Forum, give written permission that activities prohibited in terms of this section may be undertaken, only in the instance where such an activity would be required for the proper management of the marine protected area.

6. Closure phase

Rehabilitation and closure, with exploration and production, is one of the three phases in the life cycle of a gas production company's gas venture.[635] It is necessary to determine whether measures exist for environmental protection, remediation and the rehabilitation of gas activities upon termination of the company's productive activities.

6.1 Onshore gas rehabilitation

During the previous phases of the life cycle of an onshore gas venture, numerous impacts may have been caused such as air pollution, the generation of waste[636] etc. It is therefore the gas company's responsibility to sufficiently rehabilitate the damage it has caused to the environment during this process, and to prevent any possible future pollution or degradation. The law prescribes how and when rehabilitation should take place.

6.1.1 Closure certificate

The applicant has to apply for a closure certificate upon the lapsing or abandonment of the production right or on completion of the prescribed closing plan.[637] The application must be made within 180 days from the day of the occurrence of the above mentioned, and must be accompanied by the prescribed environmental risk report.[638]

The gas production company has to incorporate closing and rehabilitation plans in its EMPr, to ensure successful rehabilitation of the area.[639] The holder of an exploration

635 See 2.
636 See 2.
637 Section 69(2)(a) read with section 43(3) MPRDA. In terms of regulation 57(1), an application for a closure certificate has to be completed in the form contained in Annexure II of the MPRDA regulations. The document to accompany the application may be found in regulation 57(2) MPRDA regulations GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.
638 Section 69(2)(a) read with section 43(4) MPRDA. The prescribed content of an environmental risk report is set out in regulation 60 of the MPRDA regulations GN 527 in GG 26275 2004 as amended by GN R1288 in GG 26942 29 October 2004.
639 Glazewski *Environmental Law in South Africa* 474. In future these plans will be included in the

or production right remains responsible for any environmental liability, pollution or ecological degradation and the management thereof until the Chief Director: Mineral Development and Administration (hereafter the CDMDA) grants a closure certificate.[640] An applicant is expected to comply with the legal requirements regarding the closure of a gas venture. This places a responsibility on the holder of a right to ensure that the closure of an operation incorporates a process grounded in the company's entire life cycle,[641] that gathers information to calculate and manage risks, as well as residual and possible latent environmental impacts.[642] The land must furthermore be rehabilitated to the best possible natural state or to a predetermined state.[643] These activities relating to the closure of a gas venture must be performed as efficiently as possible.[644] The CDMDA has the authority to transfer environmental liabilities and responsibilities stipulated in the EMPr or the prescribed closure plan to a person with the necessary qualifications.[645] Only if all the requirements are met and the CDMDA is satisfied with the applicant's efforts may a closure certificate be issued.[646]

In terms of the *Gas Act*, the Minister may make regulations with regard to rehabilitation, the provision of security for rehabilitation purposes, and the composition and amount of such security.[647] The DGAB inserts section 32A in the principal *Gas Act,* that states that without derogating from the provisions of section 25(2) that a licensee who intends to terminate, relinquish or abandon any licensed

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EMPr drafted in terms of section 24N of NEMA. See also Humby 2013 *South African Law Journal* 60-84.

640 Section 69(2)(a) read with section 43 MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.

641 Regulation 56(a) and 47 MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004).

642 Regulation 56(b) and 47 MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004).

643 Regulation 56(e) and 47 MPRDA regulations (GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004).

644 Regulation 56(f) and 47 MPRDA regulations (GN 527 in GG 26275 2004 as amended by GN R1288 in GG 26942 29 October 2004).

645 Expertise, resources and organisational ability to integrate risk assessment, risk management and risk financing to ascertain the cost of environmental management; experience to fulfil the EMP obligations; direct access to risk financing; the ability to manage trusts; and expertise and experience to interpret and manage the findings of risk assessment. Section 69(2)(a) read with section 43(2) MPRDA. Badenhorst and Mostert *Mineral and Petroleum Law of SA* 19-9.

