

Long Term Mitigation Scenarios

Process Report

Prepared for:
Department of Environment Affairs and Tourism
South Africa



Prepared by:
S Raubenheimer
(On behalf of the Energy Research Centre)



**Long-Term
Mitigation
Scenarios**

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The suite of reports that make up the Long Term Mitigation Scenario study include the following:

- A Long Term Mitigation Scenarios for South Africa
- B Technical Summary
- C Technical Report
- C.1 Technical Appendix
- D Process Report

The study was supported by the following inputs:

LTMS Input Report 1: Energy emissions

LTMS Input Report 2: Non-energy emissions: Agriculture, Forestry and Waste

LTMS Input Report 3: Non-energy emissions: Industrial Processes

LTMS Input Report 4: Economy-wide modeling

LTMS Input Report 5: Impacts, vulnerability and adaptation in key South African sectors

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1. The challenge of greenhouse gas emissions mitigation

Climate change is one of the greatest threats to our planet and to our people. South Africa is especially vulnerable to the impacts of climate change. At the same time South Africa emits high quantities of the greenhouse gases which are causing climate change: in fact our country is one of the highest emitters per capita per GDP in the world. We are helping to cause the problem and we are also vulnerable to the projected impacts of climate change.

Reducing emissions of greenhouse gases is called mitigation. Responding to the impacts of climate change is called adaptation. The Long Term Mitigation Scenario Process refers primarily to the challenge of mitigation. A certain amount of adaptation will be necessary, no matter what we do. But it is also true that there will come a point where it will not be possible to adapt our way out of the problem.

South Africa is an active participant in the international process of combating climate change and regulating the emissions of greenhouse gases. We are signatories to the United Nations Framework Convention on Climate Change as well as the Kyoto Protocol. We take the issue of climate change very seriously and have shown world leadership in the UN negotiations. If we do not take action, others are less likely to. But climate policy in South Africa must also take into account national priorities, notably sustainable development and economic growth.

Under the Kyoto Protocol, at least until 2012, we, together with most developing countries, have no binding greenhouse gas mitigation obligations. However this is likely to change some time after 2012, and means that at some point South African may be required to start cutting its emissions. For example, at their recent summit, the G8 leaders made clear that they expect to work with the 'major emerging economies' on climate action. The heads of state of Brazil, China, India, Mexico and South Africa stated that "we remain committed to contribute our fair share to tackle climate change in order to stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system".

Between now and 2009, South Africa will be required to engage deeply with the issue of mitigation obligations. We will need to be ready and prepared, armed with a detailed plan and sets of negotiation positions. This plan will have to contribute to the international effort to lower emissions while meeting the development needs, especially of our poorer communities. We need to connect energy needs, mitigation plans, and initiatives such as the Accelerated and Shared Growth Initiative. We need to accurately determine the costs, benefits, and opportunities for mitigation activities.

In this context, the findings for the Stern Review on the economics of climate change are significant – that the costs of action (ranging around 1% of GDP) are far outweighed by the costs of inaction – 5 to 20% of GDP. In other words, the costs of stabilizing the climate are significant, but manageable; delay would be dangerous and much more costly. The former World Bank economist concluded that "tackling climate change is the pro-growth strategy for the longer term" and that mitigation can be undertaken in a manner that does not cap the development aspirations rich or poor countries.

2. LTMS: response to the challenge

In response to the challenge of climate change, Cabinet mandated a national process of building scenarios of possible future mitigation actions by SA, informed by the best available research and information. This mandate was issued in March 2006.

The Long-Term Mitigation Scenario (LTMS) process was established to implement this mandate. The LTMS has three objectives:

1. **South African stakeholders understand and are focused on a range of ambitious but realistic scenarios of future climate action both for themselves and for the country, based on best available information, notably long-term emissions scenarios and their cost implications;**
2. **The SA delegation is well-prepared with clear positions for post-2012 dialogue; and**
3. **Cabinet can approve (a) a long-term climate policy and (b) positions for the negotiations under the United Nations Framework Convention on Climate change**

3. Role-players in LTMS management and implementation

The **Department of Environment and Tourism** (DEAT) as the focal point for climate change in South Africa fund, convene and manage the process, which is overseen by an Inter-Ministerial Group.

