



Energy research Centre of the Netherlands

# **Advancing CCS and CDM in Africa**

## **Outcomes of two workshops in Africa**

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This document gives a short report on the workshops in Dakar and Gaborone as part of the CCS-Africa project, which is registered with ECN under number 7.7858.

## Contents

List of tables	4
List of figures	4
1. Introduction and objectives of the workshops	5
2. Workshops overview	7
3. Discussing climate change mitigation	9
4. CO <sub>2</sub> capture and storage in the African context	10
4.1 Main messages from presentations	10
4.2 Salient points from discussion	12
5. The Clean Development Mechanism in Africa	14
5.1 Main messages from presentations	14
5.2 Breakout group outcomes	15
5.3 Salient points from discussions	16
6. Major outcomes	18
6.1 How to boost CDM in Africa?	18
6.2 What is the relevance of CCS for Africa?	18
6.3 What's next after the workshops?	19
Appendix A Workshop programmes	20
Appendix B List of participants	24

## List of tables

Table 2.1	<i>Overview general characteristics of the workshop</i>	7
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## List of figures

Figure 1.1	<i>Participants in Dakar</i>	6
Figure 2.1	<i>Participants in Gaborone</i>	8
Figure 4.1	<i>Discussing CCS opportunities in Africa.</i>	13
Figure 5.1	<i>Participants discussing CDM methodologies in a breakout session in Gaborone.</i>	17

## 1. Introduction and objectives of the workshops

Climate change is one of today's greatest challenges to mankind. Africa has a distinct position in the climate change debate, as it is the continent that will feel the impacts most severely, but has the smallest responsibility for the greenhouse gas emissions that are causing climate change. It is generally recognised that Africa's priorities should be on sustainable development, including the economic development of the continent. In that sense, the synergy between emission reduction and increased investments in clean technologies that the Kyoto Protocol's Clean Development Mechanism (CDM) could provide would be extremely apt for Africa. However, Africa so far has only sparsely benefited from funding and entrepreneurial impulses provided through the CDM.

The options to mitigate climate change are diverse and the policies to bring them about vary greatly. One of more recent technologies to reduce greenhouse gas emissions is CO<sub>2</sub> capture and storage (CCS). Interest in this technology has increased over the past years, but its applicability is perceived to be mainly in industrialised countries and possibly large, coal-reliant emerging economies. Some areas in Africa may also be suitable for CCS, which makes Africa one of the stakeholders in the global discussion on CCS. The level of knowledge of CCS in Africa, however, is relatively low.

CCS-Africa responds to these challenges by enhancing the level of knowledge and access to information on CCS in African countries, and by building capacity on CDM in the African context. By doing this, the project is responding to an invitation by the COP/MOP2 (in Nairobi, 2006)<sup>1</sup> on CCS and the CDM, as well as to the intention of the CDM in Africa-related Nairobi Framework of Action, which was initiated, also at COP/MOP2, by the United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), World Bank Group, African Development Bank, and the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC). The Nairobi Framework has the specific target of helping developing countries, especially those in sub-Saharan Africa, to improve their level of participation in the CDM.

The main activity of the CCS-Africa project was to hold two regional workshops, focussing on CCS and CDM in African countries. They were held in September 2007, in Dakar (Senegal) and Gaborone (Botswana). Each workshop attracted some 70 participants from governments, non-governmental organisations and the private sector, from approximately 25 African countries.

This report aims to give an overview of the outcomes of the workshops. Chapter 2, 3 and 4, respectively, will summarise the presentations and discussion on the areas of climate change mitigation, CCS, and CDM in Africa. Chapter 5 will discuss the two prevailing questions in the workshops: how to boost CDM in Africa, and what is the relevance of CCS for Africa. In the report reference made to the project website [www.ccs-africa.org](http://www.ccs-africa.org) where presentations and more information will be available for download, up to mid-2008.

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<sup>1</sup> The COP/MOP2 decision on 'Further guidance to the CDM' stated: "(...) Encourages Parties, intergovernmental organizations, non-governmental organizations and others to organize global and regional workshops to enhance capacity-building on carbon dioxide capture and storage technologies and their applications and to share information on these workshops broadly".



Figure 1.1 *Participants in Dakar*

## 2. Workshops overview

The table below provides an overview of the general characteristics of the workshops.

Table 2.1 *Overview general characteristics of the workshop*

Location	Dakar (Senegal)	Gaborone (Botswana)
Dates	6- 7 September, 2007	10-11 September, 2007
Co-chairs	Brendan Beck (IEA GHG), Ndiaye Cheikh Sylla (Deputy Director of Environment)	Brendan Beck (IEA GHG), Balisi Gopolang (Ministry of Environment, Wildlife and Tourism)
Organisers	ENDA, ECN	EECG, ECN
Number of participants	70	71
Participant countries	Benin, Burkina Faso, Cameroun, Ivory Coast, Gambia, Germany, Guinea, Guinea Bissau, Mali, Mauretania, Niger, Nigeria, Democratic Republic of Congo, Sierra Leone, Togo, Senegal, Spain, Sweden	Botswana, Germany, India, Kenya, Lesotho, Mozambique, Namibia, South Africa, Uganda, Zambia, Zimbabwe
<i>Speakers</i>		
Introductory session	Jean Philippe Thomas (ENDA), Ndiaye Cheikh Sylla (Deputy Director of Environment Senegal), Mbaye Diagne (COMNAC Senegal) Ogunlade Davidson (IPCC), Kishor Rajhansa (UNFCCC), Stefan Bakker (ECN)	Honorable Kitso Mokaila (Minister of Environment, Wildlife and Tourism-MEWT), Mr. Selotlegeng (Deputy Permanent Secretary-MEWT) and Mr. P. Phage -Director Department of Meorological Services(MEWT), Ogunlade Davidson (IPCC), Kishor Rajhansa (UNFCCC), Stefan Bakker (ECN)
CCS session	Ogunlade Davidson (IPCC), Brendan Beck (IEA GHG), Heleen de Coninck (ECN), Wolfgang Heidug (Shell), Louis Seck (Ministry of Energy, Senegal), Tim Dixon (UK DBERR), Djimingué Nanasta (ENDA)	Ogunlade Davidson (IPCC), Brendan Beck (IEA GHG), Heleen de Coninck (ECN), Wolfgang Heidug (Shell), Tim Dixon (UK DBERR), Steve Thorne (SouthSouthNorth)
CDM session	Nogoye Thiam (ENDA), Massamba Thioye, Djimingué Nanasta (ENDA)	Norbert Nziramasanga (SCEE), Peter Zhou (EECG Consultants), Prabhat Upadhyaya (TERI)
<i>Panellists</i>		
CCS discussions	Ogunlade Davidson (IPCC), Frede Cappelen (Statoil), Tim Dixon (UK DBERR), Massamaba Thioye (Consultant and Member of Meth Panel), Djimingué Nanasta (ENDA)	Marco Lotz (Promethium Carbon), Jaco Liebenberg (SASOL), Mr W. Zhakata (DNA Zimbabwe), Leluma Matooane (DNA South Africa), Frede Cappelen (Statoil), Geoff Stiles (MARBK), Jon Duncan (ERM)
CDM discussions	Jean Philippe Thomas (ENDA), Maguette Kaire (National CC committee Senegal), Massamba Thioye (Consultant/member of CDM Meth Panel), Aliou Ba (EDEN and COMNAC Senegal)	Ogunlade Davidson (IPCC), Angela Kabuswe (DNA Zambia), Naushaad Haripersad (ESKOM), Enoch L. Liphoto (City of Johannesburg), James Wakaba (ESD Kenya)