646 Section 69(2)(a) read with section 43(5) MPRDA. See also 6.1.2 with regard to liabilities post closure.

647 Section 34(1)(d) *Gas Act*. Amended to include any transmission, storage, distribution, liquefaction or re-gasification of gas or the trading therein

activity must still comply with the rehabilitation procedure as prescribed. The DGAB substitutes section 4, that entails amongst other sections that notices may be issued in terms of section 26(1) and, if necessary, take remedial action in terms of sections 26(2).[648] The regulations relating to the rehabilitation of piped gas installations state that six months prior to termination the company must submit a plan to the NERSA dealing with alternatives for the further use or disposal of installations, decommissioning activities, site clean-up, and the removal and disposal of dangerous material and chemicals, and an EIA of the termination and abandonment of the activity.[649] Permit conditions may include a provision for environmental performance bonds for rehabilitation purposes. The NERSA may require confirmation from the licensee that the licensee has complied with the NEMA. An independent consultant must certify that the site has been rehabilitated before the financial security is released.[650]

In the case where a gas company has not honoured its duty of care, remedies exist at the government's disposal, which include the prescribing of certain steps that the company will be obliged to follow and implement.[651] If the company continues to fail to take the prescribed steps, the government has the power perform the prescribed actions at the expense of the gas company.[652] If the company still does not comply with the prescribed regulations[653] it will be held criminally liable.[654] The state or any other person (this includes natural and juristic persons including the gas company as an entity) will be exempted from any responsibility for any damage or pollution if the state or gas company acted unlawfully, *mala fide* or with purpose. A thorough investigation must be undertaken regarding the process in order to evade the use of this section 49 in future.[655]

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648 The *Gas Act* proposed DGAB amended section 4(g).
649 GNR 321 in GG 29792 20 April 2007 regulation 11(1).
650 GN R321 in GG 29792 20 April 2007 regulation 11.
651 Section 28(4) NEMA.
652 Section 28(7) NEMA.
653 Section 28(1) NEMA.
654 Section 28(15) read together with section 34 NEMA.
655 Section 49 NEMA.

6.1.2 Pollution prevention

Section 19 of the NWA and section 28 of NEMA will also be applicable after closure. However, as the DWA also has to indicate that he/she is satisfied that a closure certificate may be issued, one may argue that only section 28 of the NEMA will be applicable. However, the MPRDAA is amending the position, in that the DWA and the DEA will have to give permission for closure. In effect, section 28 of the NEMA will then not be applicable. To remedy this position the MPRDAB proposes to amend section 43(6), empowering the Minister to retain the financial provision for a period of 20 years after closure for any "latent and residual safety, health or environmental impact that may become known."[656]

The "polluter pays principle" is an economic principle which consists of the internalisation of external cost.[657] A polluter is liable for all costs to rectify any pollution or damage[658] it has caused.[659] The company would therefore have to pay a certain amount for the damage it caused throughout the gas life cycle.[660] If the entity does not exist anymore or is insolvent, the taxpayer will pay the amount.[661]

6.1.3 Air quality management

In terms of the NEMAQA, five years from the start of the gas venture the company must give written notice to the Minister of its rehabilitation strategies and strategies for the prevention of air pollution when the company plans to end all gas activities. The relevance of this section is to promote the liability of companies for the entire process of rehabilitation and the safe cessation of gas activities.[662]

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656 Section 43(5) MPRDAB, which is to be amended. The position with liability post closure is still uncertain, however.

657 See 4 and 5.

658 The term "damage" refers to any change in the environment caused by activities, and in this case, mining activities.

659 Section 2(4)(p) NEMA.

660 Du Plessis and Kotze 2007 *Stellenbosch Law Review* 178. Section 2(4)(p) NEMA was also discussed in the case of *Bareki NO and Another v Gencor Ltd and others* 2006 1 SA 432 (T).

661 Kotzé 2006 *PER* 1-44.

662 Section 33 of the NEMAQA refers to mines. The NEMAQA does not define mining. The breadth of the interpretation of the term "mining" will determine the applicability of this section to mining. The rehabilitation measures will most probably also be included in the environmental authorisation.

