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World Bank CCS Program activities in South Africa – Results and lessons learned

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Abstract

The World Bank Group (WB) Carbon Capture and Storage Trust Fund (CCS TF) was established in 2009 to support CO_2 capture and storage (CCS) capacity and knowledge building in developing countries[†]. This support is intended to create opportunities for the WB partner countries to explore their CCS potential and, if appropriate, to facilitate the inclusion of CCS options into their low-CO_2 growth strategies and policies. Nine countries were selected in Phase 1 of the CCS TF support including South Africa.

CCS TF Phase 1 support for CCS in South Africa included an allocation of US$ 1.35 million and had the objective of supporting the Government of South Africa by undertaking three specific studies:

1. The development of a regulatory framework for CCS in South Africa
2. A techno-economic review of CCS implementation in South Africa
3. The development of a national and local public engagement plan for the South African Pilot CO_2 Storage Project

The South African Department of Energy (DoE) and the South African National Energy Development Institute (SANEDI) were the beneficiaries and counterparts for these WB supported CCS studies. The *South Africa CCS Roadmap*, developed by SANEDI and released in 2010, defined several milestones to understand and develop the

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† The WB CCSTF donors include the governments of the United Kingdom and Norway, and the Global Carbon Capture and Storage Institute

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potential for CCS in South Africa. The implementation of the Pilot Carbon Storage Project (PCSP) is planned as the next milestone in the Roadmap to be completed between 2017 and 2021. The PCSP scope includes the transport, geological storage and monitoring of between 10,000 and 50,000tCO_2, sourced from an industrial facility.

The WB selected the Environmental Resources Management Southern Africa (ERM) as the lead consultant for the legal and regulatory assessment, undertaken in association with Carbon Counts and IMBEWU Sustainability Legal Specialists. The aim of the legal and regulatory assessment study was to review the existing legislation and regulation in South Africa to identify gaps and barriers for the authorisation and regulation of the PCSP with the view to informing the development of a CCS regulatory framework. The ERM consortium worked closely with the South African DoE and the Inter-Departmental CCS Task Team (IDTT), which was established in 2011 to inform, coordinate and promote the development of CCS in South Africa. The study recommended the following four options for regulating CCS in South Africa, using the existing regulations or a new regulatory framework:

1. The National Environmental Management: Waste Act (NEM: Waste Act).
2. The National Environmental Management Act (NEMA)
3. The NEMA and the Mineral Petroleum Resource Development Act (MPRDA).
4. The development of stand- alone legislation, specifically for the purposes of regulating CCS.

The aim of the second study was to develop a detailed technical and economic analysis for large-scale development and deployment of CCS across South Africa's industrial installations by 2050. The WB lead consultant for the technical and economic analysis study, Parsons Brinckerhoff, reviewed and recorded CO_2 sources and CO_2 storage locations (as identified in the *Atlas on Geological Storage of CO_2 in South Africa*) and conducted the subsequent analysis of how these sources and sink can be connected in the most cost effective way under varying roll-out scenarios. The analysis found that large-scale CCS could be deployed in South Africa at a levelized average cost of ZAR 422 per metric ton of CO_2 across all industrial sectors. The study found that the capital up-front costs of this large-scale deployment were significant but could be mitigated by taking a phased approach to CO_2 capture deployment.

The aim of the public engagement study was to develop a comprehensive plan for raising public awareness, informing and engaging with various public stakeholders in South Africa, both at the national and local levels, on the CCS technology deployment and respective management of potential risk. The public engagement took into account international best practice as well as South African specific considerations. Specific aspects, addressed the study, included:

- Raising awareness of CCS as a possible climate change mitigation measure;
- Helping to develop an understanding of key concepts in the CCS technology, subsurface storage and key issues;
- Outlining the benefits and potential risks of demonstration and deployment of the CCS technology in South Africa; and
- Placing CCS in the context of South African climate change mitigation, energy production and use, coal use, resource development, job creation, amongst others.

The WB selected SRK Consulting South Africa as the lead consultant for the study, in association with Finley-Greenberg, and the World Resources Institute (WRI), prepared National and Local Stakeholder Engagement Plans, which recommended that stakeholder engagement commence at the national level with government officials before proceeding in turn to the provincial, district municipal, and local municipal levels.

Following the conclusion of these studies a number of lessons were learned with regard to: the involvement of relevant stakeholders in the scoping and delivery of studies; and, how results are communicated to maximise the impact of the work.

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Keywords: World Bank; CCS; capacity building; developing countries; South Africa

1. Introduction

The World Bank Carbon Capture and Storage Trust Fund (CCS TF) was established in 2009 to support CO_2 capture and storage (CCS) capacity and knowledge building in developing countries. This support is intended to create opportunities for these countries to explore their CCS potential and, if appropriate, to facilitate the inclusion of CCS options into their low-CO_2 growth strategies and policies. Nine countries were selected in Phase 1 of the CCS TF support including South Africa.