Figure 2.1 *Participants in Gaborone*

### 3. Discussing climate change mitigation

Jean-Philippe Thomas, Director of ENDA, opened the first workshop in Dakar on the morning of September 6<sup>th</sup>, 2007, and welcomed all participants. He mentioned the importance of more attention for the CDM in African countries, as well as the mitigation potential of CCS. The workshop fits well in the 'International Week on Climate & Development' organised by ENDA. Ndiaye Cheikh Sylla, Deputy Director of Environment, Senegal, was co-chair together with Brendan Beck (IEA Greenhouse Gas R&D Programme). He welcomed the participants and expressed his wishes for a productive workshop.

The workshop in Gaborone started with the organizer EEGC welcoming the participants to the workshop. The organizers handed over to the two co-chairs of the 2-day workshop: Mr. Balisi Gopolang of the Department of Meteorological Services (Ministry of Environment, Wildlife and Tourism) and Brendan Beck of IEA Greenhouse Gas R&D Programme. Mr. Gopolang welcomed the Director of Meteorological services, Mr. P. Phage who made some remarks leading to welcoming the Deputy Permanent Secretary of the Ministry of Environment, Wildlife and Tourism, Mr. Selotlegeng, who officially opened the workshop. The Minister of Environment, Wildlife and Tourism Honorable Kitso Mokaila, joined the workshop shortly thereafter and expressed his concern about the costs of climate change mitigation technologies for African countries.

Professor Ogunlade Davidson (University of Sierra Leone, and Co-chair of the IPCC Working Group III on Mitigation) stressed the importance of GHG reduction in his presentation on the IPCC Fourth Assessment Report. If emission growth is not reversed by 2015, the target of remaining below 2 °C temperature rise becomes very difficult. A diverse set of technologies needs to be implemented in all sectors to prevent this from happening. All sectors and all continents have considerable potential for emission reduction, but especially energy efficiency in the building and power sectors, and measures in the transport sector are important. A range of policy instruments is available to achieve GHG reductions from these sectors, which can also have significant benefits for sustainable development. Similarly non-climate policies may have significant co-benefits for climate as well.

- Presentation: [IPCC Fourth Assessment Report: Mitigation of Climate Change](#)

## 4. CO<sub>2</sub> capture and storage in the African context

This chapter gives an overview of the presentations and discussion on CO<sub>2</sub> capture and storage, the topic prominent on the first day of the two workshops in Dakar and Gaborone.

### 4.1 Main messages from presentations

Professor Ogunlade Davidson (Co-Chair IPCC WG III) presented the conclusions from the IPCC Special Report on CO<sub>2</sub> capture and storage. CCS can play a role in a portfolio of climate change mitigation technologies. Application of CO<sub>2</sub> capture requires considerable additional energy and would decrease the efficiency of the power plant that employs CCS. Different components of the total CCS chain are in different stages of maturity, with some of them fully mature and others still in the research phase. In most scenario studies, CCS plays an important role, and reduces overall cost of meeting climate stabilisation targets. The CO<sub>2</sub> storage potential is very large and the storage of CO<sub>2</sub> could be permanent, but several issues regarding monitoring and international regulations need to be resolved before CCS can be implemented safely on a large scale.

- Presentation: [The IPCC Special Report on CO<sub>2</sub> capture and storage](#)

Brendan Beck (IEA Greenhouse Gas R&D Programme) gave an overview of the technological aspects of the different parts in the CCS chain: CO<sub>2</sub> capture, transport and storage. CO<sub>2</sub> capture projects are on-going or planned all over the world, but primarily in developed countries. CO<sub>2</sub> capture has not yet been deployed on a large scale in the power sector, but full-scale projects are being planned. For long-distance transport over land, piping the liquefied gas is the preferred and most technologically mature option. CO<sub>2</sub> can be stored in different ways: in saline aquifers, depleted oil/gas reservoirs, through enhanced oil recovery, and enhanced coal bed methane recovery. Global storage capacity is very large. Mr. Beck also outlined the ongoing CO<sub>2</sub> storage projects, of which the Sleipner project in Norway is the most well-known, with 1 MtCO<sub>2</sub> annually injected in a saline formation since 1996. Another large CCS project is taking place in In Salah, in Algeria. This project, like Sleipner, separates CO<sub>2</sub> from a gas recovery operation and injects it in a saline water body in the gas reservoir. It was concluded that the CCS technologies are available and several demonstration projects are ongoing but that there is a need for CCS demonstration in conjunction with power production.

- Presentation: [CCS technology: capture, transport and storage of CO<sub>2</sub>](#)

Heleen de Coninck (Energy research Centre of the Netherlands) highlighted the economic aspects of CCS. In the CCS chain the capture cost dominates the overall abatement cost per tonne of CO<sub>2</sub> abated. This is mainly due to the additional energy requirements in the capture process for power plants and most industrial applications. Cheaper options may be present in natural gas processing and ammonia production. Revenues from enhanced oil recovery would result in much lower or even negative cost for the CCS overall. The cost of electricity will increase with application of CCS. The current price of carbon in the CDM and EU Emissions Trading Scheme (ETS) is not sufficient to incentivise CCS in power production, but the ETS prices appear high enough to cover the costs of some non-power applications of CCS. For CCS to be implemented in the power sector, the carbon price needs to increase and the cost of CCS need to be brought down, for instance by technological progress realised by subsidising large-scale demonstration. Global mitigation models all predict a large role for CCS, but the results differ greatly according to their assumptions.

