Review of Regulatory and Institutional Frameworks on Carbon Capture and Storage in Botswana, Mozambique and South Africa

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<table>
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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AEL</td>
<td>Atmospheric emission license</td>
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<tr>
<td>APA</td>
<td>Atmospheric Pollution (Prevention) Act</td>
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<td>AQA</td>
<td>Air Quality Act</td>
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<td>CCS</td>
<td>Carbon capture and storage</td>
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<td>CDM</td>
<td>Clean Development Mechanism</td>
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<td>CMA</td>
<td>Catchment Management Agencies</td>
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<td>COP</td>
<td>Conference of the Parties</td>
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<td>CSLF</td>
<td>Carbon Sequestration Leadership Forum</td>
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<td>EEZ</td>
<td>Exclusive Economic Zone</td>
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<td>EIA</td>
<td>Environmental Impact Assessment Act</td>
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<td>EL</td>
<td>Environmental license</td>
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<td>GHG</td>
<td>Greenhouse gas</td>
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<td>HW</td>
<td>Hazardous Waste</td>
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<td>ICJ</td>
<td>International Court of Justice</td>
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<td>INAMAR</td>
<td>National Marine Institute</td>
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<td>LL</td>
<td>Land Law</td>
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<td>MEC</td>
<td>Member of an Executive Council</td>
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<td>MICOA</td>
<td>Ministry for Coordination for Environmental Action</td>
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<td>MIREM</td>
<td>Ministry of Mineral Resources</td>
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<td>ML</td>
<td>The Mining Law</td>
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<td>MMA</td>
<td>Mines and Minerals Act</td>
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<td>MPRDA</td>
<td>Mineral and Petroleum Resources Development</td>
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<td>NEMA</td>
<td>National Environmental Management Act</td>
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<td>NWA</td>
<td>National Water Act</td>
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<td>OHSA</td>
<td>Occupational Health and Safety Act No. 85 of 1993</td>
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<td>POR</td>
<td>Petroleum Operations Regulations</td>
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<td>REIAP</td>
<td>Regulation on the Environmental Impact Assessment Process</td>
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<td>Acronym</td>
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<tr>
<td>REQSEE</td>
<td>Environmental Quality Standards and Effluent Emissions</td>
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<td>RML</td>
<td>Regulation on the Mining Law</td>
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<tr>
<td>RPPPMCE</td>
<td>Prevention of Pollution and Protection of Marine and Coastal Environment</td>
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<td>RTSHGMA</td>
<td>Regulation on Technical Safety and Health at Geological-Mining Activities</td>
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<td>RWM</td>
<td>Regulation on Waste Management</td>
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<td>SACCCS</td>
<td>South African Centre for Carbon Capture and Storage</td>
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<td>SADC</td>
<td>Simplified Southern African Development Community</td>
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<td>SANS</td>
<td>South African National Standards</td>
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<td>SAPP</td>
<td>Southern African Power Pool</td>
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<td>SBSTA</td>
<td>Subsidiary Body for Scientific and Technological Advice</td>
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<td>SEA</td>
<td>Simplified Environmental Assessment</td>
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<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change, 1992</td>
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<td>WL</td>
<td>The Water Law</td>
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<td>WMA</td>
<td>Waste Management Act</td>
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I. INTRODUCTION

A. An overview

Many countries are dependent on fossil fuels for energy generation. Coal in particular is expected to remain the backbone for the power sector, with its share of the global generation mix increasing to 44 percent by 2030. The energy sector in general and especially power generation are the leading sources of greenhouse gas (GHG) emissions worldwide.

In studies analyzing pathways to achieve the goal of limiting carbon dioxide (CO₂) concentrations in the atmosphere, carbon capture and storage (CCS) can potentially play an important role – either as an interim solution until other options become economically and technologically available, or as a long-term solution. At the same time, there are concerns about the risks associated with CCS and about the overall sustainability of this technology.

The World Bank has recently partnered with a number of international organizations to form alliances and to enter a broad and inclusive CCS knowledge sharing community, which works together to inform industry, government and the public in different countries about CCS. The Bank is a collaborative member of the Global Carbon Capture and Storage Institute (Global CCS Institute) based in Australia, which is positioning itself as the global broker of information relevant to CCS, and supporting knowledge sharing as a tool to facilitate technology diffusion, drive cost reduction, accelerate innovation, and improve public awareness. The Bank also closely collaborates with the United States led Carbon Sequestration Leadership Forum (CSLF), a ministerial-level international climate change initiative whose mission is to further promote the development and deployment of CCS technologies via shared efforts that address key technical, economic, and environmental obstacles.

The Bank is currently undertaking economic and sector work, “Carbon Capture and Storage: Regional Perspective in Developing Countries,” which focuses on two regions that are selected based on 1) their level of reliance on fossil fuels for power generation; 2) regional energy and electricity network interdependency; and 3) potential to establish CCS regional networks linking CO₂ emitting sources and sequestration sites across different countries within the region. The two regions identified for the case studies are the Southern African and the Balkan regions.

As part of the economic and sector work, the Bank conducted a review of existing multilateral, regional, and national legal and regulatory frameworks that are directly or indirectly linked to potential CCS development in the Southern African region, namely in the Republic of Botswana (Botswana), the Republic of Mozambique (Mozambique), and the Republic of South Africa (South Africa), and within the regional electricity network, the Southern African Power Pool (SAPP). The objectives of the present regulatory review are to identify gaps in the existing multilateral, bilateral and national regulatory and legal frameworks in the Southern African region that might prevent the development of cross-boundary

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2 For a recent consideration of international legislative CCS efforts, see International Energy Agency, Carbon Capture and Storage – Legal and Regulatory Review (Edition 1), October 2010, available at: www.iea.org. See also the website of the Carbon Capture Legal Programme of the University College, London, which makes available for download a number of CCS specific legal approaches to be found globally, www.uel.ac.uk/cclp.
3 The Southern African Region includes member countries of the Southern African Development Community, namely Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. All of these, with the exception of the island countries of Madagascar, Mauritius and Seychelles, constitute the Southern African Power Pool (SAPP). An impact from potential CCS deployment and development of regional storage hubs could affect electricity supply to the entire SAPP community.
and national CCS projects where appropriate, and to suggest approaches to address the identified gaps to remove the regulatory and legal barriers to CCS deployment.\(^4\) The analysis focuses on the following eight issues:

1) Classification of CO\(_2\) and its legal definition, including proprietary rights of stored CO\(_2\);
2) Jurisdiction over the control and management of domestic and cross-boundary pipelines and reservoirs (including monitoring, reporting and verification requirements);
3) Proprietary rights to cross-boundary CO\(_2\) capture and storage sites and facilities;
4) Regulatory and/or licensing (permitting) scheme related to the operation and management of storage and transportation facilities;
5) Long-term management and liability issues arising out of accidents or leaks in domestic and cross-boundary CCS projects;
6) Third-party access rights to transportation networks, transit rights and land rights with regard to pipeline routes;
7) Regulatory compliance and enforcement schemes; and
8) Environmental impact (including cumulative impact) assessment process, risk assessment and public consultation;

### B. CCS in Southern African Context

There is no specific CCS legislation either at the regional or national levels in the Southern African region. However, the existing regulatory systems and institutional arrangements in Botswana, Mozambique and South Africa already contain certain elements that may be adapted to address the specific issues that may arise with CCS activities. Newly adopted legal instruments and institutional arrangements also appear to indicate some appetite for the development of CCS specific regulatory frameworks in these three countries. For example, in 2009, Mozambique adopted Resolution N. 10/2009 (Energy Strategy), which specifically promotes the use of efficient techniques for CCS in the domestic industry. CCS has also become visible as a mitigation option for GHGs in South Africa. For instance, the South African Centre for Carbon Capture and Storage (SACCCS)\(^5\) was established in March 2009, and the Centre has been active in facilitating a range of activities that are preparing the groundwork for future national CCS activities.\(^6\) Furthermore, South Africa’s draft National Climate Change Response Green Paper specifically states that the Government would implement “…ambitious research, development and demonstration programmes that result in new, novel and innovative approaches to… carbon capture and storage and the transition to a low-carbon economy” and develop “…a legislative policy and regulatory framework to support carbon capture and storage.”\(^7\)

Given that there are no CCS-specific laws yet in place in any of the three countries analysed, that these countries differ in the extent to which they have incorporated CCS in their national frameworks, and that

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\(^4\) The country specific reviews were conducted by: Chilume & Company (Botswana); Sal & Caldeira Advogados, LDA (Mozambique); and IMBEWU Sustainability Legal Specialists (Pty) Ltd (South Africa).
\(^6\) The SACCCS has defined the following roadmap towards full commercial uptake of CCS in South Africa: (i) measurement of CCS potential (completed in 2004); (ii) Atlas on Geological Storage of Carbon Dioxide in South Africa (released on September 10, 2010); (iii) test injection sequestering at a site still to be identified (2016); (iv) demonstration plant sequestering at a site still to be determined (2020); and (v) full commercial operation sequestering (2025 and beyond).
all of them are still at a nascent stage in the CCS development, this report attempts to provide only a preliminary and high-level review of the relevant legislative, regulatory and institutional regimes applicable to CCS activities. Part II of the report contains analyses of relevant national legislative and institutional frameworks in Botswana, Mozambique, and South Africa, and the analyses are organized by the eight main issues listed above. Part III then reviews the relevant legal instruments at the international, regional, and multilateral levels. Part IV concludes with a number of recommendations that may be adopted to develop an effective regional framework on CCS in the Southern Africa region.

II. NATIONAL LEGAL REGIME APPLICABLE TO CCS ACTIVITIES IN BOTSWANA, MOZAMBIQUE AND SOUTH AFRICA

While none of the three countries analyzed (Botswana, Mozambique, and South Africa) has adopted CCS-specific legislation, these countries all have relevant legislation that may be applicable to some aspects of CCS activities. This section of the report highlights the most relevant legal instruments that may be potentially applicable to CCS activities.

A. The Classification of Carbon Dioxide (CO₂) and its Legal Definition, including Proprietary Rights of Stored CO₂

1. Legal Definition of CO₂

As mentioned above, there is no CCS-specific legislation in Botswana, Mozambique or South Africa, and therefore there is no “legal definition” of CO₂ for the purposes of CCS. However, characterization of CO₂ is an important factor in identifying potentially applicable legislation in the context of future CCS-related activities. While a number of international jurisdictions have promulgated statutes which define CO₂ for the specific purposes of CCS as a commodity or product with commercial value, the analyses of relevant legislation in the three countries revealed that CO₂ would most likely be classified in the existing laws as:

(i) “noxious or offensive gas”; or  
(ii) certain types of “waste”; or  
(iii) “a dangerous good” for the purposes of transport.

In Botswana, for example, under the Atmospheric Pollution (Prevention) Act (APA), CO₂ is not expressly included under the list of “noxious or offensive gases.” However, such gases include “any other gas, fumes or particular matter prescribed as noxious or offensive gas for the purposes of the Act.” The list of gases included as “noxious or offensive” under the Act are mostly produced as a by-product of industrial processes. Therefore, it is possible that CO₂ in the context of CCS purposes may be prescribed as a “noxious or offensive” gas. Furthermore, under the Waste Management Act (WMA), CO₂ may be characterized as a “waste,” which is defined as “undesirable or superfluous by-products, any residue or

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8 Atmospheric Pollution (Prevention) Act, Laws of Botswana, Chapter 65:03.  
9 The “noxious or offensive gases” are defined as “any of the following groups of compounds when in the form of gas, namely hydrocarbons; alcohols, aldehydes, ketones, ethers, esters, phenols, organic acids and their derivatives, halogens, organic nitrogen, organic sulphur, sulphur and halogen compounds, cyanides, cyanogens, ammonia and its compounds, inorganic acids, fumes containing antimony, arsenic, beryllium, chromium, cobalt, copper, lead, manganese, mercury, vanadium or zinc or their derivatives; fumes from tar-works; cement works fumes and odours from purification plants, glue factories, cement works and meat or fish processing factories; and any other gas, fumes or particular matter prescribed as noxious or offensive gas for the purposes of the Act; and includes dust from asbestos treatment or mining” (emphasis added).
gases that can, generally by

10 Although less likely, under the same Act, CO₂ may also be characterized as a “hazardous waste” which is defined as “controlled waste which has the potential even in low concentrations, to have a significant adverse effect on public health or the environment on account of its inherent chemical and physical characteristics, such as toxic, ignitable, corrosive, carcinogenic or other properties.”

In Mozambique, the primary law governing wastes is the Regulation on Waste Management (RWM). The Regulation defines “Hazardous Waste” (HW) as containing risk characteristics due to their flammable, explosive, corrosive, toxic, infectious or radioactive nature, or due to the presence of any other characteristic that poses danger to life or health of humans and other living beings and to the quality of the environment. Characteristics of HWs are duly identified in Annex III to the RWM, which include, among others “substances consisting of compressed gases, liquefied or under pressure. These substances are gases which are hazardous by virtue of being compressed or liquefied, dissolved under pressure or refrigerated.” Based on (i) the definition of HWs cited above, and because CO₂ is known to affect the quality of the environment; and (ii) the fact that CCS involves carbon compression and liquefaction, which could make it potentially dangerous (as per the characteristics discussed in Annex III to the RWM), it is reasonable to conclude CO₂ may be treated as a hazardous waste under the RWM.