CCS TF Phase 1 support for CCS in South Africa included an allocation of USD 1.35 million and had the objective of supporting the Government of South Africa by undertaking three specific studies:

1. The development of a regulatory framework for CCS in South Africa
2. A techno-economic review of CCS implementation in South Africa
3. The development of a national and local public engagement plan for the South African Pilot CO_2 Storage Project

The South African Department of Energy (DoE), the South African National Energy Development Institute (SANEDI) and the South African Centre for Carbon Capture and Storage (SACCCS) were the beneficiaries and counterparts for these World Bank supported CCS studies. The South Africa CCS Roadmap, released in 2010, defined several milestones to prove and achieve the deployment of the CCS technology (if/when proven) in industrial sectors of South Africa's economy. The implementation of the Pilot Carbon Storage Project (PCSP) is planned as the next milestone in the Roadmap to be completed between 2017 and 2021. The PCSP scope includes the transport, geological storage and monitoring of between 10,000 and 50,000tCO_2, sourced from industrial facilities.

2. Results

2.1. The development of a regulatory framework for CCS

The WB selected Environmental Resources Management Southern Africa (ERM) as the lead consultant for the legal and regulatory assessment, undertaken in association with Carbon Counts and IMBEWU Sustainability Legal Specialists. This summary of results is based on the final report of the study – *Development of a regulatory framework for carbon capture and storage in South Africa*: *Analysis of regulatory choices*. The aim of the legal and regulatory assessment study was to review the existing legislation and regulation in South Africa to identify gaps and barriers for the authorisation and regulation of the PCSP with the view to informing the development of a CCS regulatory framework. The ERM consortium worked closely with the South African DoE and the Inter-Departmental CCS Task Team (IDTT) which was established in 2011 to inform, coordinate and promote the development of CCS in South Africa.

The study commenced with a review of the existing legal framework in South Africa with a particular focus on:

- The National Environmental Management Act No.107 of 1998 (NEMA)
- The NEMA Environmental Impact Assessment (EIA) Regulations (GN R543) 2010
- The National Environmental Management: Waste Act No.59 of 2008 (NEM: Waste Act).
- The Mineral Petroleum Resource Development Act No.28 of 2002 (MPRDA)
- The National Water Act No.36 of 1998 (NWA)

The review of these, and other Acts, focussed on an assessment of their effectiveness in regulating CCS activities. The review found that general provisions in the existing legal framework address many of the requirements of a CCS project. The review also identified areas where provisions were in place for activities analogous to elements of the CCS process which could be applied to CCS or could be used as a basis for developing a CCS specific framework.

The key findings of the review can be found in Table 1.

Table 1: CCS coverage of existing legislation in South Africa

	NEMA & EIA Regulations	NEM:WA	MPRDA	NWA
1. Project permitting/approvals to manage risks				
a. Access and storage rights	✗	✗	P	✗
b. Project assessment				
- Prospecting	P	✗	✓	✗
- Site Selection and Characterisation	P	P	P	✗
c. Project approval				
- Technical review/permitting	✓	✓	P	P
- Risk assessment	✓	✓	P	P
- Environmental Impact Assessment/Environmental, Social,	✓	✓	P	✗
Health Impact Assessment	✓	✓	P	P
d. Project operation				
- Capture	✓	✗	✗	✗
- Injection	✓	✓	P	✓
- Storage	✓	✓	P	✓
- Monitoring and reporting	✓	✓	P	✓
- Occupational health and safety	P	✗	✗	✗
- Civil protection	✓	✓	✗	P
- Disclosure/communications	✓	✓	P	P
e. Project closure				
- Decommissioning standards and procedures	P	✓	P	✗
2. Regulatory oversight for inspections, enforced closure and remediation				
a. Site inspections	✓	✓	P	P
b. Intervention to mitigate potentially hazardous effects	✓	✓	✗	✓
c. Terminate operations where they pose a risk	✓	✓	P	✓
d. Undertake remediation work and recover costs	✓	✓	✗	✓
3. Allocation of liability (short-, medium-, and long-term)				
a. Leakage and permanence				
- Local	✓	✓	P	P
- Global	✗	✗	✗	✗
b. Means of redress and compensation	✓	P	✗	P
c. Long-term stewardship of the storage site and liability	P	P	P	✗
d. Financial provision(s)	✓	P	P	✗

✓ *Currently applies or would apply with minor amendment*
P *Partially applies to regulatory need or applies to analogous activities that could be conferred on to CCS with major modifications or via new CCS-specific regulation*
✗ *Does not cover the issue*

The review also considered compliance with applicable international law and guidelines such as the London Convention and Protocol and the Clean Development Mechanism CCS Modalities and Procedures (CDM-CCS M&Ps). It was also noted that the proposed CO_2 Tax Legislation that is under development and ongoing revisions to the MPRDA could also influence any approach to regulating CCS in South Africa.