- Presentation: [Costs and economics of CCS](#)

Wolfgang Heidug (Shell) gave a presentation on risks of CO<sub>2</sub> storage. These can be divided into global risks (i.e. CO<sub>2</sub> migrating back to the atmosphere and contributing to climate change), and local risks (dangerously elevated CO<sub>2</sub> concentrations in the near-surface environment, alteration of groundwater chemistry, and effects from displacement of fluids). The mechanisms that trap CO<sub>2</sub> in underground reservoirs are diverse and change over time, generally providing more safe storage

over longer timescales through immobilisation processes like solubility trapping and mineralisation over the very long term. Adequate site characterisation and monitoring are crucial for risk management, and should take into account the possible seepage paths such as poorly plugged abandoned wells or naturally occurring. Proper risk management includes careful site selection, risk assessment, monitoring and verification, and a remediation strategy. Several techniques are available for monitoring the CO<sub>2</sub> in a reservoir. He reiterated the IPCC conclusion that it is very likely that more than 99% of the CO<sub>2</sub> stored in a properly selected and managed site will remain there over 100 years.

- Presentation: [Understanding the risks associated with CCS: An overview](#)

Regarding sustainable development impacts of CCS, Louis Seck (Directorate of Energy, Senegal) and Steve Thorne (SouthSouthNorth) gave different pictures, illustrating that different perspectives can be provided on CCS. Mr Seck focused on the positive contribution CCS can give to climate change mitigation and the resulting reduction of harmful impacts of climate change for the African continent. Mr. Thorne used a former sustainable development test that the South African Designated National Authority formerly used to assess CCS CDM projects. He concluded that CCS delivers little technological, local environmental or social benefits other than climate change mitigation. Reduction of some air pollutants could be a co-benefit. How CCS lines up compared to other mitigation technologies is an important question but requires further research and is probably strongly dependent on the specific application of CCS.

Djimingué Nanasta (ENDA) raised similar questions in his presentation on policy aspects from the civil society point of view. There are several issues that would still have to be resolved with regard to accounting and liability of CCS under the CDM. In addition, there are concerns that broad application of CCS will divert investment from other energy technologies such as renewables and energy efficiency. CCS will also increase the cost of power production significantly.

- Presentations:
  - Seck: [CCS and local sustainable development impacts](#)
  - Thorne: [CCS and local sustainable development impacts](#)
  - Nanasta: [Policy aspects of CCS from the CDM and NGO perspective](#)

Tim Dixon (UK Department of Business, Enterprise and Regulatory Reform) highlighted international policy aspects of CCS. The IPCC Guidelines for National Greenhouse Gas Inventories, published in April 2006, gives a general methodology for site monitoring, reporting and accounting for GHGs for CCS. In the EU ETS, CCS can be opted in the second phase (2008-2012) and in principle all new coal-fired power station should be equipped with CCS. The London Convention on dumping of waste at sea has been amended in 2006 in order to make CO<sub>2</sub> sub-seabed storage possible. Under the G8 several initiatives to promote CCS have been developed. The only area where CCS eligibility is still controversial is under the CDM. A process to arrange this issue is under way, and a decision on CCS in the CDM is expected at COP/MOP4 (2008).

- Presentation: [International policy perspective on carbon dioxide capture and storage](#)

Hereafter, a discussion on risks and opportunities of CCS in Sub-Saharan African was staged. Representatives from various European and African business sectors provided their perspectives on the situation. The Dakar workshop participants emphasised the lack of CO<sub>2</sub> point sources in the region of West Africa, leading to limited CCS potential even when the CO<sub>2</sub> storage potential might be large in some countries. Comments, however, were also made that although the CCS potential might not be huge in West Africa, there are capture and storage possibilities, even in West Africa, and the possibilities that are there should be used as it could lead to more investment in Africa. It is up to the governments to facilitate the potential application of the technology. In Southern Africa, the situation is quite different. There are significant early opportunities for CO<sub>2</sub> capture in South Africa and increasingly in the surrounding countries as well, but CO<sub>2</sub> storage potential is more uncertain. Also, the regulatory environment is not conducive, and the costs pose a significant barrier.

In the Gaborone workshop, a session on regional experiences with CDM and CCS was held. Heleen de Coninck introduced the CCS projects that had been submitted to the CDM Executive Board so far. Marco Lotz (University of Pretoria, Promethium Carbon) noted that carbon trading is still a new concept in Africa, and that CCS is almost fully unknown. Demand from the EU market for coal-based power with less CO<sub>2</sub> emissions could be a driver for CCS in Africa. There are point sources and storage capacity in South-Africa. However Africa needs 'Africa-solutions' and therefore use of CO<sub>2</sub> for cultivation of algae and biodiesel should also be considered. Jaco Liebenberg (SASOL) thinks the market forces for CCS are not there at the moment, and notes the need to work together in order to take the technology into the market. W. Zhakata (Zimbabwe Climate Change Office) reiterates the concerns raised by NGOs, as explained by Mr. Thorne and Mr. Nanasta earlier, and notes the need for extensive consultation with local stakeholders. Leluma Matooane (South African DNA) says that South Africa supports inclusion of CCS under the CDM, but that the pending issues need to be sorted out.

- Presentations:
  - De Coninck: [CCS and CDM in the UNFCCC](#)
  - Lotz: [CCS and CDM: Regional experiences](#)
  - Zhakata: [Climate change in Zimbabwe](#)
  - Matooane: [South Africa's DNA for the Clean Development Mechanism](#)

## 4.2 Salient points from discussion

In the panel discussions on CCS opportunities in Africa the following points were raised:

- The priority for Africa is economic development. In the field of climate change, Africa's priority is adaptation, not mitigation. However, for both economic development and adaptation to climate change, increase in energy consumption is necessary. As far as CCS can help this the technology could be useful, but climate change mitigation is not a priority for the continent.
- If insufficient incentives are given, CCS may increase the cost of electricity to consumers. This is a cause of concern among participants. There is a need to get more certainty of the cost of the different CCS options, also those outside of the electricity sector.
- In case CCS would be eligible under CDM, there should be proper accounting for seepage, e.g. by discounting the CERs.
- Several issues regarding liability for monitoring and accounting of GHG reductions over long time scales are discussed. In Norway (host of the Sleipner and Snøhvit CCS projects) the Petroleum Act gives guidance for these issues, but after productivity of the gas fields has ceased the government takes over responsibility. The question is whether such a model could be replicated in African countries.
- The CDM is the only mechanism currently that has the potential to incentivise CCS in Africa. In that light inclusion of CCS should be considered by UNFCCC parties.
- Early demonstration projects in the African region could help build more confidence in the technology; funds could be set up to support this if the CDM incentive is insufficient.
- More capacity building on CCS is necessary. Also developing a detailed atlas of suitable storage sites in Africa would be useful.
- South Africa is hosting a meeting of the Carbon Sequestration Leadership Forum in April 2008 and an invitation to all participants is expressed.



Figure 4.1 *Discussing CCS opportunities in Africa.*

## 5. The Clean Development Mechanism in Africa

Part of the first day and the entire second day of the regional workshops was allotted to CDM related topics and this chapter gives the main points.

