Development of a regulatory framework for carbon capture and storage in South Africa

Analysis of regulatory choices

3 May 2013
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For and on behalf of
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Approved by: Charles Allison

Signed: [Signature]

Position: Partner

Date: 3 May 2013

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ACRONYMS AND ABBREVIATIONS

CCS Carbon dioxide capture and storage
CCS M&Ps Modalities and procedures for CCS as CDM project activities.
CDM Clean Development Mechanism (under the UNFCCC Kyoto Protocol)
CO₂ Carbon dioxide
DEA Department of Environmental Affairs
DoE Department of Energy
EC European Commission
EIA Environmental impact assessment
EMIs Environmental Management Inspectors
EMP Environmental Management Plan
EOR Enhanced oil recovery
EU European Union
EU ETS EU Emissions Trading Scheme under Directive 2003/87/EC
GHG Greenhouse gas
IEA International Energy Agency
MEC Member of the Executive Committee
NERSA National Energy Regulator of South Africa
PASA Petroleum Agency of South Africa
PCSP Pilot CO₂ Storage Project
RoD Record of Decision
SACCCS South African Centre for CCS
SANEDI South African National Energy Development Institute
SDWA Safe Drinking Water Act (US legislation)
SIA Socio-economic impact assessment
UIC Underground Injection Control (under US SDWA)
WML Waste Management License

South African legislation referred to in this report
DMA Disaster Management Act 57 of 2002
EIA Regulations Environmental Impact Assessment Regulations (GN R543) published on 2nd August 2010
HSA Hazardous Substances Act 15 of 1973
IEM Integrated Environmental Management (under the NEMA)
MPRDA Mineral and Petroleum Resources Development Act 28 of 2002
NEM: AQA National Environmental Management: Air Quality Act 39 of 2004
NEMA National Environmental Management Act 107 of 1998
NWA National Water Act No. 36 of 1998
INTRODUCTION

1.1 OVERVIEW

This report sets out possible options for regulating carbon dioxide (CO₂) capture and storage (CCS) and a work plan for the implementation of a regulatory framework in South Africa. It forms the final deliverable under the assignment: Development of a regulatory framework for Carbon Capture and Storage in South Africa, sponsored by the World Bank Group and undertaken by a consortium consisting of: Environmental Resources Management Southern Africa (Pty) Ltd (“ERM”), IMBEWU Sustainability Legal Specialists (Pty) Ltd (“IMBEWU”) and Carbon Counts Company (UK) Ltd (“Carbon Counts”). This report was prepared by Carbon Counts with ERM and IMBEWU.

The approach taken in the report draws on a similar method employed by the European Union (EU) in the paper: Choices for regulating CO₂ capture and storage in the EU (EC, 2007). This paper proved extremely useful in mapping a way forward for CCS regulation in the EU by clearly laying out the regulatory options to be considered by policy-makers in the European Commission, and paving the way for development of the EU CCS Directive. (1) The approach is also consistent with that proposed by the International Energy Agency (IEA) for developing regulatory frameworks for CCS as discussed further below.

The report builds on work undertaken over the past three years to understand CCS in the context of the South African legal and regulatory environment including:

• The 2011 SACCCS Scoping Study for the Test Injection of CO₂ into a Geological Formation.
• The 2011 South Africa-Europe Cooperation on CCS study.
• The 2011 South African Centre for CCS (SACCCS) Carbon Capture Readiness study.
• The 2011 International Energy Agency-Department of Energy-SACCCS CCS legal and regulatory workshop.

Information is also drawn from the following international sources:

• The US Environmental Protection Agency, Safe Drinking Water Act (SDWA) Underground Injection Control (UIC) Class VI, Final Rule
• The 2010 IEA CCS Model Regulatory Framework.
• The 2010 IEA CCS Legal and Regulatory Review Edition 1.


The detail in the reports outlined above has been summarised separately in the *Gaps and Barriers Analysis Tool* for CCS legislation in South Africa, compiled by IMBEWU under this assignment.

The report is also based on the outcomes of a series of workshops with the project Steering Committee involving the Department of Energy (DoE), SACCCS and the World Bank, as well as the Inter-Departmental Task Team on CCS involving all government departments.

1.2 **SCOPE OF THE REPORT**

The analysis compiled in this report does not set out a prescriptive approach to the design of a regulatory framework for CCS in South Africa, nor does it propose actual amendments that should be made to existing statutes to confer them onto CCS. Rather, the objectives are as follows:

1. To outline what a regulatory framework for CCS should set out to achieve;
2. To highlight how existing legislation could apply to CCS without being amended, and what level of regulatory oversight would be achieved through such existing legislation;
3. To assess whether the existing legislation presents any barriers to CCS deployment;
4. To consider amendments that might be needed to confer existing legislation onto CCS or to remove barriers;
5. To assess what precedents and template approaches could be adopted from existing legislation for CCS regulation in South Africa;
6. To outline choices for moving forward in development of a regulatory framework for CCS in South Africa;
7. To benchmark globally against countries that had pioneered development and implementation of CCS legal and regulatory frameworks; and
8. To develop possible CCS legal and regulatory pathways for South Africa with coordination of existing legislation.

This report excludes a comprehensive assessment of the common law, such as mineral rights issues, contractual law, health, safety and environmental issues, and town and regional planning legislation and building legislation (although areas of concern that may be incidentally identified are discussed herein). Although land use planning issues are not considered in the content of this report, requirements in relation to this area of law remain applicable in the CCS context. Similarly, provincial and municipal licences and permits may be required by a CCS project, the detail of which will be dependent on the project specifications, such as the storage site location. Any land re-zoning procedures, as well as the application process for provincial and/or municipal licences and permits will require extensive public engagement. All these matters will need to be addressed on a case-by-case basis.
The focus of the report is on regulatory needs and options relating to frameworks under which to permit/authorise and oversee safe development, operation and closure of CCS projects in South Africa. This approach was taken to avoid conflating broad issues of a legal nature with practical regulatory needs for projects and policy-makers wishing to gain oversight of CCS operations.

Furthermore, matters of a political nature are not considered in so much as whether CCS is viewed as an appropriate technology for development and deployment in South Africa: this aspect is taken as a given and provides context for the pressing need to develop an enabling framework for deploying the technology.

1.3 APPROACH TO DEVELOPING THE REGULATORY FRAMEWORK

The IEA’s CCS Model Regulatory Framework (IEA, 2010) recommends that the starting point for developing a regulatory framework for CCS is to review existing legislation and assess how laws could apply to CCS prior to assessing whether comprehensive CCS regulatory frameworks for large-scale deployment are required. It proposes that the following key issues be considered:

- First, how issues raised by CCS operations can potentially be regulated by amending existing regulatory frameworks to cover certain aspects of the CCS chain (existing regulatory frameworks that may be relevant include those relating to: oil and gas; mining; waste; environmental; industrial permitting; health and safety; property rights; and transportation).
- Second, whether existing regulatory frameworks pose potential barriers to various aspects of CCS (for example, groundwater protection legislation may prevent CO₂ injection into saline formations).
- Third, whether a CCS regulatory regime could have any unintended consequences or interactions with existing laws.
- Fourth, once the context is understood, any gaps in which aspects of the CCS chain are not addressed by existing laws can also be identified.

It also suggests that international law should be reviewed to assess how it might impact on national level regulations.

The approach taken in this report is consistent with that proposed by the IEA and is as follows:

- The key issues in terms of risks and other aspects associated with CCS activities are presented and the attendant regulatory requirements are outlined based on the risks and issues to be managed. This includes requirements potentially imposed on South Africa under international law;
Based on the regulatory requirements identified, firstly the role of the
National Environmental Management Act, 107 of 1998 (the NEMA), and
subsequent amendments, is considered for its capacity to provide a
regulatory framework that meets these requirements (either with or
without amendments), and also the gaps and uncertainties that are not
covered by NEMA, either through amendment or otherwise;

Following this review, South African waste laws are considered in the
context of whether the provisions of the National Environmental
Management: Waste Act 59 of 2008 (the NEM: WA) provide for an effective
regulatory framework to cover CCS activities, what gaps and uncertainties
may persist, whether any issues persist in using the NEM: WA to regulate
CCS, and if so what measures could be taken to implement amendments;

Remaining gaps and uncertainties are then considered in the context of
other South African laws that could potentially be used to fill them either
through amendment or by providing a template that could be adapted for
CCS. This includes the Mineral and Petroleum Resources Development Act No.
28 of 2002 (MPRDA) and laws relating to occupational health and safety
and transportation of dangerous and/or hazardous substances;

Based on the analysis undertaken, a range of possible choices available for
developing a regulatory framework for CCS in South Africa are outlined
and a work plan for implementation proposed.

This approach has been taken in order to try and focus efforts on establishing
real and tangible measures that can be used to regulate CCS in the country,
cognisant of the need to protect public health and the environment from
potential adverse effects of the technology.
BACKGROUND ON CCS

2.1 CCS IN SOUTH AFRICA

South Africa is responsible for around 1.5% of global greenhouse gases (GHG) emissions, predominantly as a result of its coal based, energy-intensive economy. Recognising the need to take action on climate change, the South African Government published the National Climate Change Response White Paper in 2011 and included CCS as one of the Near-Term Priority Flagship Programmes aimed at reducing GHG emissions in line with the President’s commitments (made in 2009) for emissions to peak between 2020 and 2025, plateau for approximately a decade and begin declining in absolute terms thereafter (2).

The Department of Energy (DoE) is the custodian of CCS and leads on developing the CCS flagship project and is responsible for formulating the national CCS legal and regulatory framework. Working with the South African National Energy Development Institute (SANEDI) and its subsidiary, SACCCS, a CCS Roadmap was endorsed by Cabinet on 3 May 2012. The Roadmap highlights the milestones that need to be achieved starting with an assessment of CCS potential in 2004 and culminating in commercial roll out of CCS activities from 2025 as illustrated below (Figure 2.1).

Figure 2.1 South Africa’s CCS Roadmap

<table>
<thead>
<tr>
<th>Phase</th>
<th>Year</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>2004</td>
<td>CCS Potential</td>
</tr>
<tr>
<td>Phase II</td>
<td>2010</td>
<td>Carbon Storage Atlas</td>
</tr>
<tr>
<td>Phase III</td>
<td>2017</td>
<td>Pilot CO₂ Storage Project (10’s ktCO₂)</td>
</tr>
<tr>
<td>Phase IV</td>
<td>2020</td>
<td>Integrated Demonstration (100’s ktCO₂)</td>
</tr>
<tr>
<td>Phase V</td>
<td>2025</td>
<td>Commercial Operation</td>
</tr>
</tbody>
</table>

The Pilot CO₂ Storage Project

SACCCS, in conjunction with the South African Council for GeoScience, is currently undertaking detailed studies of the Zululand and Algoa basins with a view to conducting a pilot CO₂ storage project (PCSP) onshore. The reason for conducting the PCSP onshore is largely for ease of access and cost reasons. The life cycle of the PCSP is illustrated in Figure 2.2.

(2) See: http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/southafricacphaccord_app2.pdf
In conjunction with investigation of the technical feasibility for undertaking CCS in South Africa, the DoE and SACCCS are exploring the legal and regulatory implications of implementing CCS in the country in order to determine whether and to what extent existing legislation may require amendment in order to allow for and adequately regulate CCS activities.

2.2 OVERVIEW OF CARBON CAPTURE AND STORAGE

CCS consists of several steps, starting with the separation of CO₂ from streams emitted by industrial operations such as power stations, oil refineries, cement kilns and blast furnaces (Box 2.1). The capture of CO₂ is a well-established technology which has been used commercially for several decades. Different capture technologies are available depending on the emitter type and location of the capture technology in the chain. Significant research is underway to improve the capture process, including lowering the energy requirements.

**Box 2.1 A working definition for CCS**

Carbon dioxide (CO₂) capture and storage (CCS) is a process consisting of the separation of CO₂ from industrial and energy-related sources, transport to a storage location and long-term isolation from the atmosphere.

Source: IPCC, 2005

Transportation of CO₂ is accomplished either at high pressure or as a refrigerated liquid, both options involving energy intensive operations. Optimisation of the transport chain will directly benefit the overall chain efficiency (see Figure 2.3). The transport part of the overall CCS chain becomes more important as the total amount of CO₂ transported increases. Emitters and sinks are in most cases developed individually for the intended capacity,
but the transport chain will have to accommodate the increasing flow rates over the years as CCS develops. A flexible and modular design of the transport system is required, providing the freedom to shift, direct and redirect the CO₂ flows to and from different locations.

Figure 2.3 Overview of CCS chain

Transportation of captured CO₂, either by pipeline, road or ship is required to deliver it to a suitable storage site in a geological formation. These can be oil or gas reservoirs, but also deep water bearing formations like saline aquifers (as illustrated in Figure 2.4). The advantage of oil and gas reservoirs in comparison with aquifers is that a historical record of reservoir properties and production data exists, making their characterisation easier and more cost effective, and their storage performance evaluation more predictable. For aquifers, more extended reservoir surveys are typically required due to the lack of historical characterisation. The storage potential for aquifers worldwide is, however, very large. The application of CO₂ for enhanced oil recovery (EOR) provides the potential for the co-benefit of CO₂ storage whilst generating financial revenues.
A successful geological storage project should begin with a careful selection of the site. This first step consists of screening all potential candidate sites with simple but selective criteria. Then extensive characterisation of the site properties should be made, together with a design of the field (injection and monitoring strategy). This phase will be concluded by a first estimation of the storage performance and an evaluation of the risks.

*Figure 2.5* shows the sequence of tasks which have to be performed within the scope of a geological storage project.
For the operational phase, the first steps consist of building and preparing the site: drilling and completing the injection and monitoring wells, building surface facilities if needed and, plugging old wells. The injection phase follows with specific monitoring activities to optimise the injection rates while maintaining good seal integrity.

The last phase starts when the injection ends, surface facilities are decommissioned, and wells are plugged and abandoned. During this period monitoring activities should continue with a view to gaining a long-term view on CO₂ migration and fate, and behaviour so as to provide assurances about the security of long-term containment. Monitoring activities may decline or cease if secure stabilisation of the CO₂ plume in the subsurface becomes apparent from monitoring activities, although occasional ad hoc monitoring may still be necessary, especially if geological events such as earthquakes take place which could lead to CO₂ mobilisation.

Performance and risk assessment will be conducted regularly all across the lifetime of a storage site, in particular when a mismatch between observations and predictions forces the re-calibration of predictive models used to characterise the storage site.

2.3 IMPACTS AND RISKS TO BE MANAGED FOR CCS

In terms of aspects of CCS that should be regulated, it is important to first consider the potential impacts and risks presented by the technology as this provides guidance on the type of regulatory oversight that will be needed to assure its safe and environmentally sound deployment. These can be broadly split between two types:

- The global risk - namely that the transported and stored CO₂ is re-emitted to the atmosphere, thus negating the primary motivation for employing the technology i.e. to mitigate climate change. This can be considered in the context of a “permanence” issue (see Box 2.2); and,

- Local environment, health and safety (EHS) risks (or in situ risks) – those issues posed by the impacts and effects of CO₂ capture, transport and storage, including impacts of construction, materials consumption, and the risks posed by losses of containment/leakage of the captured CO₂ on the environment and communities directly surrounding the project. These effects may also be augmented by the presence of certain toxic impurities in the captured CO₂. These are summarised for each stage of the process in Table 2.1.
Box 2.2  CCS and the issue of permanence

Because emissions are not eliminated by geologically storing CO₂ but merely avoided, the issue of permanence arises *vis-à-vis* the possibility that the injected CO₂ could leak from the subsurface back to the atmosphere at some future point in time. This would negate at least part of the environmental benefits achieved by the project, and compromise the environmental integrity of any emission reduction units awarded (or carbon tax offset) to a CCS project operator during its operational lifetime. To address this matter, three essential elements have been employed to manage this risk:

1. To assure project integrity, a range of upfront conditions on, *inter alia*, site selection and characterisation must be applied; this is because a key part of achieving permanent storage is the selection of a high quality geologically storage site in the first place;
2. Rules and regulatory oversight of storage site operation and closure is needed to ensure that it is effectively managed so as to reduce the risk of leakage occurring due to poor practice.
3. Short-, medium- and long-term responsibility for the stored CO₂ must be allocated, with the responsible party accepting liability to remediate any damage caused by leakage, including the replacement of an equivalent amount of units (or potentially, repayment of carbon tax) equal to the quantum of CO₂ leakage determined to have occurred.

This combination of requirements can maintain the environmental integrity of trading schemes into which CCS-derived units are sold. A consequence is that inclusion of CCS in emissions trading (or carbon taxation regimes) typically must be underpinned by a regulatory approach to control site development, operation and closure and to allocate liability across the project life-cycle.

In addressing these issues, existing statutes in South Africa could be used, at least in part. Options include the NEMA, the NEM: WA, and the MPRDA, which all set out regulatory frameworks for managing analogous activities such as:

- Regulation of potentially polluting activities (under NEMA, in particular via the *National Environmental Management Act: Environmental Impact Assessment Regulations* (GN R543 of 18 June 2010, as amended));
- Disposal of waste onto and into land (NEM: WA); and
- Extraction of hydrocarbons and minerals from the subsurface, including drilling activities and other subsurface appraisal and extraction techniques (MPRDA).

Other legislation such as the Regulations relating to *Transportation of Dangerous Goods* may also be used to apply to safe carriage of CO₂.

It is the assessment of these options in terms of their capacity to regulate key aspects of CCS that forms the focus of this report. In the next section, the main requirements of a CCS regulatory framework are discussed, and subsequent sections consider how these could be achieved through existing statutes.
<table>
<thead>
<tr>
<th>Capture</th>
<th>Transport</th>
<th>Injection and Storage</th>
</tr>
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<tbody>
<tr>
<td>1. Emissions of other pollutants to various media (such as SOx, NOx, solid waste and upstream impacts through greater fuel use, balanced against the environmental benefits of CO₂ capture);</td>
<td>1. Pipeline routing - pipeline construction and maintenance will have impacts on the environment and landscape;</td>
<td>1. Above ground installation siting, construction and technology employed, including the potential environmental impacts of storage site prospection (seismic etc.)</td>
</tr>
<tr>
<td></td>
<td>2. Global risk - that the pipeline leaks and the captured CO₂ is re-emitted back to the atmosphere compromising the effectiveness of CCS as a mitigation option, which would even be enhanced by the energy penalty;</td>
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<tr>
<td>2. Occupational and local environmental health and safety (EHS) risks posed by the presence of large volumes of pressurised CO₂ at capture plants;</td>
<td></td>
<td>2. Global risk - that the stored CO₂ is re-emitted to the atmosphere, thus compromising the effectiveness of CCS as a climate mitigation option, which would even be enhanced by the energy penalty;</td>
</tr>
<tr>
<td>3. Any other environmental concerns from construction and operation of the capture process, taking into consideration the use of best available technology as a potential means to minimise these risks.</td>
<td>3. Local EHS risk that any leaked CO₂ poses to the surrounding local populations and the environment (from asphyxiation of flora and fauna and acidifying effects on soil, surface and groundwaters).</td>
<td>3. Local EHS risks - associated with the impacts and effects of CO₂ storage and un-planned loss of containment. These EHS risks can be split into:</td>
</tr>
<tr>
<td></td>
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<td>• surface release, potentially resulting in asphyxiation and ecosystem impacts (tree roots, ground animals, effects of CO₂ seepage on ground- and surface water quality);</td>
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<td>• effects of impurities on the subsurface;</td>
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<td></td>
<td>• impacts of CO₂ in the subsurface, through metal or other contaminant mobilisation, which could be augmented by the presence of certain impurities;</td>
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<td>• quantity-based (physical) effects such as ground heave, induced seismicity, displacement of groundwater resources and damage to hydrocarbon production;</td>
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<tr>
<td></td>
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<td>• occupational and local EHS risks posed by the presence of large volumes of pressurised CO₂ at injection facilities and storage sites.</td>
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REQUIREMENTS OF A CCS REGULATORY FRAMEWORK

3.1 REGULATORY NEEDS

Based on the risks outlined previously, the following elements are considered critical for the establishment of a regulatory framework across the full chain of capture, transport, injection and storage of CO₂:

Project permitting/approvals to manage risks

In terms of providing regulatory oversight for the following activities:

1. Access and storage rights (authorising use of the surface and subsurface land associated with a CO₂ storage site facility);
2. Project approval (technical review/permitting, risk assessment, EIA/ESHIA, public participation);
3. Project operation (capture, injection, storage, monitoring & reporting, Occupational Health and Safety (OHS), civil protection/control of emergencies, disclosure/communications); and
4. Project closure (decommissioning standards & procedures);

Regulatory oversight for inspections, enforced closure and remediation

In terms of vesting powers in a competent authority to undertake the following during project operations:

1. Site inspections (both routine and unplanned spot checks);
2. Intervention to mitigate potentially hazardous effects of poorly operated sites;
3. Termination of operations where they pose a risk to public health or the environment; and,
4. Undertaking remediation work, where necessary, and recovering the costs of such actions.