Similarly, in South Africa, in the absence of a carbon market, CO₂ may fall in the definition of a “waste.” The National Environmental Management: Waste Management Act 59 of 2008 (NEM: WA) defines “waste” as “any substance”; “that is surplus, unwanted, rejected, discarded, abandoned or disposed of”; “which the generator has no further use of for the purposes of production;” and, “that must be treated or disposed of.” Furthermore, the South African National Standards (SANS) 10228 deals with the identification and classification of dangerous substances and goods for transport, and it classifies CO₂ as a “Class 2 dangerous good” (Division 2.2 of Class 2), which is a gas that is non-flammable and non-toxic and that is also either asphyxiants or are oxidizing.

2. Proprietary Rights over Stored CO₂

The concept of propriety rights or “ownership” of stored CO₂ (CO₂ that has been injected into the subsurface for the purposes of long-term sequestration) has not been specifically provided for in the legislation in any of the three countries. However, relevant legislation includes the regime applicable to the subsurface rights in the minerals and petroleum context. For example, in South Africa, the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) regulates rights with regards to minerals and petroleum and the mining and production (winning) thereof from the Earth. However, in its current formulation, these mining laws are unlikely to be applicable to CO₂ captured from power generation or other processes for the purposes of long-term storage inter alia for the reasons that: (i) such

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10 Waste Management Act, Laws of Botswana, Chapter 65:06, Section 2.
11 Ibid.
12 Decree N.13/2006 of 015 June – Regulation on Waste Management (RWM), Article1, clause (m). Further, the Environmental Law defines “hazardous waste” as substances or objects that are disposed or are intended to be disposed, or are required, by law, to be disposed and which contain risk features given it flammable, explosive, corrosive, toxic, infectious or radioactive nature, or present any other feature that endangers mankind’s or other living beings’ life or health, or environmental quality. ELI, Article 1, clause 23.
15 In terms of SANS 10288, this term means “gases that dilute or replace the oxygen in the atmosphere”.
16 In terms of SANS 10288, this means “gases that can, generally by providing oxygen, cause or contribute to the combustion of other material to a greater extent than air does”.

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substance is not a “mineral” in terms of the laws’ definition thereof;\textsuperscript{17} and, (ii) the injection of such substance into the subsurface does not constitute the “winning of a mineral.”\textsuperscript{18} Similar provisions are also in mining laws of Botswana\textsuperscript{19} and Mozambique,\textsuperscript{20} and are not likely to be applicable in their current form, for the same reasons.

B. Jurisdiction over the Control and Management of Domestic and Cross-boundary Pipelines and Reservoirs (including Monitoring, Reporting and Verification Requirements)

The jurisdiction of pipelines or reservoirs depends upon who holds or owns the rights or interest in land over which such infrastructures are built. The Constitution of all three countries protects the private rights and interest to property and protects property from being acquired compulsorily, except compulsory acquisition with adequate compensation.

In Botswana, land may be held by the State, the local authorities or private parties. The land tenure system\textsuperscript{21} in Botswana comprises of:

- Tribal or customary land at 70%
- State land at 25%
- Freehold land at 5%

Tribal land is governed by and held in trust by the Land Boards (referred to as local authorities) for the communities under the Tribal Land Act. The Land Boards’ functions are to grant rights of use in land, terminate the rights in land, or to do anything relating to tribal land. Under the State Land Act, the State lands may be distributed for a fixed period, and upon expiration of period of validity, such land reverts to the State without compensation to grantee, notwithstanding the improvements thereon. The term of validity can be either 50 or 99 years. These laws would be relevant to CCS if the pipelines or reservoirs are built through or in tribal or state lands.

Furthermore, the Water Act may be relevant to the cross-boundary CCS pipelines. Under this Act, the Water Apportionment Board has the power to create servitudes to build pipelines to transport water from the dams. The Board may negotiate compensation with those where land is acquired compulsorily to build pipelines. The same occurs in tribal areas but through the Water Authorities which are local authorities. Similar arrangement may be adopted for CCS pipelines.

In Mozambique, Decree N. 24/2004 (Petroleum Operations Regulations) (POR) may be relevant for CCS operation. The Decree includes provisions on oil and gas pipeline systems and establishes rules, among others, on:\textsuperscript{22}

\begin{itemize}
\item[\textsuperscript{17}] The definition of “minerals” in the MPRDA is: “any substance, whether in solid, liquid or gaseous form, occurring naturally in or on the earth or in or under water and which was formed by or subjected to a geological process, and includes sand, stone, rock, gravel, clay, soil and any mineral occurring in residue stockpiles or in residue deposits...”
\item[\textsuperscript{18}] This applies unless there is enhanced oil recovery or enhanced coal bed methane recovery.
\item[\textsuperscript{19}] Mines and Minerals Act, Laws of Botswana, Chapter 66:01.
\item[\textsuperscript{21}] National Development Plan, 9.
\item[\textsuperscript{22}] Decree N. 24/2004, of 20 August – Petroleum Operations Regulations, Articles 24,39, 40, 46, 52 through 56.
\end{itemize}
pipeline operator approval: pipeline contract to be approved by the Council of Ministers, and commencement of operations to be authorized by the Ministry who oversees the oil sector;

- insurance: must cover damages to premises, third parties, removal of offscourings and cleaning up following accidents and pollution damages;

- design and construction: must be conducted in accordance with Good Practice on Oil and Gas Pipelines;

- risk analysis: must be conducted in manner that allows identification of risk to persons, environment, including financial interests;

- environmental protection: measures must be adopted to prevent internal and external corrosion, as well as pollution;

- site and route selection: construction in residential zones or with heavy population density must be avoided, and must be done in accordance with the environmental assessment conducted, and pipelines must be installed underground, except if other technical solution is acceptable, and sections on the surface must be protected so as to prevent access by third parties; and

- safety: public safety, environmental protection and worker’s safety must conform to national and international requirements.

Similar provisions may be adopted for CCS pipelines. Furthermore, the RWM may also be relevant, if as discussed above, CO₂ is considered as a “waste” or “hazardous waste” in Mozambique. Under this Regulation, the Ministry for Coordination for Environmental Action (MICOA) has jurisdiction over the control and management of domestic transportation and storage sites of waste. However, it is not clear if the use of pipelines for transportation of wastes would be permitted. The legislation currently focuses on the transportation of waste by mobile equipment (ie. vehicles) only and not by pipelines.

In South Africa, the Gas Act 48 of 2001 may be applicable to CCS pipelines and reservoirs. The Gas Act aims to promote the efficient, effective, sustainable and orderly development and operation of gas transmission, storage, distribution, liquefaction and re-gasification facilities. For purposes of the Act, however, the term “gas” includes hydrocarbon gas and not CO₂ and therefore, the law as currently stands is not applicable to CCS pipelines, if CO₂ is classified as a waste. Another relevant legislation is the law applicable to the transportation of specific types of substances and “wastes” in pipelines, if CO₂ is classified as a waste. Typically, some form of approval or authorisation is required prior to the construction of such pipelines, and relevant administrative authority would impose monitoring and reporting requirements and mechanisms to facilitate verification of legal compliance.

Furthermore, the National Environmental Management Act (NEMA) 23 provides for a general environmental “duty of care,” which places an obligation on any person who causes, has caused or may cause significant pollution or degradation to the environment, to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. The National Environmental Management: Integrated Coastal Management Act (NEM: ICMA) 24 specifically extends this general duty of care to the coastal environment by identifying specific persons who are responsible for complying with this general duty, with one such identified class of persons being “the operator of a pipeline that ends in the coastal zone” 25. Such operator is therefore responsible for ensuring the operation and management of the pipeline is in accordance with the provisions set out in this general duty of care. The National Heritage Resources Act No. 25 of 1999 deals with heritage resources management and stipulates that any person who intends to undertake a development categorised as “the construction of a … pipeline … or other similar form of

linear development or barrier exceeding 300m in length” must, at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

C. Proprietary Rights to Cross-Boundary CCS Sites and Facilities

For the acquisition of a CCS site, the relevant legislation in Botswana relates to land acquisition. Generally, if a project is deemed to be of benefit to Botswana, land can be allocated to the project holders by the responsible Minister. The land so allocated remains state land and the user shall be granted a lease for a defined period (either period of 50 years or 99 years). Such allocation often requires a prior fulfilment of EIA requirements for necessary licences by the various Departments. Please see above for more discussion on various types of land ownership.

In Mozambique, property rights over CCS storage sites and facilities would belong to the owner thereof, and property rights over CO$_2$ itself would also belong to the owner of the facilities, unless otherwise stipulated by law or contract. Specifically, the Civil Code provides that in case of construction of immovable goods (bens imóveis)(hereinafter “works”), the property right belongs to the owner of the works provided that it holds land use rights. The property rights over immovable goods covers the airspace corresponding to the surface, as well as the sub-surface, including the content in the said immovable goods, except if otherwise is provided by law (for example in the case of natural resources). Therefore, based on the Civil Code, it appears that the property rights over CO$_2$ storage sites and facilities would belong to the owner of works. Because the property right would also cover the content in the storage sites or facilities, the property right over CO$_2$ itself would belong to the owner of such infrastructures, unless otherwise is stipulated by law or contract. It is also important to stress that it is unclear whether the areas in which CCS infrastructure is located would be eligible to be classified as “partial protection zones” and thereby better insulated against potential third party claims.

In South Africa, property rights to potential CCS sites and facilities are not clearly defined. However, under the NEM: ICMA, if a CCS project is located in a coastal area, it can be stipulated that the site is held in trust by the State on behalf of the citizens. Furthermore, under the common law principle of cuius est solum, i.e. whoever owns the soil, it is their[s] “up to the heavens and down to hell”, it appears that the owner of the soil should also own the subsoil and the elements comprising the subsoil. This principle has been applied by the South African courts to grant subsurface right to the land owner.

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26 “Development” as defined in the Act means: “any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including: (a) construction, alteration, demolition, removal or change of use of a place or a structure at a place; (b) carrying out any works on or over or under a place; (c) subdivision or consolidation of land comprising, a place, including the structures or airspace of a place; (d) constructing or putting up for display signs or boardings; (e) any change to the natural or existing condition or topography of land; and (f) any removal or destruction of trees, or removal of vegetation or topsoil”.

27 Pipelines are classified as immovable goods.


29 See, e.g., London and SA Exploration Co v Rouliot (1891) 8 SC 75. The court expressed the view that the owner of land owns everything “upwards to the skies and downwards to the centre of the earth”, although these rights are not unlimited and one must exercise these rights with due regard to the corresponding rights of the owners of adjoining land. Ibid, at 90. Similarly, the South African Supreme Court of Appeal (SCA), in Anglo Operation Ltd v Sandhurst Estates (Pty) Ltd & Others (2006) SCA 146 (RSA) held that the owner of the land not only owns the surface of that land but also everything below and above.
D. Regulatory and/or Licensing (Permitting) Schemes related to the Operation and Management of Storage and Transportation Facilities

The Constitution of the Republic of Mozambique stipulates that the State shall adopt policies for the prevention and control of pollution and erosion; integration of environmental objectives in sector-specific policies; and promotion of territorial planning for the purposes of a correct location of activities and balanced social-economic development, among others. Furthermore, the Environmental Law in Mozambique (Law N. 20/97) prohibits pollution or any other form of environmental degradation, including production of any toxic and polluting substances and the storage thereof on the topsoil or release into water or the atmosphere of said substances. \(^{30}\) Similarly, the Constitution of South Africa provides that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. \(^{31}\) NEMA is the principal environmental statute in South Africa, intended to provide a framework for integrating good environmental management into all development activities and to promote co-operative environmental governance with regard to decision-making by organs of state on matters affecting the environment. While the Constitution of Botswana does not specifically refer to environmental protection, Botswana also has relevant laws that aim to protect the environment as do Mozambique and South Africa. This section will divide the discussion by the types of licensing/permitting requirements to protect the environment which are most relevant for CCS.

**License requirements related to waste and hazardous waste management**

In Botswana, under WMA, transboundary movement of waste refers to import and export of waste into or from Botswana or transit of waste in Botswana. As discussed above, the Act defines “waste” as any “substances and any combination thereof which are discarded by any person or are accumulated or stored by any person for the purpose of recycling: a) undesirable or superfluous by-products; b) residue or remainder of any process or activity; or c) any gaseous, liquid or solid matter.” \(^{32}\) If CO\(_2\) is classified as a “waste” under this Act, a waste carrier licence may be required for any such movements of “waste” (CO\(_2\)) in Botswana or for transboundary movements thereof. The Department of Sanitation and Waste Management monitors collection, disposal and treatment of controlled waste by local authorities, industries of waste management and the private sector. Currently, the mode of transportation of waste covered under the Act, however, is restricted to road, rail or air, and the appropriate mode of transportation by pipeline is not covered, nor does the Act provide for transportation by pipes cross borders. WMA also provides for the concept of duty of care relating to a person who produces, carries, treats, keeps or disposes of controlled waste. A person shall ensure that measures are put in place to prevent the escape of waste in his/her control. This concept is also covered under the common law of delict, which is based on the principle of liability for loss caused by failure in the duty of care, whether deliberate or accidental. The provision of duty of care concept is applicable to CCS.