6.1.4 Waste management

Before an environmental authorisation in terms of the NEMWA will be granted, the applicant has to comply with an EMPr, which usually includes measures necessary for rehabilitation. If requested by the regulator, financial arrangements for the remediation work during or after operation of the waste management activity must be specified in the waste management licence.[663] Waste generated throughout the life cycle of gas ventures can have both short- and long-term impacts.[664] It is therefore important for waste to be rehabilitated and disposed of to minimise the effect on the environment. The NEMWA requires the holder of a waste management licence to undertake remediation work.[665]

Unless otherwise provided for in the NEMWA, a person who conducts an activity involving the reduction, re-use, recycling or recovery of waste must, before undertaking that activity, ensure that the activity is minimally harmful to the environment[666] and must use fewer natural resources than in the disposal of such waste.[667] The Minister may after consultation with the Minister of Trade and Industry and by notice in the *Gazette*[668] require the person in charge of the remediation of waste to provide for the reduction, re-use, recycling and recovery of products and/or the components of a product manufactured or imported by that person.[669] The Minister can also request from this person to include a determined percentage of recycled material in a product that is produced, imported or manufactured.[670] The Minister has published a notice for two new regulations in terms of the NEMWA. The first notice is for the regulation of norms and standards for the remediation of contaminated land and soil.[671] Some of the chemicals used during the extraction of

663 Section 51 NEMWA.
664 Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 706.
665 Section 51(2)(e) NEMWA.
666 Section 17(1)(b) NEMWA.
667 Section 17(1)(a) NEMWA.
668 Section 17(3) states that before issuing a notice in terms of subsection (2) or any amendment to the notice, the Minister must first follow a consultative process in accordance with sections 72 and 73 NEMWA.
669 Section 17(2)(a) NEMWA. Bosman in Strydom and King (eds) *Fuggle and Rabie's Environmental Management in SA* 702.
670 Section 17(2)(b) NEMWA.
671 Notice 233 of 2012 published in terms of section 7(2)(d) read together with section 73 of the NEMWA.

gas may contaminate the land and soil. The company may be served to do a second site assessment and to report on the condition of the premises.[672] Once the land is declared to be contaminated this declaration will be noted in a contaminated land register. If the land is to be transferred, the owner of the land must inform the other party of the status of the land,[673] and the Minister of the transfer of the land.[674]

Although gas production may have ceased, the company may still be held liable for pollution long after the closure provisions come into operation.

6.2 Offshore gas rehabilitation

During the previous phases of the life cycle of an offshore gas venture, numerous impacts may have been caused to the environment, such as damage to aquatic life, the generation of waste etc.[675] It is therefore the gas company's responsibility to sufficiently rehabilitate the damage they have caused to the environment during this process.

6.2.1 Closure certificate

As with onshore operations, the gas production company will have to apply for a closure certificate in terms of the MPRDA. The same measures will apply.[676] In terms of the *Gas Act*, the Minister may make regulations with regard to rehabilitation, the provision of security for rehabilitation purposes, and the composition and amount of such security.[677]

It seems that the NEMICMA addresses specifically the rehabilitation and/or remediation of offshore gas activities or at least the structures in the coastal area. The Minister or MEC may issue a written repair or removal notice to the person responsible for a structure on or within the coastal zone if that structure is having or

672 Subsections 35 to 41 of the NEMWA will come into operation on 2 May 2014**.** See also Proc 26 in GG 37547 11 April 2014**.**
673 See 2.
674 Section 40 NEMWA.
675 See 2.
676 See 6.1.
677 Section 34(1)(d) *Gas Act*. Amended to include any transmission, storage, distribution, liquefaction or re-gasification of gas or the trading therein.

is likely to have an adverse effect on the coastal environment,[678] or if the structure is in contravention of the NEMICMA or any other law.[679] But before a Minister can exercise his/her power to issue such a repair and removal notice the Minister must first instruct the person responsible to remove his or her structure from the coastal zone or place where it is situated within a specified prohibited distance,[680] to rehabilitate the site and as far as possible to restore it to its natural state,[681] to repair the structure to the satisfaction of the Minister or the MEC,[682] or to take any other appropriate steps in terms of the Act or any other applicable legislation to secure the removal or repair of the structure.[683] If a person fails to comply with a notice which requires that person to carry out the specified action, the Minister or the MEC may instruct appropriate persons to carry out what is required by the notice[684] and recover from the responsible party the costs reasonably incurred in carrying out the required action.[685] The NEMICMA provides thus for the shortcomings of the MPRDA in this instance.