Based on the review of the existing legal and regulatory environment in South Africa, four options were presented as potential legal frameworks for CCS in South Africa in no specific order – NEM:WA; NEMA; NEMA and MPRDA; or, a New Free-Standing CCS Act.

2.1.1. Option 1: NEM:WA

Option 1 is the closest option to the *status quo*, requiring only minor amendments to existing regulatory processes to cover CCS activities. The first option uses the NEM: WA as the primary legislation for CO_2 capture, transport and storage, based on the classification of "captured CO_2" as a *hazardous waste* and the "injection and storage of CO_2" as *disposal of waste on land*. Under this option, regulation of CCS would largely be done through the *Waste Management Licensing* provisions of the Act, however additional environmental and permitting authorizations would still be required including through: NEMA; the MPRDA; the National Water Act (NWA); and through property law.

Procedurally, Option 1 would require a new *Listing Notice* under the NEM:WA to clarify the status of CO_2 capture and transport as a *waste management service*. New guidelines would also be required for CO_2 storage site development, operation and closure. CCS would also need to be added as a new *Listed Activity* under NEMA to bring it within the scope of the EIA provisions. An amendment to the *Gas Act* definitions of a "gas" would be required for the development of CO_2 pipelines.

The advantages of the NEM:WA approach is that only minor amendments to existing legislation would be required. The disadvantages are however that it would have some potential regulatory gaps with regard to long-term stewardship, compensation for *global* impacts of CO_2 leakage (i.e. climate change), and the regulatory oversight may not meet the requirements of the CDM-CCS M&Ps. Also, the Waste Management Directorate under the Department of Environmental Affairs may not have the required competencies to regulate CCS activities.

2.1.2. Option 2: NEMA

Option 2 principally relies on the provisions of NEMA, and implementing legislation such as EIA regulations, for the regulation of CO_2 capture, transport and storage and would explicitly remove "captured CO_2" and "injection and storage of CO_2" from the ambit of the NEM:WA. As with Option 1, additional environmental and permitting authorizations would be required including through: the MPRDA; the NWA; and through property law.

Procedurally, Option 2 would require an amendment to the NEM:WA to explicitly remove "captured CO_2" and "injection and storage of CO_2" from the scope of the Act. Similarly to Option 1, CCS would then need to be added as a new *Listed Activity* under NEMA to bring it within the scope of the EIA provisions and an amendment would need to be made to the *Gas Act* definitions of a "gas" for the development of CO_2 pipelines.

The advantages of using NEMA as the primary legislating approach are that only minor amendments are required to existing legislation and that some minor duplication of regulation that occurs in Option 1 would be avoided. It may also allow for greater application of government expertise in the regulation of CCS, rather than depending solely on the Waste Management Directorate as seen in Option 1. The disadvantages of Option 2 are similar to Option 1, in that it would have some potential regulatory gaps with regard to long-term stewardship, compensation for *global* impacts of CO_2 leakage, and meeting the requirements of the CDM-CCS M&Ps. There may also be some regulatory competency gaps however they are likely to be less severe than in Option 1.

2.1.3. Option 3: NEMA and MPRDA

Option 3 uses the MPRDA as the primary legislation for CCS in South Africa. The MPRDA is currently the primary piece of legislation in the country regulating subsurface activities such as oil and gas exploration, development and production which are analogous to CO_2 injection and storage activities. NEMA would then be used as the major supporting regulation, covering CO_2 capture and many environmental authorizations. Additional environmental and permitting authorizations would again be required through the NWA and property law.

Procedurally, CCS would need to be excluded from the coverage of the NEM:WA and included as a *Listed Activity* in the NEMA and in the definitions of the Gas Act, as was the case in Option 2. Option 3 however would also require significant amendments of the MPRDA itself, including modifying definitions to include CCS related terms. More importantly, new substantive parts, such as permit application requirements, and procedural parts, such as permitting application processes, would need to be added to the Act to address CCS, likely as a whole new section.

Using the MPRDA as the primary legislating approach would have the major advantage of providing greater regulatory oversite of CCS activities, providing a clear approach for granting access and property rights to the project, providing a more robust permitting procedures, requiring CO_2 storage site operators to hold financial provisions during operation, and providing greater clarity on site closure processes and the long-term stewardship of the stored CO_2. The only gap remaining in Option 3 would be compensation for *global* impacts of CO_2 leakage. The Department of Mineral Resources, the department responsible for the MPRDA, also has competencies that are very closely aligned to those required for regulating CCS. A significant disadvantage of this approach, however, is the fact it would require significant modification of the MPRDA. The Act has recently undergone a comprehensive review and amendment process which means it is unlikely that the appetite would exist to commence a new process of amendment anytime in the near future.