DEAT appointed the **Energy Research Centre** at the University of Cape Town (ERC) to project manage the entire process. The ERC undertook the task of convening and contracting the process specialists and ensuring their independence. Similarly it set up the personnel of each of the four Research Support Units. Dr Harald Winkler at ERC is the overall Project Lead.

The overall design of the process, both in terms of process and technical elements, has been shared between Dr Harald Winkler, who also coordinated the four research teams, and Stefan Raubenheimer of the **facilitation team**, appointed to facilitate the processes and take responsibility for process design and certain key documents. Stefan Raubenheimer was appointed lead facilitator, and was assisted first by Edwin Mohlalehi and in the High Level Phase will be joined by Pascal Moloï. The facilitation team falls under the management of **Tokiso**, which also provided the secretariat members, Rachel Mosupye and Yasmin Moola. Private secretarial and logistics assistance was also provided by Elin Lorimer.

The **Project Management Team** (PMT) is composed of representatives from DEAT (with Joanne Yawitch, Deputy Director-General chairing, Peter Lukey, Kelebogile Moroka), the Department of Minerals & Energy (Smangele Mgquba, Elsa Du Toit), the Energy Research Centre (Harald Winkler, Pierre Mukheibir) and Tokiso (Stefan Raubenheimer).

A Technical Advice team was also introduced, made up of Gerrit Kornelius (Airshed) and Bob Scholes (CSIR).

4. The research teams

The LTMS process required a large body of research input. Four separate Research Teams were appointed to carry out research.

The four **Research Teams** were co-ordinated by the Harald Winkler (Energy Research Centre, ERC). Energy modeling is undertaken by ERC's energy modeling team (Alison Hughes), non-energy analysis by the CSIR (Rina Taviv and Bob Scholes), macro-economic modeling by UCT DPRU (Kalie Pauw) and impacts coordinated by SANBI (Guy Midgley and Barney Kgope).

The full list of research teams, as well as the contributions made by stakeholders and experts at other meetings (such as one on industrial energy efficiency and another of eminent economists) are listed in the Acknowledgements contained in the Technical Report.

The research teams were commissioned by the SBT to analyse the scenarios and mitigation actions. The energy modeling team used Markal, a least-cost optimising tool also used for energy planning. The time horizon, however, was extended to 2050 for long-term analysis. Non-energy emissions were analysed in a series of models for waste, agriculture and forestry. Industrial processes emissions not included in energy modeling, were considered separately. The economy-wide analysis drew on input-output and Computable General Equilibrium models. A number of IPCC lead authors provided updated assessments of impacts and some basic costing.

Markal results were also independently reviewed by Stephen Pye of AEA Technology in the UK. Economy-wide modeling was reviewed by Dirk van Severen, who has worked for many years with Trade and Industrial Policy Strategies (TIPS).

5. The Scenario Building Team

The stakeholder process is divided into two phases.

Firstly, the Scenario Building Team (SBT) was assembled, with the PMT inviting strategic thinkers from key sectors. The technical SBT developed the data-based scenarios, to inform the second phase of strategic discussion in a High-Level Group (HLG).

Stakeholders from government, business and civil society were selected to form a Scenario Building Team (SBT). The individuals on the SBT participated in their personal capacity and did not formally represent organisations or sectors. They were selected to broadly cover all sectors and many interest groups, and for their known technical expertise in the field of climate change.

The Stakeholder list includes key government national departments, other agencies, provincial and local governments; members from business including large emitters, energy producers and users; and civil society, including labour and NGOs. The members of the SBT are listed in Appendix 1.