Allocate liability

Liability needs to be allocated for responsibility of the risks posed by CCS over the short- medium- and long-term across the CCS chain (i.e. creating a chain of custody / responsibility for captured CO₂). Potential aspects to include within the context of a liability framework for CCS include:

1. Management of leakage and permanence – causing both “global” and “local” damages – and the means for possible redress and compensation for the global atmosphere (due to the CO₂ release) and any affected communities/persons in the event of local damages caused by CO₂ leakage;
2. Stewardship of the storage site in the context of these aspects over the long-term, and the possibility of transferring liability from operator to state; and,

3. Costs and financial provision(s) – this can act to reduce the potential moral hazard for operators that arises where a liability transfer occurs (see Box 3.1). This type of mechanism can also limit the exposure of the state in remediating, closing and managing poorly performing projects, and costs for long-term stewardship, where appropriate.

The regulatory needs highlighted here are the main backdrop of the analysis presented in the following sections. However, several other key factors must also be taken into account, including: the removal of any barriers in existing legal frameworks; the need to comply with international laws and regulations applicable to CCS and to which South Africa is a Party; and, also the role of planned regulations in the near-term in the country.

**Box 3.1 Moral hazard and liability transfer**

“Moral hazard” is an economic behavioural term used to describe a situation where the risk of an event may increase due to actions the responsible party takes because it is partially insulated from being held fully liable for resulting harm and attendant damages. Moral hazard is a concern with any system of risk pooling because corporations are not liable for the entire costs of their own accidents or for liability transfer where it is not exposed to the long-term effects of its actions. That said liability could still apply to the operator after any liability transfer in the case of tort claims where negligence of wilful deceit etc. can be shown to have occurred (see Box 7.1).

The US Federal Government has extensively considered this issue in the context of CCS. It notes that:

“...in designing a comprehensive framework for regulating CCS activities, the most critical features relating to long-term liability will be those that serve to prevent such liability from occurring. Appropriate site selection is especially important in minimizing risks of CO₂ sequestration activities. Also critical are robust monitoring, regulatory oversight, and enforcement. To reduce the potential moral hazard, liability assumption or transfer, if warranted, could be conditioned on strong siting and operational standards as well as the environmental performance of the CO₂ sequestration project through a site closure certification process to ensure that the site does not pose an environmental, health, or safety risk.”

(ITF CCS, 2010, pg. 74).

The considerations described by the US Federal Government provide important context to the Regulatory Needs discussed here (see also Box 7.1 below).

**3.2 USING ENABLERS AND REMOVING BARRIERS**

Within the existing legal framework there are various statutes that could be modified to act as enablers for a regulatory framework for CO₂ storage in the subsurface. On the other hand, amendments to existing legislation may be needed to modify the scope of qualifying activities to either explicitly include or exclude CO₂ storage from their requirements. These might include:

- Environmental Impact Assessment (EIA) Regulations (GN R543) published on 18 June 2010, as amended;
- Water protection laws: National Water Act 36 of 1998; and
• Waste management laws: *National Environmental Management: Waste Act* 56 of 2008\(^{(3)}\)

As highlighted at the end of this report, it is a matter for further consideration as to whether these laws should be used to regulate CO₂ storage operations as pieces of enabling legislation, or whether CO₂ injection should be excluded from their scope in order to facilitate the development of a regulatory framework outside of their ambit.

### 3.3 COMPLIANCE WITH INTERNATIONAL LAW

#### 3.3.1 Overview

In addition to the regulatory needs outlined above, there is also a need for the future regulatory framework to fulfil South Africa’s obligations under international rules and standards for CCS, including:

- London Convention & Protocol (only applicable to projects taking place offshore);
- United Nations Framework Convention on Climate Change (UNFCCC) requirements;
- Modalities and procedures for CCS under the Clean Development Mechanism (CDM; CCS M&Ps; UNFCCC, 2011);
- Transboundary issues.

In most cases, these requirements can provide a useful basis for developing a regulatory framework for CCS in South Africa, as several contain prescriptive approaches to matters such as site selection, monitoring, closure and post-closure obligations.

#### 3.3.2 Requirements under the London Convention & Protocol

The 1972 *London Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter*, and the 1996 *Protocol* thereto (the London Protocol) control activities involving the dumping of waste at sea, either in the water column, or on or in the seabed. South Africa is a signatory Party to the Convention, although has yet to ratify the Protocol. It only applies to storage of CO₂ in offshore environments, and, by virtue of inclusion of CO₂ on the “reverse list”, requirements are imposed regarding CO₂ stream purity and the application of a CO₂ specific waste assessment guideline for offshore storage of CO₂ (IMO, 2007).

The main requirements under the London Convention and Protocol relate to the following two aspects:

1. **CO₂ injection stream purity** – which set limits on the quality of CO₂ that may be injected into sub-seabed geological formations; and,

\(^{(3)}\) Whilst this could be an “enabler” it could also create prohibitions for the injection of CO₂ through restrictions on the means of disposal and the types of waste that may employ various disposal mechanisms.
2. **Guidelines for Assessment of CO\textsubscript{2} stream being injected** – these outline a set of authorisation procedures including site characterisation, risk assessment, and monitoring requirements.

As a ratifying Party, South Africa should be cognisant of these requirements when developing national CCS regulations, particularly for the offshore environment (although many of the requirements could be equally applicable onshore; see **Box 3.2**).

**Box 3.2**

**London Convention and Protocol requirements for CCS**

Annex I of the London Protocol lists wastes and other matter that may be considered for dumping at sea or below the seabed, subject to a permitting procedure that takes account of the provisions of Annex II, which outlines generalised waste assessment guidelines. A proposed amendment to Annex I was agreed by parties in 2006 and came into force on 10 February 2007. The amendment adds “Carbon dioxide streams from carbon dioxide capture processes for sequestration” to Annex I of the London Protocol. This means that CO\textsubscript{2} storage in sub-seabed geological formations is now allowed. (4) The provisions are subject to the following requirements:

4 Carbon dioxide streams [...] may only be considered for dumping, if:
   1. disposal is into a sub-seabed geological formation; and
   2. they consist overwhelmingly of carbon dioxide. They may contain incidental associated substances derived from the source material and the capture and sequestration processes used; and
   3. no wastes or other matter are added for the purpose of disposing of those wastes or other matter.

Additional guidance on waste assessment in the context of CO\textsubscript{2} streams was adopted in the form of the **Specific Guidelines for Assessment of Carbon Dioxide Streams for Disposal into sub-Seabed Geological Formations** in November 2007 (IMO, 2011). These provide further guidance and requirements in the following contexts:

1. Carbon Dioxide Stream Characterisation (Chapter 4, Chemical and Physical Properties);
2. Waste Prevention Audit and Consideration of Waste Management Options (Chapters 2 & 3);
3. Action List (Chapter 5);
4. Identify and Characterise a Sub-seabed Geological Formation and the Surrounding Environment (Chapter 6, Site Selection and Characterisation);
5. Determine Potential Impacts and Prepare Impact Hypothesis(es) (Chapter 7, Assessment of Potential Effects);
6. Issue Permit (Chapter 9, Permit and Permit Conditions);
7. Implement Project and Monitor Compliance (Chapter 8, Monitoring and Risk Management);
8. Field Monitoring and Assessment (Chapter 8, Monitoring and Risk Management); and
9. Mitigation or Remediation Plan (Chapter 8, Monitoring and Risk Management).


3.3.3 **Requirements under the UNFCCC**

Under the UNFCCC all Parties must develop, periodically update, publish and make available to the Conference of Parties (COP) via the UNFCCC Secretariat, national inventories on GHG emissions and removals (excluding Montreal Protocol gases) using comparable methodologies as agreed by the COP (Articles 4 and 12). South Africa, as a non-Annex I Party, must report its

(4) Although these provisions have yet to be enacted in South Africa statute by way of amendment of the National Environmental Management: Integrated Coastal Management Act 24 of 2008, which enacts the London Convention into South African legislation.
GHG inventories in their national communications on a periodic basis, although from 2014 onwards this will move to biennial reporting.

Presently the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* and subsequent good-practice guides set out procedures for compiling national GHG inventories and are recommended for application, although these do not include any guidance for CCS.

From 2015 it is likely that the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (IPCC, 2006) that were formally adopted at COP17 in Durban will be the accepted standard for national GHG inventory compilation. Although these guidelines are for National Communications from Annex I Parties, it will be advisable for non-Annex I Parties who have CCS projects to follow the CCS-related portions of these guidelines in order to ensure that their CCS projects are recognised in their national inventories.

Volume 2, Chapter 5 of these 2006 Guidelines contains specific guidelines for CCS. They impose certain requirements for the monitoring of CO₂ which is captured and stored in geological formations and reported as “not emitted” in the national GHG inventory (i.e. as an emission reduction). These include:

- Use of *Tier 3* methods for all capture sources, all transportation methods and all geological storage activities; and,
- The undertaking of, *inter alia*, site selection, characterisation, risk assessment and monitoring of geological storage sites to “help build confidence that there will be minimum leakage” from the storage site. This provides the basis for reporting stored CO₂ as not emitted in the national inventory (see Box 2.2 on permanence).

Where the guidelines are not followed, captured and stored CO₂ cannot be deducted from the relevant source category i.e. CCS operations are not recognised as an emission reduction or “not emitted” in the national inventory.

As a consequence of these requirements, it will be necessary to undertake the activities outlined above in order to gain recognition under the UNFCCC of CCS activities taking place in South Africa; something that could most effectively be achieved through a national CCS regulatory framework.

### 3.3.4 Requirements under the Clean Development Mechanism

The CDM has been developed to allow for carbon credit generating emissions reduction projects to be implemented in developing countries and for the credits to be traded in emissions trading schemes and used for compliance against mandatory targets in developed nations. CCS was included as an eligible project activity within the CDM in 2011 by way of the agreement of a

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(5) The IPCC Guidelines allow for different tiers to be used to estimate emission and removals by sinks. Tier 1 and 2 involve the use of international or regional emission factors. Tier 3 methods usually involve using actual data and information specific to a particular project or activity, resulting in a better quality of inventory.
specific set of CDM modalities and procedures (CCS M & P’s) for the technology (UNFCCC, 2011). The main issues addressed for CCS under the CCS M & P’s under the CDM relate to participation and project requirements as discussed in Box 3.3.

**Box 3.3 Requirements for CCS projects under the CDM**

**Section F, Participation requirements**

Because of concerns over permanence – and the potential approaches to address these and other concerns (Box 2.2) – as well as other risk posed by CO2 storage, paragraph 8 the CCS M&Ps require Parties wishing to host CCS projects to establish laws and regulations which:

(a) Set procedures that include provisions for the appropriate selection, characterisation and development of geological storage sites, recognising the project requirements for CCS project activities under the CDM (set out in appendix B of the CCS M&Ps);

(b) Define means by which rights to store carbon dioxide in, and gain access to, subsurface pore space can be conferred to project participants;

(c) Provide for timely and effective redress for affected entities, individuals and communities for any significant damages, such as environmental damage, including damage to ecosystems, other material damages or personal injury, caused by the project activity, including in the post-closure phase;

(d) Provide for timely and effective remedial measures to stop or control any unintended seepage of carbon dioxide, to restore the integrity of a geological storage site, and to restore long-term environmental quality significantly affected by a CCS project activity;

(e) Establish means for addressing liability arrangements for carbon dioxide geological storage sites, taking into account the provisions set out in paragraphs 22 to 25 of appendix B of the CCS M&Ps. The provisions on liability in appendix B relate to how any local damages arising from a CO2 storage site leak can be remediated under national laws, as per (c) above;

(f) For a host Party that accepts the obligation to address a net reversal of storage (i.e. liability for permanence), establish measures to fulfil such an obligation. Under paragraph 26(b), host Parties accepting liability for a net reversal of storage must transfer an amount of units (e.g. CERs) equivalent to the level determined to have leaked from the storage site in the event that (1) the project participant hasn’t fulfilled this requirement; or (2) the liability for the storage site has been transferred to the host country Party.

(g) Parties are also required to submit an expression of agreement to host CCS projects to the UNFCCC secretariat prior to allowing the implementation of CCS project activities in its territory.

**Appendix B – Project requirements**

Appendix B sets out detailed project requirements and guidance which must, to some extent, be reflected in national laws in accordance with Section F, para. 8(a) of the M&Ps, as follows:

1. **Selection and characterisation of the geological storage site** – detailed steps and criteria for site selection and characterisation are outlined;

2. **Risk and safety assessment** – detailed steps and procedures are outlined for risk and safety assessments;

3. **Monitoring** – a range of monitoring obligations are set out;

4. **Requirements for financial provision** – this requires the project participant to establish means by which finance can be made available to cover monitoring costs, leakage etc. to avoid the host Party being exposed to costly remediation actions. The provision is transferable from participant to State on liability transfer;

5. **Liability** – a transfer from operator to state of local and global liabilities (the latter being optional) is effected under the CCS M&Ps. In essence, this is necessary to “backstop” protection for the environmental and surrounding populations in the event of a leak;

6. **Environmental and socio-economic assessments** – these are made mandatory for CCS projects under the CDM.

Source: UNFCCC (2011)
The design of the regulatory framework for CCS in South Africa should be consistent with these requirements in terms of e.g. technical standards for project development, for any CCS projects developed in the country to qualify as potential CDM candidate projects. Moreover, with on-going evolution of the mechanisms and channels for climate finance under the UNFCCC, it is likely that similar requirements could be imposed by way of any new sources of project finance under the UNFCCC.

3.3.5 Trans boundary issues

The London Convention and Protocol prohibits the export of waste, and therefore trans-boundary movement of CO₂. The International Maritime Organisation (IMO) Working Group has approved a proposed amendment to allow trans boundary movement of CO₂, although this has yet to be fully ratified by Parties.

The CCS M&Ps have yet to resolve how to manage issues for any proposed trans-boundary projects, and as such, trans-boundary projects will not be eligible under the CDM for the time being.

3.4 PLANNED LEGISLATION

A further issue to consider is future regulation in South Africa, in particular the CO₂ tax due to commence in 2015 (as announced in the February 2013 Budget Speech), or a potential domestic emissions trading scheme (as being considered by South Africa under the World Bank’s Partnership for Market Readiness). It is crucial that the CO₂ stored in CCS projects that follow applicable regulatory and monitoring requirements be formally recognised in a carbon tax or carbon trading regime as an emission reduction activity (i.e. that the monitoring rules recognise that although CO₂ is generated by the underlying activity, at least a portion of it is “not emitted” to the atmosphere but rather captured and stored for long-term isolation from the atmosphere). This would mean that although CO₂ would be generated by a taxable activity, the mass of CO₂ captured and stored by a CCS project would not be liable for the application of the CO₂ tax or require emission allowances to be surrendered under a trading scheme as the gas injected into a CCS storage site was actually “not emitted” to the atmosphere, thus fulfilling the objective of the policy, i.e. the reduction of GHGs to atmosphere (see Box 3.4).

Following along the lines described in the previous sections, in order for CCS to effectively qualify under such carbon schemes, it will be necessary for assurances to be in place for the scheme operator that the technology is delivering the emission reductions being claimed thereunder (as discussed in Box 3.4). Consequently, such schemes will have a two-fold effect:

1. Reliance on an effective regulatory framework to manage matters such as site selection, development and approaches to managing liability, especially over the long-term; and
Potential to act as an enabler for CCS regulations by providing a legislative means to impose certain requirements on CCS project operators, particularly in respect of monitoring, reporting and verification (MRV) across the chain of CO₂ capture, transport and storage.

Such developments could also act to cover liabilities linked to the global risk described previously; the absence of any national laws and regulations regarding GHG emissions mean that in general, this risk will not be covered anywhere in the existing statutes. By way of example, the treatment of CCS within the EU’s Emissions Trading System (EU ETS) is summarised in Box 3.4.

As the proposals for a CO₂ tax in South Africa remain at a development stage, it has not been possible to consider their effect in these contexts. However, they should be kept in mind during the regulatory development process.

**Box 3.4 Regulating CCS under the EU Emission Trading System**

The EU Emissions Trading System (EU ETS) (6) applies to large installations in the EU that are major point sources of CO₂ emissions (e.g. power plants, cement kilns, refineries etc.). Qualifying installations must monitor and report, for each calendar year, all CO₂ emission generated by the major source streams within the installations boundary, in accordance with EU guidelines (Regulation No. 601/2012). (7) Operators of the installation must, by 31 March of the following calendar year, report the installations verified annual emissions, and by April 30 surrender EU Allowances (EUAs; or other accepted units to the competent authority in the Member State), equal to the level of reported emissions in tCO₂.

The application of CCS at such installations avoids its emission to atmosphere, and should be recognised as such by avoiding the need to surrender EUAs for any CO₂ which is captured and transferred to long-term geological storage. However, whilst the emissions are avoided, the transfer of the CO₂ to transport and storage outside of the installations boundary presents the risk of CO₂ being emitted elsewhere, which would compromise the environmental integrity of the scheme, and pose issues in the context of permanence as described previously (Box 2.2).

To overcome these issues, both pipelines for the purpose of transporting CO₂ for geological storage, and CO₂ geological storage sites, are qualifying installations within the EU ETS. This means that there is a regulatory obligation for operators to monitor and report any CO₂ emission from these installations, and if any CO₂ is emitted due to leakage, surrender EUAs equal to the amount of leaked CO₂. Captured CO₂ may only be transferred to pipelines or storage sites which are included in the scheme. In this way, the environmental integrity of the scheme is not compromised as a chain of custody is created for the CO₂ from source to storage.

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Prior to outlining the how CCS could be regulated using the existing statutes in South Africa, both with or without modification, this Chapter briefly considers how CO₂ and CCS has been viewed under South African legislation to date. Principally this relates to how air quality legislation has addressed issues related to GHG emissions, and how South African legislation classifies CO₂ and potentially CCS activities. These aspects present important considerations for the remainder of the report in terms of how current legislation could apply, and the modifications that may be needed to apply or exclude CCS from the ambit of certain legislation.

4.1 CO₂ AS A GREENHOUSE GAS AND AIR POLLUTANT

At present industry emissions in South Africa are regulated under the National Environmental Management: Air Quality Act 39 of 2004 (NEM:AQA). The primary objective of the Act is the protection of air quality and prevention of air pollution in South Africa in order to secure ecologically sustainable development. Under the NEM: AQA and CO₂ is included in the definition of ‘greenhouse gas’ and the Act contains a number of measures to manage the level of such emissions. These measures include the declaration of priority areas, controlled emitters, controlled fuels and other measures such as pollution prevention plans. Furthermore, Section 21 provides for the listing of activities which may have a significant detrimental effect on the environment or public health. This being said, there are no existing measures for the specific reduction or management of CO₂ under NEM: AQA: CO₂ is not listed in any of the categories contained in the listed activities as published on 31 March 2010. Although CO₂ is referred to in the Highveld Priority Area Air Management Plan, it is classified as a pollutant which is characterised for “general information and due to global interest”.