2.1.4. Option 4: New Free-Standing CCS Act

Option 4 would involve the development of new “CCS Act”, either as a stand-alone Act or as a new Act under NEMA (e.g. “*National Environmental Management: Carbon Dioxide Capture and Storage Act*”). Similarly to Option 3, such an Act would likely still rely on NEMA for much of the environmental authorizations as well as on the NWA and property law for other specific elements of the permitting process.

Procedurally, the same amendments would need to be made to the NEM:WA, NEMA and to the Gas Act, as was the case in Option 2 and 3. Unlike the previous options however, Option 4 would require a new Act and/or regulations to be developed and approved following national parliamentary procedures. The development of a CCS Act could draw heavily on the MPRDA language and approaches and on the CCS legislation that has been established elsewhere in the world.

The major advantage of Option 4 is that the government can regulate CCS in any way it sees fit, without any of the constraints imposed by working within existing legislation. The disadvantage is however that the development of a new Act is a major undertaking and can take some time to navigate the parliamentary process.

To progress the regulation of CCS in South Africa, the government need to consult all the relevant departments on the four approaches proposed and decide on which approach to pursue. As of the time of writing, consideration of the four approaches is ongoing by the South African Government with no option yet selected.

2.2. A techno-economic review of CCS implementation

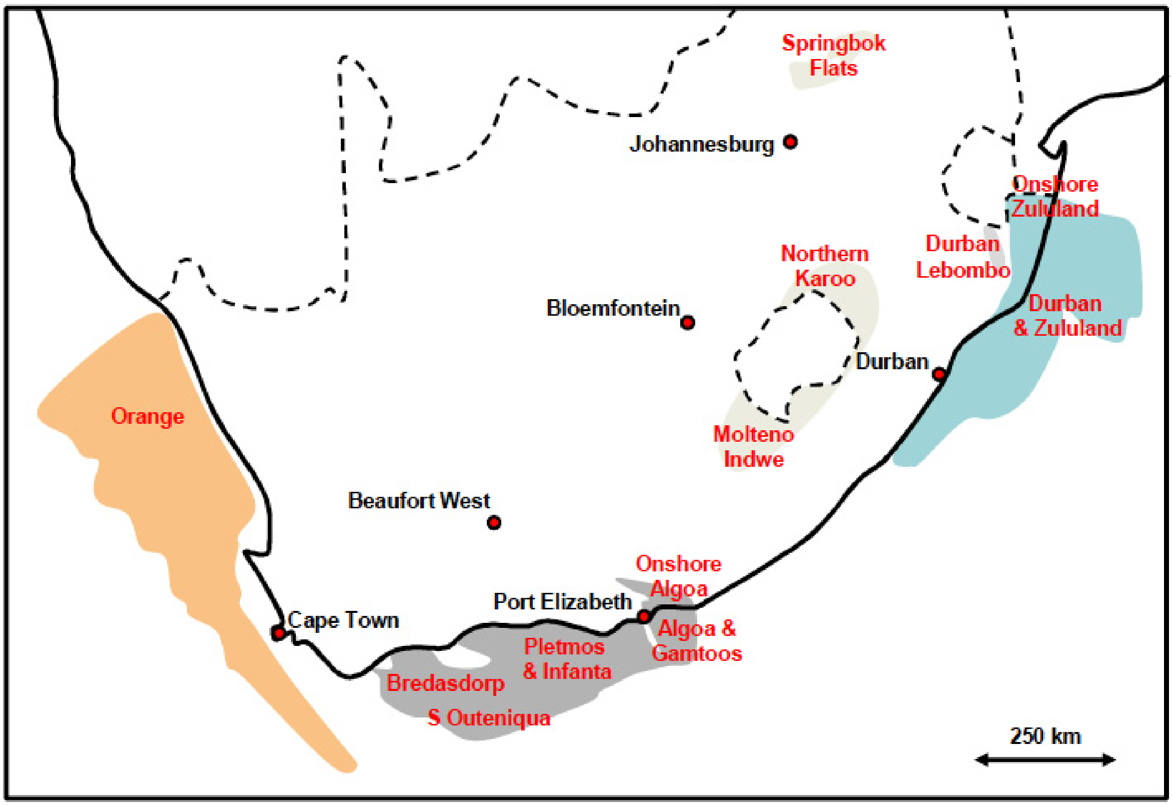
The WB selected Parsons Brinckerhoff as the lead consultant for the techno-economic analysis of CCS deployment in South Africa. This summary of results is based on the final report of the study – *Techno-Economic Review of CCS Implementation in South Africa*. The aim of the second study was to develop a detailed technical and economic analysis for large-scale development and deployment of CCS across South Africa’s industrial installations over a 30-

year period. The consultants for this study worked closely with SANEDI as well as consulting with Eskom and Sasol – the two largest industrial emitters of CO_2 in South Africa.