In Mozambique, the primary regulation governing wastes is the RWM. Under this Regulation, as mentioned above, CO\(_2\) is likely be characterized as a “Hazardous Waste” (HW) (Resíduos Perigosos), which contain risk characteristics due to their flammable, explosive, corrosive, toxic, infectious or radioactive nature, or due to the presence of any other characteristic that poses danger to life or health of

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\(^{30}\) Environmental Law defines pollution as the deposition in the environment of substances or wastes, regardless of their form, as emission of light, sound and other forms of energy, in a manner and quantity that affects the environment negatively. EL, Article I, paragraph 21.

\(^{31}\) Constitution, Section 24: Environment.

\(^{32}\) WMA, Section 2.
humans and other living beings and to the quality of the environment. The Regulation provides that the entities engaged in the disposal, recovery or recycling of waste must prove, by risk assessment conducted during the development of waste management plan, the environmental feasibility of the operation of treatment, disposal or recovery, as the case may be. In line with this, the facilities to be used in the operations referred to above are subject to environmental licensing under the Decree N. 45/2004 (Regulation on the Environmental Impact Assessment Process) (REIAP). Also under RWM, waste storage facilities are subject to environmental licensing by MICOA, and storage is defined as “temporary monitored deposition, for an undetermined period, prior to waste treatment, recovery or disposal.” This definition does not seem to fit the purposes of CCS, however, which is understood as definitive disposal without future treatment or recovery, and therefore, it is uncertain as to whether geological storage of CO₂ could be permitted and regulated under this Regulation.

In addition, transport operators and owners of vehicles used to transport hazardous waste must be certified by MICOA for the activity in question. However, note that as similar to the law in Botswana, transportation is defined as “any physical transfer of waste within the national territory,” and the focus of the law is on the movement of waste within the facilities producing such wastes and on movement through mobile means, that is, by vehicles. Furthermore, the prospective operators must prepare a waste management plan to be approved by MICOA. In the specific case of entities which deal with waste disposal, they are required to report to MICOA at the end of every semester by means of a written report. This reporting requirement applies to all entities involved in storage, disposal, recovery or recycling and transportation of waste in case of any accidental leakage.

Regulation on Environmental Quality Standards and Effluent Emissions (REQSEE) in Mozambique prohibits the storage of harmful substances in the soil, which can contribute to its degradation, outside the permitted limits. Additionally, movement of soil without the adoption of appropriate measures for soil conservation is prohibited, if the said activities may contribute to soil degradation. The permitted limits referred to above are established in Annex VI of the REQSEE, which include, among others, parameters for classification, quantification and interpretation of laboratory soil analysis of certain substances. However, no reference to CO₂ is found in Annex VI.

In South Africa, the relevant instrument is NEM: WA. Under this law, as discussed above, it is likely that CO₂ captured for the purposes of CCS would fall within the ambit of the law’s definition of “waste”, inter alia because such CO₂ could be considered to be: “any substance”; “that is surplus, unwanted, rejected, discarded, abandoned or disposed of”; “which the generator has no further use of for the purposes of production;” and, “that must be treated or disposed of.” The Act provides for a general duty of waste management, and the holder of waste must, within all reasonable measures, avoid the generation of waste and where it cannot be avoided, minimize the toxicity and amount of waste generated. The holder must also reduce, re-use, recycle and recover any waste produced and manage the waste in an environmentally sound manner and ensure that no health and nuisance impacts are created. NEM: WA

33 RWM, Article 1, clause (m). Non-Hazardous Wastes (NHS) comprise solid urban waste, for example paper, plastic, glass, metals, organic material, among others. Ibid., Article 6, paragraph 2.
34 REIAP, Article 10, paragraph 1.
35 RWM, Article 4, paragraph 2, clause (b).
36 Ibid., Article 1, clause (b).
37 Ibid., Article 22, paragraph 1.
38 Ibid., Article 1, clause (s).
39 REQSEE, Article 19.
40 In terms of section 1 of NEM: WA, a "holder of waste" means any person who imports, generates, stores, accumulates, transports, processes, treats, or exports waste or disposes of waste.
furthermore places a general duty on persons transporting waste to register with the relevant waste management officer in the relevant Department and furnish all information the waste management officer may require. The person transporting the waste must also take all reasonable measures to ensure that no spillage or littering of waste occurs while transporting such waste. It must be noted, however, that these provisions contemplate transportation of waste by vehicle and therefore may not be applicable in a CCS project utilising pipelines.

Furthermore, on July 3, 2009, the Minister published a list of waste management activities (GN 718), which contemplates two different categories of such activities, namely Category A and Category B. For both Categories, any person who wishes to commence, undertake or conduct a waste management activity must apply for and be issued with an appropriate waste management licence. The effect of these requirements is that waste management licence applications are essentially “aligned” with the NEMA EIA Regulations from a process perspective.

**Licensing requirements related to water pollution**

When CCS storage may affect the quality of underground water, the relevant licensing requirements related to water pollution may be applicable.

In Botswana, the Water Act provides that “no person shall divert, dam, store, abstract, use, or discharge any effluent into, public water or for any such purpose construct any works, except in accordance with a water right granted under this Act.” Such a right may be granted by the Water Apportionment Board, which would specify the quantity, period (whether definite or indefinite), and the purpose for which such a water right is granted. The Act further provides that the following conditions are implied in every water right granted for “industrial purposes or for the generation of power”, among others:

(a) that the water used thereunder:

(i) shall be returned, if reasonably practicable, to the stream or body of water from which it was taken or to such other stream or body of water as may be authorized by the Water Registrar;

(ii) shall, in so far as the use to which it is put allows, be substantially undiminished in quantity; and

(iii) shall not be polluted with any matter derived from such use to such extent as to be likely to cause injury either directly or indirectly to public health, livestock, animal life, fish, crops, orchards or gardens which are irrigated by such water or to any product in the processing of which such water is used;

(b) that precautions shall be taken by the holder of the right to the satisfaction of the Water Registrar to prevent accumulations in any river, stream or water course of silt, sand, gravel, stones, sawdust, refuse, sewage, waste or any other substance likely to affect injuriously the use of such water.

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41 Although the word “transport” has not been defined in NEM: WA, it must be noted that section 25 relating to duties of persons transporting waste, refers to vehicles and it can, therefore, be argued that “transport” in the context of NEM: WA is currently limited to road transport.

42 The listed activities that may be relevant for CCS include the following:

**Category A, activity 2** – “The storage including the temporary storage of hazardous waste at a facility that has the capacity to store in excess of 35m³ of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons” would trigger the requirement for a waste management licence. “Storage” means the accumulation of waste in a manner that does not constitute treatment or disposal of that waste.

**Category B, activity 9** – “The disposal of any quantity of hazardous waste to land” would trigger the requirement of a waste management licence. “Disposal” means the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land.

43 Water Act, Laws of Botswana, Chapter 34:01, Article 9.

Any holder of a water right who contravenes or who fails to comply with any condition implied in a water right in accordance with the provisions above is found guilty of an offence and shall be liable to the penalties prescribed in the Act.\textsuperscript{45} Furthermore, the Waterworks Act specifies that it is an offence for any person that pollutes or causes pollution to water, or allows foul liquid, gas or other noxious matter to enter into the water.\textsuperscript{46}

In Mozambique, REQSEE constitutes the main source of detailed and generally applicable regulations on effluent emissions. The REQSEE requires emission or discharge sites to be approved for environmental licensing, so as to ensure that no alteration of water quality in the receiving water body occurs. Specifically, Annex III of the REQSEE establishes the parameters and limits for discharge of liquid effluents by industries, including thermal power plants, although they do not refer to CO\(_2\). Furthermore, Law N. 16/91 (The Water Law) (WL) governs water use, and its protection and conservation. Under this law, internal and surface waters and their beds, as well as underground water are property of the State and are regarded as public water domain. The public water domain is inalienable and indefeasible and the rights for its use and benefit shall be provided to ensure their preservation and management of national benefit.\textsuperscript{47} In respect of underground water in particular, the WL stipulates that the relevant protection measures may be introduced to protect the solid and liquid parts of aquifers. WL prohibits any “action and the effect of introducing materials, forms of energy or the creation of conditions that directly or indirectly involve an adverse modification of its quality for later use, or in relation to its ecological function”\textsuperscript{48}. In addition, the following actions are prohibited:\textsuperscript{49}

a) making direct or indirect discharges that pollute waters;
b) accumulating solid wastes or other wastes or substances that contaminate or pose risk of contamination;
c) acting on water’s physiological or biological environment to degrade it or create threats of its deterioration; and
d) any activities in the water protection zones which may pose danger of contamination or degradation of the public water domain.

To prevent and control water contamination/degradation, it requires all activities which are likely to cause contamination/degradation of the public water domain, in particular the discharge of wastewater, other wastes or substances into the water, to be licensed by regional water administrations. Such activities shall be subject to standards on effluent quality.\textsuperscript{50}

Similarly, in South Africa, the National Water Act 36 of 1998 (NWA) states that the national Government is the "public trustee" of all of the nation's water resources and therefore has the power to regulate the use, flow and control of all water resources. Accordingly, authorization is required for the uses such as taking water from a water resource; storing water; impeding or diverting the flow of water in a watercourse; discharging waste\textsuperscript{51} or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; disposing of waste in a manner which may detrimentally impact a water resource;

\textsuperscript{45} Ibid., Article 17.
\textsuperscript{46} Waterworks Act, Laws of Botswana, Chapter 34:03.
\textsuperscript{47} WL, Article 1.
\textsuperscript{48} Ibid., Articles 6 and 51.
\textsuperscript{49} Ibid., Articles 52 and 53.
\textsuperscript{50} Ibid., Article 54.
\textsuperscript{51} Waste is defined as “… any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted”.
and altering the bed, banks, course or characteristics of a watercourse. If it is determined that a license is required for a use, a person must apply for a license, and may also be required to undertake an environmental or other assessment, which may be subject to independent review. The Department of Water Affairs may also require notification in the media of the application, with an opportunity for objections to be lodged. The water licences issued under the NWA contain monitoring and reporting obligations.

**Licensing requirements related to air pollution**

To prevent carbon leakage from CCS storage sites, the relevant licensing requirements related to air pollution may be applicable.

In Botswana, the APA aims to prevent pollution of the atmosphere by the operations of industrial processes, which is defined as “a process prescribed by the Minister which is involved in trade, occupation or manufacture devoted to production by physical, mechanical, electrical, chemical or thermal means, including...operations to generate power and ancillary operations.” The Act prohibits a person to carry out an industrial process on any premises which may involve the emission into the atmosphere of an “objectionable matter” without a registration certificate. “Objectionable matter” means smoke, gases (including “noxious or offensive gases”), vapours, fumes, grit, dust or other matter capable of being dispersed or suspended in the atmosphere, produced by an industrial process. Although CO₂ is not included in the definition of “noxious or offensive gases” under the Act, the Minister is empowered to prescribe any gas as noxious or offensive gas at a later date. Industrial process must have the “best practicable means” installed to prevent or reduce to a minimum the escape of the objectionable matter into the atmosphere.

In Mozambique, the REQSEE defines air pollutants (poluentes atmosféricos) as “substances or energy that exert harmful action likely to endanger human health, cause harm to living resources and ecosystems, damage material goods and threaten or impair the recreational value or other legitimate uses of environmental elements”. It further defines air pollution (poluição atmosférica) as “direct or indirect introduction into the atmosphere, by man, of air pollutants”. Annex II of the REQSEE establishes the standards to be observed by industrial facilities, including thermal power plants, with regard to emission of air pollutants. As discussed above for water pollution, similar license would be required for emission of air pollutants.

In South Africa, the relevant legislation is the National Environmental Management: Air Quality Act 39 of 2004 (NEM: AQA). NEM: AQA provides that the Minister must, or the Member of an Executive

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52 NWA, Section 21(a).
53 In issuing a license, the responsible authority must take into account all relevant factors, including: existing lawful water uses; efficient and beneficial use of water in the public interest; the likely effect of the water use to be authorised on the water resource and on other water users; investments already made and to be made by the water user in respect of the water use in question; the strategic importance of the water use to be authorised; the probable duration of any undertaking for which a water use is to be authorised.
54 The phrase “best practicable means” is defined as the provision and efficient maintenance of the appliances necessary to prevent the escape of objectionable matter, and effective care and operation of such appliances, the manner of usage and proper supervision, with regard to prevailing local conditions with extent of technical knowledge and costs to be incurred.
55 REQSEE, Article 1, paragraph 17.
56 Ibid., Article 1, paragraph 18.
57 Ibid., Article 8.
Council (MEC) at the provincial level of government may\(^{58}\), publish a "list of activities" which result in atmospheric emissions and which may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Subject to the transitional provisions contained in section 61 of the Act, a provisional atmospheric emission licence (AEL) is required to undertake the published "listed activities". Certain listed activities (and associated minimum emission standards) were identified and published in GN R248 of March 31, 2010, \(^ {59} \) and included the following activities which may be most relevant for CO\(_2\) generating activities, among others.

- **Category 1: Combustion Installations: Subcategory 1.1:** Solid fuel combustion installations: which are described as “solid fuel (excluding biomass) combustion installations used primarily for steam raising or electricity generation”, the application of which is to “all installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used.”