This is not to say that CO₂ specific measures under NEM: AQA will not be declared in the future, especially as CO₂ is explicitly mentioned in the definitions of NEM:AQA and the South African government has voluntarily committed to reducing the country’s CO₂ emissions by 34% in 2020 and 42% in 2025 in terms of its National Climate Change Response Policy. Furthermore, CO₂ emission reduction or management conditions may be included in Atmospheric Emission Licences issued under Section 42 of NEM: AQA or within Environmental Authorisations. An illustration of this was the condition stipulated in the Record of Decision (RoD) issued to Eskom for the construction and operation of the Kusile coal-fired power plant, requiring Kusile to be ‘carbon capture ready’, in anticipation of CCS deployment in South Africa as part of efforts to mitigate the country’s national CO₂ emissions. It should also be recognised, that the concept of capturing CO₂ from industrial sources for alternative uses is not new for South African industry; for example, Afrox Industrial Gases currently is reporting the use of CO₂ originating from oil refinery processes.
4.2 **CLASSIFICATION OF CO$_2$ UNDER SOUTH AFRICAN LEGISLATION**

An important factor determining how CO$_2$ is covered by existing statutes in South Africa, and therefore how the law might be used to regulate its production, emission or use under various conditions, is the way in which it is classified within different legislation. This can determine the extent to which it is considered as a “a pollutant” or “pollution”, as a “waste product”, whether it is “hazardous” or whether it is treated as a “commodity” and therefore how laws and regulations should be applied or otherwise.

At the current time there is no direct classification provided for CO$_2$ in South African legislation, but interpretation of certain definitions contained in various environmental statutes suggests that CO$_2$ falls within the scope of a number of definitions resulting in different classifications. These different classifications create challenges in identifying the legal treatment of captured, transported, injected and stored CO$_2$ in the national statutes. Areas of South Africa legal framework where the definition of CO$_2$ has been considered include:

- **The NEM: AQA**, which defines “greenhouse gas” as: “gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation, and includes carbon dioxide, methane and nitrous oxide”.

- **The South African Bureau of Standards (SABS) SANS 10228** deals with the identification and classification of dangerous substances and goods for transport. Under SANS 10228, CO$_2$ is classified as a “Class 2 dangerous good”. Class 2 of SANS 10228 provides a listing or grouping of gaseous dangerous goods, determined according to certain of their characteristics. CO$_2$ falls within Division 2.2 of Class 2, being a gas that is non-flammable and non-toxic.

- **The Hazardous Substances Act 15 of 1973** classifies all SANS 10228 ‘dangerous goods’ as ‘Group II hazardous substances’, with the exception of class 7 and 9 substances.

- **The NEM:WA** defines ‘waste’ as “any substance, whether or not that substance can be reduced, re-used, recycled and recovered (a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; (b) which the generator has no further use of for the purposes of production; (c) that must be treated or disposed of; or (d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but - (i) a by-product is not considered waste; and - (ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste”; it further defines “hazardous waste” as “any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological
characteristics of that waste, have a detrimental impact on health and the environment”; and "disposal" as: “the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land”.

The NEM: AQA definition has limited impact in regulating CCS as described above; the SANS 10228 classification of CO₂ as a “dangerous good” triggers certain requirements for its storage and transportation (it should be transported at a pressure of at least 280kPa, at a temperature of 20°C, or as a refrigerated liquid), which may impose issues for CCS transport. The definition of waste under NEM: WA has led to several expert observers (e.g. World Bank, 2010; Glazewski et al. 2012) to propose that captured CO₂ is a waste and/or a hazardous waste, and therefore CCS should be managed under the existing waste regime. Whilst managing CCS under waste laws may be legally appropriate, it could create some challenges for the regulation of CCS, as discussed through remainder of this report.

4.3 THE BASIS FOR DEVELOPING CCS REGULATIONS

Based on the classification of CO₂ described, the NEM: WA directly applies to CO₂ injection and storage since captured CO₂ is classified as a waste. As such, the NEM: WA could offer a means to regulate CCS, in particular for CO₂ storage as the injection of supercritical CO₂ into geological formations for long-term containment is analogous to disposal of waste. However, this could also create challenges for effective regulation of CCS, as the current provisions of the NEM: WA may not be ideally suited to the unique nature of CO₂ storage site development (which is perhaps more analogous to petroleum exploration and production). Consequently, any modifications to include CO₂ storage within the ambit of the NEM: WA could lead to potentially unintended consequences for on-going waste management operations, such as more onerous monitoring and reporting requirements.

Because of these potential unintended consequences in using the NEM: WA, the initial focus of this report is on the role of the NEMA as a regulatory instrument for CCS, especially as the NEMA includes several general provisions which apply directly to potentially polluting activities and as such could cover CCS, or could be applied through minor modification.

Further, whilst the MPRDA regulates extraction of – or the “winning of” – minerals and petroleum products from the subsurface, including particular environmental protection aspects, it is not currently worded in a way in which it could be readily applied to the storage of CO₂ without substantial amendment. In fact CO₂ injection and storage is the opposite of mineral exploitation. An amendment of the MPRDA could bring CO₂ storage operations within the scope of the mining and petroleum regulatory regime, but this could potentially create additional complexity and unintended consequences for the existing management of mining operations. In considering an amendment to the MPRDA, the expertise and cooperation of the Department of Mineral Resources (DMR) will be required, including its
assessment of, for example, the use of currently uneconomically exploitable coal seams as storage sites, as these may become economical in future.

The following chapters provide a detailed review of these pieces of legislation and their capacity to meet the regulatory needs of CCS described previously.
5 APPLYING EXISTING PARTS OF NEMA TO CCS

5.1 INTRODUCTION

This Chapter aims to understand what could be achieved by applying existing parts of the National Environmental Management Act, 107 of 1998 (the NEMA) to CCS activities. The basic premise in the following sections is that the various components of CCS – capture, transport and storage- could all be included within the ambit of the Act, either in its current form through existing general provisions in the Act, or through amendments to bring the various elements into the scope of the Act, in particular by including the various elements of CCS project as Listed Activities within the scope of the NEMA.

5.2 OVERVIEW OF NEMA PROVISIONS FOR CCS

The NEMA provides the overarching framework statute for environmental protection in South Africa, and on this basis could form the primary legal instrument through which regulation of certain elements of CCS operations, including under existing and potentially future implementing provisions, could be achieved. The Act sets out several core principles for environmental regulation including:

1. Chapter 1
   • Section 2- National Environmental Management Principles.
     These principles apply throughout South Africa to any operation or activity that may significantly affect the environment, whether an environmental authorisation is required or not. The principles that are of relevance in the context of CCS include, inter alia, the precautionary principle; polluter pays principle and the equitable utilisation of shared resources. This statement overlooks the fact that the principles are binding only on organs of state when, in broad terms, they are implementing laws affecting the environment. They are not directly binding on third parties.

2. Chapter 5:
   • Sections 23-24 – Integrated Environmental Management (IEM)
     In order to give effect to the objectives of Chapter 5, the Minister or a Member of the Executive Committee (MEC) may list activities that may not commence without obtaining prior environmental authorisation from the competent authority (Listed Activities). It is therefore important to note, that the provisions contained in Chapter 5 will only apply to a Listed Activity. There is currently no CCS specific activity listed under the National Environmental Management Act: Environmental Impact Assessment Regulations (GN R543) published on 2nd August 2010, as amended (hereafter referred to as “the EIA Regulations”), as discussed
further below. There are, however, Listed Activities that will apply to parts of a CCS project.

3. Chapter 7, Parts 1 and 2:
   - Section 28 – Duty of care and remediation of environmental damage;
   - Section 29 – Protection of workers refusing to do environmentally hazardous work
   - Section 30 – Control of emergency incidents.
   - Section 31 (Part 2) – Appointment of Environmental Management Inspectors (EMIs) and protection of whistleblowers

Sections contained in Chapter 7, entitled Compliance, Enforcement and Protection, highlighted above are accepted as general environmental management provisions that will apply to a CCS project, as it could potentially have significant effects on the environment should a leak of CO₂ occur.

The Sections of the NEMA highlighted above, and in particular the detailed requirements for EIAs outlined in the EIA Regulations, potentially provide a framework to regulate certain aspects of CCS, covering:

- Project permitting/approvals to manage risks – via the EIA requirements of NEMA, which includes provisions for socio-economic assessment (SIA) and environmental management programme (EMPs), these could provide oversight for the following:
  - project impact assessment (through provisions relating to environmental authorisations for prospecting activities, and the partially through specialist report provisions in EIAs);
  - project approval (through EIA/SIA requirements, public participation obligations);
  - project operation (capture, injection, storage, monitoring and reporting (through provisions for authorisations, EMPs, and monitoring and performance assessment); operational health & safety (partial, via worker protection provisions), civil protection (through control of emergency incidents provisions));
  - project closure (through provisions relating EMPs commitments);

- Regulatory oversight for inspections, enforced closure and remediation – through powers vested in EMIs to oversee activities which are potentially polluting or could lead to degradation of the environment. This also includes requirements to report to the competent authority and/or EMIs regarding adherence with any EMPs in place for an activity, and the right of the competent authority to take reasonable measures to remedy a polluting activity and recover all costs incurred as a result of such actions;

- Allocate liability – the general duty of care under NEMA provides a means to allocate operational liability for a CCS project by placing obligations on operators to take reasonable steps to prevent and remediate pollution or
degradation of the environment. In the event that environmental pollution or degradation occurs and the operator responsible fails to implement reasonable remedial measures, the competent authority may take reasonable measures to remedy the situation and thereafter recover the costs incurred from the responsible operator and or other parties, including the owner of the land at the time when the pollution occurred, or a successor-in-title. In addition, the Act includes requirements for a financial provision to be used for management and remediation of environmental impacts and damage, potentially for any activity required to do so.

These elements are discussed further below. In addition, the NEMA, as a framework statute, allows for regulations to be developed thereunder. To date, several sets of regulations have been promulgated under the NEMA, including most recently the EIA Regulations (GN R543). Furthermore, NEMA has been amended four times since its inclusion in the statute, in 2002, 2003, 2004 and 2008, which introduced significantly greater detail on enforcement (NEMA: Amendment Act, No. 46 of 2003) and on implementing provisions (NEMA: Amendment Act, No. 62 of 2008).

5.2.1 Listed Activities requiring an EIA under the NEMA

Sections 24(2) and 24D of NEMA (requirements for IEM/EIA, including under the EIA Regulations) empowers the Minister or MEC to identify activities that are required to undertake an EIA in South Africa and publish them by way of a Listing Notice in the relevant Gazette. The scope of Listed Activities is defined through secondary regulations, termed Listing Notices. Presently three Listing Notices are in force:

- GN R544 - Listing Notice 1 – activities requiring a “basic” assessment
- GN R545 - Listing Notice 2 - activities requiring a “full” EIA; and,
- GN R546 - Listing Notice 3 – activities requiring a “basic” assessment

As referred to previously, there is currently no CCS specific Listed Activity and therefore neither the EIA Regulations nor most parts of Chapter 5 of NEMA currently applies (with the exception of Section 23 relating to general IEM principles in the case of the latter). Notwithstanding this current gap in the legislation, there may be incidental activities such as the establishment of the storage site infrastructure, as well as, the development of pipeline infrastructure from a medium to longer term perspective, which could trigger Listed Activities.

To an extent, requirements under the NEMA IEM/EIA, as well as other parts of South African legislation will be influenced by the way in which CO₂ or captured supercritical CO₂ is classified under South African legislation.

In terms of amending existing laws pertaining to EIA, similar issues were presented in developing a regulatory framework for CCS in the EU. In this case, specific provisions of the CCS Directive (2009/31/EC) were used to
confer the requirements of the EU EIA Directive\(^{(8)}\) onto CCS activities as outlined in Box 5.1. The definitions outlined therein provide useful guidance for considering amendments or additions to the NEMA Listing Notices so as to ensure coverage of CCS under EIA requirements in South Africa.

**Box 5.1**  
**Conferring EIA requirements onto CCS in the EU**

In the same ways as activities qualifying for EIA in South Africa are triggered by Listing Notices, the EU EIA requirements are determined according to activities listed in Annex I ("full" EIA) and Annex II (partial or at the discretion of the competent authority) of the EIA Directive. To confer these requirements onto the different elements of a CCS chain, the following amendments were made by way of the CCS Directive:

**Article 31 - Amendment of Directive 85/337/EEC**

1. Annex I shall be amended as follows:
   
   (a) point 16 shall be replaced by the following:
   \[
   \text{‘16. Pipelines with a diameter of more than 800 mm and a length of more than 40 km:— for the transport of gas, oil, chemicals, and,— for the transport of carbon dioxide (CO}_2\text{) streams for the purposes of geological storage, including associated booster stations.’;}
   \]
   
   (b) the following points shall be added:
   \[
   
   24. Installations for the capture of CO}_2\text{ streams for the purposes of geological storage pursuant to Directive 2009/31/EC from installations covered by this Annex, or where the total yearly capture of CO}_2\text{ is 1,5 mega tonnes or more.}
   \]

2. Annex II shall be amended as follows:
   
   (a) the following point shall be added to point 3:
   \[
   \text{‘(j) Installations for the capture of CO}_2\text{ streams for the purposes of geological storage pursuant to Directive 2009/31/EC from installations not covered by Annex I to this Directive.’;}
   \]
   
   (b) point (i) of point 10 shall be replaced by the following:
   \[
   \text{‘(i) Oil and gas pipeline installations and pipelines for the transport of CO}_2\text{ streams for the purposes of geological storage (projects not included in Annex I).’}
   \]

**5.3**  
**Regulatory Coverage Achievable through the NEMA**

**5.3.1**  
**Assumption**

The remainder of this section assumes that an amendment will be made to the Listing Notices of the EIA Regulations to include CCS as a specific Listed Activity.

**5.3.2**  
**Project permitting/approvals to manage risks**

Chapter 5, Section 23, of the NEMA, as amended, establishes the scope of issues to be considered within IEM and included within an EIA for qualifying activities and includes, *inter alia*:

- Identification, prediction and evaluation of actual and potential risks consequences and impacts on the environment, socio-economic-conditions, and cultural heritage;

- Ensuring that these are adequately considered before commencing with a development;

- Ensuring public participation in decision-making in relation to such developments; and

- Identifying and employing modes of environmental management best suited to the particular activity.

On the basis of the broad requirements for implementation of IEM under the NEMA described above, the Act could potentially provide a useful template for implementing the following regulatory needs for approvals and operation of CCS activities, either in their entirety or at least partially. The following describes how these requirements could apply and the relevant sections of the EIA Regulations and the NEMA where these activities would be required:

- **Site selection and characterisation for a CO2 storage site** – at least partial under provisions of Regulation 31(2)(c),(d),(k),(l) relating to the property on which the development will be undertaken, the environment that may be affected, all identified environmental issues, and the potential effects. Further, through Regulation 32, the requirements for Specialist Reports to be prepared could also bring detailed technical requirements such as e.g. site characterisation reports, within the ambit of EIAs under the NEMA;

- **Risk assessment of capture, transport and storage** – under the general provisions of Regulation 31(2)(h) and (l) relating to assessing cumulative impacts, nature of impact, extent, and probability, and potentially also Regulation 32 (on Specialist Reports) which could involve detailed probabilistic modelling of leakage scenarios and potential risks and consequences;

- **Environmental and socio-economic impacts assessment for capture, transport and storage** – general requirements of Regulation 31(2)(d) ;

- **Public participation and consultation** – under Regulation 31(2)(e) relating to public information and public participation, and Regulation 54-57 relating to public participation;

- **Establishing modes of operation and closure of a CO2 storage site** – potentially, through Regulation 33(b) relating to measures to address potential environmental impacts in the environmental management programme (EMP);
• Monitoring and performance assessment against any authorisation or EMP – under Regulation 33(e),(g),(i),(k) which covers monitoring requirements, possible remediation measures, monitoring any damage occurring, and site closure planning. Regulatory oversight is achieved by provisions relating to empowerment of EMIs contained in Section 31 A-Q of the NEMA;

• Protect worker safety – through the rights vested in workers to refuse to perform any work which they consider could lead to an imminent and serious threat to the environment, under Section 29 of the NEMA;

• Civil and environmental protection through the control of emergency incident provisions – which, under Section 30 of the NEMA, impose general obligations on operators to report and take actions to control and minimise effects of the incident including to the environment and public health, to undertake clean up procedures, to remedy effects, and to assess immediate and longer-term effects. The relationship between provisions of Section 30 of the NEMA and the Disaster Management Act No. 57 of 2002 (“DMA”) are considered in Box 5.2 below.

**Box 5.2** *The Disaster Management Act and the NEMA Section 30 provisions*

The DMA provides for an integrated and co-ordinated disaster management approach focusing on preventing or reducing the risk of disasters and mitigating the severity of disasters with an effective response, on a national, provincial and municipal level. Although the definition for ‘disaster’ and ‘disaster management’ as contained in the DMA provide insight into the nature and magnitude of a disaster envisaged by the Act, Section 2 introduces limitations on the applicability of the DMA’s provisions. In terms of this section, the DMA will not apply to an occurrence which can be dealt with effectively using other national legislation containing provisions that are aimed at reducing the risk, and addressing the consequences of the occurrence.

There is a range of existing environmental legislation applicable to CCS projects that could effectively address an occurrence, such as the emergency provisions in Section 30 of the NEMA. These general environmental management provisions would provide the necessary response and remediation measures in the CCS pilot project context and as a result the DMA would not be applicable. However, in terms of commercial-scale CCS deployment, if there is an occurrence involving large amounts of CO₂ leaking at a rapid rate during the transport or storage phase of the project, it may trigger the provisions of the DMA, depending on the scale of the event, the surrounding environment and/or communities located in the immediate vicinity. On the other hand, such events are widely considered as unlikely by geological experts.

The implementing *EIA Regulations* also provide details regarding the procedures to be followed in the context of the requirements described above. It is useful to compare these requirements to the requirements for CO₂ storage permit applications imposed in the EU under the CCS Directive (2009/31/EC) as outlined in Box 5.3; *Box 5.4*. 
Furthermore, other elements of the NEMA can provide for regulatory oversight of CCS activities, and also for managing liability arrangements, as described further below.

5.3.3 Regulatory oversight, enforced closure and remediation

In terms of regulatory oversight of operations, Sections 31A-Q, \(^{(9)}\) set out the enforcement mechanisms of the NEMA and specific environmental management Acts (such as National Water Act No. 36 of 1998 (“NWA”) and NEM: WA). This includes the designation of EMIs, and their powers covering inter alia:

- routine inspections without warrant, including inspection of books and electronic records, taking of photographs and samples, and questioning of the operator;
- issuing of compliance notices; and,
- seizure and forfeiture of items.

Compliance notices may be issued where there is reason to believe on the part of the EMI, that a person has failed to comply with a provision of the law which that EMI is responsible for upholding or has failed to comply with a term or condition of a permit, authorisation or instruction issued. A person who fails to comply with a compliance notice commits an offence and may be

\(^{(9)}\) Outlined in the NEMA (Amendment) Act No. 46 of 2003
liable to a fine or imprisonment (based on World Bank, 2010). See Box 5.5 for further discussion of inspection under the EU ETS.

Chapter 7, Section 28, of the NEMA also includes general requirement for a duty of care for all activities that may have a significant impact on the environment – including activities permitted under IEM/EMP – where, inter alia, the following applies:

- An operation which is causing, could cause, or has caused, significant pollution or environmental degradation, must take reasonable measures to prevent such pollution or degradation occurring, continuing or recurring.

- Various other duties are placed on persons in such circumstances including requirements to take reasonable measures to:
  - assess the potential environmental impacts of the event;
  - inform and educate employees about environmental risks;
  - cease, modify or control any act, activity or process causing pollution or degradation;
  - contain or prevent the movement of pollutants or cause of degradation;
  - eliminate any source of pollution/degradation; or
  - remedy the effect of the pollution/degradation.

- If concerns are raised by authorities about a breach of duty of care, including the requirements of any EMP in place, the authorities are permitted to direct the person concerned to investigate, evaluate and assess impacts and commence and continue taking specific measures to remedy the problem.

- If that person fails to do so, the authorities are empowered to take the prescribed reasonable measures themselves and recover costs from such actions.

- Under these provisions, general powers are vested in the authorities to intervene at sites of any type in South Africa where significant adverse effects on the environment could occur. As such, this duty and its enforcement provisions would apply, in general, to all aspects of CCS operations without amendment to the NEMA i.e. they apply currently.