The study considered the sources of industrial CO_2 and potential geological CO_2 storage locations in South Africa and conducted the subsequent analysis of how these sources and sinks can be connected in the most cost effective way under varying roll-out scenarios. The sources of CO_2 reviewed in this study included: power generation; cement production; the iron and steel industry; synthetic fuel production including coal-to-liquids (CTL) and gas-to-liquids (GTL); paper mills; and oil refining. In the model, fitting CO_2 capture was only considered on plants that would have greater than ten years of operation after the date of capture and that emitted over 400,000 metric tons of CO_2 per year. The majority of CO_2 emissions identified occur in the north east of the country near Johannesburg and the coal fields in the region.

Data on the geological storage locations for CO_2 in South Africa was based on the *Atlas on Geological Storage of CO_2 in South Africa* that was produced by SANEDI in 2010 and focussed on the offshore Durban/Zululand Basin; the basins offshore Port Elizabeth; and the Orange Basin (see Figure 1).

Figure 1: CO_2 geological storage formations in South Africa



Four core scenarios were developed and analysed in the study – Base, Alternative 1, Alternative 2, and Alternative 3. The scenarios varied based on:

- the potential injectivity and capacity of the storage formations – P30 (low injectivity and capacity), P50 (moderate injectivity and capacity), and P70 (high injectivity and capacity) were considered;

- the phasing in of CO_2 capture – in some scenarios CO_2 capture was applied to all CO_2 sources at the commencement of the modelling period and in others capture was applied stepwise over 15-20 years; and
- the number of storage formations made available to the model – in two scenarios only the Durban/Zululand Basin was considered for storage whereas all other scenarios considered all available storage locations.

2.2.1. Base Scenario

The Base Scenario applies CO_2 capture to all CO_2 sources that meet the technical criteria (ten years of operation remaining post-capture, and greater the 400,000 metric tons of annual CO_2 ($MtCO_2$) emissions) where there is sufficient capacity available for storage. The scenario applies capture to all existing and new CO_2 sources, immediately with no phasing, with the only limitation placed on capture of CO_2 being the availability of storage. The Base Scenario includes moderate (P50) storage capacity and injectivity for all storage locations. The aim of the Base Scenario was to establish a technical limit without any commercial considerations factored in.

The results from the Base Scenario modelling showed that a total of 305.5 $MtCO_2$ is captured annually from a total of 62 installations. The majority of the captured CO_2 comes from power generation (188.5 $MtCO_2$ / 22 installations), the refining and synthetic fuel industry (58.5 $MtCO_2$ / 9 installations), and the metals industry (37.6 $MtCO_2$ / 14 installations) with the majority of these sites located in the north east of the country. A total of 7,556 $MtCO_2$ was captured and stored over the 30-year period of the analysis.

The Base Scenario found that there was sufficient injectivity and capacity nationally to store all the CO_2 captured over the 30-year analysis period. It did however find that the north eastern Durban/Zululand Basin had insufficient injectivity and capacity to store all the emissions from the north east region which results in the need for a cross-country pipeline (over 1,200kms / 750 miles) to transport CO_2 to the larger Orange Basin in the west of the country (see Figure 2). The analysis then showed that in this scenario, approximately one-third of all CO_2 captured was stored in the Durban/Zululand Basin with approximately two-thirds stored in the Orange Basin. The offshore Port Elizabeth Basins stored less than 3% of the total CO_2 captured. Despite the total CO_2 storage bias towards the Orange Basin, the required infrastructure was significantly higher in the Durban/Zululand Basin to overcome significantly poorer injectivity compared with the Orange Basin – the Durban/Zululand Basin would require 441 injection wells (0.25 $MtCO_2$ injected per well per year) vs the Orange Basin which would only require 202 wells (1 $MtCO_2$ injected per well per year).

Figure 2: Map of South Africa showing a potential pipeline network

The total consolidated capital expenditure (CAPEX) and operating expenditure (OPEX) for the Base Scenario, in 2013 currency, was ZAR 3.78 trillion[‡] (~US$ 378 billion) with a breakdown of approximately 80% on capture, 11% on transport, and 9% on storage. This equates to a levelized cost of ZAR 421.7 (~US$ 42) per metric ton of CO_2 stored however the actual costs vary considerably depending on the source of the CO_2 – power generation has a cost of ZAR 519 (~US$ 51.9) per metric ton; the metal industry has a cost of ZAR 315.9 (~US$ 31.5) per metric ton; and, the refining and synthetic fuels industry has a cost of ZAR 207 (~US$ 20.7) per metric ton. The CAPEX expenditure of the Base Scenario is front loaded in the scenario

[‡] Capture costs in the power generation industry includes additional generation capacity to replace lost output from CO_2 capture. The replacement capacity is supplied by new build nuclear power generation.

given deployment of capture happen at the same time at the commencement of the modelling period (see Figure 3).