- **Category 2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass:** Subcategory 2.1: Combustion installations: which are described as “combustion installations not used primarily for steam raising or electricity generation” the application of which is to “all combustion installations (except test or experimental) including catalytic cracking regenerators”.

There are many other CO\(_2\)-generating activities listed in GN R248, the undertaking of which may be subject to conditions in an AEL. In due course, it is conceivable that such conditions might include those relating to CCS. The AEL and EIA processes are interwoven and interdependent and often would result in an aligned outcome. If an application for an AEL is successful, the licensing authority is obligated to first issue a provisional AEL so as to allow the commissioning of the listed activity. This provisional AEL may be subject to conditions and requirements, determined by the licensing authority and those prescribed for such listed activities by the Minister.\(^ {60} \)

**Licensing requirements for activities in coastal areas**

If the CCS activities were to take place in the coastal zone of Mozambique, whether in the form of an activity that potentially causes water pollution or an offshore CO\(_2\) storage, Decree N. 45/2006 (Regulation on the Prevention of Pollution and Protection of Marine and Coastal Environment) (RPPPME) may be relevant. The Regulation establishes the legal regime for the prevention and control of marine pollution by vessels or land-based sources. Under this Regulation, a discharge is defined as “any dumping, leakage, pouring, release or pumping of harmful or hazardous substances in any quantity, from a vessel, port, port infrastructure, duct, rig or its supporting structure.”\(^ {61} \) The Regulation applies to all persons and entities, national or foreign, which carry out activities that are likely to cause negative impact to the environment in the areas which constitute maritime, lacustrine and fluvial public domains.\(^ {62} \) “Maritime public domain” covers interior waters, the territorial sea and the zone and land strip that border marine waters up to 100 meters, measured from the maximum high tide line.\(^ {63} \) It further applies to the discharge by vessels of harmful or hazardous substances in ports, port facilities, emitting facilities along the coast, rigs, and to

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\(^{58}\) There will be a national list of activities for which must be licensed in terms of NEM: AQA and the possibility exists that various province-specific lists will enter provincial statute books.

\(^{59}\) National Environmental Management: Air Quality Act No. 39 of 2004, List of Activities which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage, GN R248 GG 33064 of March 31, 2010.

\(^{60}\) NEM: AQA, Section 42.

\(^{61}\) RPPPME Article 1, paragraph 13.

\(^{62}\) Ibid., Articles 2, and Article 3, paragraph 1.

\(^{63}\) Ibid. Article 1, paragraph 16.
the discharge by other land-based sources in (i) interior waters, including ports and wetlands; (ii) the Mozambican territorial sea; (iii) the Mozambique Channel, when used for international navigation subject to the Convention on Sea Law, to the extent that the Mozambican exercises jurisdiction over the channel; (iv) the exclusive economic zone, in accordance with international law; and (v) the high seas.  

The Regulation further defines pollution by land-based sources as “the pollution of the maritime zone by watercourses from the coast, including the introduction through submarine pipelines or other type of ducts, or through artificial structures located within the national jurisdiction.” It covers: (i) pollutant discharges from land-based sources along the Mozambican coast; (ii) discharges through rivers, channels and other watercourses, including underground waters; and (iii) any other land-based source located in the national territory, through water, the atmosphere or directly. Reference is also made to harmful or hazardous substances, which are defined as “any substance or object which, when discharged or released into the sea, a lake or a river, is capable of causing damage to the health of humans, aquatic ecosystems, or prejudice the use of water.”

For purposes of pollution by land-based sources, a list of harmful or hazardous substances is provided in Annex IV, the discharge of which into underground waters is prohibited, provided that the same are not covered by the REQSEE and the Regulation on Public Water Supply and Sewage Systems. The exception to this prohibition applies in cases of injections into deep, salted and unusable layers, which may be permitted. Additionally, RPPPMCE stipulates that the parameters and limits for discharge of the substances listed in Annex IV must be approved by MICOA. To date, there is no record concerning the adoption of the said parameters and limits. In these regards, the lack of explicit reference to CO₂ in this regulation, including lack of parameters to govern its discharge into water raises uncertainty as to whether or not its injection into the subsurface under water would be permitted under this Regulation.

In South Africa, a recently published CCS Atlas indicates that the Republic’s offshore CO₂ storage capacity amounts to approximately 98% of the total storage capacity and that all of this capacity is located within 240km of the South African shore. If the CCS activity takes place close to a coastal area, the relevant piece of legislation is NEM: ICMA. The aim of this Act is to establish a system of integrated coastal and estuarine management in South Africa, including norms, standards and policies, in order to promote the conservation of the coastal environment, and maintain the natural attributes of coastal landscapes and seascapes, among others. In terms of the Act, the ownership of “coastal public property” vests in the citizens of South Africa and is held in trust by the State on behalf of citizens. The Act regulates “dumping at sea,” which includes “any deliberate disposal into the sea of any waste or material other than operational waste from a vessel, aircraft, platform or other man made structure at sea” and “any storage of any waste or other material on or in the seabed, its subsoil or substrata.” “Sea” includes “the bed, subsoil and substrata beneath those waters, but does not include estuaries.” The injection of CO₂ into an offshore subsurface geological formation is likely covered by this definition.

Furthermore, Section 71 of NEM: ICMA provides that any person, who intends to dump at sea, any waste or other material, must apply to the Minister of DEA for a dumping permit which authorises such

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64 Ibid. Article 3, paragraph 2.
65 Ibid. Article 1, paragraph 39.
66 Ibid.; Article 1, paragraph 45.
67 “Coastal public property” consists of, among others, coastal waters, land submerged by coastal waters, the seashore.
68 NEM: ICMA, Section 11.
dumping. However, CO₂ is not on the list of materials that may, in terms of a dumping permit, be “dumped at sea.” It is worth noting that the dumping provisions found in NEM: ICMA are based on the Dumping at Sea Convention of 1996 (the London Convention), prior to its 2006 amendment, which now provides for the inclusion of CO₂ streams from CO₂ capture processes. If NEM:ICMA is amended to incorporate this 2006 amendment, the “dumping” of CO₂ will be subject to the guidelines set out in Schedule 2 of the Act, which provides for a waste prevention audit, a dump-site selection assessment, assessment of the potential effects, monitoring and potential permit conditions. In addition, in the event that a CCS project seeks to store CO₂ within “coastal public property,” a coastal lease is likely required. In issuing environmental authorization relating to coastal activities, the competent authority must take account of certain specified coastal related concerns, including the likely impact the proposed activity will have on the coastal environment.

**Licensing requirements for workers’ safety**

Potential leakage of CO₂ from the capture, transport and storage processes of a CCS project has possible health and safety risks to persons working within close proximity to where such leak occurs. The IPCC 2005 Report, for example, recognises that a sudden and large release of CO₂ could pose immediate harm to human health and a danger to human life. In Mozambique, the most relevant law for workers’ safety and health is the Decree N. 61/2006 (Regulation on Technical Safety and Health at Geological-Mining Activities) (RTSHGMA). The Regulation defines the measures for ensuring safety and health conditions for mining workers, including the implementation of measures to prevent accidents, and control professional risks and hygiene at workplaces. It applies to recognition, prospecting, mining, and processing of mineral resources. Further, the RTSHGMA contains provisions related to the protection of workers against exposure to CO₂, among other gases. In this regard, the Regulation defines permissible concentrations of both carbon monoxide and dioxide at workplaces which in no event shall be exceeded. In case the permitted concentration levels are exceeded, workers shall be immediately removed from the workplace and corrective measures shall be adopted by the technical director of the concerned company. Mining companies are also required to assess the exposure risk, as well as to provide their workers with protective equipment suitable to the conditions at the workplace. These provisions may be taken as a point of departure for developing safety and health rules for CCS purposes.

In South Africa, the Occupational Health and Safety Act No. 85 of 1993 (OHSA) and the regulations promulgated thereunder are the primary legislation for workers’ health and safety. Under this Act, not only do the employers have a general duty to their employees to provide and maintain a working environment that is safe and without risk but employers also have a general duty to ensure persons other than those in his employment, who may be affected by the employers activities, are not exposed to hazards to their health and safety. An inspector may issue a prohibition notice to an employer where the inspector is of the opinion that an act performed or to be performed is likely to threaten the safety or health of any person. There are no CCS-specific provisions, however.

**Licensing requirements for mining activities**

In Botswana, under the Petroleum (Exploration and Production) Act, an operator must obtain an exploration license to conduct exploration activity for petroleum, and while this Act does not discuss

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69 Ibid., Section 63.
70 Law No. 14 of 2002 (dated June 26, 2002) in its Annex defines “mineral resources” (# 38) as: "any solid, liquid or gas substance formed in the earth's crust by geological or other related phenomena."
71 RTSHGMA, Article 283.
72 Ibid., Article 300.
73 Petroleum (Exploration and Production) Act, Laws of Botswana Chapter 67:01.
CO₂, this law may be relevant to assess the feasibility of CCS activity. In addition, a development license is required beyond the exploration stage. To obtain a license, a program is required for progressive reclamation and rehabilitation of lands disturbed by extraction of petroleum and minimization of the effect of extraction to adjoining land or water area. The holder of licence is required to, among other things: secure safety, health and welfare of persons engaged in operations; control the flow and prevent waste or escape of petroleum gas in the area; prevent the pollution of any water well, spring, stream, river, lake, reservoir by escape of petroleum, salt water, drilling fluid, chemical additive, gas or any other waste product; and treat or dispose of pollution in an environmentally safe manner. Similar obligations will likely be imposed on CCS operators. It is also worth noting that the Mines and Minerals Act (MMA) clearly outlines that the rights of all minerals under the land surface are vested in the State. According to MMA, “mineral resources” includes hydrocarbons (oil and natural gas). Although the MMA does not refer to CO₂ specifically, the act may have implications for CO₂ stored underground.

The Mining Law (ML) governs the terms for the exercise of rights and duties concerning the use and enjoyment of mineral resources in Mozambique. The law essentially covers activities such as recognition, prospecting, mining, processing, sale of mineral products and others related to the aforementioned activities. The ML is complemented by the Regulation on the Mining Law (RML), which establishes the rules for the performance of the activities permitted under ML, in addition to specific requirements, rights and duties of mining titleholders, among others. Neither the ML nor the RML addresses geological storage of CO₂ but some of its provisions may have implications for CCS. For example, a major engineering project which includes pipelines would require a prior consultation with the Ministry of Mineral Resources to determine the existence, in the construction areas, of ore bodies with interest to the national economy. If such an ore is determined to be present, the Council of Ministers may declare that the concerned areas be reserved for purposes of granting of mining titles, specifying which activities are prohibited. Similar arrangement may be possible for CCS. Additionally, note that the State is vested with powers to promote and conduct, through specialized entities, geo-scientific research, continuous geological mapping of the national territory and other mining-geological studies, among others, which may be deemed relevant for purposes of an inventory and assessment of reserves of mineral resources. Although it does not refer expressly to CCS, this research may be relevant for purposes of identifying potential geological storage sites for CO₂.

In South Africa, the relevant piece of legislation is MPRDA, which provides for equitable access to and sustainable development of South Africa’s mineral and petroleum resources. The MPRDA gives effect to the principle that the State is the custodian of South Africa’s mineral resources and has the right to exercise sovereignty over all the mineral resources within the Republic. “Mineral” is defined as “…any substance, whether in solid, liquid or gaseous form, occurring naturally in or on the earth or in or under water and which was formed by or subjected to a geological process, and includes sand, stone, rock, gravel, clay, soil and any mineral occurring in residue stockpiles or in residue deposits, but excludes (a) water….(b) petroleum; or (c) peat.” In light of the findings reported in the South African CCS Atlas, it is assumed that captured CO₂ would not be stored in a mine, a mining area or in a production area, and therefore the provisions of the MPRDA and regulations promulgated under the MPRDA would not likely directly apply to such storage.

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75 RML: Article 106, paragraph 1.
76 ML: Article 42, paragraph 1.
E. Long-term Management and Liability Issues arising out of Incidents or Leaks in Domestic and Cross-boundary CCS projects

1. Statutory Liability (liabilities in terms of legislation)

In Botswana, the Environmental Impact Assessment Act (EIA Act) provides that the person responsible for the negative environmental impact shall rehabilitate the affected environment to its normal function. Furthermore, under the MMA, the holder of a license is obliged to conduct the operations in accordance with good mining industry practice and to preserve the natural environment, minimize and control waste, prevent loss of biological resources and treat pollution or contamination of the environment. An EIA is required as part of the Project Feasibility Study Report, and a holder of a license shall rehabilitate or reclaim the mining area from time to time. The holder is also responsible for the maintenance of top soil during and at the end of mining operations. Where Government carries out restoration on behalf of the holder, he or she shall reimburse the Government any costs incurred. Non-compliance with the provisions of MMA is a criminal offence with penalties.

In Mozambique, Environmental Law requires persons conducting certain activities to meet their liability obligations, which must be covered by appropriate insurance policies against any damages caused. These obligations include the duty to indemnify the injured parties, regardless of fault, for damages to the environment or for causing temporary or definitive interruption of economic activities. It also provides for proactive action by the State, if so required, by means of adoption of necessary measures to prevent, mitigate or eliminate any serious damage to the environment. In such case, the State is entitled to recover, from the person causing the damage, all costs incurred in the adoption of said measures. However, there is no provision for transnational liability, which raises uncertainty as to who is liable in the event of damage resulting from the transboundary movement of hazardous wastes and other wastes and their disposal, including illegal traffic in those wastes.