In addition to these powers, for all Listed Activities, Section 24N relating to EMPs (and Regulation 34(e) of the EIA Regulations) sets down the responsibility of the EMP holder to manage operations in accordance with the EMP and provisions for monitoring and auditing against the conditions set therein, subject to CCS becoming a Listed Activity.
Box 5.6  Inspections under the EU CCS Directive

**Article 15 - Inspections**

The EU CCS Directive contains provisions for the following obligations for Member States to arrange:

1. A system of **routine and non-routine inspections** of all CO₂ storage complexes for the purposes of checking and promoting compliance and of monitoring the effects on the environment and on human health.
2. Inspections should include activities such as visits of the surface installations, including the injection facilities, assessing the injection and monitoring operations carried out by the operator, and checking all relevant records kept by the operator.
3. Routine inspections shall be carried out at least once a year until three years after closure and every five years until transfer of responsibility to the competent authority has occurred. They shall examine the relevant injection and monitoring facilities as well as the as the full range of relevant effects from the storage complex on the environment and on human health.
4. **Non-routine inspections** shall be carried out: (a) if the competent authority has been notified or made aware of leakages or significant irregularities; (b) if the reports pursuant to Article 14 have shown insufficient compliance with the permit conditions; (c) to investigate serious complaints related to the environment or human health; (d) in other situations where the competent authority considers this appropriate.

5.3.4  Allocate liability

In terms of liability, the NEMA includes various provisions which can provide the basis for a regulatory framework in terms of the requirements discussed previously. These include:

- **Leakage and permanence** – the potential *local* environmental and public health hazard posed by the risk of CO₂ leakage during development and operation of a CCS project, could be at least partially covered by the IEM/EMP if the *Listed Activities* are amended to cover CCS, and fully covered by the *duty of care* (Section 28) and *control of emergency incidents* (Section 30) requirements irrespective of whether CCS becomes a *Listed Activity*. These both create obligations for the operator to manage these risks and to control, stop and remediate their effects. Obligations for remediation for *global* damages would not be met through the NEMA provisions unless specific conditions were imposed to this effect in a project’s authorisation;

- **Means of redress and compensation** – under *Section 34(1)*, NEMA includes provisions in relation to redress and compensation for any damages to property or communities that may have been caused by leakage and under *Section 34(3)* in relation to any financial advantage gained as a consequence of an event, but only on conviction of a criminal offence. In principle, the latter could apply where carbon taxes are offset or carbon credits have been issued to a CCS project operator provided that the conduct that resulted in the harm to the was the subject of a criminal conviction;
Financial provision – under Section 24P of NEMA, requirements for a financial provision are set out for an environmental authorisation for mining operations or, at the discretion of the Minister, any other application for a qualifying activity under the NEMA (Section 24P(7)). The financial provision, covering “rehabilitation, management and closure of environmental impacts”, must be in place prior to environmental authorisation. The financial provision may be drawn on by the State to rehabilitate and manage any environmental impacts if the authorised operator is unable to do so. In this way, the NEMA can provide a suitable basis for establishing a financial provision for CO₂ storage sites, if the requirements of the Act were to be made applicable to CO₂ storage operations.

Long-term stewardship and liability – the NEMA sets out various provisions in relation to closure and apportionment of liability on closure (Section 5; Section 24R), although the provisions are only applicable to the issuing of closure certificate under the MPRDA, and would not currently apply to CO₂ storage sites without amendment of the MPRDA or of the NEMA so as to apply such provisions to these activities (see below).

5.3.5 Consistency with international law

Under Chapter 6, Section 25, of NEMA, the scope for meeting international obligations and agreements is outlined, including (under para. 3) the powers of the Minister to introduce implementing legislation. These general provisions provide a means by which any binding international legal requirements such as those under the London Protocol could be introduced into South Africa statute. This also potentially provides a basis for introducing a CCS regulatory framework in South Africa, cognisant of the requirements of the CCS M&Ps under CDM and the Participation Requirements imposed thereunder (Box 3.3).

It is also useful to note that many of the provisions in the NEMA fulfil requirements set down in the 2006 IPCC Guidelines in terms of e.g. site selection and monitoring, and also the CCS M&Ps under CDM in respect of these aspects plus environmental and socio-economic assessments, redress for affected communities, and remediation requirements (see Box 3.3).

5.4 Remaining gaps and uncertainties

The NEMA can provide a fairly comprehensive basis for regulating many of the issues associated with CCS, as outlined in Chapter 3.1 above. This includes oversight for project planning, development, operation and closure, as well as emergency incidents and means of redress and compensation from any adverse effects of a CCS project.

(10) These would likely need to be implemented through an amendment of the National Environmental Management: Integrated Coastal Management Act 24 of 2008.
However, several uncertainties exist within the framework, relating mainly to its scope and effectiveness, as follows:

**5.4.1 Scope of NEMA/EIA Regulation requirements**

Whilst aspects of CCS and analogous activities are covered under the EIA Regulations, they do not explicitly apply to CCS in the following cases:

1. **Storage site prospecting/exploration** – the NEMA IEM requirements would only be triggered if, in accordance with the Listing Notices, such activities were subject to authorisation (even though Section 50 of the MPRDA relating to prospecting applies to CCS without amendment – see Chapter 7.2.1 below – this does not trigger EIA Regulation requirements under the relevant Listing Notices);

2. **Geological storage site development** (excluding incidental activities) – the NEMA IEM requirements will only be triggered if an amendment is made to the current Listed Activities however incidental activities are likely to trigger one or more Listed Activities;

3. **Operational oversight** – the NEMA only imposes limited obligations for monitoring and reporting of project performance with no fixed timeframes for such obligations or information regarding the level of disclosure required (capture, transport or storage); this may be addressed through specific requirements for an EMP. Appointed EMIs are authorised to undertake inspections;

4. **Occupational health & safety** – although some worker rights are protected under NEMA (e.g. for whistle-blowing), specific regulations regarding working practices is covered elsewhere in South Africa’s statute;

5. **Long-term stewardship and liability transfer** – the NEMA provisions apply only to sites closed in accordance with a closure certificate issued under the MPRDA, which applies only to mining operations (see below).

Such uncertainties means that regulatory coverage is only partially achieved and would require amendments to existing legislation to be triggered, for example though amendment of the, the NEMA EIA Listing Notices, the Gas Act, or the MPRDA (as discussed in greater detail in the latter sections of this report).

**5.4.2 Suitability of the NEMA regulatory framework**

Whilst NEMA appears to potentially provide robust basis for regulating CCS, several aspects require clarification:
1. **Specialist reports** – whilst these could provide a trigger within the existing NEMA framework for more detailed assessments of, *inter alia*, geological storage site characterisation and suitability, risk assessment, monitoring plan design etc., it is unclear as to whether this provides the most effective instrument. It may be prudent to consider issuing additional technical guidance to supplement requirements for Specialist Reports, drawing on international best-practice. It may also be useful to consider implementing a clearer permitting procedure that leverages existing government expertise for oversight of subsurface development (e.g. South Africa Council of Geosciences; Petroleum Agency SA);

2. **Timing** – the timing of submissions of reports under the EIA Regulations should be considered in the context of investments being made into site exploration and the data available at the time of submissions of EIAs etc. In general, an iterative process will be required as investigations proceed and greater knowledge of the subsurface is obtained during exploration;

3. **General effectiveness** - the degree to which the EIA Regulation requirements and other provisions (e.g. duty of care) provide a suitably robust basis for regulating CCS is a matter for debate, and should be further informed by expert opinion and consultation with stakeholders. In particular, the breadth of the liability provisions and the absence of reporting obligations unless the situation falls within the ambit of an emergency are of concern.

### 5.4.3 Other issues

In addition to the uncertainties outlined above, the following gaps would remain if the current approach under NEMA were applied to CCS activities:

1. **Access and storage rights** – although the NEMA sets down requirements for authorisations, it does not include provisions covering access and property rights in relation the surface or subsurface; only the EIA Regulations require applicants to notify a land owner. As such, the general provisions of NEMA do not provide a clear basis for granting access to the land or subsurface pore space into which CO₂ will be injected and stored as part of a CCS project.

2. **Global risks** - Any emissions due to CO₂ leakage could be recorded in South Africa’s national greenhouse gas (GHG) inventory and reported to the UNFCCC in accordance with 2006 IPCC Guidelines, as described above. However, South Africa is a non-Annex I country under the UNFCCC and not included in Annex B of the Kyoto Protocol, so consequently the *global* risks posed by leakage of CO₂ would not present any liability for the emissions or impose requirements to remediate effects on the global atmosphere on the operator or state at the moment. This is, however, contingent on two other aspects:
   - **CDM** – if a CCS project in South Africa is registered as a CDM project activity in line with the requirements set out thereunder, then
obligations to remediate the damage to the atmosphere would be set on both operator and/or government through the *net reversal of storage* provisions (Box 3.3).

- Carbon Tax or national GHG trading scheme – good practice would suggest that the role of CCS within such frameworks would need to include provisions to manage permanence (Box 2.2).

3. *Long-term stewardship and liability* – whilst the approach to managing long-term stewardship of mines suggests that liability transfer from operator to state may take place – subject to apportionment of liabilities and the transfer of a financial security – a political decision may be necessary regarding whether a similar approach may be taken to geological CO₂ storage sites, especially in light of planned revisions to the MPRDA to address changes in the way in which liability can be transferred.

The matters raised are discussed further in subsequent Chapters of this report.
6

APPLYING WASTE LEGISLATION TO CCS

6.1 INTRODUCTION

The objective of this section is to consider the implications for using the National Environmental Management: Waste Act 59 of 2008 (the NEM: WA) as the primary means of regulating CCS in South Africa.

The definition of waste, hazardous waste and waste disposal under the NEM: WA has been outlined previously (Section 4.2). This has provided the basis for broad agreement amongst legal experts in South Africa that these definitions apply to captured CO₂ as a “waste” and to CO₂ injection and storage as a “hazardous waste disposal” activity. Therefore, these activities are currently within the ambit of waste laws in South Africa.

On this basis, the following key issues are of interest:

• What are the requirements for management of captured CO₂ through employing the NEM: WA? (e.g. waste management licensing, waste management services);

• Are there benefits to utilising the NEM: WA for regulating CCS ahead of the NEMA (through associated amendments to apply to CCS)? What could be achieved for regulation? Would this be more effective than taking an approach involving only the NEMA?

• What would happen if the provisions of waste legislation are expressly excluded for captured CO₂? What amendments would be necessary to exclude CCS from the ambit South Africa waste legislation?

6.2 OVERVIEW OF NEM: WA PROVISIONS FOR CCS

The primary purpose of the NEM: WA is to implement waste management practices, standards and norms so as to reduce, reuse and recycle waste wherever possible, and to prevent harm to the environment and human health from waste management and disposal practices in South Africa. The Act sets out several core requirements for the regulation of waste management including, inter alia:

1. Chapter 4, Part 2:
   o Section 16 – General duty in respect of waste management

2. Chapter 4, Part 5:
   o Sections 21-25 – Storage, collection and transportation of waste

3. Chapter 5:
   o Sections 43-59 – Licensing of waste management activities

4. Chapter 7:
   o Sections 65-68 – Compliance and enforcement
Under these provisions, the NEM: WA can provide regulatory coverage of the following aspects of CCS activities:

- **Project permitting/approvals to manage risks** – via the requirements relating to waste management licensing for facilities handling waste. This is reinforced by the requirements to undertake a “full EIA” in accordance the NEMA requirements for a Category B waste management installation (see Chapter 6.2.1 below), as specified in Schedule 1 of the NEM: WA.

- **Regulatory oversight for inspections, enforced closure and remediation** – through powers vested in EMIs under the NEMA, as amended, to oversee activities which are potentially polluting or could lead to degradation of the environment – these provisions cover waste disposal facilities (see Chapter 5.3.3 above);

- **Allocate liability** – the general duty of care under the NEMA would apply to a CCS project regulated under the NEM: WA (see Chapter 5.3.4 above). In addition, the general duty of in respect of waste management, outlined in Section 16 of the NEM: WA would apply. This includes, *inter alia*, requirements for waste to be disposed of in environmentally sound manner, and so that it does not endanger health or cause nuisance.

These are considered in more detail below.

### 6.2.1 Activities covered by NEM: WA

In South Africa, all activities involving disposal of a waste as determined by the definition of “waste” in the NEM: WA are subject to the requirements of the Act (see Chapter 4.2). Based on expert legal opinion, the undertaking of CCS activities should be considered “hazardous waste disposal”. Therefore in accordance GN R718 of 3 July 2009 - List of Waste Management Activities that have, or are likely to have a Detrimental Effect on the Environment, the disposal of any quantity of hazardous waste to land (Category B, activity 9 of GNR718) as would be occurring at a CO₂ storage site, would be subject to waste management licence. Listing as a Category B installation under GN R718 requires that a “full scoping EIA” assessment process in terms of Section 24 of the NEMA be carried out for such an installation (see Chapter 5.3 above).

Classification of CO₂ as a hazardous waste also has potential implications for the capture and transportation of CO₂ in terms of provisions relating to waste management services in the Act. (11) Under Section 9 of the NEM: WA, the Department of Environmental Affairs (the DEA; or any delegated entity, e.g. a municipality) would be required authorise such undertakers.

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(11) Under the NEM:WA, “waste management services” means “waste collection, treatment, recycling and disposal services”
In terms of derogations from the Act (i.e. activities and substances to which obligations under the Act are not applicable), Section 4 lists the following activities that fall outside its scope:

- radioactive waste as regulated by the Hazardous Substances Act No. 15 of 1973 (the HSA; see Section 7.2.5 below) and various nuclear energy statutes;
- residue deposits and residue stockpiles as regulated under the MPRDA;
- disposal of explosives, as regulated under the Explosives Act 15 of 2003.
- disposal of animal carcases, as regulated under the Animal Health Act 7 of 2002.

Conceivably, CCS could be subjected to a similar derogation under Section 4 if an alternative regulatory approach to regulating the technology were to be adopted. This would require an amendment to the NEM: WA. Furthermore, under Sections 74-78, any person may apply for an exemption from the provisions of the Act, which may be applicable for a test injection project such as the PCSP, should an alternative approach to regulating this proposed development be preferred.

6.3 REQUIREMENTS UNDER THE NEM: WA

The following sections provide a general overview of the obligations for CCS operators in South Africa under the NEM: WA.

6.3.1 General duties of waste holders

Under the Act, Part 2, Section 16 imposes a General Duty on waste holders (which term is very widely defined) to:

(1) [...]take all reasonable measures to-
   (a) avoid the generation of waste and where such generation cannot be avoided, to
       minimise the toxicity and amounts of waste that are generated;
   (b) reduce, re-use, recycle and recover waste;
   (c) where waste must be disposed of, ensure that the waste is treated and disposed
       of in an environmentally sound manner;
   (d) manage the waste in such a manner that it does not endanger health or the
       environment or cause a nuisance through noise, odour or visual impacts;
   (e) prevent any employee or any person under his or her supervision from
       contravening this Act; and
   (f) prevent the waste from being used for an unauthorised purpose.

(2) Any person who sells a product that may be used by the public and that is likely to
    result in the generation of hazardous waste must take reasonable steps to inform the
    public of the impact of that waste on health and the environment.

(3) The measures contemplated in this section may include measures to-
(a) investigate, assess and evaluate the impact of the waste in question on health or the environment;
(b) cease, modify or control any act or process causing the pollution, environmental degradation or harm to health;
(c) comply with any norm or standard or prescribed management practice;
(d) eliminate any source of pollution or environmental degradation; and
(e) remedy the effects of the pollution or environmental degradation.

(4) The Minister or MEC may issue regulations to provide guidance on how to discharge this duty or identify specific requirements that must be given effect to, after following a consultative process...

Depending on whether CO₂ in general is declared a waste, or just “captured” or “supercritical” CO₂, the requirements could place an obligation on CO₂ producers such as power stations and industrial installations to minimise its production and toxicity, ensure that it is treated in an environmentally sound manner and to reduce, reuse and recycle CO₂.

Under subsection 2, it might also place an obligation on them to notify public of potential impacts of the CO₂ waste. This could create challenges in terms of e.g. communicating potential climate change impacts arising from emitting CO₂ and could be seen as a potential unintended consequence of classifying CO₂ as a waste, as such obligations would likely prove difficult to fulfil in practice. If the scope were restricted to “captured CO₂ for the purposes of geological storage”, then the obligation would only reside with operations using CCS. Under subsection 3, a duty of care is imposed on the sellers of products that may generate CO₂ and a mandate is provided to the State to provide Guidance as to how that must be implemented (subsection 4).

6.3.2 Waste Management licensing

Chapter 5 of the NEM: WA sets out requirements for waste management licensing, which currently applies to CO₂ storage site developers in South Africa. Under Section 51, the contents of a waste management license (WML) application are specified, and include requirements to disclose, inter alia:

- a description of the activity to which it applies, and the premises where it is taking place;
- the period over which it applies;
- the amount and type of waste that may be generated, handled, processed, stored, reduced, re-used, recycled, recovered or disposed of;
- operating requirements relating to the management of the waste;
- monitoring, auditing and reporting requirements;
- the conditions for decommissioning of a waste disposal facility

And potential obligations to:
- establish committees for the participation of effected parties;
- be bound by EMP requirements under the NEMA;
undertake remediation work, and specify financial arrangements to be taken to for the undertaking of remediation work during operation or decommissioning;

• comply with all requirements in relation to environmental management inspections under NEMA;

• consider any other matters needed for protection of the environment.

Currently these permitting requirements provide the basis for regulating the establishment, operation and closure of CO₂ storage sites in South Africa. The requirements are unclear as to how they could create specific obligations for site characterisation and selection. It is also unclear whether and how they might be applied to power plants or industrial installations generating the CO₂ (and thus being “waste holders”).

6.3.3 Compliance and enforcement

Chapter 7 of the NEM: WA outlines the compliance and enforcement approaches for waste management. In general terms, it relies on the powers vested in EMIs under Section 31A-Q of NEMA to undertake e.g. inspections, as discussed previously (see Chapter 5.3.3).

In addition, under Section 66, EMIs can request operators to submit a Waste Impact Report where they suspect, on reasonable grounds, that an operator has on one or more occasions failed to comply with the conditions of its WML, or has had, or is likely to have, detrimental effects on human health or the environment.

These provisions would allow for regulatory oversight of CO₂ storage operations to be achieved.

6.4 Potential for NEM: WA to Regulate CCS

6.4.1 Coverage

As captured CO₂ is considered a waste, the requirements contained in NEM: WA serves to create a set of de facto regulatory obligations on potential developers of CO₂ storage sites in South Africa, including: requirements to provide details of the planned development and decommissioning as part of the waste management licensing process, regulation of activities through the triggering of NEMA “full” EIA requirements, and regulatory oversight by EMIs via the NEMA provisions.

Furthermore, if considered necessary, clarification on the status of “the injection and geological storage of CO₂” and other aspects of CCS (e.g. CO₂ capture and transport) as waste management activities under the NEM: WA, could be achieved through the issuance of a waste Listing Notice by the Minister via powers vested in Section 19 of Act.
However, several uncertainties could persist under the waste management framework, as applied to CCS. These might include:

- **Scope and definitions in the Act** – in terms of the following:
  - *Capture and transport* – it is unclear what obligations would be placed on operators of such installations in terms of e.g. whether they would need to apply for authorisation from municipalities to perform *waste management services* or whether they too would need to apply for a *waste management licence*; it seems possible that these obligations would apply. It is also unclear how the Act might apply to CO₂ pipelines, as the language in the Act appears to apply to road transport (e.g. in Section 25);
  - *General ambiguity and relevance of terminology around waste* – in relation to matters such as *Waste Impact Reports*, which appear to have limited relevance to the potential risks posed by CO₂ storage sites. This sort of ambiguity means that the Act could require amendment to include specific aspects, language and requirements relevant to CCS and CO₂ storage sites.