2.2.2. Alternative Scenario 1

In the Alternative Scenario 1, only the Durban/Zululand Basin is made available to the model and low (P30) injectivity and capacity assumptions are used. This results in the total injection per year being limited to 110 $MtCO_2$ at a rate of 0.1 $MtCO_2$ per well per year. The application of CO_2 capture in the Alternative Scenario 1 is also phased over a 15-year period to spread out the capital requirements of deployment.

Alternative Scenario 1 stores a total of 2,302 $MtCO_2$ over the 30-year period analyzed which equates to 30% of the total storage seen in the Base Scenario. The consolidated CAPEX and OPEX on Alternative Scenario 1 is ZAR 1.25 trillion (~US$ 125 billion) which is 39% of the total costs of the Base Scenario and results in a levelized capture and storage cost of ZAR 541.9 (~US$ 54.2) per metric ton of CO_2 stored. The profile of capital investment is far more evenly distributed over the analysis period due to the phasing of the CO_2 capture deployment (see Figure 3).

In the Alternative Scenario 1 there is a significant decrease in CO_2 capture costs from ZAR 318.2 per ton (~US$ 31.8) to ZAR 260.6 per ton (~US$ 26.1) as the restriction in storage capacity results in the model being able to select only the cheaper capture options. Despite this the overall capture and storage costs increase significantly driven by the significant increase in storage costs from ZAR 47.1 (~US$ 4.7) per ton to ZAR 223.6 (~US$ 22.4) per ton due to the assumption of low (P30) injectivity.

2.2.3. Alternative Scenario 2

Alternative Scenario 2 uses the same constraints and phased roll-out as Alternative Scenario 1 but increases the injectivity and capacity assumptions used from low (P30) to moderate (P50) – the same factors used in the Base Scenario. This results in the total injection per year being limited to 130 $MtCO_2$ at a rate of 0.25 $MtCO_2$ per well per year.

Alternative Scenario 2 stores a total of 2,578 $MtCO_2$ over the 30-year period analyzed which equates to 12% more total storage than in the Alternative Scenario 1. The consolidated CAPEX and OPEX on Alternative Scenario 2 is ZAR 1.08 trillion (~US$ 108 billion) which is 14% cheaper than the Alternative Scenario 1. Similarly to Alternative Scenario 1, the profile of capital investment is far more evenly distributed over the analysis period due to the phasing of the CO_2 capture deployment (see Figure 3).

The levelized capture and storage cost for Alternative Scenario 2 is ZAR 416.0 (~US$ 41.6) per metric ton of CO_2 stored which makes it the lowest cost scenario by a slim 1% compared with the Base Scenario. This results from the Alternative Scenario 2 seeing the a similarly significant decrease in CO_2 capture costs from the Base Scenario, as was seen in the Alternative Scenario 1 however seeing a much smaller increase in storage costs from ZAR 47.1 (~US$ 4.7) per ton in the Base Scenario to ZAR 93.7 (~US$ 9.4) per ton.

