Presentation Outline

• Introduction
• South Africa’s CCS Roadmap
• Challenges
• Cooperation with the World Bank
• Way Forward
Introduction (1)

- South Africa is a coal-based economy
  - 2010 estimates: ~200 Gt of coal resources & ~33 Gt of coal reserves
  - In 2009 fossil fuels contributed ~89.2% towards primary energy usage
  - Coal represents 65.5% of primary energy sources, followed by Oil (25.3%) and Gas (2.8%), and the balanced sourced from Nuclear (3.2%) and Renewable Energy (7.6%)
  - Coal is the primary energy feedstock for ~90% of total electricity generation and ~30% of total liquid fuels production via CTL technology
- It is estimated that South Africa emits about 400 Mt CO$_2$ per annum
South Africa is committed to the management of the efficient use of its coal through employment of Clean Coal Technology like Carbon Capture and Storage (CCS) for the stabilisation of CO$_2$ emissions.

Active participation in collaboration with organisations like the World Bank, IEA, CSLF and the Global CCS Institute as well as other countries on CCS development and deployment.

COP 15 in Copenhagen: President Jacob Zuma committed South Africa to reducing its CO$_2$ emissions by 34% in 2020 and by 42% in 2025, subject to the technical, financial and capacity support from developed countries.

SA has embarked on CCS Roadmap.

Integrated Resource Plan (IRP) 2010 incorporates continued use of coal, using clean coal technologies like CCS, efficiency programmes while phasing in renewable energy.
Potential sequestratable carbon dioxide sources in South Africa

<table>
<thead>
<tr>
<th>SEQUESTRABLE</th>
<th>Mt</th>
<th>% Emission</th>
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<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>
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<tr>
<td>Manufacturing</td>
<td>30</td>
<td>12</td>
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<tr>
<td>Synfuel Industry</td>
<td>~30 million tonnes</td>
<td>~95% CO₂</td>
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<table>
<thead>
<tr>
<th>NON-SEQUESTRABLE</th>
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<tbody>
<tr>
<td>Waste</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Agriculture</td>
<td>48</td>
<td>27</td>
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<tr>
<td>Fugitive</td>
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<td>Transport</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Heat Production</td>
<td>37</td>
<td>21</td>
</tr>
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**Total** 408
South Africa’s CCS Road Map (1)

• 2004: A CCS technology potential study commissioned
  o provided a preliminary indication of CCS technology potential to reduce CO2 emissions into the atmosphere

• 2008: SANERI initiated a project for the development of a Carbon Dioxide Geological Storage Atlas ("the Atlas") to locate and characterize potential geological storage sites for study for CO2

• 30 March 2009: Launch of the South African Centre for Carbon Capture and Storage (SACCCS) under SANERI
  o Objectives include: Spearheading human capital and systems development for CCS; Improving the country’s readiness to accomplish world class CCS deployment in the future; Creating a focused advancement of CCS initiatives, including public awareness and mobilisation of resources for CCS development and deployment

• 29 September – 03 October 2009: An inaugural International CCS Conference and CCS Regulatory / Policy Framework Workshop hosted by SADoE
  o Conference planned for October 2011

SANEDI = South African Energy Development Institute
South Africa’s CCS Road Map (2)

10 September 2010: Launch of the Atlas
- A public-private partnership of South African entities
- ~150 Giga tonnes of theoretical storage capacity in 4 geological basins; viz. Mezoic, Outeniqua, Durban / Zululand and Algoa basins
- Karoo Basin potential for non-conventional geological storage potential: IEA GHG R&D Programme & the SACCCS joint research to determine potential considered
- Challenge: main CO2 point sources are very far away from potential storage sites

2011: Regulatory Framework Development officially included in Work Plan

2016: Conduct a test injection experiment by the end of 2016

2020: A demonstration plant will commissioned

2025: A commercial scale plant will be commissioned

NB: Enabling environment for the execution of the Road Map, taking due cognisance of our PESTEL environment
Lack of opportunities for EOR worsen financial constraints.
Competition with other imperatives for funding
South Africa’s Challenges

• Development of enabling CCS legislative / regulatory framework for South Africa

• Addressing key issues incl. funding, long-term liability, financial assurance for long-term stewardship, human capacity building and public awareness

• Competing needs for funding
  o very expensive technology inaccessible to a developing country, whose national budget is constrained by poverty alleviation initiatives.

• An integrated approach / collaboration
  o The success of CCS in South Africa depends on developing a pool of expertise, knowledge transfer and an objective skills development strategy

NB: These are common challenges in respect of CCS that in developing countries like South Africa, taking due regard of its socio-economic challenges
Long Term Liability

• Learnt lessons from conventional mining activity
  o Threat of rising acid mine water in Johannesburg – “A further US$600 million is added for water infrastructure and services, including funding for the acid water drainage threat associated with abandoned underground mines.” Budget Speech of 23-Feb-11
  o Mine dumps
  o Current environmental management plans by miners – under the Minerals and Petroleum Resources Development Act

• Options with their own pros and cons noted
  o Liability Cap (per person or event); Insurance; Liability exemption (operators are exempted from being liable - amt, type or time); Compensation fund

• Exact modalities and corresponding legislative framework need to be determined

• Unanswered questions: Hidden costs; financial burden to future governments and generations?
  o Uncertainty generally work against public buy-in
  o The poorest of the poor generally bear the brunt of negative consequences

Lack of opportunities for EOR or EGR worsen financial constraints.
Competition with other imperatives for funding
Public Engagement

• Wide gaps
  o Heterogeneity - socio-economic; linguistic; etc.