The SBT entered into a managed dialogue with the research groups, commissioning research and providing inputs and assumptions. It also evaluated the results. It developed the Scenario framework and the final Scenario Report. All Stakeholders approved the Scenario Report, and accepted the Technical Reports.

The SBT met 6 times, the first taking place on 16 August 2006, with the final meeting on 24 October 2007. In addition, a core group of Stakeholders formed a working group, meeting 3 times in total.

To arrive at the point where inputs and assumptions were commissioned, significant work was done to reach process agreements. These include SBT members agreeing to the rules of the process, defining assumptions and key drivers for the scenarios, and auditing the accuracy of initial results. The set of outputs of the SBT is achieved by consensus.

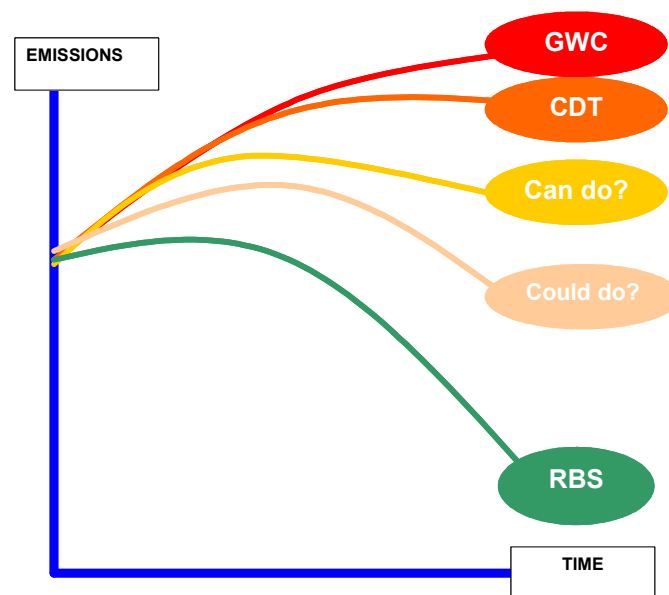
6. The process and research in the SBT

The LTMS took a data-based approach to scenario development. The scenario-building drew on two major components – process and research. It sought to develop ‘ambitious but realistic’ scenarios, whose stories draw on credibility from the rigour of the underlying technical research.

This approach is quite distinct from classic scenario processes. Such scenario planning can include anticipatory thinking elements that are difficult to formalize, such as subjective interpretations of facts, shifts in values, new regulations or inventions.

The SBT adopted an initial Scenario Framework within which the research based dialogue would be conducted.

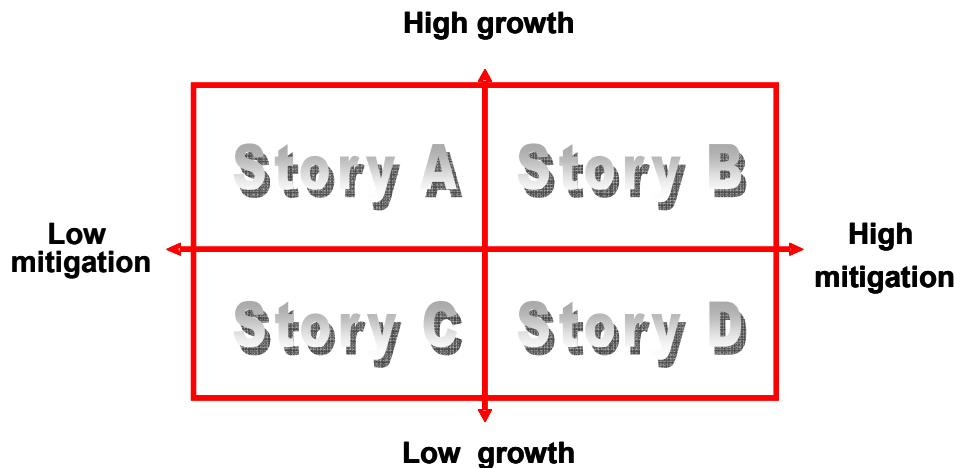
Figure 1: Scenario framework



The two outer scenarios create an envelope. The first of these shows a prediction of our emissions path if we had growth without any carbon constraint (GWC). Required by Science (RBS) shows the emissions paths for South Africa to contribute to stabilising the concentrations of greenhouse gases in the atmosphere (the UNFCCC objective). RBS forms the bottom of the envelope.