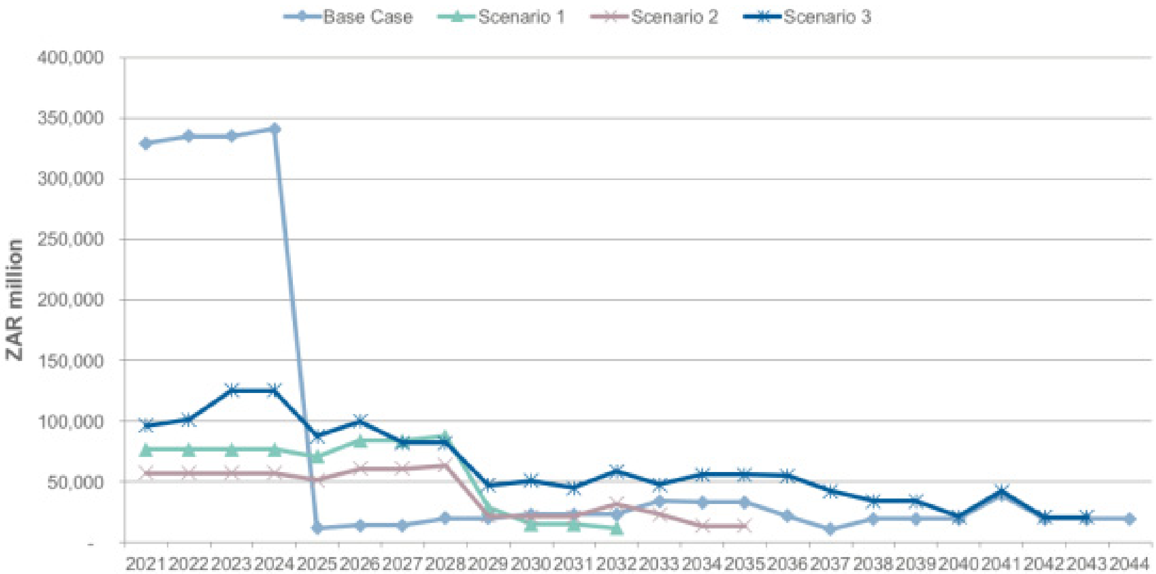
2.2.4. Alternative Scenario 3

In the Alternative Scenario 3, both the Durban/Zululand Basin and the Orange Basin is used for storage and moderate (P50) injectivity and capacity factors are used. This results in the total potential injection per year being 320 $MtCO_2$ (which is greater than the rate of emissions 305.5 $MtCO_2$) at a rate of 0.25 $MtCO_2$ per well per year in the Durban/Zululand Basin and or 1 $MtCO_2$ per well per year in the Orange Basin. Alternative Scenario 3 phases the deployment of capture over a 20-year period.

Alternative Scenario 3 stores a total of 5,127 $MtCO_2$ over the 30-year period analyzed which equates to 68% of the total storage seen in the Base Scenario. This 32% reduction in total storage is due to the phasing in of CO_2 capture in the Alternative Scenario 3 which does not occur in the Base Scenario which deploys all the CO_2 capture upfront in the model. The consolidated CAPEX and OPEX on Alternative Scenario 3 is ZAR 2.41 trillion (~US$ 241 billion) with an evenly distributed capital investment profile over the analysis period (see Figure 3).

The levelized capture and storage cost for Alternative Scenario 3 is ZAR 469.8 (~US$ 46.9) per metric ton of CO_2 stored which is higher than the Base Scenario. This results primarily from the phasing in of the CO_2 capture plant and the fact that the plant will have had the capital investment made but will have operated for a significantly shorter period by the end of the analysis' 30-year period.

Figure 3: CAPEX and OPEX expenditure per year for each deployment scenario



2.3. The development of a national and local public engagement plan for the South African Pilot CO_2 Storage Project

The WB selected SRK Consulting South Africa as the lead consultant for the development of the South African CCS public engagement plans, in association with Finley-Greenberg and the World Resources Institute (WRI). This summary of results is based on the final report of the study – *Carbon Capture and Storage Initiating Stakeholder Engagement: National and Local Stakeholder Engagement Plans*. The aim of the study was to develop an integrated best-practice framework for conducting public engagement in South Africa for CCS in general, at a national level, and for the PCSP in particular, at both a national level and locally where the project may be located. The SRK consortium worked closely with the South African DoE, SANEDI, and other industrial CCS stakeholders, such as AngloAmerican in the development of this plan.

The study commenced with a review of the current context and requirements for public engagement in South Africa and of best-practice CCS public engagement plans and experience internationally. The review of the South Africa context and public engagement requirements included a review of: the South Africa CCS activities including the planned development of the PCSP; the regulatory requirements for public engagement and consultation; the socio-economic and demographic context both at a national level and at a local level; and, the environmental context at a national and local level. The review of international CCS public engagement best-practice looked at published best-practice documents such as the *WRI Guidelines for Community Engagement in CCS Projects*, CCS public engagement case studies produced by the Global CCS Institute and the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO), as well as drawing first-hand experience from those in the team that have been involved in actual CCS project development, such as the members of Finley-Greenberg who led the development of the Illinois Basin Decatur Project.

The review of the South African context highlighted a number of challenges, many of which have not been present for international CCS projects. These include issues such as:

- The presence of eleven official languages in the country;
- A diverse variety of cultures and belief systems, including traditional systems;
- High rates of unemployment and underemployment across the country;
- A complex governance framework overlaying National, Provincial, District and Local Municipal jurisdictions, with traditional boundaries and authorities.
- Diverse land ownership in the areas of interest for the PCSP, including land owned privately, owned by the government, and owned by traditional authorities;
- The presence of environmentally protected areas near the areas of interest for the PCSP including national parks and in one case a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site.

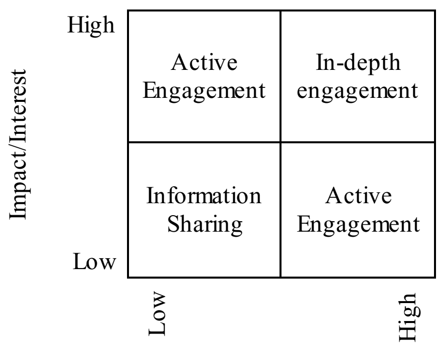
Based on the initial review, a stakeholder database was developed that included government (national, provincial and local); traditional authorities; public utilities; NGOs and environmental groups; research and academia; business and commerce; labor; and, landowners.