6.2.2 Pollution prevention

The owner of an offshore installation at the time of the first incident, or the first of numerous occurrences, shall furthermore be held liable in terms of the MPCCLA for any loss or damage caused elsewhere than on an offshore installation by pollution resulting from the discharge of oil from an offshore installation,[686] as well as the costs of any measures taken by the Authority in terms of the DSCA regarding the offshore installation, for the purposes of reducing or preventing loss or damage caused by the discharge of any oil.[687] The Authority may take any measures deemed necessary to remove or prevent pollution of the sea discharged from an offshore

678 Section 60(1)(a) NEMICMA. Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
679 Section 60(1)(b) NEMICMA.
680 Section 60(2)(b)(i) NEMICMA. Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
681 Section 60(2)(b)(ii) NEMICMA.
682 Section 60 (2)(b)(iii) NEMICMA.
683 Section 60(2)(b)(iv) NEMICMA.
684 Section 61(1)(a) NEMICMA. Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
685 Section 61(1)(b) NEMICMA.
686 Section 9(1)(a) MPCCLA.
687 Section 9(1)(b) MPCCLA.

installation.[688] Finances may be made available by the Director-General for any expenses needed by an organisation in rescuing, conveying, treating, feeding, cleaning and rehabilitating coastal birds polluted by oil discharged from the offshore installation in question.[689] Any person performing salvage operations in connection with an offshore installation in terms of an agreement with the owner shall be regarded as the agent of the owner.[690] Any person acting on the authority of the State or the Authority to perform any measures to prevent or remove pollution of the sea[691] or an act required shall not be liable for any loss of or damage to an offshore installation, its cargo or harmful substances.[692]

Any person who commits an offence in terms of section 2(1)(a) shall be liable in terms of the DSCA to a fine not exceeding R250 000 or to imprisonment not exceeding five years or to both,[693] as well as in the case of an offence in terms of section 2(1)(b) a fine not exceeding R100 000 or imprisonment for a period not exceeding two years or both.[694] Any person who commits an offence under section 2(1)(c) shall be liable to a fine not exceeding R5 000 or to imprisonment for a period not exceeding six months, or to both.[695]

It seems that environmental authorisations in future will have to include closure and rehabilitation conditions. In the meantime, however, the NEMICMA places an obligation on gas production companies to remove platforms and installations in the coastal zone. Pollution prevention is also regulated by other legislation pertaining to the sea. It may be necessary to have more specific regulation of offshore rehabilitation in the MPRDA or the NEMA to ensure effective enforcement and control of the possible impact of these activities on the environment post closure.

688 Section 9(2)(a) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
689 Section 9(2)(b)(ii) MPCCLA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.
690 Section 10(3) MPCCLA. Parramon *Regulation of land-based marine pollution in South Africa and France* 280.
691 Section 10(5) MPCCLA.
692 Section 10(4) MPCCLA.
693 Section 6(1)(a) DSCA.
694 Section 6(1)(b) DSCA.
695 Section 6(1)(c) DSCA. Osborn and Datta 2006 *Ocean & Coastal Management* 576-596.

7. Conclusion and recommendations

Gas exploration at sea and on land is a recent phenomenon in South Africa. The reason for the sudden interest in gas exploration on land is that it may prove to be a source of alternative or "greener" energy and provide the possibility for South Africa to move away from coal-based energy.[696]

The aim of this study was to determine to what extent South African energy and environmental law regulates the impacts of the activities of gas exploration, production and management during the phases of the life cycle of a gas venture. The impacts that onshore and offshore gas exploration activities may have include environmental impacts,[697] as well as impacts on the surrounding community.[698] Offshore gas production should, for example, be weighed against fishing ventures in the vicinity and onshore gas production activities against agriculture and food security.[699] The immediate benefit of gas exploration and production activities may be overshadowed by their other (sometimes hidden) impacts.[700] The proponents of gas exploration and production tend to emphasise its potential economic benefits.