### 5.1 Main messages from presentations

Kishor Rajhansa (UNFCCC Secretariat) gave a general introduction to the Clean Development Mechanism. He explained the institutional setting around the CDM including the CDM Executive Board, Designated Operational Entities, project participants and Designated National Authorities. In the CDM project cycle each of these parties has their own role. A large range of technologies in different sectors can be implemented in projects developed under the CDM. In recent years there is a rapid development in the project pipeline and the Certified Emission Reductions generated by these. Also the number of Kyoto Protocol Parties which are host countries to CDM projects has increased significantly. Africa however is lagging behind compared to other regions such as Asia and Latin America. Considerable progress has been made in development of baseline and monitoring methodologies. Further progress is needed by more attention for the market issues (such as the recently started CDM Bazaar) and improvement in the methodologies and the design of the CDM (e.g. Programmes of Activities).

- Presentation: [Introduction to CDM](#)

Stefan Bakker (Energy research Centre of the Netherlands) focussed on market development in the CDM. In 2006, the total value of the CDM market was nearly € 4 billion. As of September 2007, over 2400 CDM projects have been submitted for validation, projected to generate more than 2000 MtCO<sub>2</sub>-eq until 2012. These projects exhibit a large diversity in technologies and Mr. Bakker highlighted the difference between the projects reducing CO<sub>2</sub> emissions and those that abate non-CO<sub>2</sub> GHGs. The former tend to be associated with greater sustainable development benefits. Until recently, non-CO<sub>2</sub> greenhouse gas projects have dominated the CER portfolio, but this has started to change over the past two years, leading to an increasing share of energy efficiency and renewable energy projects. Africa currently has about 4% of the CDM market. Although uncertainties are large, there are some signs that there will be significant demand for CERs after 2012.

- Presentation: [Developments in the CDM market](#)

Although their smaller scale generally makes them less economically viable, small-scale CDM projects have advantages over large-scale projects, as presented by Nogoye Thiam (ENDA) and Norbert Nziramasanga (Southern Centre for Energy and Environment). The COP/MOP has enacted reduced requirements for small-scale Project Design Documents, as well as simplified procedures for the baseline methodologies, which reduces transaction cost significantly. Another option to limit transaction cost is bundling of several activities into one small-scale CDM project activity. Programmatic CDM (officially called 'CDM Programme of Activities' or PoAs) is currently under development and will improve the opportunity to earn CERs for bodies implementing a policy or measure. A special PDD for PoAs and other modalities and procedures are available on the [cdm.unfccc.int](http://cdm.unfccc.int) website.

- Presentations:
  - Thiam: [Projets de faible ampleur, regroupement, et MDP Programmatique](#)
  - Nziramasanga: [Modalities for small-scale CDM projects](#)

Massamba Thioye (private consultant and member of the CDM Methodologies Panel) and Peter Zhou (EECG) gave presentations explaining the details of filling in a Project Design Document. They emphasised the importance of the PDD as the key document which is uploaded to the UNFCCC website and is reviewed by stakeholders. It needs to contain succinct information regarding the project location, implementation and monitoring, and how the project reduces GHG emissions. It should describe how it applies an approved baseline and monitoring methodology for the

relevant project, and give a plausible proof that the project is additional (i.e. that it would not be implemented without help of the CDM). For the latter the CDM Executive Board has developed a special tool that should be applied. The formulae for calculation of the emission reductions should be given in a clear and consistent fashion. Transparency, conservativeness, completeness and clear language are important aspects of a good PDD.

- Presentations:
  - Thiye: [Elaboration de projet MDP](#)
  - Zhou: [Practical guidance: how to prepare a PDD?](#)

Djiminigué Nanasta (ENDA) and Prabhat Upadhyaya (The Energy Research Institute, India) presented their views on the under-representation of African countries in the CDM. Even though there is significant potential in all sectors to reduce GHG emissions, only 21 out of 771 registered CDM projects are in Africa. This can be explained by a number of barriers including uncertain investment climate, lack of awareness among governments and project developers as well as DNAs that are not established or not proactive, non-conducive regulatory frameworks, lack of straightforward approval procedures, and weak economies. Several capacity building activities from a range of international institutions have been initiated to help overcoming these barriers. Also the Nairobi Framework of Action was launched at COP/MOP2 in 2006 in order to improve African participation in the CDM. UNEP, UNDP and the African Development Bank, among others, are involved in capacity building activities including training, policy development and creating successful CDM projects. Some lessons can be learned from India, where CDM has flourished from the beginning. The success of CDM in India can be explained by many capacity building programmes, a proactive DNA and enthusiastic industry, but also a growing economy, policy support and media attention.

- Presentations:
  - Nanasta: [CDM in Africa and the Nairobi Framework of Action](#)
  - Upadhyaya: [CDM in Africa: Learnings from India](#)

## 5.2 Breakout group outcomes

During the second day of the workshops, the participants grouped in breakout sessions to elaborate the key elements of a PDD for potential CDM projects in four different sectors.

In Dakar the four selected case studies by the breakout groups were:

- Small-scale renewable energy for the user in Mali: off-grid electrification of 10 villages.
- Energy efficiency improvement of a diesel power plant by waste heat utilisation and combustion optimisation.
- A landfill gas capture and electricity generation project in Dakar.
- CO<sub>2</sub> capture and storage from a new gas-fired power station in Ivory Coast, combined with enhanced oil recovery.

The four break-out groups in Gaborone discussed on the following scopes:

- Small-scale renewable energy. a small hydro project (10MW) in Zambia displacing a 5MW diesel generator.
- The Energy Efficiency group discussed an energy-efficient lighting project using CFL displacing incandescent lamps at a mine environment in Zimbabwe.
- The waste sector group discussed a project involving abattoir waste that is currently partially managed- transforming that to methane capture and use to displace use of diesel in incinerators in Botswana.
- The CCS group discussed a potential project to capture CO<sub>2</sub> from a power plant and transporting it for storage in a saline aquifer (sealed by a cap rock) more than 800m deep.

During the feedback session all groups reported on the issues they came across while filling in a PDD for their case studies. It turned out to be an interesting learning experience for everyone. An important obstacle was the development of a new baseline methodology or the choice for an existing methodology. Identifying which scenario reasonably represents the baseline scenario stirred

strong debate. For small-scale projects this process is simpler but can still pose challenges. More guidance to different sections in a PDD would be necessary.

When the baseline scenario has been identified the framework for calculation of the baseline emissions and the project emissions should be set up. In order to do this the project boundary has to be determined. All relevant emission sources need to be within the project boundary and should be accounted for. If there are sources of emissions outside the boundary that arise as a result of the CDM project, these need to be taken into account as leakage. When all formulae have been identified the emission reductions by the project can be determined.