- **Future development of waste regulations** – in terms of secondary standards that may be introduced to implement certain requirements under Section 7 of the Act e.g. for the design of landfill sites in South Africa. (12) Design requirements for such installations could be inadvertently imposed on CO₂ storage sites, although they would bear little relevance to such installations, which could create conflicts in the legislation (see also Box 6.1). On the other hand, it is conceivable that a standard / guideline document could be developed specific to the development of CO₂ storage sites;

- **Effects in other areas of regulation** – the application of the NEM: WA to CO₂ will trigger authorisation requirements under the NWA if injection of CO₂ takes place into a deep saline formation (see Chapter 7.2.2 below). Other areas which could be enacted would be the National Environmental Management: Integrated Coastal Management Act 24 of 2008 in terms of the “dumping of waste at sea”, although the implications of this Act for offshore CCS have not been considered in detail here; see World Bank, 2010 for further information. The provisions therein largely enact requirements under the London Convention and Protocol, and the conditions outlined in Box 3.2 above would likely be applicable (if the Act is to be updated to reflect the latest developments in the Protocol).

Experiences with waste law and CCS regulation in the EU are summarised in Box 6.1, and provide a useful point of reference for considering the relevance of waste law to CCS regulation in South Africa.

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(12) A proposed standard for Disposal of Waste to Landfills has been drafted in this context. Available at: http://www.sawic.org.za/documents/1481.pdf
**Box 6.1 EU experiences with CO₂ and waste legislation**

When the European Commission (EC) set about designing a regulatory framework for CCS, one of the key early questions posed was whether to classify captured CO₂ as waste. This would impose a raft of EU waste regulations onto CCS operations, including requirements under Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste (which implements the Basel Convention in EU Law) for waste transfer and receipt notifications to be maintained when there is a transfer of custody (e.g. between a capture facility and a transport facility), and the EU Landfill Directive. While amending these instruments to accommodate CCS was considered possible, it would have been difficult and may have resulted in a cumbersome regulatory framework with unintended consequences for other users of CO₂ (e.g. in the food industry). Other issues included that, for example, under the EU Landfill Directive, whilst containing useful provision in relation to after-care (i.e. stewardship) and financial provisions for landfill sites which could have been conferred onto CO₂ storage activities, there are many technical design requirements for landfills in the Directive, which would have been applicable to CO₂ storage sites, but of limited relevance. In its evaluation, the Commission concluded that:

> “Many parts of the waste legislation potentially apply to CO₂ storage, but they do so in a fragmented way and are not designed to cover the particular risks in question. Neither framework [Waste nor IPPC Directive] could be adapted to regulate CO₂ storage without substantial and fairly complicated amendment. Thus it was decided to develop a free-standing legal framework for CO₂ storage in the form of a draft Directive, and remove CCS as regulated above from the scope of the waste legislation.” (EC, 2008)

Consequently, captured CO₂ was excluded from the scope of the EU waste legislation by amendment to the Waste Framework Directive, as per the following amendment set out in the CCS Directive (2009/31/EC):

**Article 35 - Amendment of Directive 2006/12/EC**(14) **Article 2(1)(a)**

> ‘(a) gaseous effluents emitted into the atmosphere and carbon dioxide captured and transported for the purposes of geological storage and geologically stored in accordance with Directive 2009/31/EC [...] or excluded from the scope of that Directive pursuant to its Article 2(2);

*Article 2 of the EC Waste Framework Directive sets out exclusions to its application in similar way to Section 4 of the NEM: WA. Article 2(1)(a) already excluded “gaseous effluents”, and the amendment above extend its scope to cover captured CO₂ as described.*

**Source:** adapted from IEA, 2010; see also EC, 2008, EC, 2007.

### 6.5 GAPS AND BARRIERS

In addition to the uncertainties highlighted, several gaps would still persist in a regulatory framework under the NEM: WA, including:

- **Access and storage rights** – the Act does not provide clear provisions in relation to the rights of a waste management licence holder to access the surface and subsurface land for the undertaking of activates such as injection of CO₂;

- **leakage and permanence** – whilst the NEMA general duty of care and control of emergency incident provisions would apply for any local risks, the

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Act does not offer any enhancements to the regulatory framework in this context. Global risks would not be covered by any of the provisions of the NEM:WA, in same way as described for the NEMA (see Chapter 5.4);

- **financial provisions** – the Act does not provide for any mandatory requirements in relation to financial provision, although the requirements could still be enacted under the NEMA, Section 24P(7); and

- **long-term stewardship and liability** – the NEM: WA does not include any provisions for the long-term stewardship of decommissioned waste facilities.

More generally, it is unclear whether the NEM: WA adds anything to the levels of risk management/approvals, regulatory oversight and liability allocation to that could be achieved under the NEMA (as outlined previously), or whether adopting an approach similar to the MPRDA would prove more effective than trying to apply waste laws to CCS. It also leads to multiple regulation of the same activity, e.g. through triggering of authorisation requirements under both NEMA and the NWA, and also create unintended consequences for power plants or industrial installations that capture CO₂, who would be classified as waste holders for the purposes of the Act and would also be required to obtain additional or a revised waste management licence that cover CO₂. For these reasons, it is recommended that careful consideration be made of the scope to utilise the NEM: WA to regulate CCS, or to remove CCS operations from its ambit.
7 FILLING GAPS THROUGH OTHER PIECES OF LEGISLATION

7.1 INTRODUCTION

This Chapter considers how other pieces of legislation in South Africa could be employed to address gaps and uncertainties that might arise from the conferring requirements of the NEMA onto CCS activities. Further, this Chapter also considers the potential of such legislation to provide a template that could be adapted for CCS in new, CCS-specific, regulations. The principal legislation reviewed herein includes:

- The *Mineral and Petroleum Resources Development Act No. 28 of 2002* (the MPRDA).
- The *National Water Act No. 36 of 1998* (the NWA).
- The *Occupational Health and Safety Act No. 85 of 1993* (the OHSA).
- The *Hazardous Substances Act No. 15 of 1973* (the HSA).

In the following sections, these statutes are considered for their applicability to CCS activities and their capacity to cover the regulatory needs outlined previously (Chapter 3.1 above).

7.2 REGULATORY COVERAGE ACHIEVED THROUGH OTHER SOUTH AFRICAN LEGISLATION

7.2.1 The Mineral and Petroleum Resources Development Act (MPRDA)

*Overview*

The primary purpose of the MPRDA is to provide a legal basis for custodianship of South Africa’s mineral and petroleum resources by the State in an equitable, economically beneficial, orderly and ecologically sustainable manner. In doing so, it establishes a means by which the State can control mineral and petroleum development regarding rights for prospecting, mining, exploration and production.

Although CO₂ injection and storage operations are not currently covered by the MPRDA - its scope is restricted to extraction of, or “winning of”, minerals and petroleum from the subsurface(15) - the underlying activities which it regulates provide a close analogue with the regulatory requirements for CCS activities. One of the key aspects addressed by the MPRDA is ownership of the subsurface and the granting of access to entities for its use commensurate with the general obligations of the State as the custodian of South Africa’s

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(15) Due to definitions of “minerals” and “petroleum” which do not include CO₂, and therefore it falls outside the scope of the Act, as described in detail elsewhere e.g. World Bank, 2010; Glazewski, 2012.
mineral resources. On this basis, it provides an extremely useful analogue with respect to the granting of rights to explore for, develop and utilise subsurface pore space for the purpose of long-term geological storage of CO₂. This aspect is key for CO₂ storage sites to be developed in the future, and is largely absent in other South Africa statutes that could apply to CCS.

Other aspects relate to the way in which conditions are set on such access, through the granting of permits and rights and the constraints set down therein, as discussed further below.

It therefore provides a useful regulatory “template” to consider for applying to CO₂ injection and storage in South Africa. The main aspects include:

- **Project permitting/approvals to manage risk** - via provisions relating to the application and issuance of various permits and rights that are authorised under the Act, the procedures for applying for such permits and rights, and in the provisions relating to site closure. It is a matter for consideration as to whether these requirements could be more effective in providing a solid basis for regulating CO₂ storage site development, operation, closure and post-closure in addition to that which could be achieved under the NEMA and the EIA Regulations.

- **Regulatory oversight for inspections, enforced closure and remediation** – via the regulatory oversight in place for operations authorised/permitted/issued under the Act. Again, it is a matter for consideration as to whether these requirements could be more effective than could be achieved under Section 31 of the NEMA, as amended.

- **Allocate liability** – in relation to how the permit allocates liability, and the provisions relating to site closure.

The approach to regulating these aspects under the MPRDA are more technically-oriented relative to the similar requirements outlined previously for the NEMA (i.e. within EIAs and environmental authorisations). For this reason, it may be more appropriate to consider the MPRDA as a possible mechanism for regulating CO₂ storage in South Africa. That said, the MPRDA is closely aligned with the NEMA with respect to provisions in the MPRDA relating to how potential environmental, socio-economic and cultural heritage aspects are managed, and therefore the MPRDA and the NEMA both apply to activities regulated under the Act.

It is also useful to note that much of the language (e.g. definitions) and procedures (e.g. granting of access rights, permit applications, conditions) are oriented towards subsurface exploitation, and therefore can be potentially provide a basis for developing a regulatory framework for CO₂ storage site development in South Africa, perhaps in a more effective way than other pieces of its legislation.
Notwithstanding these observations, it is also important to note that amending the MPRDA to apply to CO₂ storage activities is not specifically advocated here – such actions could create complexity in the design of the regulation, and pose unintended consequences for mining and petroleum operations. (16) Rather, it is useful to be mindful of the fact that:

1. The permitting of subsurface activities is not something new in South Africa, and statute is established for such activities; and,
2. the provisions in existing legislation could provide a useful basis and/or precedent for regulating CO₂ storage in South Africa.

The key features in terms of the regulatory needs for CO₂ storage are described in greater detail below.

**Project permitting/approvals to manage risk**

The MPRDA sets out a range of requirements for mining and petroleum operations in terms of permitting, approvals and risk management. Whilst not applicable to CCS at present, these can be considered as analogous to the various regulatory needs for CCS described previously, based on the following:

- **Access and storage rights** – the following sections of the Act outline the basis for granting authorisations and permits for subsurface development activities:

  1. **Chapter 4 (Mining):**
     - Section 13 – Reconnaissance permits
     - Sections 16-21 – Prospecting rights
     - Sections 22-30 – Mining rights
  2. **Chapter 6 (Petroleum):**
     - Section 74-75 – Reconnaissance permits
     - Sections 79-82 – Exploration rights
     - Sections 83-86 – Production rights

Under **Section 5**, the holder of such rights is granted permission to, *inter alia*:

- Enter land to which the right relates;
- prospect, mine, explore or produce the mineral/petroleum;
- remove or dispose of materials;
- carry out other incidental activities related to the prospecting, mining, exploration or production.

Similar provisions will likely be necessary to authorise CO₂ storage site exploration, characterisation, development and operation in South Africa.

(16) There is a view that this would require the addition of a Part 3 to the MPRDA, which would take some time to draft and add. Furthermore, revisions to the MPRDA are ongoing at the time of writing, and the prospect of adding CCS to the discussions could further complicate this process.
In terms of authorisations for \( \text{CO}_2 \) storage site prospection, the conditions set out in Section 50(1) of the MPRDA pertaining to Ministerial discretion for the investigation of the subsurface, would allow for such activities to commence, subject to the conditions set out thereunder, without any amendment to the Act.

- **Establishing modes of operation and requirements for closure of a \( \text{CO}_2 \) storage site** - in accordance with, e.g. Section 17, 23, 80, 84, applications for permits and rights under the MPRDA are required to include specific details covering *inter alia*:
  
  - Financial status and technical ability of the applicant to conduct the operation in accordance with the proposed *work programme*;
  - the expected expenditure in relation to the scale and duration of the operation;
  - the potential pollution, ecological and environmental impacts arising from the activity; and
  - a proposed *work programme*\(^{(17)}\) outlining how the resource will be produced optimally.

In terms of technical requirements for site closure, Section 43 sets out that a *Closure Certificate* may only be issued where a *prescribed closure plan* has been completed.

The permit application requirements, and in particular the *work programme*, could provide the basis for determining how a \( \text{CO}_2 \) storage site would be operated (e.g. well locations, injection rates, injection pressures etc.), whilst a *prescribed closure plan* would also be needed for a \( \text{CO}_2 \) storage site. It is useful to compare these requirements against the \( \text{CO}_2 \) storage permit application procedures prescribed in EU law (Box 5.4).

- **Environmental and socio-economic impacts assessment, and public participation** - the MPRDA also enforces similar obligations as achieved for other activities regulated under the NEMA regarding environmental controls on mining and petroleum operations, as set out under Sections 37, 38 (IEM) and 39 (EMPs); these are generally applicable to all prospecting, mining, exploration and production activities. Such requirements broadly reflect, reiterate and confer the environmental authorisation requirements under the NEMA, as described previously.

- **Risk assessment of capture, transport and storage** - established through the NEMA provisions, as described previously.

- **Monitoring and performance assessment against authorisations** - various requirements are set down for reporting, although it typically only

\(^{(17)}\) This shall include details of e.g. the activities to be undertaken, phases, equipment to be used, and estimated expenditure (based on the definition of “exploration work programme” contained in the Act).
requires compliance with an EMP to be systematically assessed at the time of application for a renewal of a right (e.g., under Section 24, 81, 85, 88). In addition, Chapter 6, Section 70-72 of the MPRDA, allows for the establishment of a designated agency for petroleum exploration and production (the Petroleum Agency SA), and mandates it to monitor and report annually to the Minister in respect of compliance with permits issued – operators are therefore mandated to report to the Agency.

- Civil and environmental protection through the control of emergency incident provisions – established through NEMA general duty of care and control of emergency incidents, as described previously.

Regulatory oversight, enforced closure and remediation

Provisions outlined in Sections 45, 46 and 47 of the MPRDA allow for the State to:

- Undertake remedial actions in cases where operations cause ecological degradation, pollution or environmental damage or harm to human health, and to remediate such damages;
- recover the costs from the relevant rights holder; and
- suspend or cancel rights, permits or permissions.

The costs involved with any remediation work carried out by the State can be drawn from a financial provision, established in accordance with Section 41 (see Section “Allocate Liability” below). These provisions are consistent with those in place under NEMA.

Furthermore, under Chapter 7, Sections 91 and 92, an authorised person, including persons authorised by way of a warrant, may enter a prospecting, mining or exploration area, and request information and undertake, inter alia, the following:

- Inspect books and records of activities carried out;
- take of samples and remove them for analysis;
- seize any material, substances, books, record or statement or other document including electronic records.

Where such inspections reveal a contravention to the Act or right, permit or permission, under Section 93, the right holder must take action to rectify the contravention or the right may be suspended or terminated. The powers of the authorities described are similar to those vested in EMIs under the NEMA, Section 31.

Alongside the oversight offered under the NEMA through EMPs and EMIs, the approach under the MPRDA presents a useful framework for contemplating oversight of CO₂ storage operations in South Africa (see also Box 5.6 regarding EU inspection procedures).
Allocate liability

For liability, the MPRDA works in conjunction with the NEMA provisions relating to duty of care and control of emergency incidents, as per Section 38 of the MPRDA. Specific provisions include:

- **Leakage and permanence** – in terms of local risks during the development and operational phase of a mining activity (although not any petroleum activity), under Section 43, the rights holder remains responsible for any environmental liability arising from pollution or ecological degradation and management thereof until the issue of a closure certificate. Global risks would not be covered by any of the provisions of the MPRDA, in the same way as described for the NEMA (see Section 5.4, page 35, above).

- **Financial provision** - Under Sections 41 and 89, a prospecting, mining right or mining permit holder, or an exploration or production right holder, must make a prescribed financial provision for the rehabilitation or management of negative environmental impacts of an activity. This can take the form of insurance, bank guarantee, trust fund or cash that guarantees the availability of sufficient funds to undertake the agreed work programmes and rehabilitate the prospecting, mining, reconnaissance, exploration or production area, as applicable. Similar approaches could be taken for CCS regulation;

- **Long-term stewardship and liability** - Under Section 43, conditions for the issuance of a Closure Certificate are outlined, which may be applied for by the relevant rights holder on abandonment, cessation or completion of a prescribed closure plan; it must be issued by the Minister of Mineral Resources. Upon issuance of a Closure Certificate, the financial provision must be returned to the rights holder. As it currently stands, once a Closure Certificate is issued, the liability can be at least partially transferred to the State, although it is at the discretion of the State whether such a transfer occurs, and what liabilities are transferred. As such, an operator could potentially remain liable in perpetuity.

**Issues for long-term stewardship of CO₂ storage sites**

The long-term stewardship of CO₂ geological storage sites is a challenging issue, posing many ethical questions regarding whether a transfer of liability is appropriate, whether it promotes a moral hazard for developers (see Box 3.1), and whether the state or the private sector should bear the long-term responsibility for efforts made to mitigate climate change. The private sector has successfully argued in some jurisdictions that it cannot take on unlimited liabilities over time frames potentially spanning many hundreds of years as they are not in the position to take on such liability, and it would affect fiduciary duties towards shareholders. On the other hand, others have suggested the protecting companies from such exposure would diminish their
responsibility to act appropriately to ensure long-term storage is achieved i.e. a moral hazard. As such, the topic poses a complex challenge to balance between risks, benefits and rewards – absent an appropriate balance, businesses will be unlikely to invest in CCS projects.

In South Africa, many such issues are played out in relation to mine closure and acid mine drainage, and analogues may be drawn from these experiences to inform the appropriate policy choice for the country. However, it is beyond the scope of this report to attempt to provide answers to these questions. In order to help inform a view, experiences in other jurisdictions are highlighted in Box 7.1.

**Box 7.1 Long-term liability in other legal frameworks**

**European Union**

Under the EU CCS Directive, long-term responsibility for CO₂ storage sites is transferrable to the Member State where the storage site is located upon its closure. After this takes place, all liabilities relating to e.g. CO₂ emissions and remedial measures, are absolved from the operator. Transfer of responsibility can only take place where:

(a) all available evidence indicates that the CO₂ will be completely and permanently contained;
(b) a minimum period, to be determined by the competent authority has elapsed. This shall be no shorter than 20 years, unless the criterion referred to in point (a) is complied with before;
(c) the financial obligations in relation to transferring a financial contribution to the Member State to support long-term responsibility (under Article 20) have been fulfilled;
(d) the site has been sealed and the injection facilities have been removed.

However, liability would still reside with the operator depending on Member State law and interpretation of the EU Environmental Liability Directive. In cases where there has been fault on the part of the operator, including cases of deficient data, concealment of relevant information, negligence, wilful deceit or a failure to exercise due diligence, the competent authority shall recover from the former operator the costs incurred after the transfer of responsibility has taken place.

**CCS M&Ps**

These allow for the transfer of responsibility based on provisions very similar to those outlined for the European Union above, including transfer of a financial provision to the host country. National level procedures would also apply based on the specific host country.

**United States**

The United States federal approach to CO₂ storage site regulation has not yet allowed for a transfer of liability from operator to state. In the *Report of the Inter-agency Task Force on Carbon Capture and Storage (ITF CCS, 2010)*, it was concluded that Federal involvement with liability issues presented a “moral hazard” issue for potential operators, and concerns were expressed that this could “create a disincentive to proceed in a safe and environmentally sound manner”.

On other hand, the US SDWA Underground Injection Control (UIC) Class VI Final Rule allows for some limited transfer of responsibilities to take place, by absolving the operator of UIC liabilities once certain conditions are met, although other liabilities remain in place. These developments notwithstanding, a number of States have acted to allow for a transfer of liability for CO₂ storage sites from operator to the State. These take several forms including those with a long-term stewardship fund with the State taking some limited liabilities (Kansas, Louisiana, Texas, Wyoming); those with a long-term stewardship fund with the State taking all liabilities (North Dakota, Montana); and, those without funds (Oklahoma, Utah, Washington, West Virginia). As such, a rather fragmented approach to long-term liability for CO₂ storage sites is emerging in the USA (based on Pollak, 2010).

Consistency with international law

Adopting a regulatory scheme for CO2 storage sites similar to that of the MRPDA could serve to meet international requirements relating to the London Protocol, UNFCCC and the CDM.