The life cycle starts with the planning or exploration phase, where the life cycle of the gas process is planned and used to determine if gas production both onshore and offshore will be sufficiently viable to merit proceeding with development. The planning/exploration phase of a gas venture entails the reconnaissance and exploration phases of a gas venture. The possible environmental impacts are minimal, although the seismic surveys used to determine if gas production will be viable can harm biodiversity to a certain extent. The gas exploration company must thus obtain reconnaissance and technical cooperation permits or exploration rights and, if necessary, the right to impinge on biodiversity etc.

696 See 1 and 2.
697 See 2.
698 See 2.
699 See 2.
700 See 2.

During the production/operational phase[701] the gas production company must perform the extraction process in line with all of the conditions, licences and legal requirements imposed on it. Possible environmental impacts during this phase may include an impact on biodiversity in both onshore and offshore ventures.[702] With regard to onshore activities, the air quality may be impacted should flaring occur, and will make NEMAQA applicable, whereas waste as well as hazardous waste may be generated, NEMWA and HSA will be applicable, for example.[703] With regard to offshore gas production, the marine life may be impacted, making NEMBA and MLRA applicable.[704] If a platform has to be constructed in the ocean to conduct the activities, the NEMICMA will set out the prerequisites with regard to the construction of such a structure.[705] Apart from the licences, a gas company has a duty to prevent contamination of the land and the sea and to reduce or prevent pollution.

The last phase is known as the rehabilitation and closure phase.[706] This phase describes all the legal obligations of a gas exploration company regarding the rehabilitation of the environment. Harmful products and substances involved in the process should therefore be monitored and managed throughout the life cycle. For a summary of the applicable legislation, see Table 1.

701 See 5.
702 See 5.
703 American Petroleum institute 2014 www.adventuresinenergy.org. See 5.
704 See 5.
705 Getches-Wilkinson Centre for Natural Resources, Energy, and the Environment 2014 www.oilandgasbmps.org.
706 See 6.

Onshore			Offshore		
Planning phase	**Acts/ regulations**	**Organ of state**	**Planning phase**	**Acts/ regulations**	**Organ of state**
Authorisation of reconnaissance and exploration activities	MPRDA Ss 69-80 GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004	DMR	Authorisations for offshore operations	MPRDA Ss 69-80 NEMICMA Ss 33, 34, 63 & 83	DMR DEA
Biodiversity	NEMBA Ss 87-90	DEA	Biodiversity	NEMBA S 57	DEA
Onshore			**Offshore**		
Production phase	**Acts/regulations**	**Organ of state**	**Production phase**	**Acts/regulations**	**Organ of state**
Authorisation of production activities	LUPO Ss 6, 11, 16 SPLUM S 30	Western Cape municipality	Authorisation of production activities	*Gas Act* Ss 15, 16, and 28 GN R1251 in GG 32849 31 December 2009	NERSA and PASA

Onshore			Offshore		
Production phase	**Acts/regulations**	**Organ of state**	**Production phase**	**Acts/regulations**	**Organ of state**
Authorisation of production activities	*Gas Act* Ss 15 – 19 GN 1251 in GG 32849 31 December 2009 MPRDA Ss 83, 84, 85 NEMA S 24 GN R544 in GG 33306 18 June 2010 GN545 in GG 33306 18 June 2010	NERSA, PASA & Regional Manager DMR DEA	Authorisation of production activities	NEMICMA Ss 64- 66 and 83 GN 840 in GG 34781 25 November 2011	DEA