Within this envelope, the focus of analysis was on action scenarios – provisionally called Can do and Could do. The SBT defined a series of possible mitigation actions, which were then modelled by the research teams. Based on these results, actions were then combined into action packages. The modelling work done on these packages revealed three important results: the emissions reductions off the base case (GWC), the cost, and the economy-wide impacts. A reading of the Scenario Report will show how this initial thinking framed the final Scenario structure adopted by the SBT.

During the early part of the SBT process, and finally later at its penultimate meeting, the Scenario choices were determined by considering the future international contexts that may exist. In the early stages the following work was done:



Classical scenario planning methods were used to explore the background contexts to this process, using the classical two-by-two matrix, with key dimensions along the X and Y-axes. The Y-axis represents high growth (e.g. 6%) vs. low growth). The X-axis represents mitigation effort – from none to high. Note that this is not emission reduction, since higher mitigation effort does NOT necessarily mean decreasing emissions, but less than it otherwise would have been (“BAU”). Absolute emission (tons of CO₂/year) might still increase, although emissions would be lower relative to BAU.

The diagram results in four quadrants, which represent the following:

Top right quadrant - shows growing SA and high mitigation effort, which is where we would like to be

Bottom left quadrant – shows no growth and low mitigation effort with emissions still increasing

Top left quadrant - shows high growth and low mitigation effort

Bottom right quadrant - shows low growth and an high mitigation, although emissions may be decreasing as a result of economic hardship, not effort

The SBT chose these quadrants as they accurately represented the challenge of development on the one hand and its link to emissions on the other. It recognized that SA currently fits into Story A: we are growing the economy, but our emissions are also growing. Story B is perhaps where we want to be: a growing economy but with good mitigation efforts being made, and possibly will overall emission reduction. Story C is the worst of all worlds, a failing economy with no mitigation effort (we were here pre-1994), and story D presents us with a failing economy with emissions dropping as a result.

This early thinking was useful to guide thinking but was later extended by a far more international perspective, developing into the picture included overleaf. These possible future international stories were used to test the robustness and plausibility of the Scenarios, and lead to the setting of the final binary framework in the Scenario Report.

These tools are included here to illustrate the process undertaken by the SBT which ultimately lead to the results contained in the Scenario Report. This thinking was not in any way formally adopted by the SBT.



7. Closing the gap

It became apparent early on when the first results of the research groups appeared, that a very large emissions gap lay between the GWC and RBS envelope trajectories. What followed was essentially the modelling of a series of actions, their cost and extent progressively ratcheted up, with the aim of “closing the gap”. This series of attempts to provide Strategic Options for reaching the RBS Scenario, was based on the learning from the SBT process that only one of the two Scenarios (RBS) was both robust and plausible against the internal and external contexts that had been discussed. But the further learning was that all the actions which could with accuracy (known technology, known cost) be modelled, did not finally close the gap.

The SBT accordingly commissioned a brief exploration (not by any means an in depth study) into the possible actions that might close the gap. The meeting was hosted by the Department of Science and Technology, and had an emphasis on future technology, but social policies and behavioural changes were also discussed. This process became playfully known as the “Fairy Godmother” meeting.

It must be emphasised that this one day meeting is merely an exploration, but its outputs are nevertheless trenchant and are included here.