7.2.2 The National Water Act (NWA)

The NWA vests power in the State to act as the trustee of all of the water resources in South Africa, and to act to protect, use, develop, conserve, manage and control water in an equitable and sustainable manner.

Under the NWA, Section 21(g), disposing of waste in a manner which may detrimentally impact on a water resource is considered water use for which a water use licence is required. As such, injecting CO2 into a saline water-bearing geological formation (or a deep saline formation) could be considered a water use and therefore fall within the ambit of the Act. Consequently, CCS projects storing CO2 in deep saline formations will require authorisations for a water use in accordance with the type of water use listed in Section 21(g) as well as permit applications in accordance with Part 7, Sections 40-41.

Furthermore, aspects of the NWA could apply to CCS in the context of the leaking CO2 contaminating ground and surface waters. In this context, the NWA includes, in Part 4, Section 19, regarding prevention of Pollution of water resources and in Part 5, Section 20, provisions relating to Emergency Incidents in the event of water pollution. These place obligations on users of the land that are performing activities which could potentially pollute water to take all reasonable measures to prevent such pollution from occurring (e.g. cease, modify or control the operation, and clean-up and remedy effects). Powers are also vested to direct a person on whom there is a duty of care to take reasonable measures, including pollution remediation. If the person concerned does not comply with the directive either adequately or at all, the State may take the measures and, inter alia, recover the costs from a range of parties including the responsible operator.

In the EU, the Water Framework Directive (2000/60/EC) (19) posed a barrier to injection of CO2 into deep saline formations under Article 11(j). Therefore, in order to remove such a barrier an amendment was introduced under the CCS Directive (2009/31/EC) which added a new derogation to those already referred to in Article 11(3)(j) (see Box 7.2).

Box 7.2  

**Amendment of the EU Water Framework Directive**

<table>
<thead>
<tr>
<th>Article 32 - Amendment of Directive 2000/60/EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Article 11(3)(j) of Directive 2000/60/EC, the following indent shall be inserted after the third indent:</td>
</tr>
<tr>
<td>‘— injection of carbon dioxide streams for storage purposes into geological formations which for natural reasons are permanently unsuitable for other purposes, provided that such injection is made in accordance with Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide or excluded from the scope of that Directive pursuant to its Article 2(2).’</td>
</tr>
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7.2.3  

**The Occupational Health and Safety Act (OHSA)**

The OHSA and the regulations promulgated thereunder deal primarily with health and safety issues in the workplace, in particular the health and safety of employees and the health and safety of people who use plant or machinery. As such, worker safety at CO\(_2\) capture, transport and storage facilities would be regulated in the same way as other industrial or energy infrastructure installations.

The application of the OHSA is not restricted to employees only and also provides for the protection of people, other than employees, against health and safety hazards emanating from activities at the workplace.

*Section 43* of OHSA empowers the Minister of Labour to make regulations regarding occupational health and safety. Should CO\(_2\) fall within the ambit of this definition of “gas” under the OHSA, then the *Pressure Equipment Regulations* would be applicable to the storage of CO\(_2\) in any surface tanks prior to injection. Although there are no licensing provisions in these Regulations, it is important to note that all users of pressure vessels must ensure that the said vessel has a certificate from the manufacturer and from an approved inspection authority (*Section 6*).

Furthermore, although transportation (e.g. pipelines) and temporary storage facilities are, prior to injection, unlikely to fall within the applicability of the *OHSA: Major Hazard Installation Regulations 62 of 2001*, any project developed in South Africa would be advised to request an approved inspection authority to conduct an assessment as to whether the facility will be a major hazardous installation. If the outcome of the assessment confirms the facility is a major hazard installation, notification in *Section 3* must be submitted. This is to include the following:

(a) the physical address of the installation;
(b) the complete material safety data sheets of all substances that resulted in the installation being classified as a major hazard installation;
(c) the envisaged maximum quantity of such substance that may be on the premises at any one time;
(d) the risk assessment of the major hazard installation as contemplated in regulation 5(1); and
(f) any further information that may be deemed necessary by an inspector in the interests of the health and safety of the public.

The risk assessment provision in regulation 5(1) is required to be carried out every 5 years, and a range of requirements are outlined thereunder in terms of notifying the authorities. In addition, public notification requirements must be complied with.

### 7.2.4 Transport regulations

#### Road transport by truck

The licensing of any trucks used to transport CO₂ from a capture to an injection and storage site will be the responsibility of the transportation company or alternatively the project operator if trucks are purchased for the project.

Any person causing damage to the national road, intentionally or negligently will be guilty of an offence and liable for imprisonment or a fine or both in terms of the National Roads Traffic Act. On a practical level, allocation of liability can be made on a contractual basis between the relevant parties.

The Transportation of Dangerous Goods and Substances Regulations will also be applicable to any vehicle that is carrying pressurised CO₂ and it will be the duty of the consignee and the consignor to comply with these Regulations.

#### Pipeline transport

The Gas Act 48 of 2001 and the Petroleum Pipelines Act 60 of 2003, which presently regulate the design and operation of major pipelines transporting gaseous materials in South Africa, are currently not applicable to the transportation of CO₂. However, the legislation could be modified to apply to CCS projects, in particular the Gas Act (World Bank, 2010).

If CO₂ pipeline construction is required in the future, generally applicable South Africa environmental legislation and regulation under the NEMA would typically apply to CO₂ pipelines, including:

- The provision for EIA under Chapter 5 and the EIA Regulations, in the context of the planning of the pipeline corridor; and,
- the duty of care and control of emergency incidents, as described previously, in the event of leakage and significant pollution, environmental damage, or risk to public health.

Depending on whether the Gas Act is modified to apply to CO₂ pipelines, a amendment to the Listing Notices to bring CO₂ pipelines within the ambit of the EIA Regulations under NEMA may be needed; if the definition of “gas” in

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(20) “gas” under the Gas Act means “... all hydrocarbon gasses 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, regasified [liquefied] natural gas, [liquefied] petroleum gas or any combination thereof.”
the *Gas Act* brings CO₂ into its ambit, *Listing Notice 2, Activity 3* would automatically apply to CO₂ pipelines, subject to meeting the capacity thresholds outlined therein.

Depending on a range of factors relating to matters such as whether supercritical CO₂ is declared as a “dangerous good”, which at the current time appears to be the case (see *Chapter 4.2* above), requirements to undertake an EIA for a CO₂ pipeline could also be triggered by other activities included in the NEMA *Listing Notices*, for example, *Listing Notice 2, Activity 6 (Installations for the Transportation of Dangerous Goods)*, as well as requirements relating to vegetation clearance to create a pipeline corridor.

**Accidents/leakage**

In the event of leakage of CO₂ during transportation, and any resultant significant local pollution, environmental damage, or risk to public health, the control of emergency incidents under the NEMA, will apply to any infrastructure used to transport CO₂. This would oblige the operator to take actions to control the pollution, as described previously in *Chapter 5.3.3*.

However, no liability would be created for the global impact resulting from such a leak unless the activity formed part of a CDM project or through imposition of requirements under the CO₂ Tax regime where a chain of custody for captured CO₂ in South Africa could be created (see *Chapter 3.4*).

**7.2.5 The Hazardous Substances Act No. 15 of 1973 (The HSA)**

The existing view of captured CO₂ as a “dangerous good” under SANS 10228 (see *Chapter 4.2*) means that its capture, transport, injection and storage triggers obligations in relation to the HSA.

As such, *Section 29* allows for regulation of activities involving such hazardous substances by “authorising, regulating, controlling, restricting or prohibiting the storage, transportation, or dumping and other disposal”. As such, power is vested in the state to restrict the transport and storage of such substances, which potentially could include CO₂. Presently the scope of the HSA applies only to “the manufacture, operation, importation, sale and use of hazardous substances” and, to some extent, with their storage, but not to any significant extent with their disposal. Also, the HSA seeks primarily to “control substances which may cause injury, ill-health or death to human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature, or the generation of pressure”. Further, from a practical perspective, no significant controls are applied to the storage of the category of substances into which CO₂ falls.

On this basis, the implications for CCS under the HSA are unclear at present. Under certain circumstances, potentially the DMA could apply to a CO₂ leakage event (see *Box 5.2*).
7.3 REMAINING GAPS AND UNCERTAINTIES

Analysis outlined in the preceding sections suggest that the MPRDA and other parts of South African legislation could provide enhanced coverage in addition of CCS regulation alongside the NEMA, should they be amended so as to confer their requirements onto CCS. For example, for the MPRDA to apply directly to CCS, it would need amendment in a number of places, including, inter alia, definitions, objective, and potentially the addition of a new Part 3 specific to the geological storage of CO2. Other existing legislation in South Africa could be used to regulate transportation of CO2, as described previously. In the context of what such amendments could achieve, the following considerations apply:

- **Storage site prospecting/exploration permits; granting of access and storage rights** - the MPRDA could potentially provide a permitting framework for CO2 storage site development, either through conferring the scope of the Act onto such activities, or by using the MPRDA approach as a “template” for new specific legislation for CO2 storage. Presently, Section 50 of the MPRDA allows for prospecting rights for CO2 storage to be granted, absent of the need to amend the legislation.

- **Long-term stewardship and liability** – the procedures for site closure under MPRDA, and the associated financial provision, could provide a template for long-term stewardship of stored CO2, subject to amendment of the Act of the use of similar provisions in a new Act relating to geological storage of CO2.

- **Approvals and operational controls on transport of CO2** - the provisions of the NEMA, alongside other existing legislation relating to transport of certain goods, potentially provides for a robust regulatory framework for the transportation of CO2, either by road or pipeline with limited or no amendment. Amendments to the Listing Notices to include such activities within the scope of the Act, and/or amendments to the Gas Act to include CO2 transport in pipelines within its ambit, would be needed in order for a comprehensive regulatory framework for CO2 transport by pipeline to be established.

However, several aspects remain uncertain at present, including:

- **The most appropriate way to establish authorisations for development of CO2 storage sites** – further consideration of the most appropriate way to develop a permitting regime for storage site development and operation is needed. Some potential options are outlined in Chapter 10 of this report.

- **The most appropriate way to address long-term stewardship** – further consideration is needed regarding how long-term stewardship of stored
CO₂ will be managed. This could take account of international practices, as highlighted previously (Box 7.1). Current approaches in the MPRDA are undergoing review at the time of writing, and these could influence policy with respect to the State taking on liability for such facilities.

- *Whether application of the Gas Act to CO₂ pipelines would have unintended consequences* – a detailed review of the possibility of making the Gas Act applicable to CO₂ pipelines has not been considered in this paper. It would likely only require an amendment to the definition of “gas” for the purpose of the Act. However, further assessment of the potential implications of making such an amendment is warranted.

The main gap remaining relates to the *global risk* arising from leakage across capture, transport, injection and storage, and the same issues as outlined in Chapter 5.4 apply.
SUMMARY AND CONCLUSIONS

8.1 THE EXISTING LEGAL FRAMEWORK

The analysis presented in this paper has attempted to make a summation of the effectiveness of various existing laws in South Africa to provide a regulatory framework for CCS in the country.

The indication is that for the most part, South Africa either has many of the requirements already in place through general provisions in existing legislation, or has analogous regimes in place which could be applied to CCS or used as the basis for developing CCS-specific legislation.

In the contexts described, the main findings for the various pieces of relevant legislation are discussed further below. A detailed summary indicating coverage and gaps for various aspects of the CCS value chain is presented in Figure 8.1 below.

The NEMA

The framework provided under NEMA creates several pillars on which to build an effective regulatory approach to CCS in South Africa, covering:

- **EIAs and specialist reports** – which can provide a basis for CO₂ capture activities, CO₂ pipeline developments, and CO₂ storage site characterisation and selection studies, risk assessments, and environmental and socio-economic as part of project approvals/permitting.

- **EMPs** – which can provide a basis for determining the modes operation of CO₂ pipelines and CO₂ storage sites.

- **EMIs** – can provide regulatory oversight of operations.

- **Duty of care and control of emergency incidents** – which can provide for control of CO₂ leaks where they pose a risk across the whole CCS chain.

- **Means of redress and compensation** – as covered by provisions of Section 34 of the Act. Further, these could support the basis for supporting implementation of South Africa CO₂ Tax, by creating obligations to compensate any financial gains were leakage to occur across a CCS project.

- **Liability** – by allowing for requirements in relation to financial provisions.

However, further clarity regarding the scope and suitability of the framework to effectively regulate CCS is needed, and expert opinion should be sought from relevant stakeholders, in order to inform this view based on experiences from practitioners and operators. In particular, an amendment to the Listed
Activities under the EIA Regulations would be required to make that regime directly applicable to CCS; currently it is only incidentally applicable in that some aspects of a CCS project may trigger a Listed Activity.

The NEM: Waste Act

South African legal experts consider that “captured CO₂”, principally for the purpose of CCS, would qualify as a waste or hazardous waste under South African law, and as such injection of CO₂ would constitute disposal of hazardous waste to land (World Bank, 2010, Glazewski et al, 2012). As such, the following requirements currently apply to CCS related activities:

- **Waste management license** – these currently can be used as the basis for CO₂ requiring storage site characterisation and selection studies to be undertaken, and risk assessments carried out as part of a project’s WML application. Allows a WML only to be issued where the results of these assessments indicate safe and environmentally sound operation of the site.

- **General duty** – as placed on waste generators and handlers to ensure treatment and disposal in an environmentally sound way.

- **The NEMA** – provisions would apply in conjunction with the NEM: WA, including for EIAs, socio-economic impact assessment, duty of care and control of emergency incidents, as described above. An EMP could also be used to provide the basis for determining the modes operation of CO₂ pipelines and CO₂ storage sites.

- **EMIs** – can provide regulatory oversight of operations.

Notwithstanding the coverage achieved, it is possible that inclusion of CCS within the ambit of South African waste law could create issues in the context of, inter alia:

- Obligations for capture and transport installation operators to obtain various authorisations, and potentially place obligations on generators of CO₂ to make disclosures regarding the effects of the “CO₂ waste” being produced.

- More generally, whether using the current NEM: WA to regulate CO₂ storage operations is considered technically robust, whether it adds much to the regulatory framework that could potentially be provided under the NEMA, and whether more technically appropriate approaches could developed analogous to MPRDA requirements.

These findings suggest several choices for moving forward with regulation of CCS in South Africa, which are briefly outlined in the next Chapter of this report.
The MPRDA and other laws

The approach taken to regulating mining and petroleum exploration and extraction activities provides a useful template for considering approaches to strengthen the regulatory scheme that could be imposed on CCS activities by the NEMA. Other laws can also serve to fill gaps in relation to e.g. transport of CO₂. Key aspects include:

- **Access and storage rights** – which, under the MPRDA, are granted in respect of exploration, production, and/or mining rights issued to applicants. It provides a useful analogue for the way in which CO₂ storage site development activities could be permitted. Under Section 50 of the MPRDA, CO₂ storage site prospection activities may be authorised under the Act without amendment.

- **Work programmes and closure plans** – which must be contained in the various permit applications under the MPRDA, and should include, *inter alia*, details of how the site will be developed and operated, the phasing of such development, the costs etc., and in terms of site closure, the plans needed to support the issuance of Closure Certificates.

- **Financial provision and Closure Certificates** – which, under the MPRDA, offer means by which moral hazard may be reduced, the State may cover at least some of the potential costs of long-term stewardship of a decommissioned mine, and allowing operators to transfer part or all of the liabilities associated with a site back to the State.

- **Transport of CO₂** – the existing laws relating to road transport of dangerous goods will apply to CO₂ transport by truck. This can provide safeguards for the safe conduct of such activities. Amendments to existing legislation such as the Gas Act may be necessary to create similar safeguards for transport of CO₂ by pipelines.

However, amendments necessary to confer the MPRDA onto CO₂ storage activities would be substantial. This would likely involve the addition of a CCS-specific Part 3, and it would also require a very detailed review of all definitions and general provisions to ensure that (a) CO₂ storage operations would be covered and (b) amendments wouldn’t result in intended consequences or perverse outcomes for mining or petroleum activities regulated under the Act. In light of contentions revolving around the current proposed MPRDA amendments, such amendment may not be accepted by all stakeholders.
### Figure 8.1 Summary of regulatory coverage

<table>
<thead>
<tr>
<th>Qualifying comments</th>
<th>NEMA &amp; EIA Regulations</th>
<th>NEM: WA</th>
<th>MPRDA</th>
<th>NWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would require inclusion of CO₂ capture, transport and storage in EIA Listing Notices</td>
<td>Currently applies as captured CO₂ considered waste, and CO₂ injection considered waste disposal</td>
<td>Would require major revision of MPRDA (new Part 37). Could be used as basis for new CCS legislation</td>
<td>Currently applies as captured CO₂ considered waste, and CO₂ injection (in aquifer) is &quot;water use&quot;</td>
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#### 1. Project permitting/approvals to manage risks

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<tbody>
<tr>
<td>Prospecting</td>
<td>Regulation 31(2)(c) etc</td>
<td>Requirements for EIA</td>
<td>n/a</td>
<td>n/a</td>
<td>Regulation 31(2)(c) etc</td>
<td>Requirements for EIA</td>
<td>P</td>
<td>Section 13, 16-21, 22-30 &amp; 74-75, 78-80</td>
<td>Mining / petroleum rights provisions</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Site selection and characterisation</td>
<td>P</td>
<td>Section 51 Waste Management Licensing (WML)</td>
<td>✓</td>
<td>✓</td>
<td>P</td>
<td>Sections 17, 23, 80, 84</td>
<td>Mining / petroleum permits</td>
<td>n/a</td>
<td>n/a</td>
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#### 2. Regulatory oversight for inspections, enforced closure and remediation

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</tr>
</thead>
<tbody>
<tr>
<td>Capture</td>
<td>✓</td>
<td>Regulation 33(b)</td>
<td>EMP provisions</td>
<td>✓</td>
<td>Section 51</td>
<td>General WML</td>
<td>P</td>
<td>Sections 17, 23, 80, 84</td>
<td>Mining / petroleum permits (work programma)</td>
<td>✓</td>
<td>Section 39</td>
<td>WUL conditions</td>
</tr>
<tr>
<td>Storage</td>
<td>✓</td>
<td>Regulation 33(b)</td>
<td>EMP provisions</td>
<td>✓</td>
<td>Section 51</td>
<td>General WML</td>
<td>P</td>
<td>Sections 17, 23, 80, 84</td>
<td>Mining / petroleum permits (work programma)</td>
<td>✓</td>
<td>Section 39</td>
<td>WUL conditions</td>
</tr>
<tr>
<td>Monitoring &amp; reporting</td>
<td>✓</td>
<td>Regulation 33(b)(i)(k)</td>
<td>EMP provisions</td>
<td>✓</td>
<td>Section 51</td>
<td>General WML</td>
<td>P</td>
<td>Sections 17, 23, 80, 84</td>
<td>Mining / petroleum permits (work programma)</td>
<td>✓</td>
<td>Section 39</td>
<td>WUL conditions</td>
</tr>
<tr>
<td>Disclosure/communications</td>
<td>✓</td>
<td>Regulation 54-57</td>
<td>Public participation</td>
<td>✓</td>
<td>Section 51(2)(b)</td>
<td>Decommissioning specs</td>
<td>P</td>
<td>Sections 17, 23, 80, 84</td>
<td>Mining / petroleum permits</td>
<td>✓</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

#### 3. Allocate liability (short-, medium- and long-term)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Damage and compensation</td>
<td>✓</td>
<td>Regulation 34</td>
<td>Damages and compensation</td>
<td>P</td>
<td>Section 34</td>
<td>via NEMA</td>
<td>✓</td>
<td>n/a</td>
<td>n/a</td>
<td>Through NEMA</td>
<td>✓</td>
<td>n/a</td>
</tr>
<tr>
<td>Financial provision(s)</td>
<td>P</td>
<td>Section 24R</td>
<td>Financial provision</td>
<td>P</td>
<td>Section 51(2)(f)</td>
<td>Financial arrangements</td>
<td>P</td>
<td>Section 41, 89</td>
<td>Financial provision</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
8.2 **EMERGING LEGISLATION**

In terms of emerging legislation in the country, two developments could affect future regulation of CCS. These relate to:

- *The proposed CO₂ Tax* – this was announced in the budget speech and greater detail is forthcoming. If CCS were to be included as a means to offset tax requirements through the avoidance of CO₂ emissions from covered entities, then it is advisable that safeguards be introduced under the legislation to ensure that the emissions injected at a CCS storage site are actually being ‘avoided’ for purposes of applying the proposed tax. As such, regulatory requirements in relation to the management of “permanence”, as described above in Box 2.2, will be needed to support implementation. This should provide a basis for creating a *chain of custody* for captured CO₂ from capture to storage, and impose associated monitoring and reporting requirements across the chain. Such an approach would serve to close the gap relating to global risks (i.e. re-release of captured CO₂ back to the atmosphere), which is not addressed in any of the existing South Africa statute.