Onshore			Offshore		
Production phase	**Acts/regulations**	**Organ of state**	**Production phase**	**Acts/regulations**	**Organ of state**
Operational or production phase	MPRDA Ss 78, 82, 85 and 86 GN 527 in GG 26275 23 April 2004 *Gas Act* S 29 GN 962-963 in GG 29258 29 September 2006	DMR NERSA, PASA & Regional Manager	Operational or production phase	MPRDA S 5 *Gas Act* S 29 GN 962-963 in GG 29258 29 September 2006 NEMICMA Ss 58, 68	DMR NERSA, PASA & Regional Manager DEA
Water use	NWA Ss 15-20, 43 and 49	DWA			
Air quality management	NEMAQA Ss 21-23, 26-30, 36-42 and 46 GN 248 in GG 33064 31 March 2010	DEA	Air quality management	NEMAQA Ss 21 and 22 GN 248 in GG 33064 31 March 2010	DEA

Onshore			Offshore		
Production phase	**Acts/regulations**	**Organ of state**	**Production phase**	**Acts/regulations**	**Organ of state**
Waste management	NEMWA Ss 16, 17, 21, 45-53 and 66 HSA S 8	DEA	Pollution prevention and waste management	DSCA Ss 1-5 . MPCCLA Ss 1, 8, 14, 22 and 24 MLRA S 43	DEA
Transportation	NRTA S 55 SANS 10231 (2010) SABS Code of practice 0231 GN 265 in GG 36338 12 April 2013	DT			

Onshore			Offshore		
Closure Phase	**Acts/regulations**	**Organ of state**	**Closure phase**	**Acts/regulations**	**Organ of state**
Closure certificate	NEMA S 28 MPRDA S 69 GN 527 in GG 26275 23 April 2004 as amended by GN R1288 in GG 26942 29 October 2004 *Gas Act* S 34 GN R321 in GG 29792 20 April 2007	DEA DMR NERSA & PASA	Closure certificate	NEMA S 28 *Gas Act* S 34 GN R321 in GG 29792 20 April 2007 NEMICMA S 60	DEA NERSA DEA
Pollution prevention	NWA S 19 GN 398 in GG 26187 of 26 March 2004 GN 399 in GG 26187 26 March 2004	DWA	Pollution prevention	DSCA S 6 MPCCLA Ss 9 & 10	DEA

Onshore			Offshore		
Closure Phase	**Acts/regulations**	**Organ of state**	**Closure phase**	**Acts/regulations**	**Organ of state**
Air quality management	NEMAQA S 33	DEA			
Waste management	NEMWA S17 & 51	DEA			

Table 1: An analysis of onshore and offshore gas exploration in terms of its life cycle

Gas exploration is regulated mainly by the MPRDA, which focuses on gas exploration at sea. The MPRDA read with the NEMA chapter 5 provides that EIAs as well as EMPrs need to be performed for certain potentially harmful activities. In future, an environmental authorisation will be issued with conditions that have to be complied with during the life cycle of the project.[707] If biodiversity is to be harmed the NEMBA would be applicable, whereas if gas exploration is to be undertaken on land, the NWA, for example, would be applicable - and at sea the NEMICMA.[708] The applicable authorities would *inter alia* be the DEA, the DWA and the DMR.

The MPRDA and the NEMA are to be amended to transfer all the decision making to the Minister of Mineral Resources, leaving the Minister of Water and Environmental Affairs to be the appeal authority. How far the Minister of Mineral Resource's authority will stretch in relation to the SEMAs is still to be seen. However, in relation to specific offshore gas activities the Minister of Water and Environmental Affairs/Provincial Environmental Authority will still be the authority in relation to marine and coastal affairs, a situation which may cause confusion in decision-making.

The production phase deals with the actual process of extracting and transporting the gas. The *Gas Act* and the NEMAQA will, for example, be applicable to deal with the regulation of these activities during this phase. The discarding or recycling of waste that was ignited during the exploration and production phase is regulated by the NEMWA, the NEMAQA and the MPRDA. During the closure phase a company has to comply with the provisions in the *Gas Act* and the MPRDA, for example. If gas exploration is undertaken at sea various other laws will be applicable.[709]

It seems that various departments (the DEA, the DMR, the Department of Energy, the DWA and the DT and provincial authorities) regulate gas activities in terms of different legislation. This results in a fragmented regulatory framework that does not provide the necessary protection for the respective phases of a gas exploration life cycle. The exploration of gas is rapidly expanding, and in order for it to provide South

707 See 4.1.1 and 4.1.2.
708 See 4.2.1.
709 See 6.2.

Africa with a sustainable alternative to coal-based energy, legislation needs to match the progress in this field.[710] It may be that South African energy and environmental law are not necessarily following this trend. The country's governance regime is fragmented and may not be able to establish a concerted and integrated approach to environmental governance with regard to gas ventures.