• Due consideration of public comment
  o South Africa has one of the world's most progressive constitutions

• SACCCCS will play pivotal role
  o Inclusive of interface with various institutions

• General and project specific
  o CCS Conference and Workshop
  o Atlas for Geological Storage
  o Mainstreaming in Departmental / Government agenda
Cooperation at all levels

• International
  o South Africa acknowledges support from the World Bank, Carbon Sequestration and Leadership Forum, International Energy Agency, Global Carbon Capture and Storage Institute and others
    o Amongst others, South Africa is an ex-Deputy Chair of the CSLF Policy Group and current Deputy Chair of the CSLF Technical Group
  o The CCS Task Team will coordinated different views from policies, acts and regulations of relevant Departments and thus integrate to give the government position
  o Ongoing support (both technical and financial) by the International community is key
  o Bilateral and multilateral international cooperation

• Domestic
  o CCS is a cross-cutting matter requiring interdepartmental cooperation
  o Various pieces of legislation under the administration of various government department and spheres of government would need to be amended and/or factored in
  o SADoE has initiated an Interdepartmental Task Team, which involves all relevant government departments to expedite the formulation of a common government position on CCS matters

NB: CCS is a cross-cutting issue
World Bank CCS Trust Fund

- The World Bank has approved a funding of $1.2 million dollars towards CCS activities in South Africa over a period of two years, commencing in 2011.

  - Concept Note for the Development of Carbon Capture and Storage in South Africa project (P122209) was finalised in June 2011

  - The World Bank held a Workshop on CCS in Southern Africa at the beginning of June 2011 in Sandton, South Africa

The Department of Energy’s key implementing agent is the SACCCS under SANEDI
Task (1)

- The SADoE / World Bank collaboration for the development of a national regulatory framework covering the whole CCS value chain on both technical and policy fronts
  - Benchmark globally to assess CCS regulations that would be suitable for the South African context
  - The identification of omissions in the current legislation and evaluate the potential to coordinate clauses in different Acts that would govern CCS, prior to the development of an integrated CCS Act
  - Perform a feasibility study on point sources associated with CO$_2$ emissions, the coal to liquid technology, electrical power generation and industries of medium to low emitters; evaluate costs of capture, transportation and injection; as well as consequences of CO$_2$ presence in geological formation
  - The IEA has identified South Africa as one of the few pilot countries to pilot its model CCS regulatory framework developed - The IEA is collaborating with South Africa to address CCS regulatory matters not covered by World Bank

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Task (2)

• A plan for implementation of CCS in the industrial and electricity generation sectors including matching potential carbon dioxide emission sources against perspective sinks and an assessment of applicable capture technologies.
  
  o CO₂ for the Test Injection will be sourced from high concentration industrial sources, particularly CTL

  o Also consider development of capture technologies from other sources

  o Activities will focus on:

    o an assessment of capture, preparation and transportation costs in such sectors as CTL production; electricity generation, ammonia production; and oil refineries;

    o an evaluation of suitable capture technologies for electricity generation and industrial applications; and

    o assistance on identification of potential pilot projects in both industrial and electricity generation sectors

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Task (3)

• Building of institutional capacity by conducting expert workshops, training, technical classes and study tours for industry and energy sector stakeholders
  
  o targeted training for policy and decision makers in the energy and mining sectors, legal experts, industry professionals (e.g. engineers, geologists, economists, etc.), and environmental specialists
  
  o thematic workshops, including Regional CCS Week in October 2011
  
  o study tour to one of the existing CCS operations (e.g. U.S., Australia, Norway) – one for Australia already undertaken at the beginning of July 2011
  
  o develop a pool of CCS experts for the growth and sustainability of the industry through skills transfer and other interventions, considering SA’s history and consequent skills challenges

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Task (4)

- Initiating public and community engagement on the issues related to CCS deployment including potential environmental and social impacts
  
  - perform a survey to collect and evaluate public views on CSS, the outcome of which will be disseminated among various stakeholders
  
  - develop an implementation plan for public/stakeholder engagement to promote CCS for further implementation by the SACCCS

The Department of Energy’s key implementing agent is the SACCCS under SANEDI
Way Forward

• Implementation of the Cooperation Agreement between the Department of Energy and the World Bank
  o Development of Regulatory Framework
  o CCS Conferences and Workshops

• Cooperation with other key stakeholders both domestically, regionally and internationally
  o Collaboration with organisations like the IEA, CSLF and the Global CCS Institute as well as other countries on CCS development and deployment is vital

• Operationalise the Interdepartmental Task Team on CCS Legislative / Regulatory Framework Development

• Continued support for SACCCS
  o General execution of its mandate
  o Execution of Roadmap – synchronization with enabling policy and regulatory frameworks

Together we can do more!
Ngiyabonga
Ke ya leboha
Obrigada
Dank u
Merci
Thank you
Gracias
Grazie
Takk
Danke schoen