- *Revisions to the MPRDA* – these are on-going and could affect how long-term stewardship of mining sites in South Africa is managed. This could have repercussions regarding regulatory approaches to long-term stewardship of CO₂ storage sites in the country.

8.3 **COMPLIANCE WITH INTERNATIONAL LAW**

The requirements imposed under the NEMA go far in terms of meeting requirements under international law such as the requirements set down for CCS projects under the CDM (in the CDM M&Ps; see Box 3.3). They could also support requirements in relation the national GHG inventory reporting under the 2006 IPCC Guidelines (see Section 3.3 above).

In terms of the London Convention and Protocol, the requirements outlined previously (*Chapter 3.3*) would need to be reflected in any future amendments to the *National Environmental Management: Integrated Coastal Management Act 24 of 2008*, which implements the Convention and Protocol in South Africa statute. It is advisable that such amendments be made once a general approach to regulating CCS in the country is established so as to avoid any conflicting requirements in the regulations.
9 CHOICES FOR REGULATING CCS

9.1 OVERVIEW

Based on the analysis provided in this paper, it is apparent that there are several options for regulating CCS in the South Africa, and thus choices for policy-makers in deciding how to establish a regulatory framework for CCS in the country. Based on the preceding sections, the project team considers that four principal options exist for the design of the regulatory framework in South Africa, based on the NEM: WA, the NEMA, the MPRDA, and/or a combination of all of these, both as they presently apply to CCS and via their use as an analogue on which to establish a free-standing “CCS Act”. Within these options, we consider that the approaches will involve either minor modifications of existing statutes, or more thorough or major modifications, as summarised in Figure 9.1 and discussed further below.

Figure 8.1 above outlines a detailed summary of the applicability of existing legislation in relation to the regulatory needs for CCS as discussed in detail in Chapters 4-7 above.

Figure 9.1 Summary of choices for regulating CCS in South Africa

<table>
<thead>
<tr>
<th>NEM: WA &amp; NEMA Approaches</th>
<th>MPRDA &amp; NEMA Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor modifications</td>
<td>Major modifications</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>1. NEM: WA as basis (the status quo)</td>
<td>3. NEMA &amp; MPRDA (use mineral and petroleum acts to regulate CCS)</td>
</tr>
<tr>
<td>- WML provisions provides basis for regulating CO₂ storage</td>
<td>- Amend MPRDA to include CO₂ storage or prepare CCS Part of MPRDA (Part 37)</td>
</tr>
<tr>
<td>- NEM: EIA covers various other aspects</td>
<td>- NEM: EIA covers various other aspects</td>
</tr>
<tr>
<td>Requires CCS activities to be included in NEMA Listing Notices</td>
<td>Requires extensive amendment to MPRDA</td>
</tr>
<tr>
<td>2. NEMA as basis (CO₂ not “waste”)</td>
<td>Requires CCS activities to be included in NEMA Listing Notices</td>
</tr>
<tr>
<td>- Rely on NEMA + EIA provisions to regulate aspects of CCS (except WUL)</td>
<td>4. New CCS Act &amp; NEMA (use NEMA + draw on MPRDA for free-standing CCS Act)</td>
</tr>
<tr>
<td>- Rely on CL for access and property rights</td>
<td>- Use relevant approaches/terminology (e.g. definitions) from MPRDA to draft new CCS Act</td>
</tr>
<tr>
<td>- Exclude captured CO₂ from scope of NEM: WA</td>
<td>- NEM: EIA covers various other aspects</td>
</tr>
<tr>
<td>Requires CCS activities to be included in NEMA Listing Notices</td>
<td>Could be new Act under NEMA (“NEM: CCS”)</td>
</tr>
<tr>
<td>Requires CO₂/CO₂ injection to be excluded from NEM: WA (Section 4)</td>
<td>Requires CCS activities to be included in NEMA Listing Notices</td>
</tr>
</tbody>
</table>

Source: slide presented by project team at IDTT Workshop, Pretoria, 18 March 2013.

The following descriptions of the options are summarised in terms of the main actions that could be taken, and should be read in conjunction with the analysis outlined previously and the summary sheet in Figure 8.1. Each option below includes an illustration of the regulatory pathway and amendments required to implement the option.
9.2 **OPTION 1: NEM: WASTE ACT AS BASIS**

9.2.1 **Description**

This option involves using the NEM: WA as the primary means to regulate CCS. It essentially represents the *status quo*, requiring only minor amendments to existing legislation to achieve regulatory coverage for CCS in South Africa.

9.2.2 **Substantive aspects**

Under this approach the following would be assumed, based on the analysis set out in the previous Chapters:

1. **The NEM: WA applies to CCS activities,** based on the classification of CO₂ or “captured CO₂”, as a hazardous waste, and activities relating to the “injection and geological storage of CO₂” as *disposal of waste on land*. As such, the NEM: WA would provide the principal basis for regulating CCS activities – primarily CO₂ storage site development, operation and closure – via its provisions relating to *waste management licensing* (as described in Chapter 6.3.2, summarised in the previous Chapter and detailed in Figure 8.1). Guidelines pertaining to technical standards for CO₂ storage site development, monitoring, closure etc. could be also developed under the scope of the Act and *Section 7* to ensure sufficient project specific management. Although the NEM: WA would provide the regulatory framework for the storage and operation of the CCS project, other related environmental authorisation are still required – this includes a *Water Use Licence* in terms of the NWA and an environmental authorisation for incidental NEMA EIA listed activities which are triggered. The WML will however be the primary authorisation regulating the environmental impacts associated with the CCS project. The WML assessment would require a “full EIA” to be undertaken as stipulated in the NEMA *Section 24* due to the CO₂ storage sites triggering the activity involving the *disposal of hazardous waste to land* as listed under *Category B* of *Schedule 1* to the NEM: WA.

2. **The NEMA - Regulatory coverage for incidental activities** would also be potentially achieved, including for CO₂ capture installations via the EIA Regulations as applied to installations where CO₂ capture may take place (e.g. power plants or industrial facilities), and also for activities such as vegetation clearance that may be necessary for CO₂ pipeline and storage site development. The NEMA provisions relating to EIA, SIA, EMIs and also the *duty of care* and *control of emergency incidents* would therefore also apply to a CO₂ capture facilities, potentially CO₂ transport where an emergency incident was to occur, and to CO₂ storage sites.

Requirements in the NEMA relating to financial provision under *Section 24P(7)* (i.e. Minister or MEC discretion to apply the Financial Provision requirements for any activity covered by the Act) could also be used as a
basis to impose an obligation on CO₂ storage site operators to hold such instruments, without amendment.

3. **The MPRDA**, for permitting of exploration activities, *Section 50* relating to ministerial discretion for exploration of the subsurface, would apply to CO₂ storage site prospection activities without amendment.

4. **The NWA** would apply to injection and geological storage of CO₂ in a deep saline formation under *Section 21(g) – disposing of a waste that could detrimentally impact on a water resource*. In such circumstances, CO₂ storage site developers would be required to obtain a *Water Use License*. Other general provision of the Act would apply where water resources may be affected by CO₂ leakage (see *Section 7.2.2* above).

5. **Property law** would provide the basis for allowing access for CO₂ storage site development and use of the subsurface pore space for the purpose of CO₂ storage.

6. Various other regulatory needs for CCS activities will be covered under existing legislation, such as the *Transport of Dangerous Goods Act* and the *Hazardous Substances Regulations* for transport of CO₂ by trucks, whilst an amendment to the *Gas Act* could be used to bring CO₂ pipelines within the ambit of regulations applicable to gas pipelines.

### 9.2.3 Procedural aspects

The following amendments could be necessary to clarify the status of CCS in the statute and achieve full regulatory coverage as described in the previous section:

- **The NEM: WA** – In terms of the broad definitions contained in the NEM: WA, “captured CO₂” utilised for the purposes of CCS is currently regulated under the existing waste regime. However, other aspects of CCS (e.g. CO₂ capture and transport) could potentially be included within a *Listing Notice* to clarify their status as *waste management services* and therefore falling within the ambit of the Act. *Section 19* of the NEM: WA vests power in the Minister to publish activities subject to the NEM: WA i.e. to publish *Listing Notices*. This would serve to eliminate any ambiguity regarding application of waste legislation to CCS.

New guidelines to be developed for CO₂ storage site development, operation, and closure under NEM: WA via *Section 7(1)(c)* of the NEM: WA, which vests power in the Minister to set *norms and standards* for the “storage, treatment and disposal of waste, including planning and operation of the waste treatment and disposal facility”;

- **The NEMA** – a new *Listed Activity* to bring CCS activities within the ambit of the EIA Regulation. *Section 24(2)* and *Section 24D* of the NEMA vests
powers in the Minister or MEC to propose Listed Activities subject to EIAs under the EIA Regulations (see Chapter 5.2.1 above). This may not be necessary depending on whether there is any ambiguity over the status of CCS as a waste management activity included in Schedule 1.B of the NEM: WA.

Under Section 24P(7) of the NEMA, the Minister or MEC would need to notify in writing the requirement for the CO₂ storage site operator to hold a financial provision.

- **Gas Act** - amend the definition of “gas” in the Gas Act to include “captured CO₂” so as to bring CO₂ pipelines within its ambit. This may only be necessary at the current time if CO₂ pipelines can be expected. This will require an amendment to the Gas Act through parliamentary procedures.

Most of these amendments require inter-department consultations within the relevant Ministries, principally the DEA, but also NERSA and other government departments and agencies, to determine the extent to which such amendments may be needed, and the implications for regulatory competence (see also Section 10 below).

### 9.2.4 Potential regulatory gaps

Application of the above option would leave the following gaps:

- Lack of clarity regarding the management of long-term stewardship of the CO₂ storage site;

- no means for compensation for the global damage caused to the atmosphere if CO₂ leaks from transport or storage;

- these requirements may not meet the level of regulatory oversight required under the CCS M&Ps, and therefore the capacity of CCS projects in South Africa to be eligible under the CDM.

### 9.2.5 Advantages and disadvantages

In terms of advantages, the approach would only require very minor modifications to existing Acts, could draw on tested and proven permitting procedures as applied to waste management facilities today, and would make use of existing experience in government for this type of activity.

In terms of disadvantages, it would rely on property law to grant subsurface access rights onto storage site developers, which could delay developments due to lengthy civil law procedures. There could also be some potential unintended consequences of including captured CO₂ as a listed activity within the ambit of the NEM: WA (see Chapter 6.4 above). Also, the lack of clarity regarding long-term stewardship of stored CO₂ is likely to deter potential CCS
investors. The requirements relating to financial provisions under the NEMA, 
Section 24D(7), would require the Minister or MEC to make specific 
obligations on a case-by-case basis, rather than applying systematically.

It is also uncertain at the current time whether the required competencies to 
regulate complex geological matters associated with CO₂ storage reside within 
the Waste Management Directorate of the DEA. Under this option, it would be 
mandated to, inter alia, assess WML applications for CO₂ storage sites, issue 
permits that include relevant operational conditions, and potentially oversee 
operations. To some extent, the requirements for a “full” EIA would mean that 
this responsibility would be shared with the EIA Directorate (see Section 10 
below).

Figure 9.2 summarises the regulatory pathway and amendments required in 
order to implement this option.
Figure 9.2  NEM: WA CCS Regulatory Pathway
9.3 **OPTION 2: NEMA AS BASIS**

9.3.1 **Description**

This option is very similar to Option 1, however, it removes captured CO$_2$ from the ambit of the NEM: WA, and principally relies on the provisions contained in the NEMA and implementing legislation (e.g. the EIA Regulations) to provide regulatory coverage for CCS.

9.3.2 **Substantive aspects**

The differences between Option 2 presented here and Option 1 above are as follows:

1. **The NEM: WA** exclude the application of CO$_2$ by including “captured CO$_2$” and/or “injection and geological storage of CO$_2$” under *Section 4* of the Act, which lists substances/materials to which the Act does not apply (see *Chapter 6.2.1* above). Alternatively, a similar outcome could be achieved by the CCS project developer applying for an exemption under *Sections 74-78* of NEM: WA. However a positive outcome from the exemption application is not guaranteed (see *Chapter 6.2.1* above) and this approach would need to be taken for each and every project proposal on a case-by-case basis.

2. **The NEMA** would provide the principal basis for regulating CO$_2$ capture, transport and storage. Technical aspects relating to site characterisation and risk assessment etc would be covered by provisions in the EIA Regulation relating to *Specialist Reports*, which would provide the basis for an *Environmental Authorisation* as the primary means to permit CO$_2$ storage activities. As for Option 1 above, regulatory coverage for incidental activities would be included. Provisions relating to EIA, SIA, EMIs and also the *duty of care* and *control of emergency incidents* would all apply to a CO$_2$ capture facilities, potentially CO$_2$ transport where an emergency incident was to occur, and CO$_2$ storage sites as part of their *Environmental Authorisation* procedure.

3. Items 3-6 as described in Option 1 would above apply in the same way.

9.3.3 **Procedural aspects**

The following amendments could be necessary to clarify and achieve full regulatory coverage as described in the previous section:

- **The NEM: WA** – amendment of the Act to exclude “injection and geological storage of CO$_2$” from the ambit of the waste regime is likely to be required. Alternatively, it may be possible to achieve a similar outcome through *Section 19(2)(c)* of the NEM: WA, which vests power in the Minister to publish activities that may be *excluded* as waste management...
activities under the NEM: WA. However the outcome of the exemption application is not guaranteed and consultation with the DEA will be necessary to clarify the most suitable approach.

- **The NEMA** – new *Listed Activity* to bring CCS activities within the ambit of the EIA Regulation. *Section 24(2)* and *Section 24D* of the NEMA vests powers in the Minister or MEC to propose *Listed Activities* subject to EIAs under the EIA Regulations (see Chapter 5.2.1 above). Some potential definitions that could be modified to apply in a *Listing Notice* are outlined in Box 5.1 above;

Under *Section 24P(7)* of the NEMA, the Minister or MEC would need to notify in writing the requirement for the CO₂ storage site operator to hold a financial provision;

- **Gas Act** – amendment required as described under Option 1.

Most of these amendments require inter-department consultations within the relevant Ministries, principally the DEA, but also NERSA and other government departments and agencies, to determine the extent to which such amendments may be needed, and the implications for regulatory competence (see also *Section 10* below).

### 9.3.4 Potential regulatory gaps

Application of Option 2 would leave the following gaps:

- Lack of clarity regarding the management of long-term stewardship of the CO₂ storage site;

- no means for compensation for the *global* damage caused to the atmosphere if CO₂ leaks from transport or storage;

- these requirements may not meet the level of regulatory oversight required under the CCS M&Ps, and therefore the capacity of CCS projects in South Africa to be eligible under the CDM.

### 9.3.5 Advantages and disadvantages

In terms of advantages, the Option 2 approach would only require very minor modifications to existing Acts. It could avoid double regulation of CCS activities as would be applied under Option 1 (i.e. via both NEM: WA and NEMA), although this is currently the case for existing waste management activities in South Africa so is unlikely to be a major impediment. Furthermore, it can remove any potential unintended consequences of including “captured CO₂” or “injection and geological storage of CO₂” within the ambit of the NEM: WA (see previous Chapter and also *Chapter 6.4.1* above). It may also provide greater latitude for utilising a wider range of

In terms of disadvantages, Option 2 would rely on property law to grant subsurface access rights onto storage site developers, which could delay developments due to lengthy civil law procedures. It is also a matter for consideration as to whether the supporting information required for applications, such as Specialist Reports, EIAs, SIAs, risk assessment, and the resulting Environmental Authorisations issued under the NEMA, provide for a sufficiently robust regulatory framework for CCS. The requirements relating to financial provisions under the NEMA, Section 24D(7), would require the Minister or MEC to make specific obligations on a case-by-case basis, rather than applying systematically. Further, as for the NEM: WA, the NEMA does not provide any clarity regarding how long-term stewardship of stored CO₂ would be effectively managed in South Africa, affecting potential investment into CCS, as per Option 1 above. An assessment of the competencies of the relevant permitting and enforcement branch for Environmental Authorisations as described previously for Option 1 will need to be made (see Section 10 below).

Figure 9.3 summarises the regulatory pathway and amendments required in order to implement this option.
Figure 9.3  Option 2: NEMA and EIA Regulations regulatory pathway
Option 3: NEMA and MPRDA

9.4 Description

Option 3 would involve a slightly different approach to Options 1 and 2. It builds on the basis of the MPRDA as being the primary piece of legislation regulating subsurface activities in South Africa; an area of regulation that has analogues to CCS, and in particular activities relating to the injection and geological storage of CO₂. In essence, it broadly follows Option 2 by removing CCS from the ambit of the NEM: WA and utilising the existing links (and future links through planned amendments) between the NEMA and MPRDA.

9.4.2 Substantive aspects

The key assumptions underpinning Option 3 are as follows:

1. The NEM: WA would not apply to CCS in the same way as described under Option 2 above. The primary instruments for regulating CCS activities would be the MPRDA and the NEMA.

2. The NEMA is applied as described under Option 2, namely: some technical aspects relating to site characterisation and risk assessment etc would be covered by provisions in the EIA Regulation relating to Specialist Reports, which would provide the basis for an Environmental Authorisation which would be part of the means to permit CO₂ storage activities. As for Option 2 above, regulatory coverage for incidental activities would be included. Provisions relating to EIA, SIA, EMIs and also the duty of care and control of emergency incidents would all apply to a CO₂ capture facilities, potentially CO₂ transport where an emergency incident was to occur, and CO₂ storage sites as part of their Environmental Authorisation procedure.

3. The MPRDA would reinforce the Environmental Authorisation permitting procedures under the NEMA by requiring specific permits to be obtained from the DMR in relation to exploration/prospection (although already covered under Section 50 of the Act) and CO₂ injection (not currently covered in the Act). Provisions relating to access to the subsurface contained in the various parts of the MPRDA could also be conferred onto CO₂ storage operations. The work programme provisions in the MPRDA could potentially be used as a basis for imposing greater technical disclosure obligations on CCS operators compared to the Environmental Authorisation requirements under the NEMA (as outlined in previous Chapter and in Chapter 7.2.1 above). Requirements for Prescribed Closure Plans and site Closure Certificates can also provide a robust basis for regulatory oversight of these activities in relation to a CO₂ storage site, and can facilitate long-term stewardship arrangements for stored CO₂ in a similar way as applied to mines in South Africa. Further, requirements relating to financial provisions could be directly conferred onto CO₂
storage site operators. Regulatory oversight for operations would reside with the DMR under this approach.

4. Items 4-6 as described in Option 1 would above apply in the same way.

9.4.3 Procedural aspects

The following amendments would be necessary to clarify and achieve full regulatory coverage as described in the previous section under Option 3:

- The NEM: WA – amendment of the Act or the issuance of a new *Listed Activity* to remove “captured CO₂” and the “injection and geological storage of CO₂”, as described under Option 2.

- The NEMA – new *Listed Activity* under NEMA to bring CCS activities within the ambit of the EIA Regulation, as described under Option 2.

- The MPRDA – significant amendments including definitions contained in the Act in order that existing terms apply to CCS, where relevant, and new CCS specific aspects would need to be drafted. This would include new substantive parts (e.g. permit application requirements etc) and procedural parts (e.g. permit application process), most likely in a new *Part 3* specific to “injection and geological storage of CO₂”. Procedures for amending MPRDA would need to be followed.

- Gas Act – amendment required as described under Option 1.