The participants in the meeting were:

Adoniya Sebitosi (AS) University of Cape Town

Alison Hughes (AH) Energy Research Centre

Azeem Khan (AK) University of Cape Town

Chris Reinecke (CR) Sasol

Elsa Du Toit (EDT) DME

Jason Schäffler (JS) Nano Energy

Kobus Meiring (KM) Optimal Energy

Linda Manyuchi (LM) DST

Llanley Simpson (LS) DST

Richard Worthington (RW) SACAN

Somila Xosa (SX) DST

Tembakazi Mali (T Mali) SANERI

Tumi Mailula (T Mailula) DST

The meeting was a brainstorming exercise, its purpose to think laterally about “fairy godmother” technologies of the future which could be taken forward, rather than discussing technologies that are already included in the model. The process was first identifying the technologies and then assessing their likely impact, time horizons, barriers etc.

The list of technologies which would have a likely impact on mitigation, were determined as:

NEW TECHNOLOGIES

Defining categories:

<p>Mitigation (M)</p> <p>Large: 100Mt CO₂/yr</p> <p>Medium: 10Mt CO₂/yr</p> <p>Small: 1Mt CO₂/yr</p>	<p>Viability (V)</p> <p>Near: 2010</p> <p>Medium: 2025</p> <p>Far: 2050</p> <p>Beyond: beyond 2050</p>
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NEW RENEWABLE ENERGY (Mitigation=M to L)

- New wind (M)
- Urban/micro wind, distributed generation (N)
- Ocean (wave, tidal, ocean current, thermal) (M-F)
- Geothermal (F)
- Biomass Gasification (N)
- Heat pumps (N)
- SWH for cooling systems (N)
- Energy density of biomass (N)
- Second generation biomass (M)
- Solar chimney (N)
- Building-integrated PV (N)

SUPER TECH (Mitigation=S)

- Nano-technology storage & ultra capacitors (M)
- Superconductivity
- Peltier effect (M)
- Pizo (pressure) electric (M)
- Wireless transmission (B) “Virgin” electricity (?)
- Livestock methane (N)

NEW FOSSILS (Mitigation=M to L)

- Underground coal gasification (M)
- Ultra supercritical coal (B)
- Kalahari Gas: coal-bed methane (M)
- Methane management e.g. coal (M)

GRID REFORM (Mitigation=M to L)

- Net metering (N)
- Vehicle to grid (M)
- AC to DC transmission (F)
- Energy mix (F)

ENERGY EFFICIENCY (Mitigation =L,L,S)

- Increased energy efficiency (N)
- System efficiency (N)
- LEDs (N)
- Induction heating (N)

TECH POLICY (Mitigation =S to M)

- Air traffic management (M)
- 1 Watt standby power (N)
- Shipping

HYDROGEN (Mitigation=L)

- Hydrogen from non-carbon source (M)
- Hydrogen economy (storage/distribution/use) (M)
- Fuel cells (e.g. hydrogen/solid oxide)(M)

TRANSPORT (Mitigation =M to L)

- Air to super-fast rail (N)
- Regenerative braking on trains (N)

TECH COMBINATIONS (Mitigation =M)

- Integration of energy technologies e.g. PBMR with CTL (M)
- System integration of RE technologies (N)

REPLACEMENT MATERIALS (Mitigation =M to L)

- Light metals for automotive & aerospace industry (NtoM)
- Materials recovery and recycling (N)

NEW NUCLEAR (Mitigation =L)

- Breeder reactors (?) / fusion (B)
- Fast neutron reactors (N)

COMMUNICATIONS (Mitigation =L)

- New communication technologies (N)
- Virtual holidays (F)

ALT GENERATION (Mitigation =M)

- Micro generation (N)

HYDRO (Mitigation = M to L)

- Imported hydro (M)

SPACE (Mitigation =L) Space-based “ideas” (B)

SINKS (Mitigation =M) Algae pond CO2 sink (M)

STORAGE (Mitigation =M)

- Storage (NtoM)