Similarly, in South Africa, NEMA imposes a duty of care on every person who causes, has caused or may cause significant pollution or environmental degradation to take reasonable measures to prevent such pollution from occurring, continuing or recurring. The Act also requires that, in so far as harm to the environment is authorised by law or cannot reasonably be avoided or stopped, measures should be taken to minimise and rectify such pollution or degradation of the environment. The persons on whom the NEMA imposes an obligation to take “reasonable measures” include an owner of land or premises, a person in control of land or premises, or a person who has the right to use the land or premises on which or in which any activity or process is or was performed or undertaken or any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment. This

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78 ELI, Article 20.
79 In terms of section 1 of NEMA "pollution" means any change in the environment caused by: (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or wellbeing or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
80 The “reasonable measures” may include direct or indirect steps, including the investigation, assessment and evaluation of impacts; awareness raising and training for employees; cessation, modification or control of any activity or process causing pollution or degradation; control of pollution movements or the cause of degradation; the elimination of any source of pollution or degradation; or the remediation of the effects of the pollution or degradation.
broad form of potential liability may be applicable to South African CCS project, particularly in the event of a leak or migration of the stored CO₂.

Moreover, Section 19 of the NWA casts the net of potential liability for water pollution 81 widely in that it places a duty on an owner of land, a person in control of land, or a person who occupies or uses the land on which an activity or process is, or was performed, or any other situation exists which causes, has caused, or is likely to cause pollution of a water resource which includes an aquifer (a potential location for CO₂ storage), to take all reasonable measures to prevent any pollution from occurring, continuing or recurring. If the required measures are not taken, and the person concerned fails to take the measures, or complies inadequately, after being directed to do so, the competent authority is empowered to take such measures considered necessary to remedy the situation itself, and it may recover the costs jointly and severally from the same group of individuals as identified above in NEMA. In addition, the costs of the measures taken by the relevant authority may be recovered from any other person who, in the opinion of the regulatory body, benefited from the clean-up measures undertaken, to the extent of the benefit enjoyed. The costs claimed must be reasonable and may include, without being limited to, labour, administrative and overhead costs.

With respect to “waste” under NEM: WA, it is important to recognise that, contrary to the usually prospective application of legislation, the Act’s sections dealing with contaminated land have retrospective effect. 82 The contaminated land provisions also apply to contamination that originated on land other than the land which becomes contaminated, arises or is likely to arise at a different time from the actual activity that caused the contamination, or arises through an act or activity of a person that results in a change to pre-existing contamination. Land deemed to be contaminated may be declared a so-called "remediation site" by the Minister and a remediation order may be handed to the owner of the land. Upon receipt of such order, the landowner will have to take the necessary steps set out in the order to remediate the land. These contaminated land provisions have far-reaching implications in the event that stored CO₂ leaks into land adjacent to the storage site. Potential contamination of land and the liabilities attached for the remediation of such land are considerations a CCS project needs to undertake during the early stages of development.

2. Control of Emergency Incidents

In terms of emergency incidents, in South Africa, NEMA requires that a responsible person 83 or, where the "incident" 84 occurred in the course of that person's employment, his or her employer must forthwith after knowledge of the incident, report to a range of stipulated organs of state and all persons whose health may be affected by the incident, through the most effective means reasonably available of the nature of the incident; any risks posed by the incident to public health, safety and property; the toxicity of substances or by-products released by the incident; and, any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment. The responsible person (or his or her employer) must also, as soon as reasonably practicable, after knowledge of the incident: take all

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81 In terms of the NWA, "pollution" means "the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it (a) less fit for any beneficial purpose for which it may reasonably be expected to be used; or (b) harmful or potentially harmful: (aa) to the welfare, health or safety of human beings; (bb) to any aquatic or non-aquatic organisms; (cc) to the resource quality; or (dd) to property."

82 NEM: WA section 35 provides that Part 5 of NEM:WA applies to the contamination of land even if the contamination occurred before the commencement of the Act.

83 A "responsible person" includes any person who is responsible for the incident, owns any hazardous substance involved in the incident, or was in control of any hazardous substance involved in the incident at the time of the incident.

84 An "incident" means an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.
reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons; undertake clean-up procedures; remedy the effects of the incident; and assess the immediate and long-term effects of the incident on the environment and public health. It is an offence to fail to comply with the reporting requirements and obligations to address an incident. A person convicted of such an offence is liable on conviction to a fine not exceeding ZAR1 million or to imprisonment for a period not exceeding 1 year (or both such fine and such imprisonment).

Similarly, Section 20 of the NWA deals with pollution of water resources following an emergency incident, such as an accident involving the spilling of a harmful substance that finds, or may find its way into a water resource. The responsibility for remediing the situation and complying with the section rests with the "responsible person", as defined. If there is a failure to act, the relevant Catchment Management Agencies (CMA) may take the necessary steps and recover the costs from every responsible person.

Although not as extensive, the laws in Botswana and Mozambique also provide for protection against emergency incidents. In Botswana, as discussed above, the common law of delict imposes liability for loss caused by failure in the duty of care, whether deliberate or accidental. In Mozambique, RWM requires that all entities involved in storage, disposal, recovery or recycling and transportation of waste to report to MICOA in case of any accidental leakage.

F. Third-party Access Rights to Transportation Networks, Transit Rights and Land Rights with Regard to Pipeline Routes

In Mozambique, Law N. 19/97 (Land Law) ("LL") classifies land as the most important and valuable resource that the country has for its development. In line with this, the LL stipulates that land is a State property and cannot be sold or otherwise alienated, mortgaged or pledged. This means that the land over or underneath which any infrastructure is installed shall always remain State property. As a rule, land in general can be used freely, provided that the corresponding rights of use and benefit of land (direitos de uso e aproveitamento da terra or DUATs) are duly secured with the relevant entity. For the establishment of conductors (such as pipelines), the concerned pipeline owner is entitled to an easement of passage. Such an owner must first secure land use rights by negotiating easements, following which the partial protection zone may be established. This has to be done in a manner such that little or no prejudice is caused to occupied land, and compensation is paid to the land occupants. However, it is unclear whether the areas in which CCS infrastructure is located would be eligible to be classified as "partial protection zones" and thereby insulate it against potential third party claims.

With regard to third party access to pipelines, Law N. 03/2001 (Petroleum Law) provides for the conclusion of contracts for purposes of establishing and operating oil or gas pipelines. It also provides for access to such pipelines by third parties by requiring the holders of pipeline rights to transport,

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85 In terms of the NWA, an "incident" includes any incident or accident in which a substance: (a) pollutes or has the potential to pollute a water resource; or (b) has, or is likely to have, a detrimental effect on a water resource.
86 NWA defines "responsible person" to include any person who (a) is responsible for the incident; (b) owns the substance involved in the incident; or (c) was in control of the substance involved in the incident at the time of the incident.
87 LL, Articles 10 through 13.
88 "Partial protection zones" are, among others, land occupied by facilities and aerial, surface, sub-surface and submarine conductors for electricity, telecommunications, oil, gas, and water projects, with a bordering strip of 50 meters on each side.
89 Civil Code: Article1550, paragraph 1 and Article 1553.
90 Petroleum Law, Article 17, clause (b).
without discrimination and in commercially acceptable terms, oil belonging to third parties, provided that the pipeline system has sufficient capacity and that there are no unsolvable technical problems that may hinder the satisfaction of third parties’ demands. In case the capacity of the pipeline system is not sufficient, the respective holder of rights is required to increase the capacity, provided that it does not cause an adverse effect on the technical integrity or safe operation of the system; and the third parties have secured funds to meet the costs of the increased capacity.

In South Africa, there are three types of land, namely, state-owned/controlled land, communal land and privately owned land, with varying rights attached to each form of tenure. The State may expropriate land in terms of section 25(2) of the Constitution if such expropriation is for a public purpose or in the public interest and compensation has been agreed upon by the parties affected by such expropriation. In the context of a CCS project activity requiring the transport of CO₂ by pipeline and in the absence of the State’s capacity to expropriate land, or a right in land, for the purposes of the construction of, or access to, a pipeline, some form of private agreement is likely to be required between the relevant parties. Therefore, the position of land rights to transportation routes is essentially a matter that would, currently, be regulated by private law in the form of a contractual relationship between the parties themselves.

Furthermore, although the Gas Act and regulations thereunder are not, in their current formulation, applicable to CO₂ transported by pipeline, this Act and regulations make provision for third party access to hydrocarbon pipelines and these provisions may serve as an indicator of the future architecture of regulation of pipelines used in the CCS context in South Africa. In terms of section 33 of the Gas Act, a licensee may “lay and construct pipes for the distribution of gas under or over any such street, and may from time to time repair, alter or remove any pipes so laid or constructed within its licensed area of supply”. However, such licensee will be responsible for restoring the area after undertaking such activities. The Act stipulates that the infrastructure laid by the licensee remains the property of the licensee, and the licensee may remove such infrastructure should he wish. Moreover, the Piped Gas Regulations (GN 321 of 20 April 2007), make provision for third party access to transmission pipelines and to storage facilities. In terms of the transmission pipelines and storage facilities, the Regulations state that the allocation mechanism to ensure third party access to uncommitted capacity must comply with the following principles: 1) use-it-or-lose-it, taking into account diurnal and seasonal load profiles; 2) non-discrimination; 3) defined time periods; and 4) technical feasibility.

While no specific laws were identified in Botswana that regulate such third party access rights, it is likely that a contract law, similar to Mozambique and South Africa, would generally govern such third party access rights.

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91 Ibid., Article 18, paragraph 1.
92 Ibid., Article 18, paragraph 2.
93 State-owned land or public property is land where the State regulates access to and use of such land. The land is managed by the State for the benefit of the Republic.
94 Communal land is defined in the Communal Land Act No. 11 of 2004 which provides that such is as “occupied or used by members of the community subject to the rules, or customs of that community.
95 Privately owned land is where the ownership in the land has been transferred through acquisition, to a private individual, or juristic person, such as a company or a trust, who has rights and obligations in terms of that property. Private property is regulated by private law and centres on the relationship between the legal subject and the object of the right.
97 "Uncommitted Capacity" means such capacity determined by the Gas Regulator in a transmission, storage or distribution facility as is not required to meet contractual obligations.
G. Regulatory Compliance and Enforcement Scheme

In Botswana, under MMA, an authorized officer is provided with inspection powers to ascertain compliance of holders of licences with the requirements of the Act. The officer may inspect the premises or mining operations, ascertain whether there is any nuisance or breach of environmental obligations in the area, premises or operations. Records or books may be examined and samples of soils or specimens of rocks, ore or minerals may be taken for examination. Similarly, under APA and Public Health Act, inspectors are empowered to inspect for pollutants. Furthermore, the EIA Act provides for inspectors to have access to the site in order to evaluate compliance with the Act and the residual environmental impact of the existing activity, the effectiveness of mitigation measures and functioning of monitoring mechanisms. The Act also provides for powers of entry to the site. WMA also provides for the inspection of land from time to time to determine whether the condition or any part of the land is likely to cause pollution to the environment or harm to human, animal or plant life and take such steps as maybe necessary thereto to prevent the pollution or remedy the situation.

Where violations or non-compliance are found as a result of such inspections, the Botswanan laws include the following provisions that may affect the operation of any potential CCS activities. Under the EIA Act, a competent authority may revoke or modify authorization to implement an activity where there has been an unanticipated irreversible adverse environmental impact or a developer fails to comply with any term or conditions subject to which the developer’s authorization was issued. Similarly, WMA permits the state to order the immediate closure of any existing waste management facility on the ground of risk of pollution to the environment and harm to animal or plant life. Under the Water Act, the Water Registrar and all persons authorized by him in writing may, at all reasonable times, enter upon any land and may inspect any works constructed or under construction thereon and may take measures to ascertain the quantity of water abstracted or capable of being abstracted by means of such works or otherwise. “If in the opinion of the Water Registrar any works are so constructed, maintained or used or are being so constructed, as to constitute a danger to life, health or property, he may require any person for the time being enjoying the benefit of those works to carry out such repairs or to effect such additions or modifications to such works or to carry out such demolitions or to change the use of the works in such manner as he may consider necessary and may by notice in writing suspend any water right until he is satisfied that such requirement has been fulfilled and thereupon the right shall cease for the period of the suspension.”

In Mozambique, MICOA is generally responsible for the regular inspection and oversight of monitoring actions and environmental management of the activity subject to an environmental license. On some sector-specific environmental issues, Ministry of Mineral Resources (MIREM) and National Marine Institute (INAMAR) may also intervene. In these regards, these institutions are vested with punitive powers in case of breach of the regulations, under which fines can be imposed on offenders. For instance, MICOA is responsible for enforcing REQSEE, and it is vested with powers to conduct tests, audits, and technical-scientific assessments in order to determine the quality of environment and compliance with the law.