Demonstrating additionality of the proposed CDM project is linked to determination of the baseline scenario but still may pose challenges. For large-scale projects, the additionality tool should be followed. As part of that, project proponents may choose to use the investment analysis or the barrier analysis. For small-scale project the combined tool for baseline and additionality can be used, which includes applying simple barrier analysis.

### 5.3 Salient points from discussions

Several aspects of CDM were discussed:

- Though apparently there is a large potential for afforestation and reforestation in Africa (notable the Congo basin), there are only a handful of projects ongoing. This can be explained by the fact that only relatively recently the first methodologies for these projects have been approved. In addition some projects have been criticised because of negative social impacts, which has deferred project developers. Forestry projects are slowly increasing in number. Avoided deforestation projects are currently not eligible under the CDM, their inclusion is under consideration and may provide opportunities for African countries.
- Production of biofuels is taking off in the CDM, and has generated interest from workshop participants. There are however concerns that energy crops will compete with other agricultural activities. There is potential in African regions for utilisation of degraded land for biofuel production.
- Programmatic CDM may increase opportunities for Africa to develop more CDM projects in fields such as biofuels and rural electrification.
- There was interest in the experience of South Africa in relation to CDM approval process and their DNA role. In that respect participants wanted to know:
  - Has there been a study on CDM barriers in South Africa? A study on the review of Sustainable Development indicators has been conducted and another one on the review of taxation of Certified Emission Reductions (CER).
  - How did the South African DNA manage to support so many CDM projects? The DNA assists developers to fast-track the process; project developers are not required to submit validation to allow fast-tracking. The time frame for the project cycle to be finalised is about 8 months.
  - How did South Africa convince politicians to establish a DNA? There is clear cooperation between government and private sector.
  - How is South Africa assisting other DNAs in the region, is it at a cost, and how much time do they devote to assistance? The South African DNA assists by capacity building and sharing experiences when invited to workshops.



Figure 5.1 *Participants discussing CDM methodologies in a breakout session in Gaborone.*

## 6. Major outcomes

### 6.1 How to boost CDM in Africa?

The lively discussions around the panel sessions on CDM in Africa raised general recognition and many suggestions for improvement from the panellists and participants, of which the major points are summarised below.

- The capacity for expanding CDM opportunities is there in Africa but requires coordination between national and local governments, the private sector and CDM experts. The important role of the DNAs is generally recognised: a proactive and cooperative DNA with clear project approval procedures can attract CDM project developers and investors. In many African countries this could be improved, though the available capacity and resources may pose challenges. In addition more readily available data such as grid emission factors would help in developing PDD for CDM projects.
- There is a need for Africa to see CDM as a business investment opportunity, as an opportunity to support development not just ecological perspective- that is why CDM is flourishing where the business environment is well developed.
- A number of successful demonstration projects that CDM is working well will provide more confidence to project developers and investors, and could work as a lever for further CDM development in Africa.
- Africa needs to identify CDM champions (i.e. flagships projects), identify their CDM potential, and support project development. CDM experts from African countries play a key role in disseminating information and more experts with good networks with business and governments are needed. 'Centres of Excellence' and African DOEs could help. Africa does not need more workshops, but more practical assistance in developing CDM projects.
- Africa regions suffer from a 'bad image' where unstable countries provide for a risky environment to invest in. This image needs to be improved. Africa will not attract more CDM projects if the investment climate is not improved.
- Finance is available through the African Development Bank (AfDB) but the bank has not yet capacity to implement projects -AfDB is now establishing a climate change unit in the environment unit that could handle issues of CDM. The African Union (AU) has also a Memorandum of Understanding with AfDB as the implementing agency for climate change and this is to be executed through regional economic communities (RECS). There is therefore an opportunity for RECS to spearhead CDM especially for bundling regional projects.
- There are also significant resources being channelled to Africa for fossil fuel production activities. It could be an opportunity to tap on those opportunities to help CDM along.
- It is generally recognised that CDM will continue beyond 2012 as some strong non-Annex I countries are quite advanced in promoting CDM and Annex I countries have expressed clear indications that CERs will continue to be used, ensuring demand for CDM projects after 2012. New developments in CDM such as Programmatic CDM and the possible eligibility of avoided deforestation could provide valuable opportunities for African countries.

### 6.2 What is the relevance of CCS for Africa?

Extracting the most relevant issues from the discussions shedding light on relevance of CCS for African countries, the following conclusions can be drawn:

- Only if CCS can be aligned with African priorities, Africa should grab the opportunity to implement it. It is very clear, however, that climate change mitigation is not a top priority given Africa's circumstances.
- There is potential for CO<sub>2</sub> capture from point sources in many African countries, as well as significant CO<sub>2</sub> storage potential in some regions. In addition, enhanced oil/gas recovery or enhanced coal mine methane provide interesting opportunities for synergies between climate

change mitigation and fossil fuel resource utilisation. Distance between sources of CO<sub>2</sub> and potential storage reservoirs, however, might be long and more research is needed to study the underground storage potential.

- The CDM is the only mechanism currently that has the potential to provide incentives for CCS in Africa. Unless some other mechanism is developed for CCS deployment, inclusion of CCS in the CDM is essential if CCS is to be deployed in Africa.
- Early demonstration projects in the African region could help build more confidence in the technology and develop the governmental capacity to regulate CCS. However, incentives to overcome the costs would need to be in place.
- Further opportunities to hold similar forums of exchange of experiences and monitor progress with regard to CCS should be used. Power utilities should be involved particularly as they are the likely beneficiaries of CCS.

### 6.3 What's next after the workshops?

For the way forward, the participants and their resource persons suggested the following:

- Maintain and continue the network of participants through the website [www.ccs-africa.org](http://www.ccs-africa.org); as a platform for sharing information.
- A position paper based on the two workshops (led by EECG and ENDA) is aimed to be presented at the Abuja African Negotiators forum, as a way to make inputs to these negotiators before COP13/MOP3, December 2007 in Bali.
- It was also suggested that use should be made of the Forum of Energy Ministers of Africa (FEMA) and African Ministers of Environment (AMCEN) as forums to spearhead CDM.
- Engage regional economic communities in future similar workshops.
- Recognising the importance of the media attention to inform the general public, more journalists can be included in future workshops for more publicity.