South Africa's energy and environmental legislation mainly regulates the environmental aspects of gas activities, but some fragmentation still needs to be addressed. The legislation does not specifically provide for onshore gas activities and the regulation thereof has to be "read into" the different laws. Since onshore gas exploration is an alternative and relatively new extraction process, legislation should contain specific provisions for the regulation of the entire life cycle of gas exploration, production and management. It is important that either the MPRDA or the *Gas Act* or both be amended and extended to specifically provide for onshore gas exploration activities, regulating all its environmental impacts during its life cycle. The offshore extraction of gas is also regulated in various Acts. Once the operations connect to the land, there is uncertainty as to which legislation should apply. Similarly the MPRDA should clearly distinguish between petroleum and gas exploration activities – regulating also the life cycle of the gas ventures and their related environmental impacts.

The procedures regarding the extraction of gas both onshore and offshore are complex and their impacts differ from each other, and therefore the legislation needs to be unique to address each of these activities. If the processes used to extract gas were to be sufficiently regulated by law, this would contribute to the effective monitoring by the various applicable departments of non-compliance during each phase of both the onshore and the offshore life cycle. Clear policies and a regulatory framework are also necessary in order to attract the required energy sector investment and sustain a high economic growth rate. The legislation could, for example, include tax incentives for the use of energy-efficient technology or for the exploration and production of gas as an alternative to fossil fuels.

710 See 2.1 and 2.4.

Specific recommendations may also be made. Clarity must be provided regarding the definition of “petroleum” in the MPRDA and whether or not it includes gas exploration. A distinction should also be made between conventional and unconventional gas exploration and production, as different methods are used. Furthermore, a sufficient distinction should be made in the *Gas Act* and MPRDA between the regulation of onshore and offshore gas activities. The legislation relating to marine pollution is out of date and must be updated to incorporate present sources of pollution as a result of offshore gas activities. The end of an onshore governing body’s authority and the commencement of the offshore governing body’s authority regarding the coast should be clarified.

There are very few legislative measures efficiently regulating the rehabilitation of offshore gas exploration activities. This provides the opportunity for gas exploration companies to shrug off their responsibilities regarding the impacts their operations may have on the marine environment. If a gas exploration and/or production company adheres to appropriate legislation, licences and permits issued, the possibility exists that minimal damage and pollution to the environment will be performed during offshore gas production, as well as that all possible damage or contamination will elicit the response of effective rehabilitation and remediation.

Engaging with the development of new environmental and/or energy legislation demands a comprehensive analysis over a broad timeframe. Many state departments have rushed their newly proposed legislation in order that it should come into effect before the 2014 elections, which may result in its not being as thorough as it needs to be in order to address the broad scope of policy and the existing regulatory vacuum. The policy framework indicates only what needs to be done and not how it is to be done, but states that legislation and policies have to be adapted to address climate change issues. It is thus necessary for energy and environmental legislation to address the goals contained in the policy documents, such as environmental protection during the gas life cycle. It is therefore of paramount importance to address the fragmented nature of the regulatory framework relating to the gas exploration, production and management life cycle in order to identify and minimise the broad scope of the impacts these activities may have on

the environment. Perhaps the time has come to split the MPRDA and the petroleum and gas legislation into two separate Acts.

Onshore gas exploration has not yet been undertaken on a large scale in South Africa. It is therefore difficult to assess its specific impacts and determine the pros and cons of the process. It is essential that continuous research should be undertaken regarding the potential ecological impacts of developing a large-scale South African gas industry. It should be based on scientific knowledge regarding the terrain or area where onshore and offshore exploration activities will commence, as well as the natural gas itself.[711] The law should keep pace with new scientific developments.[712]

711 See 2.1.
712 All of the research with regard to this dissertation was performed prior to 27 October 2013.

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