In South Africa, NEMA provides for the appointment of the Environmental Management Inspectors (EMIs) and their powers, including powers relating to the seizure of items, routine inspections, the power to issue compliance notices, and the forfeiture of items. EMIs may issue compliance notices where there is reason to believe that a person has failed to comply with a provision of the law which that inspector is responsible for upholding or has failed to comply with a term or condition of a permit, authorisation or

98 Water Act, Section 28.
99 REIAP, Article 24 and 26.
A person who fails to comply with a compliance notice commits an offence and may be liable to a fine or imprisonment. In the context of coastal areas, NEM: ICMA allows for the Minister to issue a written coastal protection notice should the Minister have reason to believe a person is carrying out, or intends to carry out an activity that is likely to have an adverse effect on the coastal environment. The coastal protection notice may prohibit the activity, if not already prohibited in terms of the Act, and instruct the person to take appropriate steps to protect the environment, to investigate and assess the impact of the activity on the coastal environment and to postpone the activity for a period of time to allow such investigations to be carried out. The Act furthermore allows the Minister to issue a written repair or removal notice to any person responsible for a structure on or within the coastal zone which is likely to have an adverse effect on the coastal environment due to its condition or because it has been abandoned or has been erected, constructed or upgraded in contravention of the Act. Such repair or removal notice may be applicable to a CCS project where such projects have infrastructure within the coastal zone to facilitate the injection and/or storage of the captured CO₂ and the infrastructure complies with the requirements for the written repair or removal notice. Should a person issued with one of the abovementioned compliance notices fail to comply with such notice, the Minister may carry out what is required in the notice and recover the costs reasonably incurred for the carrying out of such required action.

Furthermore, under NEM: AQA, the air quality officer may require any person to submit an atmospheric impact report, should the air quality officer have reasonable grounds to suspect that the person has failed to comply or contravened any provision of the Act or any condition of a licence, and if such failure or contravention may have a detrimental effect on the environment. Similarly, for water use, NWA requires a water use licence to undertake one of the water uses and must comply with the conditions of that authorization. If conditions of the NWA or any authorisation under the NWA are contravened, a responsible authority, by notice in writing may direct that person, or the owner of the property in relation to which the contravention occurs, to take any action specified in the notice to rectify the contravention, within the time specified in the notice or any other longer time allowed by the responsible authority. If the action is not taken within the time specified in the notice, or any longer time allowed, the responsible authority may carry out any works and take any other action necessary to rectify the contravention and recover its reasonable costs from the person on whom the notice was served, or apply to a competent court for appropriate relief. Furthermore, a responsible authority may by notice to any person entitled to use water under the NWA suspend or withdraw the entitlement if the person fails to comply with any condition of the entitlement, to comply with the NWA, or to pay a charge which is payable in terms of Chapter 5 of the NWA. Moreover, no person may “unlawfully and intentionally or negligently commit any act or omission which pollutes or is likely to pollute a water resource” and may not “unlawfully and intentionally or negligently commit any act or omission which detrimentally affects or is likely to affect a water resource”. Any person who contravenes either of these provisions is guilty of an offence and liable, on the first conviction, to a fine or imprisonment for a period not exceeding five years, or to both a fine and imprisonment for a period not exceeding ten years or to both a fine and such imprisonment.
Under NEM: WA, an EMI may require any person to submit a waste impact report if they suspect, on reasonable grounds, that such person has failed to comply or contravened any condition of a waste management licence or exemption and that such failure or contravention is likely to have detrimental effects to the environment, including socio-economic conditions or has already contributed towards the degradation of the environment. Failure to comply with certain provisions of this Act may result in the person being liable of an offence and thereby facing the possibility of imprisonment on conviction of such an offence and a fine.\(^9\)

**H. Environmental Impact (including Cumulative) Assessment Processes, Risk Assessment and Public Consultation**

In Botswana, EIA Act’s scope includes activities "likely" to cause significant adverse effects on the environment or locations that may be environmentally sensitive. Before a licence is issued for an activity prescribed under the EIA Act, the licensing authority shall ensure that an "authorisation" is granted. A preliminary EIA is required as a first step to obtaining such a license. Public participation is in the form of publication through media for period not less than 21 days and upon expiration of 21 days, meetings shall be held with affected communities. If the Department of Environment and Conservation\(^10\) decides that an activity is likely to have a significant adverse environmental impact, an EIA is required and an applicant shall also submit a statement. The EIA shall refer to health, safety or quality of life of people, archaeological, aesthetic, cultural or sanitary conditions of the environment and configuration, quality and diversity of natural resources. The statement shall cover, among others: description of proposed activity and its purpose; outline of alternative sites of proposed activity; description of likely environmental impact on local environment and socio-economic consequences; an environmental management plan; prediction of period of environmental impact; description of mitigating measures to address adverse effects of impact; description of residual environmental impact; a monitoring programme and evaluation exercise; and potential transboundary environmental impact. The statement submitted may be subject to public review, and public comments must be taken into consideration in the decision-making. The Department may refer any technical issues to technical departments and may involve the local authorities in stages of monitoring during and after implementation. The monitoring programme and evaluation report shall be complied with by the developer. The Department may conduct environmental audits biennially. For an activity likely to have significant adverse environmental impact in another country, the Department is compelled to consult the Minister, who shall inform the country about the intended activity through Minister of Foreign Affairs.

A similar EIA law is in place in Mozambique. EL requires an environmental license for any activity which may cause significant environmental impact. Decree N. 45/2004 (Regulation on the Environmental Impact Assessment Process) further provides for classification of activities into categories (A, B and C) by the potential risk of environmental damage they present. The extent and/or type of the environmental assessment is then determined by MICOA.\(^11\) Specifically, category A activities include, among others, the following activities that may be of some relevance to CCS activities: disposal sites for municipal waste with a capacity of more than 500 tons per day; storage, transportation, treatment and disposal of hazardous industrial waste; and installations for disposal and treatment of waste water with sewer capacity for more than 150,000 inhabitants.\(^12\) These activities require an Environmental Impact Assessment (EIA) preceded by the approval, by MICOA, of the corresponding Environmental Pre-Feasibility and Scoping Study and Terms of Reference. The EIA is meant to generate a project-specific environmental license. Category B activities are not listed but are defined in Annex II of REIAP as those

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\(^9\) NEM: WA, Sections 67 and 68.

\(^10\) Currently renamed Department of Environmental Affairs.

\(^11\) REIAP, Article 3, and 10 through 13.

\(^12\) Ibid., Annex I, Clause 4.8.
that generally do not significantly affect human populations or environmentally sensitive areas. The impacts of such activities are of shorter duration, intensity, extent and magnitude and/or significance in comparison with those of Category A. The Category B activities require a Simplified Environmental Assessment (SEA), which is also meant to generate a project-specific environmental license. Category C activities are listed in the Annex III of the REIAP, and the negative impact of such activities is negligible, insignificant, minimal or nonexistent. For those cases, neither EIAs nor SEAs are required, but specific directives on good environmental management must be observed. CCS activities are likely to fall in either category A or B under this Act.

As part of an environmental assessment, an activity proponent must conduct public consultations with all stakeholders directly or indirectly affected by the activity in question. It consists of the provision of information by the former to the latter, as well as collection of opinions and suggestions from them. The consultation process, from the project design phase until the submission of EIAs or SEAs, is of the responsibility of the proponent, while MICOA is responsible for the said consultation from the revision of Terms of Reference until the issuance of environmental licenses. Upon successful completion of environmental assessments and approval thereof by MICOA, it grants the concerned person/entity an environmental license for the activity it intends to carry out.

In South Africa, NEMA is the primary statute regulating the "listed activities", which are the activities that require environmental authorization prior to their being undertaken. Chapter 5 of NEMA deals with integrated environmental management and such prior environmental authorizations, the granting of which requires an EIA of the proposed undertaking of the listed activity. Specifically, section 24 of NEMA requires that an applicant for an environmental authorization to consider, investigate, assess and report the consequences for or impacts on the environment of the listed activity to the relevant competent authority. One requirement that is particularly important is the requirement of public participation.

There are currently three lists of “NEMA listed activities” for which environmental authorization is required prior to their commencement, all of which were published on June 18, 2010 and which came into operation on August 2, 2010. The three lists are contained in the following listing notices:

- **Listing Notice 1**: These Regulations (GN R544) deal with nationally listed activities for which a so-called "basic assessment" impact assessment process is required in order to seek to obtain environmental authorisation. Basic assessment requires a less rigorous environmental evaluation process and is distinguished, terminologically, from the notion of EIA.
- **Listing Notice 2**: These Regulations (GN R545) deal with nationally listed activities for which a scoping report and Environmental Impact Report is required – together with the full EIA process.
- **Listing Notice 3**: These Regulations (GN R546) deal with listed activities for which a "basic assessment" is required only in respect of certain geographical areas only in order to seek to obtain environmental authorisation.

It should also be recognised that the NEMA listed activities change with relative frequency and reference to the listed activities applicable at the commencement of an actual CCS project would be necessary for legal certainty on the question of environmental authorization. Should a person fail to obtain this requisite authorisation or contravene a condition of an authorization, that person has committed an offence in law. A person convicted of such offence is liable of a fine not exceeding ZAR 5 million or a period of imprisonment not exceeding ten years.

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113 Ibid., Article 14, paragraph 2.
114 Previously listed activities were in terms of a 2006 suite of Regulations.
115 In addition to the Listing Notices, Regulations were published (GN R547) and also came into effect on August 2, 2010 that deal with environmental management frameworks in terms of NEMA.
III. KEY INTERNATIONAL, REGIONAL, AND MULTILATERAL LEGAL INSTRUMENTS RELEVANT TO CCS PROJECTS

A. An Overview

In addition to national legal and regulatory frameworks analyzed above, the purview of this report includes the regional and international legal context for CCS and, in particular, the inter-state legal relationships which may exist that are likely to be relevant for CCS activities. Consequently, this part of the report considers the key international, regional, and multilateral legal instruments to which Botswana, Mozambique, and South Africa is a party and which are likely to be relevant to CCS activities.¹¹⁶ The analysis seeks to identify, in respect of each of the instruments considered, the relevance of the instrument for CCS and, where possible, the potential implications of the instrument for CCS projects in the Southern Africa region. This Part is only aimed at indicating the key instruments to be considered in the development of CCS projects in the Southern Africa region, and is not intended to provide a detailed exhaustive review.

By way of background, Botswana, Mozambique and South Africa are members of the Southern African Power Pool (SAPP) and the Southern African Development Community (SADC). South Africa and Mozambique also participate in the Regional Electricity Regulators Association of Southern Africa (RERA), which was established by SADC as a formal association of electricity regulators in July 2002 in terms of the SADC Protocol on Energy (1996), the SADC Energy Cooperation Policy and Strategy (1996), the SADC Energy Sector Action Plan (1997), and the SADC Energy Activity Plan (2000) in pursuit of the broader initiative of the New Partnership for Africa’s Development (NEPAD) and the African Energy Commission (AFREC). The RERA aims to facilitate the harmonization of regulatory policies, legislation, standards and practices and, serves as a platform for effective cooperation among energy regulators within the SADC region.

At this stage, there is no regional and international instrument that is dedicated to CCS related issues. However, certain sectoral agreements and conventions have or may have implications for CCS activities in the Southern African region. In this context, the most relevant sectoral conventions or agreements relate mainly to the following sectors: energy, climate change, marine protection, maritime activities, technology transfer/cooperation, mining, and environmental protection generally.

Specifically, Botswana, Mozambique and South Africa are parties to various international and regional conventions, some of which are discussed below. For various reasons, Botswana is not a signatory to some of the key international instruments related to CCS, such as the London Convention and the UN Convention on the Law of the Sea (1982)(UNCLOS), as noted below. Therefore, discussions in this part of the paper will mainly refer to Mozambique and South Africa.

B. International Framework

1. International Environmental Law Principles

Although the exact legal nature of all international law principles is not yet fully ascertained, the following principles will likely be important when developing the CCS regional regulatory framework in the Southern African region. Many of the principles below have already been incorporated in the domestic policy and regulatory frameworks.

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<th>INTERNATIONAL ENVIRONMENTAL LAW PRINCIPLES POTENTIALLY APPLICABLE TO CCS</th>
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INTERNATIONAL ENVIRONMENTAL LAW PRINCIPLES POTENTIALLY APPLICABLE TO CCS

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<th>PRINCIPLES</th>
<th>POTENTIAL RELEVANCE FOR CCS</th>
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<td>Inter-generational equity</td>
<td>This principle will be important in the assessment of CCS projects in the long term and their associated risks and impacts on the future generations, especially regarding the potential long term environmental risks and leakage risks.</td>
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2. International Treaties

As mentioned above, there is currently no international CCS-specific treaty. However, Botswana, Mozambique, and South Africa are parties to various international treaties which, either mention or may have indirect implications for CCS projects. In particular, recent developments under the United Nations Framework Convention on Climate Change, 1992 (UNFCCC) and the Kyoto Protocol, 1997 may have important implications for CCS. This sub-section will briefly highlight some of these recent developments. Detailed analysis of other international treaties is provided in Section D below.

