Carbon Capture and Storage
South Africa

World Bank
14Sep09

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South Africa
Climate Change Activities

Constitution: Right to a clean Environment
South Africa is a Non-Annex I Party to Kyoto Protocol – No Obligations
Undertakes Actions Related to Mitigation and Adaptation
Targets for:
- Renewable Energy
- Energy Efficiency

Long Term Mitigation Scenarios Study
- GDP Costs of Undertaking Mitigation Actions
- Available www.deat.gov.za

Incentives
- Tax R2c/kWh on non-renewable Electricity
- Tax Relief on Bio-Diesel
- Feed-in Tariffs on Renewable Electricity [REFIT]

Need to Balance Development [poverty alleviation, job creation] with Environmental Protection
CO$_2$ Emissions

Emissions in Gg/year
- 0 - 880
- 881 - 3,712
- 3,713 - 8,336
- 8,337 - 14,845
- 14,846 - 29,410
- 29,411 - 53,203
- 53,204 - 105,257

Source: CSIR/DME
## CO₂ Emissions Quantification

### SEQUESTRABLE

<table>
<thead>
<tr>
<th>Category</th>
<th>Mt</th>
<th>% Emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>161</td>
<td>65</td>
</tr>
<tr>
<td>Industrial</td>
<td>28</td>
<td>11</td>
</tr>
<tr>
<td>Other Energy</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>30</td>
<td>12</td>
</tr>
</tbody>
</table>

\[ 249 \text{ Mt} \quad 61 \% \]

**Synfuel Industry**

- ~30 million tonnes ~95% CO₂

### NON-SEQUESTRABLE

<table>
<thead>
<tr>
<th>Category</th>
<th>Mt</th>
<th>% Emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Agriculture</td>
<td>48</td>
<td>27</td>
</tr>
<tr>
<td>Fugitive</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>Transport</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Heat Production</td>
<td>37</td>
<td>21</td>
</tr>
</tbody>
</table>

\[ 159 \text{ Mt} \quad 39 \% \]

### Total

<table>
<thead>
<tr>
<th>Mt</th>
<th>% Emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>408</td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** CSIR/DME
CCS STORAGE GEOLOGY
Deep Saline Aquifers

A: ~183 GT Storage Potential
B: ~80 Gt Storage Potential
C: ~24 Gt Storage Potential
D&E: Storage Potential Undetermined

Theoretical Capacity: ~104 GT
At 40 Mt/y for 100y Need: 4GT
Incentive for further work
SA Long Term Mitigation Scenario

Mitigation costs as share of GDP, for runs of combined wedges - each time adding another as in list at right.

0 Limit on low-efficiency vehicles
1 +Passenger modal shift
2 +Improved vehicle efficiency
3 +SWH subsidy
4 +Commercial efficiency
5 +Residential efficiency
6 +Industrial efficiency
7 +Cleaner coal
8 +Nuclear
9 +Escalating CO2 tax
10 +Renewables
11 +CCS 20 Mt
12 +Subsidy for renewables
13 +Biofuels
14 +Electric vehicles in GWC grid
15 +Hybrids

Mt CO2 reduced, 2003-2050

SOURCE: DEAT LTMS
South African Centre for Carbon Capture & Storage
Established 30Mar09

Core Parties

Participants

Energy Innovation For Life
Charter Signing 27Mar09
Minister Sonjica Presiding
South African Centre for Carbon Capture & Storage

Carbon capture and storage demonstration plant to be operational in South Africa by the year 2020

Develop in country human and technical capacity to undertake the envisioned demonstration plant
Mission
Country Readiness

Enablers in place that facilitate the implementation of carbon capture and storage

Preliminary Potential Investigation
DONE
YES THERE IS POTENTIAL

Objective:
CCS Demo Plant
Operational by 2020

Context
SA Potential
SA CENTRE CCS
INTal COOPn

Capture Technologies
Transport Technologies
Geological Storage Technologies
Monitoring and Verification & Remediation
Economics
Risk Assessments
Legal/Regulatory Environment
Human Capacity Building
Public Outreach
Test CO2 Injection Experiment
Geo Storage Atlas
Geo Storage Atlas - Update
Demo Plan
CCS in South Africa
Time/Scale

<table>
<thead>
<tr>
<th>CCS Potential</th>
<th>Carbon Atlas</th>
<th>Test Injection</th>
<th>Demo Plant</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>DONE 2004</td>
<td>2010</td>
<td>2016</td>
<td>2020</td>
<td>2025</td>
</tr>
</tbody>
</table>

- 10s thousands tonnes
- 100s thousands tonnes
- millions tonnes

Possible C Trading

5 year Charter
**Geological Storage of Carbon Atlas**

**Definitive Information Regarding Geological Storage Potential**
- Undertaken by Council GeoScience – Some Data from Petroleum Agency

**Financially Supported by:**
- PetroSA
- AngloCoal
- Eskom
- Sasol
- SANERI

**Inception Meeting – 4Sep08**
**Scheduled Publication mid 2010**
CCS WEEK
Training Courses

28Sep09: Introductory CCS Course
   — CO2CRC Australia

29/30Sep09: Carbon Capture and Storage Conference
   — Official Opening of South African Centre for Carbon Capture and Storage

1Oct09: Course/Workshops
   — Legal Framework Course – 1Oct09
   — IEA CCS Global Road Map
   — Appraisal of Proposed CCS Centre Work Plan
   — Appraisal of CCS Atlas Progress

2Oct09: Advanced Geological Storage Course
   — British Geological Survey

www.ccsconference.co.za
International Co-operation I

- CSLF
- IEA GHG IA
- Global CCS Inst
- IPAC-CO2
- British Geological Survey
- Brandenburg Technical University
Capacity Building Visits:
- Norway - Sleipner
- Australia – Otway
- Preparation for Planning Test Injection Experiment

Training Courses in South Africa
- Annual event
- Endeavour to include neighbouring countries

High Pressure Chambers
- Test SA Rocks
Thank You