Most of these amendments require inter-department consultations within the relevant Ministries, principally the DMR, but also the DEA, PASA, NERSA and other government departments and agencies, to determine the extent to which such amendments may be needed, and the implications for regulatory competence (see also Section 10 below).

9.4.4 Potential regulatory gaps

Application of Option 3 would only leave a gap relating to the means for compensation for the *global* damage caused to the atmosphere if CO₂ leaks during transport and/or storage.

9.4.5 Advantages and disadvantages

The main advantages of Option 3 compared to Options 1 and 2 can be considered to include:

- Provides a clear approach to granting access and property rights for the subsurface user i.e. the CO₂ storage site developer/operator;
• sets down potentially more robust permitting procedures for CO₂ storage site development, with specific technical elements, and draws on existing experience and expertise within the DMR;

• would systematically require CO₂ storage site operators to hold a financial provision, rather than being dealt with on a case-by-case basis as applicable under Options 1 and 2;

• provides greater clarity regarding the management of site closure and long-term stewardship of stored CO₂;

The main disadvantage of Option 3 relates to the current on-going amendment of the MPRDA, which it seems is too far progressed to consider including CCS as described at this stage. As such, it is unlikely that another “window” for modifying the Act will exist within at least the next 5 years. Furthermore, substantial drafting would be required to include CCS within the scope and application of the Act and requiring significant input from various governmental agencies including DoE, DEA and DMR. Other issues include the potential challenges in fitting the technology to the scope and definitions already contained in the Act, and potentially unintended consequences that could arise through modifying these aspects.

*Figure 9.4* summarises the regulatory pathway and amendments required in order to implement this option.
Figure 9.4  Option 3: MPRDA and NEMA regulatory pathway
9.5 OPTION 4: FREE-STANDING CCS ACT

9.5.1 Description

Option 4 would involve something similar to Option 3, but rather than developing substantive text for CCS regulation as a new Part 3 under the MPRDA, a similar outcome can be achieved by way of a new free-standing “CCS Act”. This could be introduced under the NEMA as a new “National Environmental Management: Carbon Dioxide Capture and Storage Act” (“NEM: CCS”).

9.5.2 Substantive aspects

The approach under Option 4 would apply in the following way:

1. The NEM: WA would not apply to CCS following the approach described under Option 2 above. The primary instruments for regulating CCS activities would be a new “CCS Act” and the NEMA.

2. The NEMA is applied as described under Option 2 and 3, namely: some technical aspects relating to site characterisation and risk assessment etc could be covered by provisions in the EIA Regulation relating to Specialist Reports, which would provide the basis for an Environmental Authorisation which would be part of the means to permit CO₂ storage activities. As for Option 2 above, regulatory coverage for incidental activities would be included. Provisions relating to EIA, SIA, EMIs and also the duty of care and control of emergency incidents would all apply to a CO₂ capture facilities, potentially CO₂ transport where an emergency incident was to occur, and CO₂ storage sites as part of their Environmental Authorisation procedure.

3. The NEM: CCS / CCS Regulations would provide a basis for more robust approaches to, inter alia, CO₂ storage site prospection, site development (e.g. work programmes), operation (e.g. permit conditions), closure (e.g. closure plans and permits) and long-term stewardship (applying whatever approach determined suitable by the government). These parts could be drafted drawing heavily on experiences and language under the MPRDA and also informed by CCS legislation existing in the EU, US and Australia.

4. Items 4-6 as described in Option 1 would above apply in the same way.

9.5.3 Procedural aspects

The same procedures described under Options 2 and 3 would apply under Option 4. A new act and/or regulations would need to be drafted following parliamentary procedure.
Clearly this approach will need wide ranging inter-departmental consultations and in order to determine whether such an approach is considered to be broadly appropriate, and to identify the government department and the appropriate Minister or Deputy Minister to sponsor the Bill.

9.5.4 Potential regulatory gaps

The free-standing Act and/or regulations could be used to fill all potential gaps under Option 4. For example, specific provision could be included regarding the global risk, which is the main pervasive gap in Options 1-3 e.g. a requirement to purchase and retire carbon offset in the event of CO2 leakage.

9.5.5 Advantages and disadvantages

The main advantages of Option 4 compared to the Options 1-3 is that it provides unlimited latitude to regulate CCS on whatever basis deemed appropriate by the government. It also means that the text of the Act and/or regulations wouldn’t be potentially restricted to using the existing definitions and the scope for unintended consequences, as described for Option 3, would be eliminated.

The greatest challenge of Option 4 will be the time involved in developing a new draft Bill/Regulations and the parliamentary process to get the Act onto the statute book.

*Figure 9.5 summarises the regulatory pathway and amendments required in order to implement this option.*
Figure 9.5  Option 4: NEM: CCS Act regulatory pathway
All of these options require careful consideration to assess their advantages and disadvantages in further detail following consultation with all government stakeholders involved. The following Chapter provides a high level work plan aimed at guiding discussions to the point where government can make an informed choice about how they wish to regulate CCS in South Africa and the next steps required in order to implement the regulatory framework going forward.
10 IMPLEMENTATION WORK PLAN

10.1 OVERVIEW

The Department of Energy (DoE), the Inter-Departmental Task Team on CCS (IDTT) and the South African Centre for CCS (SACCCS) were consulted on the proposed regulatory framework options discussed in the preceding chapters of this report, including discussions regarding implementation of the framework. The main discussion took place in the format of an IDTT workshop held at the DoE, Pretoria, on 18-19th March 2013, facilitated by the project team of ERM, IMBEWU and Carbon Counts.

It was apparent from the discussion at the Pretoria workshop that the various key stakeholders involved – principally within the IDTT – are not currently in a position to select a preferred regulatory framework option within the timeframe of this project. The main uncertainty which emerged in workshop discussions related to the competencies in the potential departments and directorates across the South African government that may be tasked with regulatory oversight for CCS project development and implementation under the proposed options. The selection of an appropriate option for regulating CCS in South Africa remains open until views have progressed about where the necessary competencies lie within government departments and directorates.

Given the issues associated with deciding which regulatory approach/option to implement, this Chapter provides some suggested immediate next steps and guidance for future activities that could be undertaken to decide on a regulatory approach/option, and to develop and implement the relevant regulation/legislation that may be needed thereunder.

The principal focus is on near-term options to develop an enabling framework for the Pilot CO2 Storage Project (PCSP). This could be undertaken as a “pilot process” to help inform a potential longer-term systematic regulatory approach, i.e. by regulating the PCSP through a learning-by-doing process using minor modifications to existing statutes. Such a pilot approach could help to better inform the South African government on the potential options for a more detailed, long-term systematic approach to regulating CCS in the country. This report has also considered the longer-term systemic options for such a framework.

Therefore, a near-term decision for the South African policy-makers is whether or not to take a “learning-by-doing” approach. In fact, the options outlined in previous sections of the report could actually be considered in the context of a progression from Option 1 or 2 as a pilot test, through to Options 3 or 4 as more systemic approaches for CCS regulation. The possibility of such a progression in the regulatory approach to CCS in South Africa is an aspect that the IDTT should consider during its forthcoming deliberations.
In order for the PCSP to begin in 2017, the permitting regime, oversight capacity within government and liability issues will need to be resolved by the end of 2015. Figure 10.1 provides an overview of the key activities required in order to achieve this, and these aspects are discussed further below. Table 10.1 provides a matrix of suggested activities including objectives, responsible parties, and timing.

**Figure 10.1 Overview of regulatory framework implementation path**

1. **EVALUATE OPTIONS FOR REGULATORY FRAMEWORK**

10.2.1 *Overview*

The four “Options” for the CCS regulatory framework in South Africa need to be considered in greater depth so that the DoE and IDTT can decide which approach to take forward for implementation. There are a number of gaps that need to be addressed and there is a pressing need for further consultation across government departments and potentially other relevant stakeholders (i.e. government agencies, specialist non-governmental organisation and potentially the private sector) in order to get detail on the competencies that exist, the work that needs to be carried out and the associated timelines for implementation.

In the short-term, the DoE and IDTT should undertake steps to:

1. Gain a deeper understanding of the four regulatory options, including, *inter alia*:
   - The scope to which the options could be taken as “pilot” approaches, or as more systemic means for CCS regulation;
   - whether there are benefits from developing CCS regulation through a “learning by doing” approach, using the PCSP as a means to test certain options;
   - the degree of regulatory assurance that could be achieved for safe and secure deployment of CCS in South Africa; and
the government departments to which competencies for authorisations, enforcement and liability could be assigned for each option.

2. Assess competencies within the relevant departments and understand challenges for implementation associated for each option:
   - Consult bilaterally and multilaterally across departments to gain a view on capacities and challenges;
   - take a view on issues of timing with respect to other amendments to existing legislation in progress.

3. Consider options for strengthening institutional capacity and regulatory oversight for CCS technology through e.g. establishing a scientific panel or using existing competencies in government (e.g. Petroleum Agency of SA; PASA).

4. Take a decision on whether an interim pilot approach will be taken first as a ‘learning by doing’ exercise with the full regulatory framework to follow, or, whether the full regulatory framework is preferred to be established from the beginning.

5. Based on the outcomes of steps 1-4, select the most appropriate option for regulating CCS in South Africa over the short- and medium term.

6. Prepare a regulatory impact assessment.

Further consideration of some of the steps highlighted is outlined below.

10.2.2 Internal consultation with officials/ministers in other government departments

During the workshop discussion in Pretoria in March 2013, it was apparent that the departments and directorates that may be required to assess and authorise a CCS project application (e.g. the Waste Directorate in the DEA) have yet to be consulted on their potential role i.e. the DEA member of the IDTT is from the Air Quality Unit. As such, it has not been possible to assess their readiness or otherwise to fulfil this role. Therefore, in order to gather the necessary information to go through the process outlined above, the DoE will need to work with IDTT members to engage with other stakeholders that have an interest in CCS and should be involved in the evaluation of options and development/implementation of the regulatory framework. This should include, as a minimum, relevant policy and legal directorates within the DEA, DMR, Department of Water Affairs (DWA), and the Department of Transport (DoT).

It is recommended that the DoE host bilateral meetings with each department initially and multilateral meetings/workshops as required in order to deal with any issues which arise in advance of the IDTT meeting discussed in the remainder of this chapter.
In order to make an informed decision about which option to choose, all participants in the bilateral meetings and workshops highlighted in the Work Plan in Table 10.1 should be familiar with the contents of this report and be prepared to discuss the answers to the following questions:

- For each option:
  - What are the risks associated with each option?
  - What additional research/analysis is required?
  - What potential unintended consequences could occur?
  - Are we covering all the regulatory needs posed by CCS?
- What legislative revision processes are underway which could facilitate/impede the process?
- Who should be the permitting authority?
- Who should be the regulating authority?
- What capacity/resources are required in order to enable the regulator/permitting authorities to carry out these roles?
- How do we deal with long-term stewardship and liability issues?
- When do we need to choose the direction we want to take?

The results of these meetings/workshops should be written up into a report to support IDTT decision-making.

10.2.3 IDTT meeting to agree a preferred option

A decision on the preferred regulatory framework option and the timeline for implementation should be taken collectively by the IDTT with each member department in the IDTT ratifying the collective decision that is taken. Based on outcomes of the inter-departmental consultations and workshops described above, the IDTT should meet in order to discuss the following:

- To what extent do the options deal with the following requirements?
  - Project permitting/approvals to manage risks (planning phase/authorisations and conditions of operation);
  - Regulatory oversight for inspections, enforced closure and remediation (operational oversight & closure); and
  - Allocate liability (short-, medium- and long-term).
- What is the preferred framework for regulating CCS in South Africa?
- Who are the preferred regulatory and permitting authorities? What capacity building/resources are required in order for this function to be effectively conducted?
- What are the key decision points that need to be reached in relation to the CCS Roadmap?
  - Pilot CO₂ Storage Project by 2017.
  - Demonstration plant by 2020.
  - Commercialisation by 2025.
- Who is responsible for developing the regulation/legislation, in liaison with whom and by when?
• Are there any special instructions for how the regulation/legislation should be developed and/or what it should include (e.g. one page notice relating only to PCSP, formal amendments to Acts, guidance note etc.)?

10.3 **REVISED IMPLEMENTATION WORK PLAN**

The high level implementation plan outlined in the remainder of this Chapter and in *Table 10.1* should be revised in light of the outcomes of the IDTT inter-departmental consultations that will be undertaken as described above. The revised work plan should consider the following:

1. Who is responsible and/or accountable for developing the regulation and ensuring successful implementation?
2. Who needs to be consulted/informed about the process?
3. What are the milestones for implementing the selected regulatory option?
4. When do we need to have concluded each phase in order to meet the schedule in the CCS Roadmap (i.e. PCSP by 2017).

10.4 **DRAFT REGULATION**

Building on the outcome of the IDTT meeting discussed above, the department responsible for regulating CCS under the selected option should begin drafting regulation/legislation/guidance drawing on the information in this report and stakeholder inputs. A draft regulation (or regulatory framework, if it is to be a composite of different pieces of existing legislation) should cover as a minimum, *inter alia*:

1. Purpose and objectives of the regulation.
2. Scope and prohibitions (what it applies to and what is not allowed).
3. Definitions.
4. Storage selection and exploration (requirements, procedures).
5. Storage permits (requirements, procedures).
6. Operation, closure and post closure (requirements, procedures).
7. Liability (transfer, financial security).
8. Procedural matters (competent authority, review of regulation, disclosure, penalties etc.).
9. Schedules (amendments to existing legislation, technical requirements etc.).

The content of the draft regulation should be agreed and approved by the IDTT, its individual member Departments and other relevant stakeholders as necessary and appropriate.

10.5 **REGULATORY IMPACT ASSESSMENT**

A Regulatory Impact Assessment should be conducted in order to understand the impact and cost associated with the draft regulation. This could draw on best-practice from other jurisdictions, such as the EU regulatory impact assessment for the EU CCS Directive and should cover, *inter alia*:

• The steps and procedures undertaken to arrive at the options;
• the procedure used to evaluate the options;
• an assessment of potential negative and/or perverse outcomes;
• an assessment of regulatory simplicity/complexity;
• consideration of regulatory effectiveness; and
• costs of implementation of the selected option.

10.6 \textit{CONSULTATION}

External stakeholders should be consulted on the proposed draft regulation in order to obtain their buy-in to the process and to incorporate their comments and suggestions as appropriate. This can help identify potential practical challenges for implementation, based on first-hand experience of being involved in permitting processes.

10.7 \textit{PROMULGATE LEGISLATION}

The draft regulation should be finalised based on comments received during consultation with external stakeholders. Once finalised and approved by the IDTT and Cabinet, the legislation should be promulgated or guidelines gazetted in order to bring them into force.
Table 10.1  CCS Regulation Implementation Work Plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Objectives</th>
<th>Responsible parties</th>
<th>Timing</th>
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<tbody>
<tr>
<td><strong>Finalisation of Regulatory Choices Report</strong></td>
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<tr>
<td>DoE and IDTT to provide comment on this report prior to finalisation</td>
<td>• Obtain DoE and IDTT approval of the contents of this report and thereby approval of the implementation plan going forward. The report will be finalised based on one round of comments.</td>
<td>All IDTT members</td>
<td>May 2013</td>
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<tr>
<td><strong>Evaluate options for regulatory framework</strong></td>
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<tr>
<td>IDTT to send list of individuals/directorates within their Departments to be involved in bilateral meetings to DoE</td>
<td>• Identify individuals/directorates within government departments that have an interest in CCS and should be involved in the evaluation of options and development/implementation of the regulatory framework</td>
<td>All IDTT members</td>
<td>May 2013</td>
</tr>
<tr>
<td>Bilateral meeting(s) DoE/DEA</td>
<td>Obtain DEA Waste, Environmental Impacts and Legal Directorates views on: • The implications of regulating CCS under Waste/EIA permitting procedures • The implications of including MPRDA closure provisions under NEMA • The capacity within the department to assess applications</td>
<td>DoE to organise meeting(s)</td>
<td>June - July 2013</td>
</tr>
<tr>
<td>Bilateral meeting DoE/DMR</td>
<td>• Obtain DMR views on the implications of regulating CCS under MPRDA in relation to timing of amending legislation and the practical feasibility.</td>
<td>DoE to organise meeting</td>
<td>June - July 2013</td>
</tr>
<tr>
<td>Bilateral meeting DoE/DWA</td>
<td>• Obtain DWA views on the implications of CCS projects on water resources • Understand the capacity within the department to assess applications for water use licences linked to storage in saline aquifers</td>
<td>DoE to organise meeting</td>
<td>June - July 2013</td>
</tr>
<tr>
<td>Bilateral meeting DoE/DoT</td>
<td>• Obtain DoT views on the extent to which the transport of CO2 is covered under existing legislation and the implications for amending definitions in the Gas Act to include CO2</td>
<td>DoE to organise meeting</td>
<td>June - July 2013</td>
</tr>
<tr>
<td>Stakeholder workshop on Long Term Liability involving DoE, SACCCS, IDTT, Departmental representatives with an interest in the topic, potentially external stakeholders and experts</td>
<td>• Discuss/debate the issues in a broader stakeholder forum than IDTT • Establish a list of options for managing long-term liability for stored CO2 in South Africa • Evaluate the options to establish pro’s and con’s • Agree an approach for managing long term liability</td>
<td>DoE to organise meeting</td>
<td>July – August 2013</td>
</tr>
<tr>
<td>Draft report summarising outcomes of internal stakeholder engagement</td>
<td>• Provide supporting materials to the decision-making process through inclusion of departmental positions in relation to each option</td>
<td>DoE</td>
<td>August – September 2013</td>
</tr>
<tr>
<td>Event</td>
<td>Description</td>
<td>Responsible Party</td>
<td>Timeframe</td>
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<tr>
<td><strong>IDTT meeting to evaluate and choose option</strong></td>
<td>• Review the findings of the discussions with internal stakeholders</td>
<td>DoE to organise meeting</td>
<td>October 2013</td>
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<tr>
<td></td>
<td>• Agree the most appropriate option for regulating CCS in SA</td>
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<td>• Agree the implementation plan and schedule</td>
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<tr>
<td><strong>Revise Implementation Work Plan</strong></td>
<td>• Revise work plan to include activities, responsibilities and timing specific to the selected option</td>
<td>DoE</td>
<td>November - December 2013</td>
</tr>
<tr>
<td><strong>Draft Regulation</strong></td>
<td>• Enable implementation of the Pilot CO2 Storage Project by 2017 and where possible other CCS projects in the future</td>
<td>Regulating Authority</td>
<td>November 2013 - June 2014</td>
</tr>
<tr>
<td></td>
<td>• Draft text based on international examples and/or analogous local legislation</td>
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<tr>
<td><strong>Consultation with IDTT and internal stakeholders</strong></td>
<td>• Agree draft text with government stakeholders</td>
<td>Regulating Authority in liaison with DoE and IDTT</td>
<td>November 2013 - June 2014</td>
</tr>
<tr>
<td><strong>Regulatory Impact Assessment</strong></td>
<td>• Establishes a consolidated and defensible basis for the decision-making process</td>
<td>Regulating Authority in liaison with DoE and IDTT</td>
<td>July - September 2014</td>
</tr>
<tr>
<td></td>
<td>• Obtain an in depth understanding of the potential impacts and costs associated with the proposed regulation</td>
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<tr>
<td><strong>Consultation</strong></td>
<td>• Obtain input from external stakeholders on the proposed regulation</td>
<td>Regulating Authority</td>
<td>October 2014 - February 2015</td>
</tr>
<tr>
<td></td>
<td>• Gain support for the proposed process</td>
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<tr>
<td><strong>Finalise draft legislation</strong></td>
<td>• Incorporate external stakeholder comments in revised legislation</td>
<td>Regulating Authority in liaison with DoE and IDTT</td>
<td>March - May 2015</td>
</tr>
<tr>
<td></td>
<td>• Agree final text with government stakeholders</td>
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<tr>
<td><strong>Promulgate CCS legislation</strong></td>
<td>• Promulgate CCS amendments/ legislation</td>
<td>Regulating Authority</td>
<td>June 2015</td>
</tr>
</tbody>
</table>
REFERENCES


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