UNFCCC and the Kyoto Protocol

Although neither UNFCCC nor Kyoto Protocol includes explicit reference to CCS, a proposal to include CCS in the Kyoto Protocol’s Clean Development Mechanism (CDM) has been on the table as early as November 2005. In 2008, the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol adopted Decision 2/CMP.4 to request the CDM Executive Board to assess the implications of the possible inclusion of CCS in geological formations as CDM project activities, taking into account technical, methodological and legal issues. This work culminated in the following two documents:

1) Implications of the Inclusion of Geological Carbon Dioxide Capture and Storage as CDM Project Activities – An Assessment; and
2) Possible Implications of the Inclusion of CCS as CDM Project Activities.  

At COP 16 in Cancun, Mexico, in December 2010, the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol adopted Decision-/CMP.6 “Carbon dioxide capture and storage in geological formations as clean development mechanism project activities”, where the COP/MOP decided that “carbon dioxide capture and storage in geological formations is eligible as project activities under the clean development mechanism,” provided that the following issues are addressed and resolved in a satisfactory manner: non-permanence, including long-term permanence; measuring, reporting and verification; environmental impacts; project activity boundaries; international law; liability; the potential for perverse outcomes; safety; and insurance coverage and compensation for damages caused due to seepage or leakage. Furthermore, the COP/MOP requested the Subsidiary Body for Scientific and Technological Advice (SBSTA), at its thirty-fifth session, to elaborate modalities and procedures for the inclusion of CCS in geological formations as project activities under the CDM, which would address the following issues, among others:

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121 Ibid.
1) The selection of the storage site for CCS in geological formations shall be based on stringent and robust criteria in order to seek to ensure the long-term permanence of the storage of carbon dioxide and the long-term integrity of the storage site;

2) Stringent monitoring plans shall be in place and be applied during and beyond the crediting period in order to reduce the risk to the environmental integrity of CCS in geological formations;

3) The boundaries of CCS in geological formations shall include all above-ground and underground installations and storage sites, as well as all potential sources of CO₂ that can be released into the atmosphere, involved in the capture, treatment, transportation, injection and storage of CO₂;

4) The boundaries referred to above shall be clearly identified;

5) Any release of CO₂ from the abovementioned boundaries must be accounted for in the monitoring plans and the reservoir pressure shall be continuously measured and these data must be independently verifiable;

6) The appropriateness of the development of transboundary CCS project activities in geological formations and their implications shall be addressed;

7) A thorough risk and safety assessment using a methodology specified in the modalities and procedures, as well as a comprehensive socio-environmental impacts assessment, shall be undertaken by independent entity(ies) prior to the deployment of CCS in geological formations;

8) The abovementioned risk and safety assessment shall include, inter alia, the assessment of risk and proposal of mitigation actions related to emissions from injection points, emissions from above-ground and underground installations and reservoirs, seepage, lateral flows, migrating plumes, including CO₂ dissolved in aqueous medium migrating outside the project boundary, massive and catastrophic release of stored CO₂, and impacts on human health and ecosystems, as well as an assessment of the consequences of such a release for the climate.

9) Short-, medium- and long-term liability for potential physical leakage or seepage of stored CO₂, potential induced seismicity or geological instability or any other potential damage to the environment, property or public health attributable to the CDM project activity during and beyond the crediting period; and

10) Adequate provisions for restoration of damaged ecosystems and full compensation for affected communities in the event of release of CO₂ from the deployment of CCS in geological formations must be established prior to any deployment of related activities.

This Decision will have critical implications for CCS projects, not only regarding their potential inclusion in the CDM but also regarding specific conditions for their being undertaken. Botswana, Mozambique and South Africa are all Non-Annex I Parties to the UNFCCC and the Parties to the Kyoto Protocol.

C. Regional Framework

1. Regional treaties

There are several regional treaties that may be applicable for CCS activities. One type of such treaty is related to marine protection, including:

1) Convention for the Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, 1981 (Abidjan Convention) (South Africa is a Contracting Party but not Botswana and Mozambique); and

These Conventions aim to coordinate the efforts of the countries of the region to plan and develop programs to protect and manage the marine and coastal areas. The Convention may be relevant especially if offshore CCS activities are contemplated.

Furthermore, in terms of the transport of waste, the Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa, 1991 could have implications for CCS projects in Africa involving the import of CO₂ into Africa from non-contracting Parties to the Convention. However, this Convention would be applicable only if CO₂ is characterized as “hazardous waste” under the Convention. Of the three countries, only Mozambique has ratified the Bamako Convention. South Africa has not ratified this Convention because the Convention may potentially create a trade in waste and South Africa is concerned about such potential trade.

2. SADC Agreements/Protocols

SADC has no protocol / agreement dealing specifically with CCS, although the following protocols could potentially be relevant, to some extent, for CCS activities:


3. SAPP - Guidelines/Agreements

SAPP has not developed any specific guidelines or agreements related to CCS.¹²²

D. Analysis of the Eight Key Issues

1. The Classification of Carbon Dioxide (CO₂) and its Legal Definition, including Proprietary Rights of Stored CO₂

There are no international or regional agreements relevant to CCS projects in Southern Africa that provide guidance on this issue. However, international environmental law, dealing largely with waste related activities, has indirectly addressed the question of the classification of CO₂. For example, some scholars have argued that under the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972) (The London Convention),¹²³ “CO₂ derived from fossil fuels … [may be] considered an industrial waste, although no consensus has been reached on this issue amongst the various

¹²² The SAPP has developed documentation for a number of environmental issues, including: Environmental and Social Impact Assessment Guidelines For Transmission infrastructure for the SAPP Region; SAPP Occupational Health & Safety Environmental Guideline; Guidelines for Environmental Impact Assessment (EIA) for Thermal Power Plants; SAPP Position on Climatic Change; SAPP Guidelines on the Management of Oil Spills; and Guidelines for Environmental and Social Impact Assessments for Hydro Projects in SAPP Region. However, CCS is not among them.

¹²³ Of the three countries, only South Africa is party to the Convention.
international signatories to the Convention."

On November 3, 2006, the Contracting Parties to the 1996 Protocol of the London Convention adopted an amendment which allows for CO₂ storage in sub-seabed formations. Specifically, it provides that “carbon dioxide streams from carbon dioxide capture processes for sequestration” can be stored if they meet three criteria: (1) disposal is into a sub-seabed geological formation; (2) the carbon dioxide stream is of high purity containing only incidental amounts of associated substances; and (3) no wastes or other matter are added for the purpose of disposing of those wastes or other matter.

Other international conventions that may be relevant for this issue include the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. All three countries (Botswana, Mozambique and South Africa) are parties to the Convention. However, it has been argued that CO₂ is probably not a "hazardous substance" for the purposes of the Basel Convention. Furthermore, some scholars have argued that a storage of CO₂ may be qualified as “industrial storage or enhanced resource recovery projects” under marine treaties. However, such an interpretation is not yet universal and will have to be undertaken on a case by case basis and according to each international and regional legal instrument and its associated definitions.

With respect to propriety rights over stored CO₂, no international or regional treaties agreements in Southern Africa provide guidance on this issue. It is envisaged that this matter will likely be addressed by national law and, if necessary, in an appropriate bilateral or multilateral agreement.

2. Jurisdiction over the Control and Management of Cross-boundary Pipelines and Reservoirs (including Monitoring, Reporting and Verification Requirements)

For offshore projects, the provisions of UNCLOS, the London Convention and its 1996 protocol will also likely apply. In terms of UNCLOS, the ocean is divided into zones, namely: the territorial sea, the exclusive economic zone (EEZ), the continental shelf and the high seas. Accordingly, States’ rights, responsibilities and jurisdiction with respect to a CCS activity will depend on the location of the project. In essence, coastal States have jurisdiction over their territorial sea, EEZ and continental shelf, and may therefore prescribe additional regulations within these areas or prohibit CO₂ ‘dumping’ altogether. Note, however, that there is some uncertainty about the rights of coastal States in relation to disposal of CO₂ via pipeline into the EEZ or continental shelf since UNCLOS is silent on this issue. With regards to the high seas, CO₂ disposal is a freedom which may be exercised by all States provided that they have due regard to the interests of other States and the requirements of international law. Surveying, siting, monitoring and construction of gas pipelines (national, international, offshore or inland) will mostly be regulated by wider international environmental treaties relating to environmental protection including marine pollution and conservation, and habitat and species conservation. Regional marine conventions might also have some implications.

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125 Of the three countries, only South Africa is party to the Protocol.
126 See, Solomon, et al.
128 See, e.g. Article 21, UNCLOS, describing the rights of Costal States to adopt certain types of laws and regulations.
3. Proprietary Rights to Cross-boundary CCS Sites and Facilities

In dealing with this issue in the international law context, the determination to be made is whether the state has sovereign and exclusive rights to use the sub-surface for CO₂ injection purposes. For offshore projects, this issue is mainly regulated by UNCLOS. According to this Convention, it has been argued that a country has sovereign rights to use underground aquifers and reservoirs on the continental shelf and in the EEZ for injection of CO₂ for both depositing purposes and enhanced oil recovery.¹³¹ However, for oil and gas reservoirs including aquifers in the continental shelf which are shared with neighbouring countries, it has been argued that a country cannot unilaterally decide to use such reservoirs and aquifers for CO₂ injection without an agreement among the parties and such approach might also apply to inland reservoirs.¹³²

In terms of onshore projects, there are currently no international or regional treaties which address the property rights issues relating to CCS sites and facilities. The question of proprietary rights to cross-boundary CCS sites and facilities is, therefore, likely to be required to be addressed on a case by case basis, taking into consideration the national property laws of each country concerned. It is also recommended that if the storage site is located between different countries or is to be used by different countries, an agreement between the countries should address and clarify this issue. No such agreement currently exists in the Southern African region.

4. Regulatory and/or Licensing (permitting) Schemes related to the Operation and Management of Storage and Transportation Facilities

There are no international or regional instruments that provide for a licensing scheme. However, the London Convention may be relevant to offshore CCS operations, as well as its 1996 Protocol. As discussed above, some scholars have argued that under the London Convention, “CO₂ derived from fossil fuels … [may be] considered an industrial waste, although no consensus has been reached on this issue amongst the various international signatories to the Convention.”¹³¹ The 1996 Protocol of the London Convention further adopted an amendment which allows for CO₂ storage in sub-seabed formations. Specifically, it provides that “carbon dioxide streams from carbon dioxide capture processes for sequestration” can be stored if they meet three criteria: (1) disposal is into a sub-seabed geological formation; (2) the carbon dioxide stream is of high purity containing only incidental amounts of associated substances; and (3) no wastes or other matter are added for the purpose of disposing of those wastes or other matter.

5. Long-term Management and Liability Issues arising out of Incidents or Leaks in Cross-boundary CCS Projects

There are no international or regional conventions or agreements which directly addresses this issue. Therefore, international customary law, including some of the general international principles listed above, is likely to be the main source of international law to address transboundary pollution issues arising from CCS activities.¹³³ For example, most international and regional conventions require states to take adequate steps to control and regulate sources of serious global environmental pollution or transboundary harm within their territory or subject to their jurisdiction. International law prescribes a general obligation (duty of care) to prevent harm.¹³⁴

¹³² Ibid.
¹³³ International customary laws are used in this report to mean general practices accepted as law and recognized among States as obligatory. See, Ian Brownlie, Principles of Public International Law (6th Ed.)(2003).
¹³⁴ Birnie and Boyle, page 108.
It has been argued that long-term liability issues require urgent regulation at a national and international level. Generally-speaking, there are three types of liability issues which are relevant for long-term CCS projects, namely: environmental, in situ, and trans-national liability. In the event of any CO₂ leakage or migration to the atmosphere, in situ or trans-national responsibility must be assigned to a particular party in order to address any harm caused to the global climate, health and environmental damage to the air, soil, water, and overall ecosystem. Currently, such assignment would occur in terms of applicable international law and, depending on the location of the CCS project and the environmental media impacted, international customary law is also likely to be a course of specific obligations.

6. Third-party Access Rights to Transportation Networks, Transit Rights and Land Rights with Regard to Pipeline Routes

In this context, the provisions of UNCLOS, London Convention and its 1996 Protocol, relevant environmental treaties and customary international law will likely be applicable as well as any provisions of an international pipeline agreement concluded for a specific CCS project.

7. Regulatory Compliance and Enforcement Scheme

Currently no international instrument addresses this issue. Each treaty and instrument will contain its own compliance and enforcement mechanisms. Moreover, the location of the CCS project will determine the relevant enforcement and compliance entities (national and international).

8. Environmental Impact (including Cumulative) Assessment Processes, Risk Assessment and Public Consultation

Environmental assessment and EIA are advocated by many international and regional environmental conventions. In terms of customary law, there is also a general international obligation for states to ensure that activities within their jurisdiction and control respect the environment of other states or of areas beyond national control. However, such international obligations tend to be generic and vague in nature. In 2010, the International Court of Justice (ICJ) rendered its judgment in a dispute between Argentina and Uruguay concerning Uruguay’s authorization for pulp mills on the banks of the Uruguay River, which forms the international boundary between the two countries. The ICJ recognized environmental impact assessment as a practice that has become an obligation of general international law. However, national legislation will be primarily responsible for prescribing such requirements, and specific bi-lateral or multi-lateral cooperation may need to take place if the proposed CCS project may have impacts on neighbouring countries. Specific agreements should be concluded between neighbouring countries, if applicable.