Each stakeholder was then assessed based on:

1. The level of impact the project will have on the stakeholder/the level of interest the stakeholder has in the project; and
2. The level of influence that the stakeholder has over the development and execution of the project.

Based on this assessment, the stakeholders were categorized into four groups as seen in Figure 4 below.

Figure 4: Stakeholder assessment matrix



Influence

The stakeholders earmarked for "in-depth engagement" would then become the priority stakeholders. Key messages and methods of engagement were then developed for each of the stakeholders identified as either "in-depth engagement" or "active engagement. The key messages for each stakeholder would represent a selection of the overall set of key messages. The selection of targeted key messages intended to inform the stakeholder of the information that is of interest to them or may impact them. All key messages and all supporting information could then be made available to any stakeholder should they be interested in the broader aspects of the project.

The key messages identified for the project related to:

- Project description;
- Rationale for the project;
- Details of the CCS roadmap and project program;
- Job creation;
- Skills development;
- Areas of interest for the PCSP;
- Human safety;
- Water use;
- Potential for groundwater pollution;
- Potential environmental impacts;
- Energy costs;
- Economics;
- International CCS experience; and
- Responsibility and liability.

Methods of engagement identified included:

- Individual consultation meetings;
- Technical workshops;
- Open house meetings;
- Focus group meetings;
- Mediated discussions;
- The SANEDI website;
- Media briefings;
- Questions and answer sheets;
- Factsheets; and
- Social media.

The Stakeholder Engagement Plans then brought together the key stakeholders, key messages, and the methods of engagement. The plan also included a process of documenting the outcomes of the engagement activities, and the review and revision of the engagement process to take into account the feedback received and emphasised that the engagement process should therefore be iterative and dynamic and not a static document.

The plan recommended that engagement should start as early as possible in the project cycle and that initial engagement related to the PCSP should start with the national level Government. Once the engagement process has commenced with the National Government stakeholders, the process can progress down the levels of government from Provincial Government, to District Municipal Government, to Local Municipal Government and Traditional Authorities. Once Local Municipal Government and Traditional Authorities are being engagement the go-ahead can be sought from them to start engaging the local public, land-owners and other local stakeholders. This ordered process was recommended to ensure that all relevant stakeholders were kept informed of the process and that whenever the project proponents commenced engagement with any stakeholder the relevant higher-level stakeholders were aware. The plan also recommended that communications material should take into account the preferred language of the stakeholders as well as their customs and traditions. It was also recommended that where possible, communications material include as much visual material as possible to overcome potential language and literacy issues.

3. Lessons Learned

3.1. Stakeholder Participation

Critical to the success of this Phase 1 World Bank CCS Program was the in-depth and ongoing integration of government, and other, stakeholders, including industry players, into the project planning and execution teams. Throughout all three studies outlined above stakeholders were brought into the process at the earliest stage possible – inputting elements of the terms of reference, highlighting critical selection criteria for the contractors, attending inceptions and progress meetings, etc. In the legal and regulatory study this focused on the Department of Energy and the Inter-departmental CCS Task Team. For the Techno-Economic Analysis, it focused on representatives from high-CO_2 emitting industry. In the stakeholder engagement study this related to the involvement stakeholder engagement experts from the South African Government and industry. In each case these stakeholders were incorporated into the project steering committees, along with SANEDI and the World Bank, which generally met monthly and were requested to review draft and final reports before sign-off.

The involvement of stakeholders in the planning and management of studies such as these does require additional work by the project manager and at times can slow the development process for the study, incorporating multiple comments and views at every stage. The benefits that this involvement brings however far out-ways the additional work to make it happen and it is strongly recommended that such involvement is sought wherever possible.

3.2. Communication of Results

In all three studies above, the consortiums were required to submit a final report with an executive summary. In future studies however, in order to reach a broader audience, it was thought that the production of a standalone *Summary for Policymakers* and potentially a *Technical Summary* could be of benefit. The *Summary for Policymakers* would be of particular value in applying the outcomes of the study to the perspective of government stakeholders in a brief and succinct manner.

4. Next-Steps

The World Bank CCS TF have now advanced their support for CCS in South Africa to Phase 2. Phase 2 involves the provision of US$ 27.4 million of World Bank CCS TF funding to support the assessment of the feasibility of, and building of expert capacity, for CCS in South Africa. This will be done through the development of the PCSP, which will involve the investigation and characterization of a suitable CO_2 storage site and the subsequent injection, storage, and monitoring of CO_2 in the identified storage site, and the development of a front-end engineering design study for a CO_2 Capture Pilot Project. The results of the studies conducted in Phase 1 continue to inform the activities in Phase 2.

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