## Appendix A Workshop programmes

6 - 7 September 2007, Hôtel Ngor-Diarama, Dakar, Senegal

Co-chairs:

Brendan Beck (IEA GHG)

Ndiaye Cheikh Sylla Deputy Director of Environment Senegal

### Day 1 Introduction to CCS and the CDM

	<i>Time</i>	<i>Title</i>	<i>Speaker</i>
9:00	9:45	Introductory talks by local officials	Jean Philippe Thomas (ENDA) Ndiaye Cheikh Sylla (Deputy Director of Environment-Senegal) Mbaye Diagne (President of COMNAC)
9:45	10:15	IPCC Fourth Assessment Report: Mitigation of Climate Change	Ogunlade Davidson (IPCC)
10:15	10:45	<i>Coffee/tea break</i>	
10:45	11:15	Introduction to the CDM <ul style="list-style-type: none"> <li>• What is the CDM and how does it work?</li> <li>• What kinds of projects are implemented under the CDM?</li> </ul>	Kishor Rajhansa (UNFCCC)
11:15	11:50	CDM market developments	Stefan Bakker (ECN)
11:50	12:15	IPCC Special Report on CO <sub>2</sub> capture and storage	Ogunlade Davidson (IPCC)
12:15	12:45	CCS Technology: Capture, transport and storage of CO <sub>2</sub>	Brendan Beck (IEA GHG)
12:45	13:30	<i>Lunch break</i>	
13:30	13:50	Costs and economics of CCS	Heleen de Coninck (ECN)
13:50	14:10	Risks and environmental aspects of CCS	Wolfgang Heidug (Shell)
14:10	14:30	CCS and local sustainable development impacts	Louis Seck (Direction de l'Energie-Senegal)
14:30	15:00	International policy aspects of CCS <ul style="list-style-type: none"> <li>• EU Emissions Trading Scheme, regulatory development, R&amp;D</li> <li>• IPCC National Inventory Guidelines</li> <li>• London Convention and OSPAR</li> </ul>	Tim Dixon (UK DBERR)
15:00	15:15	Discussions	
15:30	16:00	<i>Coffee/tea break</i>	
15:00	16:30	Policy aspects of CCS in the CDM/NGO perspective	Djimingué Nanasta (ENDA)
16:30	18:00	Panel discussion on risks and opportunities of CCS in West Africa	Frede Cappelen (Statoil) Tim Dixon (UK DBERR) Massamba Thioue (Consultant and Meth Panel) Djimingué Nanasta (ENDA)

*Day 2 Developing a CDM project*

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Time	Title	Speaker	
9:00	9:30	Small-scale projects, bundling, and programmatic CDM	Nogoye Thiam (ENDA)
9:30	10:00	Practical guidance: how to prepare a PDD?	Massamba Thiolye (Consultant/member of CDM Meth Panel)
10:00	10:15	Introduction to the breakout sessions	Libasse Ba (ENDA)
10:30	13:00	Breakout groups; try to fill in a PDD <ul style="list-style-type: none"><li>• Small-scale renewable energy</li><li>• Energy efficiency</li><li>• Waste sector</li><li>• CO<sub>2</sub> capture and storage</li></ul>	Supervised by project partners and/or CDM-related speakers; rapporteur from the group.
13:30	15:00	<i>Lunch break</i>	
15:00	15:45	Feedback session (15 minutes per group), and discussion	Group rapporteurs
15:45	16:15	CDM, Africa and the Nairobi Framework of Action	Djimingué Nanasta (ENDA)
16:15	18:00	Panel discussion: How to boost CDM in Africa?	Jean Philippe Thomas (ENDA) Maguette KAIRE (COMNAC: National CC committee) Massamba Thiolye (Consultant/member of CDM Meth Panel) Aliou BA (CSE and Chairman of national Carbone Committee) Djimingué Nanasta (ENDA)
17:15	17:30	Wrap-up, follow-up and vote of thanks	Co-chairs, Libasse Ba, Heleen de Coninck

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## 10 - 11 September 2007, Boipuso Hall Fairgrounds, Gaborone, Botswana

Co-chairs:

Brendan Beck (IEA GHG)

Balisi Gopolang (Ministry of Environment, Wildlife and Tourism)

### *Day 1 Introduction to CCS and the CDM*

<i>Time</i>	<i>Title</i>	<i>Speaker</i>	
8:30	9:00	Introductory talks by local officials	Hon. Kitso Mokaila (Minister of Environment, Wildlife and Tourism) Mr. Selotlegeng (Secretary Ministry of Environment, Wildlife and Tourism)
9:00	9:30	IPCC Fourth Assessment Report: Mitigation of Climate Change	Ogunlade Davidson (IPCC)
9:30	10:00	Introduction to the CDM <ul style="list-style-type: none"> <li>• What is the CDM and how does it work?</li> <li>• What kinds of projects are implemented under the CDM?</li> </ul>	Kishor Rajhansa (UNFCCC)
10:00	10:30	CDM market developments	Stefan Bakker (ECN)
10:30	11:00	<i>Coffee/tea break</i>	
11:00	11:30	IPCC Special Report on CO <sub>2</sub> capture and storage	Ogunlade Davidson (IPCC)
11:30	12:00	CCS Technology: Capture, transport and storage of CO <sub>2</sub>	Brendan Beck (IEA GHG)
12:00	12:20	Costs and economics of CCS	Heleen de Coninck (ECN)
12:20	12:40	Risks and environmental aspects of CCS	Wolfgang Heidug (Shell)
12:40	13:30	<i>Lunch break</i>	
13:30	14:00	International policy aspects of CCS <ul style="list-style-type: none"> <li>• EU Emissions Trading Scheme, regulatory development, R&amp;D</li> <li>• IPCC National Inventory Guidelines</li> <li>• London Convention and OSPAR</li> </ul>	Tim Dixon (UK DBERR)
14:00	14:30	CCS and sustainable development	Steve Thorne (SouthSouthNorth)
14:30	15:00	<i>Coffee/tea break</i>	
15:00	15:05	Introduction to CCS proposals under CDM	Heleen de Coninck (ECN)
15:05	16:00	Regional experiences with CDM and CCS	Marco Lotz (CSIR/Promethium) Jaco Liebenberg (Sasol) Mr. W. Zhakata (DNA Zimbabwe) Leluma Matoane (DNA SA)
16:00	17:00	Panel discussion on risks and opportunities of CCS in Southern Africa	Above panel, expanded with Frede Cappelen (Statoil) Geoff Stiles (Marbek) Jon Duncan (ERM)

*Day 2 Developing a CDM project*

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	Time	Title	Speaker
9:00	9:30	Small-scale projects, bundling, and programmatic CDM	Norbert Nziramansanga (SCEE)
9:30	10:00	Practical guidance: how to prepare a PDD?	Peter Zhou (EECG)
10:00	10:15	Introduction to the breakout sessions	Peter Zhou (EECG)
10:30	13:00	Breakout groups; try to fill in a PDD <ul style="list-style-type: none"><li>• Small-scale renewable energy</li><li>• Energy efficiency</li><li>• Waste sector</li><li>• CO<sub>2</sub> capture and storage</li></ul>	Supervised by project partners and/or CDM-related speakers; rapporteur from the group.
13:00	14:00	<i>Lunch break</i>	
14:00	15:30	Feedback session (15 minutes per group), plus discussion	Group rapporteurs
15:30	16:00	<i>Coffee/tea break</i>	
16:00	16:25	CDM, Africa and the Nairobi Framework of Action: Lessons from India	Prabhat Upadhyaya (TERI)
16:25	17:30	Panel discussion: How to boost CDM in Africa?	Angela Kabuswe (DNA Zambia) Naushaad Harripersaad (Eskom) Enoch L. Liphoto (City of Johannesburg) James Wakaba (ESDA) Ogunlade Davidson (IPCC)
17:15	17:30	Wrap-up, follow-up and vote of thanks	Co-chairs, Peter Zhou, Heleen de Coninck