Marine and fresh waters international and regional conventions also contain requirements in this context and most of their provisions need to be incorporated into national legislation to be fully effective and operational, and binding on private operators.

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136 Ibid.
137 Ibid.
IV. KEY FINDINGS AND RECOMMENDATIONS

This section provides a summary of key findings on the eight issues analyzed, and recommendations for the adoption of national/regional regulatory frameworks that may be applicable to CCS activities. The recommendations are based on a high level analysis of relevant laws in the three countries, and it must be noted that laws in this field are continually evolving at the national, regional and international levels. Therefore, the analyses of laws and the recommendations should be considered accurate as at the date of this report, and the proponents of CCS interventions are advised to revisit the assumptions and conclusions included herein at the time of the interventions.

A. Key Findings and Recommendations at the Domestic Level

Part II of this report analyzed a number of domestic legislations that are or may be relevant to CCS in Botswana, Mozambique and South Africa. While none of the countries has adopted a CCS-specific legal instrument, all three countries appear to have the basic elements that touch on certain aspects of the eight issues. The table below summarizes the key findings for each of the three countries and sets forth recommendations that may be adopted at the domestic level necessary for an effective regional framework on CCS.

<table>
<thead>
<tr>
<th>8 Key Issues</th>
<th>Botswana</th>
<th>Mozambique</th>
<th>South Africa</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Classification of CO₂</td>
<td>Possibly regarded as “hazardous waste” (Regulation on Waste Management)</td>
<td>- Potentially classified as a “waste” (NEM: WA) - Class 2 dangerous good (division 2.2), which is a gas that is non-flammable, non-toxic and is either an asphyxiant or oxidizing (SANS 10228)</td>
<td>Applicable legal instrument to specifically define CO₂ in the context of CCS activities</td>
<td></td>
</tr>
<tr>
<td>Jurisdiction over the pipelines &amp; reservoirs</td>
<td>Petroleum Operations Regulations include provisions on oil and gas pipeline systems and establishes rules generally governing the operation of such pipeline systems</td>
<td>- Gas Act regulates gas transmission, storage, distribution, liquefaction and re-gasification facilities for specified gases - General duty of care (NEMA) and NEM: ICMA extends this duty of care to the coastal environment. - National Heritage Resources Act stipulates that any person who intends to undertake a development categorised as “the construction of a … pipeline” must notify the responsible heritage resources authority</td>
<td>Clearly specify the jurisdiction, role and responsibilities of relevant players for the authorization and operation of CCS pipelines and reservoirs</td>
<td></td>
</tr>
<tr>
<td>Proprietary rights to CO₂ CCS sites and facilities</td>
<td>Property rights over CCS storage sites and facilities would belong to the owner of works. Because the property right would also cover the content in the storage sites or facilities, the property right over CO₂ itself would belong to the owner of the pipeline as well, unless otherwise is stipulated by law or contract.</td>
<td>- Coastal public property vests in the citizens of the Republic, held in trust by the State on behalf of the citizens (NEM: ICMA) - Owner of the soil is also owner of the subsoil and the elements comprising the subsoil (common law)</td>
<td>The proprietary rights to the land on which the sites/facilities are built must be clearly defined in the relevant legal instrument.</td>
<td></td>
</tr>
<tr>
<td>4) Regulatory</td>
<td>- WMA regulates the transboundary</td>
<td>- NEM: WA regulates wastes and places a CCS-specific standards should be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schemes Related to Management and Transportation Facilities</td>
<td>Movement of waste as well as duty of care relating to a person who produces, carries, treats, keeps or disposes of controlled waste. - Water Act requires water right to divert, dam, store, abstract, use or discharge any effluent into public water from such source. - Waterworks Act specifies that it is an offence for any person that pollutes or causes pollution to water, or allows foul liquid, gas or other noxious matter to enter into the water. - APA aims to prevent air pollution. - Petroleum (Exploration and Production) Act requires licenses for specific activities.</td>
<td>As well as its disposal, recovery, recycling, and transport and requires relevant licenses for conducting such activities. - REQSEE prohibits the storage of harmful substances in the soil; requires emission or discharge sites to be approved for environmental licensing to prevent water pollution; and regulates air pollutants. - RPPPMCE establishes the legal regime for the prevention and control of marine pollution. - RTSHGMA contains provisions related to the protection of workers against exposure to CO₂. - ML and RML regulates mining activities and licenses.</td>
<td>General duty of care on persons transporting waste. - GN 718 lists waste management activities that require a waste management license. - NWA lists the water uses for which authorization is required. - NEM: AQA provides for the establishment of ambient air quality standards. AEL is required to carry on &quot;listed activities&quot;. - In the event that the CO₂ is stored within the coastal public property a coastal lease will be required. (NEM: ICMA) - The OHSA imposes health and safety obligations. - MPRDA governs mining activities.</td>
<td>Developed, and existing laws may be adapted to apply specifically to CCS activities to prevent potential environmental pollution and degradation.</td>
</tr>
</tbody>
</table>

| 5) Long-term Management and Liabilities | - EIA Act requires a responsible person for the negative environmental impact to rehabilitate the environment affected. - MMA requires the holder of a license to rehabilitate or reclaim the mining area from time to time. - Common law of delict applies in case of accidental leaks. | ELI provides for general environmental liability, and establishes the duty to indemnify the injured parties, regardless of fault, for damages to the environment or for causing temporary or definitive interruption of economic activities. It also provides for the State to act proactively to clean up environmental damage for the account of the person that caused it and later recover the costs so spent. | NEMA imposes a duty of care. In terms of emergency incidents, NEMA requires that a responsible person or, where the "incident" occurred in the course of that person's employment, his or her employer must forthwith after knowledge of the incident, report to a range of stipulated organs of state and all persons whose health may be affected by the incident. - NWA places a duty on an owner of land, a person in control of land, or a person who occupies or uses the land on which an activity or process is, or was performed, or any other situation exists which causes, has caused, or is likely to cause pollution of a water resources, to take all reasonable measures to prevent any pollution from occurring, continuing or recurring. - NEM: WA applies to the contamination of land even if the contamination occurred retrospectively before the commencement of the Act. | Further clarify the liabilities/responsibilities in emergency situations/accidental releases. Clearly spell out whether the liability provisions would apply retrospectively. |

| 6) 3rd Party Access Rights | Contract laws would most likely generally apply and govern third party access rights. - LL requires land use rights by means of easements to build a pipeline, although it is not clear whether a partial protection zone could be established to insulate it against potential third party claims. - Petroleum Law allows third party access to oil, gas and refined fuel pipelines. | Although not currently applicable to CCS, a third party may have access to hydrocarbon pipelines and these provisions may serve as a guide to the future regulation in the context of CCS projects (Gas Act). - Piped Gas Regulations make provision for third party access to transmission pipelines and to storage facilities. | Extend the application of relevant laws to the CCS context. Clearly define the extent to which third parties may have access to the CCS infrastructures. |
7) Regulatory compliance and enforcement scheme
- Appointment of an inspector (MMA, APA, Public Health Act, EIA Act, WMA)
  - The competent authority may revoke or modify authorisation to implement an activity where there has been an unanticipated irreversible adverse environmental impact or a developer fails to comply with any term or conditions subject to which the developer’s authorization was issued (EIA Act).
  - Under WMA, the state can order the immediate closure of any existing Waste Management Facility on the ground of risk of pollution to the environment or harm to human animal or plant life.
- Regulatory compliance and enforcement schemes are mainly ensured by MICOA, and where necessary, by MIREM and INAMAR in coordination with the former. The main tools used for this are the audits and inspections these entities are responsible for carrying out, in addition to punitive powers provided by law.
- NEMA establishes EMIs and their powers, including powers relating to the seizure of items, routine inspections, the power to issue compliance notices, and the forfeiture of items.
- NEMA: ICMA allows for the Minister to issue a written coastal protection notice, should the Minister have reason to believe a person is carrying out, or intends to carry out an activity that is likely to have an adverse affect on the coastal environment.
- A responsible authority may by notice to any person entitled to use water under the NWA suspend or withdraw the entitlement if the person fails to comply with any condition of the entitlement, to comply with the NWA, or to pay a charge which is payable.
- NEMA: WA may require any person to submit a waste impact report if an EMI suspects that such person has failed to comply or contravened any condition of a waste management licence.
- Compliance would be easier to monitor and enforce if requirements for monitoring and reporting are clearly defined for CCS activities.
- Existing auditing/inspection powers must be extended to CCS activities.
- Punitive measures must be clearly defined in the event of violation of provisions governing CCS activities.

8) Environmental impact assessment
EIA Act regulates any “activity” that is likely to cause a significant adverse effects on the environment. Involvement of public with affected communities is critical.
As a rule, all activities posing potential risk to the environment are subject to environmental licensing. The licensing process is preceded by assessment risk (in the form of plans and reports) and public consultation with stakeholders, following which a license may be granted or refused.
NEMA requires that an applicant for an environmental authorisation to undertake a listed activity must consider, investigate, assess and report the consequences for or impacts on the environment of the listed activity (or specified activity) to the relevant competent authority. Public participation is an important requirement.
Clearly define what type of environmental assessment must be carried out for CCS activities.

B. Key Findings and Recommendations at the Regional and International Levels

Part III of the report focused on some of the relevant international and regional agreements potentially applicable for CCS activities. The table below highlights the main findings for the eight issues (analyzing from the regional and international perspectives) and lists recommendations at the regional and international levels. The recommendations can be summarized as follows:

1) There needs to be a platform for countries in the Southern African region to discuss and agree on multilateral/regional treaties for important CCS related issues such as compliance, enforcement and disputes resolution mechanisms.

2) As to the transboundary movement of CO\textsubscript{2} for disposal, multilateral/regional agreements are needed on how operations can be conducted based on an agreement among the countries concerned.
3) In terms of property rights, there might be a need for a specific multilateral agreement to address the propriety rights over various segments of cross-boundary transportation. Each agreement/treaty should provide sufficient compliance, enforcement and disputes resolution mechanisms.

4) At the operational level, the following issues must be taken into consideration and addressed by a regional and international regulatory framework for CCS activities:

a) The selection of CO2 storage site in geological formations shall be based on robust criteria in order to seek to ensure the long-term permanence of the storage and the long-term integrity of the storage site;

b) Stringent monitoring plans should be in place in order to reduce the risk to the environmental integrity of CCS in geological formations;

c) A framework should provide for a thorough risk and safety assessment as well as a comprehensive socio-environmental impacts assessment, prior to the deployment of CCS in geological formations; and

d) A framework should adequately and clearly address the following issues related to liability:

   (i) A means of redress for communities, private-sector entities and individuals affected by the release of stored CO2 from CCS project activities;

   (ii) Provisions to allocate liability among entities that share the same reservoir, including if disagreements arise;

   (iii) Possible transfer of liability; and

   (iv) Long-term liability needs to be specifically addressed, including (i) CO2 migration to areas where it was not originally injected, which may result in public health, environmental or ecosystem damage; (ii) to transnational liability, to be determined specifically by means of intergovernmental agreement among the countries concerned; and (iii) applicable corrective measures in case of leakage.

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138 There is a possible role for the Africa Institute for the Environmentally Sound Management of Hazardous and Other Wastes.
139 See COP 16/ CMP.6 Decision.
140 Ibid.
141 Ibid.
142 Ibid.
<table>
<thead>
<tr>
<th>8 Key Issues</th>
<th>Existing international instruments/recommendations</th>
<th>Existing regional instruments/recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Classification of CO₂ and its legal definition, including proprietary rights of stored CO₂;</td>
<td>UNCLOS, The London Convention and its 1996 Protocol, Basel Convention</td>
<td>Recommendation: Recommend clearly defining CO₂ in regional agreements, including waste related conventions/agreements, as appropriate</td>
</tr>
<tr>
<td>2) Jurisdiction over the control and management of domestic and cross-boundary pipelines and reservoirs (including monitoring, reporting and verification requirements);</td>
<td>Inland projects: - International customary law Offshore projects: - UNCLOS - London Convention and its 1996 Protocol</td>
<td>Offshore projects: Possibly Nairobi and Abidjan Conventions Recommendation: Recommend pipeline agreements for each project</td>
</tr>
<tr>
<td>3) Proprietary rights to cross-boundary CO₂ CCS sites and facilities</td>
<td>Inland projects: - International customary law Offshore projects: UNCLOS</td>
<td>Recommendation Recommend specific agreement between concerned countries, if applicable</td>
</tr>
<tr>
<td>4) The regulatory and/or licensing (permitting) scheme related to the operation and management of storage and transportation facilities</td>
<td>Offshore projects: London Convention and its 1996 Protocol</td>
<td>Recommendation Recommend agreement to include provision ensuring compliance with national regulatory/licensing requirement</td>
</tr>
<tr>
<td>5) Long-term management and liability issues arising out of incidents or leaks in domestic and cross-boundary CCS projects;</td>
<td>- International customary law</td>
<td>Recommendation Recommend specific agreement between concerned parties/countries, if applicable</td>
</tr>
<tr>
<td>7) Regulatory compliance and enforcement scheme</td>
<td>Recommendation For each agreement/treaty, respective compliance, enforcement and disputes resolution mechanisms must be detailed</td>
<td>Recommendation For each agreement/treaty, respective compliance, enforcement and disputes resolution mechanisms must be detailed</td>
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