SOCIAL POLICIES (Mitigation =L)

- Social policies (NtoM)
- Dietary change
- Air rationing
- Localisation

Of these technologies the following show the most promise as mitigation drivers in the short to medium term:

Technologies that may be Implementable by 2015

- Urban/micro wind, distributed generation
- Biomass Gasification
- Heat pumps
- SWH for cooling systems
- Energy density of biomass
- Solar chimney
- Net metering
- Increased energy efficiency
- System efficiency
- LEDs
- Induction heating
- 1 Watt standby power
- Air to super-fast rail
- Regenerative braking on trains
- System integration of RE technologies
- Light metals for automotive & aerospace industry
- Materials recovery and recycling
- Fast neutron reactors
- Micro generation

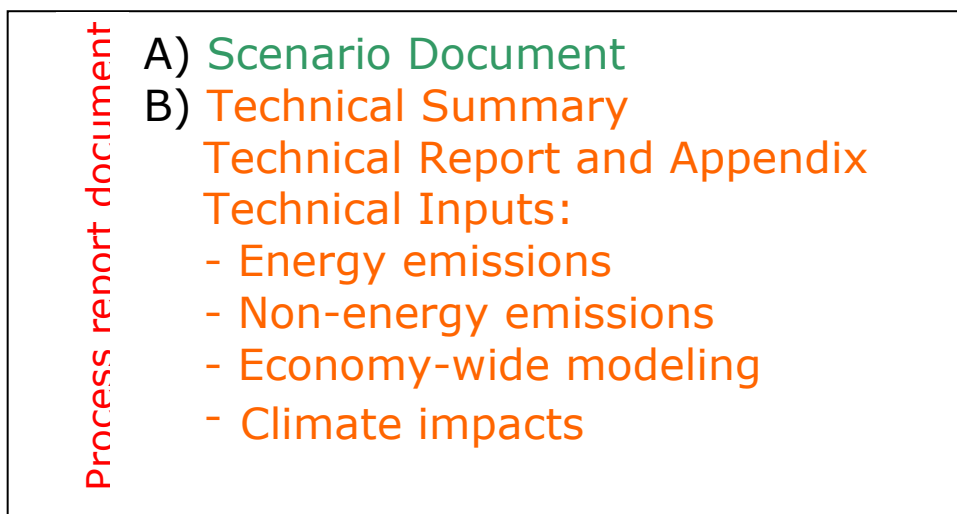
- New communication technologies
- Storage
- Social policies

There is a need to do further work in this regard.

8. Outputs of the SBT

The key outputs of the SBT are contained in a package of Documents. These include

1. The Scenario Document
2. The Technical Summary
3. This Process Report
4. The Technical Report and Appendix
5. Technical inputs



The core outputs are summarised in particular in the LTMS Scenarios document, which has been approved by the SBT, and the Technical Summary, accepted as a rigorous basis for the further LTMS process. The detailed Technical Report provides the analytical underpinnings, while the Process Report (this document) records the process that produced all the outputs.

9. The High Level Process

The SBT concluded its work on 24 October 2007, “signing off” the set of outputs referred to above. These documents will now be forwarded by the SBT for discussion by the High Level Group (HLG).

The High Level Group includes the Ministers in the Inter-Ministerial Committee on climate change (IMC), in dialogue with a group of South African leaders from the sectors business/labour/civil society. The HLG is in the first instance a forum for the discussion and development of the Scenario and Technical Summary, and second it is a final meeting(s) of the IMC itself.

The process envisaged for the HLG phase is as follows:

- The focus moves first to **communication and capacity development** around the SBT results and presentation to a group of high-level decision makers, most of who will be newcomers to the issues raised in the Scenarios. This communication challenge will not be achieved in “one go” and hence a phased

approach is suggested, with progressive capacity transfer and “buy-in”. This component will take the form of roundtable discussions. These will be with the following groups:

- **the Directors General of all the Departments represented by the IMC**
- **the senior leadership within the Union movement**
- **the senior leadership within the NGO movement**
- **the leaders and captains in Industry and other relevant sectors.**

These discussions will be aimed at briefing the leadership in SA on the results of LTMS, and selecting those who will meet with the IMC. The key to this is to ensure a link between this work and current national policy that could be affected by different negotiating positions.