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## Appendix B List of participants

	Workshop	First name	Last name	Organisation	Country
1	Dakar	Safiri	Ibouraima	Ministère de L'Environnement et de la Protection de la Nature (MEPN)	Benin
2	Gaborone	Balisi	Gopolang	Dept of Meteorology	Botswana
3	Gaborone	Wanano	Kenneth	EECG Consultants Pty Ltd -	Botswana
4	Gaborone	Farai	Manwa	Business Support Centre	Botswana
5	Gaborone	Mrs.	Masisi	Dept of Meteorology	Botswana
6	Gaborone	Moore	Moffat	Department of Waste Management & Pollution Control	Botswana
7	Gaborone	Kitso	Mokaila	Ministry of Environment, Wildlife and Tourism	Botswana
8	Gaborone	D.F.	Molotsi	Dept of Meteorology	Botswana
9	Gaborone	Mrs.	Monaka	Dept of Meteorology	Botswana
10	Gaborone	Washington	Mupita	BMC	Botswana
11	Gaborone	Justice	Ofentse	BMC	Botswana
12	Gaborone	Mr.	Phage	Dept of Meteorology	Botswana
13	Gaborone	Anne	Poret	Business Support Centre	Botswana
14	Gaborone	Gladys	Ramothlwa	Former Director Meteorology	Botswana
15	Gaborone	Mr.	Selotlegeng	Ministry of Environment, Wildlife and Tourism	Botswana
16	Gaborone	O.M.	Seretse	University of Botswana	Botswana
17	Gaborone	Tich	Simbini	Biofuels Botswana	Botswana
18	Gaborone	Tiroyaone	Tshukudu	Department of Waste Management & Pollution Control	Botswana
19	Gaborone	Peter	Zhou	EECG Consultants Pty Ltd -	Botswana
20	Dakar	Isidore B.	Zongo	Secretariat Permanent du Conseil National pour l'Environnement et le Développement Durable (SP/CONEDD)	Burkina Faso
21	Dakar	Serge	Nzali	Institut Africain Pour La Promotion des modes de Production et de Consommation Durables (P&CD)	Cameroon
22	Dakar	Trazié Lou Bozié Rachel	Boti	Ingénieur d'Etat en Agronomie spécialisation en pédologie Agence Nationale de l'Environnement (ANDE)	Côte d'Ivoire
23	Dakar	Bagaman	Kassi	Société d'Opération Ivoirienne d'Electricité (SOPIE)	Côte d'Ivoire
24	Dakar	Gaius	Elenga Bolumbu Entanga	Ministère de l'Environnement Direction de Développement Durable	Democratic Republic of Congo
25	Dakar	Théophile	Tshiani Kabeya	Responsable Environnement, Société National de l'Electricité SNEL	Democratic Republic of Congo

Workshop	First name	Last name	Organisation	Country
26 Dakar	Kemo Kending	Ceesay	Energy department	Gambia
27 Dakar	Amie	Jarra	Department of water resources	Gambia
28 Dakar	Bah FM	Saho	Energy department	Gambia
29 Dakar	Maren	Kügler	Eutech Energie & Management GmbH	Germany
30 Dakar and Gaborone	Kishor	Rajhansa	UNFCCC	Germany
31 Gaborone	Sebastian	von Wolff	OneCarbon	Germany
32 Dakar	Alioune	Dabo	Direction Nationale des Hydrocarbures Ministère de l'Energie et de l'Hydraulique	Guinea
33 Dakar	Moussa Kabassan	Keita	Responsable MDP Ministère Agriculture, Elevage, Environnement, Eaux et Forets	Guinea
34 Dakar	Celedonio Placido	Vieira	Entreprise National de Prospection et Exploitation du Pétrole et Gaz - PETROGUIN EP	Guinea Bissau
35 Gaborone	Prabhat	Upadhyaya	The Energy and Resources Institute (TERI)	India
36 Gaborone	James	Wakaba	Energy for Sustainable Development in Africa	Kenya
37 Gaborone	Leon Nkhatho	Ramatekoa	National Environmental Secretariat	Lesotho
38 Dakar	Boubacar Sidiki	Dembele	Point focal MDP : Secrétariat technique permanent (STP /CIGQE)	Mali
39 Dakar	Moulaye Ahmed	Sbaï ould EL MEDANI	Fédération des Bâtiments et Travaux Publics	Mauritania
40 Dakar	Alioune	Ewbek	Union des Producteurs Agricoles	Mauritania
41 Dakar	Baye	Fall	Point Focal UNFCCC : Ministère de l'Environnement	Mauritania
42 Gaborone	James Claudio	Bernardo da Conceicao	Petromoc - Petroleos de Mozambique, SA Praca dos Trabalhadores. 09 Maputo	Mozambique
43 Gaborone	Boaventura	Cuamba	Eduardo Mondlane University, Department of Physics	Mozambique
44 Gaborone	Sergio Jeremias	Elisio	Eduardo Mondlane University	Mozambique
45 Gaborone	Gloudi	de Beer	NAMPOWER	Namibia
46 Gaborone	Danie	Louw	NAMPOWER	Namibia
47 Gaborone	Leefa	Ndilula	Namibia's Renewable Energy Program (NAMREP)	Namibia
48 Dakar and Gaborone	Stefan	Bakker	Energy research Centre of the Netherlands (ECN)	Netherlands
49 Dakar and Gaborone	Heleen	de Coninck	Energy research Centre of the Netherlands (ECN)	Netherlands

	Workshop	First name	Last name	Organisation	Country
50	Dakar and Gaborone	Wolfgang	Heidug	Shell International Renewables B.V.	Netherlands
51	Dakar	Moussa	Gousmane	Secrétariat Exécutif du Conseil National de l'Environnement pour un Développement Durable	Niger
52	Dakar	Andrew I.	Ayeni	Federal Ministry of Environment; Climate Change Division Environment House	Nigeria
53	Dakar and Gaborone	Frede	Cappelen	Statoil	Norway
54	Dakar	Aliou	BA	EDEN Group International	Senegal
55	Dakar	Libasse	Ba	ENDA	Senegal
56	Dakar	Pape Alassane	Deme	Direction de l'Energie	Senegal
57	Dakar	M'baye	Diagne	Directeur Général Adjoint de SUNEOR	Senegal
58	Dakar	Yacine	Diagne	ENDA	Senegal
59	Dakar	Cheikh	Dieng	Direction des Eaux Forêts Chasse et Conservation des Sols	Senegal
60	Dakar	Aby	Dramé	ENDA	Senegal
61	Dakar	Aliou	Fall	Industries Chimiques du Sénégal	Senegal
62	Dakar	Ousmane	Fall Sarr	Ministere de l'Energie	Senegal
63	Dakar	Mme Fatou Diaw	Guene	Ministry of Environment	Senegal
64	Dakar	Fatima	Kaba	ENDA	Senegal
65	Dakar	Maguette	Kaïré	Institut Senegalais de Recherche Agricole	Senegal
66	Dakar	Mamadou	Khouma	Directeur du Projet GHG	Senegal
67	Dakar	Mamadou	Mangane	Direction Nationale de la météorologie	Senegal
68	Dakar	Djimingué	Nanasta	ENDA	Senegal
69	Dakar	Fallou	Ndiaye	Ecole Supérieur Polytechnique	Senegal
70	Dakar	Moussa	Saleh	Ecole Supérieur Polytechnique	Senegal
71	Dakar	Louis	Seck	Direction de l'Energie	Senegal
72	Dakar	Alassane	Sene	Direction Nationale de la météorologie	Senegal
73	Dakar	Amadou Chimere	Siby	TAMOIL - Senegal	Senegal
74	Dakar	Ndiaye Cheikh	Sylla	Ministry of Environment	Senegal
75	Dakar	Nogoye	Thiam	ENDA	Senegal
76	Dakar	Massamba	Thioye	Consultant; Meth Panel member	Senegal
77	Dakar	Jean-Philippe	Thomas	ENDA	Senegal
78	Dakar	Assize	Touré	Centre de Suivi Ecologique-Dakar	Senegal

Workshop	First name	Last name	Organisation	Country
79 Dakar	Abdoulaye	Wele	CSE	Senegal
80 Dakar	Tommy	Braima	Meteorological department	Sierra Leone
81 Dakar and Gaborone	Ogunlade	Davidson	IPCC/University of Sierra Leone	Sierra Leone
82 Gaborone	Francois	Cornish	FPCTECH(SA) Pty Ltd / IEC Trust	South Africa
83 Gaborone	Pieter	Du Toit	CIC ENERGY CORP	South Africa
84 Gaborone	Jon	Duncan	ERM	South Africa
85 Gaborone	Richard	Emmanuel	FPCTECH(SA) Pty Ltd / IEC Trust	South Africa
86 Gaborone	Liesl	Halley	Sasol Petroleum International	South Africa
87 Gaborone	Naushaad	Haripersad	ESKOM HOLDINGS Ltd.	South Africa
88 Gaborone	Alex	Hetherington	Alex Hetherington Media	South Africa
89 Gaborone	Nnnesi Anna	Kgabi	NorthWest University	South Africa
90 Gaborone	Lesole	Kgobane	Department of Minerals and Energy, Coal and Gas Directorate	South Africa
91 Gaborone	Jaco	Liebenberg	Sasol Petroleum International	South Africa
92 Gaborone	Enoch Lerato	Liphoto	Climate Change & Cleaner Production, City of Johannesburg	South Africa
93 Gaborone	Marco	Lotz	CSIR/ Promethium Carbon	South Africa
94 Gaborone	France	Maleme	The Green House Project	South Africa
95 Gaborone	Leluma	Matooane	Designated National Authority, Department of Minerals & Energy	South Africa
96 Gaborone	Anthony	Miller	CIC ENERGY CORP	South Africa
97 Gaborone	Stanford	Mwakasonda	ERC, University of Capetown	South Africa
98 Gaborone	Martin	Sebakwane	North West African Farmers Union	South Africa
99 Gaborone	Geoff	Stiles	Marbek Resource Consultants Africa Ltd.	South Africa
100 Gaborone	Steve	Thorne	SSN SouthSouthNorth (Africa)	South Africa
101 Gaborone	Freddy Milambo	Tshiala	University of Pretoria	South Africa
102 Dakar	Alexandre	Lopez	Ecosecurities	Spain
103 Dakar	Esso-Sam Abdou-Rassidou	Agrignan	Gestionnaire, Ministère de l'environnement et des ressources forestières	Togo
104 Dakar	Sena	Alouka	Directeur exécutif Jeunes volontaires pour l'environnement	Togo
105 Dakar	Kossivi Uwolowudu	Essiomle	Coordonnateur National du Projet ANCR	Togo
106 Dakar	Afêtom	Passem	Ingénieur en Management de l'Environnement, Communauté Electrique du Bénin (CEB)	Togo
107 Dakar	Rachid	Tcheou	Administrateur Général ONG - GLOBE VERT	Togo

Workshop	First name	Last name	Organisation	Country
108 Gaborone	Jane	Nimpamyia	Ministry of Energy and Mineral Resources, Coordinator of FEMA,	Uganda
109 Dakar and Gaborone	Brendan	Beck	IEA GHG R&D Programme	United Kingdom
110 Dakar and Gaborone	Tim	Dixon	Department of Business, Enterprise and Regulatory Reform	United Kingdom
111 Gaborone	Angela C	Katongo Kabuswe	Ministry of Tourism Environment & Natural Resources	Zambia
112 Gaborone	Michael	Mulasikwanda	Dept of Energy, Ministry of Energy & Water Development	Zambia
113 Gaborone	Maka	Sikazwe	Dept of Energy, Ministry of Energy & Water Development	Zambia
114 Gaborone	Harley	Walimwipi	Centre for Energy, Environment and Engineering Zambia Ltd. (CEEEZ)	Zambia
115 Gaborone	Bothwell	Batidzirai	Chinhoyi University of Technology	Zimbabwe
116 Gaborone	Lasten	Mika	Practical Action	Zimbabwe
117 Gaborone	Cornelius	Mzezewa	EnerConsult	Zimbabwe
118 Gaborone	Partridge	Ndemera	Ministry of Energy and Power Devt	Zimbabwe
119 Gaborone	Lovemore	Nyahuma	Zimbabwe Electricity Supply Authority (ZESA)	Zimbabwe
120 Gaborone	Norbert	Nziramasaanga	Southern Centre for Energy and Environment (SCEE Washington )	Zimbabwe
121 Gaborone	Kate	Porter	Somarelang Tikologo	Botswana
122 Gaborone	Washington	Zhakata	Climate Change Office, Ministry of Environment and Tourism	Zimbabwe