- Second the focus moves to *developing discussion* between the components of the HLG. This is where the leadership in the various sectors meet with the Ministers in the IMC to reflect the inputs, positions and consensus elements achieved and inform the Cabinet accordingly
- Finally the focus moves to Cabinet itself, where the steps in the decision making process, both to determine the negotiation process and the policy making process are agreed.

9.1 The communication/capacity development phase

The communication phase is aimed at bringing HLG stakeholders into the process, helping them to fully understand the implications of the scenarios, and pre-position them for the actual HLG meetings. This will take place in a series of engagements (in late October and November), headed up by DEAT, assisted by Stefan Raubenheimer and Harald Winkler:

1. A special meeting of the **NCCC**¹ will be called and the draft results will be presented. This will be done in an effort to start an outreach to the public, which will be completed after the IMC decision (see below).
2. **Civil society** has been well represented in the SBT, but will be invited to discussions to ensure proper preparation and choice of the HLG representatives.
3. The leadership within **Labour** will similarly be brought to a communication meeting, which will be scheduled for one morning/afternoon in October 2007. The NEDLAC convenor for labour may assist in ensuring that the labour group has covered all the issues and is prepared for the HLG’s first meeting in 2008. The labour group will be asked at this meeting to nominate a person(s) to sit on the HLG.
4. The “Captains of **Industry**” group will require a programme of progressive capacity interventions and selection. The Cambridge Programme for Industry and the National Business Institute will assist in hosting and convening these interventions. There are three groups of “players” in this sector: the industry representatives in the SBT, the sherpas to the CEOs, and the CEOs themselves. The SBT members are in the best position to assist the Facilitators and Team Leader to present the results and the draft reports, as well as the necessary background to the upcoming meeting with the IMC and other stakeholders. The sherpas will be the first to whom such presentations are made, and once their understanding and buy in is achieved, they will assist the

¹ National Committee on Climate Change

process by bringing their CEOs to the final preparation meeting. The selection process (the sectors, companies and individuals) will occur under the guidance of the SBT members from industry, particularly through the NEDLAC and BUSA auspices.

5. **Government and linked organisations** will in this communication phase first be represented by the DGs of all the departments attached to the IMC, in order to ensure that they are fully aware of the presentations to be given to their Ministers. In addition, the Parliamentary Portfolio Committee and the Select Committee for the NCOP will also be brought into the process. Presentations may be made at the DG clusters and at the Cabinet Lekgotla, if possible. DEAT, the Facilitators and Team Leader will present the findings of the SBT and ensure that the group has covered all the issues and is prepared for the HLG's first meeting in 2008. This group will also include the Director of the DNA, the CEO of NERSA, the CEO of CEF and such other entities/individuals as DEAT determines.
6. Minister van Schalkwyk will convene a meeting of the IMC at which the **Draft Long Term Mitigation Scenarios Report** will be presented by DEAT, the Facilitators and Team Leader, at this stage for information and clarity purposes. The set of meetings may be scheduled in sequence over 2 or 3 days.

The dates of the above meetings will be set in consultation with the various players.

9.2 The Discussion and Input phase

In this phase, the HLG, including the Ministers of the IMC, Captains of Industry, Civil Society, and Labour will meet for the first time. In this meeting, the parties will discuss the issues raised in the Long Term Mitigation Scenarios Report. The task of the facilitators will be to facilitate the presentation of the views and positions of the various non-government stakeholders to the Ministers. Through this process the Ministers will be fully informed of the views of the various sectors within SA. The ministers will then be able to state their views. The following discussion will be emergent in nature: the group will be encouraged to assess the scenarios and see whether there is consensus on what they reveal, and whether there is a common path for the Government and Stakeholders. The aim will be to try to establish the maximum consensus against which the IMC can base its final decisions.

The date for this meeting will be set in consultation with the various players.

9.3 The phase within the IMC

Finally, the process moves solidly to the IMC itself. This meeting will take place with the DEAT assisted by Facilitators and Team Leader. At this meeting the IMC will be assisted to consider the process steps for the development of the SA negotiating positions as well as the development of the long-term climate change policy. The IMC may craft a Cabinet Memo setting out that decision.

The Ministers will set the date for this meeting.

At this point the LTMS process as a whole is complete.

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Appendix 1.

NAME	ORGANISATION
Alan Hirsch	Presidency
Alan Munn	Sustainable Business Manager, Engen
Andre van der Bergh	BHP Billiton
Andrew Borraine	SA Cities (new member sought)
Annie Sugrue	EcoCity/CURES
Bill Rowston	DWAF(new member sought)
Bobby Peek	Groundwork
Bob Scholes	CSIR
Bongi Gqasa	DPE
Bridget Thovhakale	DST
Chris Moseki	DWAF
Dick Kruger	Mining
Dipolelo Elford	W.C DEA & DP
Dr A Paterson	Aluminium
Dr Johan Ledger	SESSA
Dr Joseph Matjila	Manager: Centre of Excellence Kumba Resources
Dr Laurrain Lotter	Executive Director, CAIA (Chemical)
Dr Trevor Chorn	Corporate Environmental Specialist, Engen
Dr. John Scotcher	Forestry SA
Elsa Du Toit	DME
Gerrit Kornelius	AIRSHED
Glen Mpufane	Labour (NUM)
Hassan Mohamed	Presidency
Herman J. van der Walt	Group Air and Climate Change Advisor, SASOL
Ian Langridge	EIUG
Imraan Patel	DST
Jacob Dikgang	DoT
Jason Shaeffler	Nano Energy
Jeff Subramoney	DME
Jeffrey Kgobane	DME
Joanne Yawitch	DEAT
John Purchase	GRAIN SA
Jonas Mphenya	SAWS
Judy Beaumont	DEAT
Justice Mavhungu	DPE

Kadri Kevin Nassiep	CEF / SANERI
Kelebogile Shirley Moroka	DEAT
Leila Mohamed	SEA
Linda Manyuchi	DST
Litha Mcwabeni	DDG: Corporate Strategy & Structure, DPE
Liza Roussot	Treasury
Lize Coetzee	DT
Lwandle Mqadi	SACAN (withdrawn)
Lwazikazi Tyani	DME
Lydia Greyling	DFA
Mandy Ramharos	Eskom
Maphuti Legodi	DME
Maryna Möhr-Swart	Chamber of Mines
MC Moseki	Director Water Resource Planning Systems
Mike Edwards	Executive Director, Forestry
Nic Opperman	Director: Natural Resources, AgriSA
Peter Lukey	DEAT
Phillip Tshikalanke	DME
Professor Robin Barnard	Agriculture
Rabelani Tshikalanke	DME
Richard Worthington	Earthlife
Rod Crompton	NERSA
Rudi Dicks	COSATU
Russel Baloyi	SALGA
Sakkie van der Westhuizen	Regional Environmental Manager, Sappi (Paper)
Sharlin Hemraj	Treasury
Sibusiso Gumede	Labour - COSATU
Smangele Mgquba	DME
Sonwabo Damba	Eskom
Stan Jewaskiewitz	Envitech Solutions
Tabby Resane	DEAT
Tony Frost	WWF
Tony Surridge	DME
Tshenge Demana	DTI
Tsietsi Mahema	DEAT
Wendy Poulton	Eskom
Y Stan Pillay	Sustainable Development, Anglo Coal