

# LONG-TERM PLANNING EFFORTS: THE SOUTH AFRICAN LONG-TERM MITIGATION SCENARIO PLANNING PROCESS

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*Case Studies contain preliminary research, analysis, findings, and recommendations on previous long-term planning exercises. They are circulated to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues.*

All the interpretations and findings set forth in this case study are those of the authors alone.

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The Long-Term Mitigation Scenario (LTMS) process was a Cabinet-mandated government process that occurred in South Africa between 2006 and 2007 and that sought to understand what South Africa could do to mitigate climate change. Combining two central components—a facilitated stakeholder process and technical work—the LTMS engaged a core group of stakeholders who used technical research and modeling tools to identify a set of greenhouse gas (GHG) (emission) scenarios and trajectories for South Africa between 2010 and 2050.

While now dated, the LTMS provided the foundation for South Africa's domestic and international climate mitigation policy, finding expression in the National Climate Change Response White Paper (NCCRWP), South Africa's Copenhagen pledge, and in its nationally determined contribution (NDC). It therefore remains informative to understand and reflect on one of the earliest long-term climate mitigation planning processes undertaken in a developing country. This case study describes how the LTMS arose, its objectives, its design and outputs, and how these have informed and interacted with mitigation policy subsequently. Finally, it reflects, with the benefit of over a decade of hindsight, on the LTMS's contribution to long-term planning for climate mitigation. It highlights that how such processes are positioned in relation to policymaking is critical, that politics cannot be ignored, that planning to maintain momentum immediately after the process concludes must be a priority, and, finally, that we are now in a different world from that in which the LTMS took place, one that demands responsiveness and flexibility of policymaking priorities and practices, including when planning for the long term.

This case study draws from a research project I led in 2015 under the MAPS Programme ([www.mapsprogramme.org](http://www.mapsprogramme.org)) that reviewed the South African Long-Term Mitigation Scenario (LTMS) planning process, conducting 17 interviews with members of the South African climate or development policy community. Two publications resulted from this project: the first a MAPS research paper, "What Was the Contribution of the Long Term Mitigation Scenario Process to South African Climate Mitigation Policy?" (Tyler and Torres Gunfaus 2015), and the second an article in the journal *Development*, "Reflecting on the South African Long-Term Mitigation Scenario Process a Decade Later" (Tyler and Torres Gunfaus 2017).

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## SOUTH AFRICA AND CLIMATE CHANGE POLICY IN 2005

In 2004, South Africa developed its first National Climate Change Response Strategy, which identified the country’s vulnerability to climate change, as well as key issues and problems related to climate policy, and set out principles for a response. These were sharpened at the 2005 National Climate Change Conference. However, within policy circles there was a sense that South Africa had little potential to reduce its emissions given its coal-based energy sector. One of the priorities emanating from the conference and articulated in the government’s postconference statement of intent (the “Midrand Plan of Action”) was to explore what the country could actually do in terms of mitigation. This priority was confirmed by the observation of the South African delegation to the international climate change policy process at the UNFCCC MOP1 that it would not be long before developing as well as developed countries would be asked to make mitigation commitments. To be better prepared for such a moment, the Department of Environmental Affairs (DEA)<sup>1</sup> received a Cabinet mandate to explore mitigation options for South Africa along the lines of a joint proposal by civil society and academia that had been developed simultaneously.

In a 2015 essay, Marta Torres Gunfaus and I describe in detail the “policy window” that enabled the LTMS, including a proactive and well-respected delegation steeped in the long-term perspective of an international policy process engaged with mitigating climate impacts over a century and beyond, a “perfect storm” of key international scientific publications on climate change, a business interest in energy efficiency, and a number of well-positioned policy champions, including the far-thinking environment minister at the time (Tyler and Torres Gunfaus 2015). Despite a general fatigue in policymaking across the South African government after the postapartheid policy push, this “window” to consider climate mitigation was opened.

At the time, the objectives of the LTMS were to ensure the following:

- ◆ That South African stakeholders understood and were focused on a range of ambitious but realistic mitigation scenarios, based on best available information, including the cost implications of long-term mitigation.
- ◆ That the South African delegation was well prepared for the post-2012 dialogue.
- ◆ That the Cabinet could approve long-term climate policy domestically and internationally.
- ◆ That the scenarios would assist future work to build public awareness and support for the government. (DEAT 2006)

Such a long-term climate mitigation policy initiative (considering time frames to 2050) was relatively unique in a developing country context at the time. Stefan Raubenheimer (2011) suggests two reasons for this. First, the country had a good understanding of climate impacts at the time, based on an ever-expanding body of local research; these implications were profound and emphasized a long-term framing of the climate issue. Second, the LTMS initiators, individuals from academia, civil society, and government, were deeply engaged in the international climate-mitigation policy discussion and its long-term time frames. They agreed that “the study should look as far as possible into the future” (Raubenheimer 2011, 13). The milestones of 2025 and 2050 were drawn from work by the Intergovernmental Panel on Climate Change (IPCC) (Raubenheimer 2011).

The LTMS had to grapple with reducing emissions in the context of severe development challenges: in 2006 South Africa had an official unemployment rate of 25.5 percent (Statistics South Africa 2006) and one of the highest inequality levels globally, as defined by a Gini coefficient of 0.72, with 57.2 percent of its citizens living below the upper-bound poverty line (Statistics South Africa 2014).

## THE LTMS DESIGN

The LTMS was focused solely on mitigation (as opposed to adaptation), although an LTMS research team did look into climate change impacts, vulnerability, and adaptation in key South African sectors with findings summarized in *Input Report 5* to the LTMS process (Midgley et al. 2007). This report is comprised of 10 free-standing chapters, which both surveyed the literature on the impact of climate change on South Africa at the time and in some cases included new work required to complete the assessment. The report references the scenarios that had just been generated for the IPCC fourth assessment report (2007), processed to generate regional scenarios for South Africa, and compared against the older generation scenarios (such as HadCM1 and 2) upon which much of the surveyed literature was based.

The design twinned process with technical work in a coevolving manner throughout. For the process component, a core group of stakeholders—the Scenario Building Team (SBT)—was drawn from across government, business, and civil society. Members were invited to participate in their personal capacity, based on their technical skills and on their involvement in one of the main sectors of relevance to climate mitigation (Raubenheimer 2011). In addition to the senior government officials included in the SBT, a number of junior officials observed the process as a capacity-building exercise. The SBT—which had about 50 members—met more than six times, led by Harald Winkler of the University of Cape Town’s Energy Research Centre and facilitated by an experienced mediator with a climate mitigation background, Stefan Raubenheimer of Thokiso, a mediation and arbitration organization. This process component fit well with South Africa’s traditions of stakeholder process and scenario development (Booyens 2006; Segal 2007; Venter and Landsberg 2011), which included the Mont Fleur scenarios conducted prior to the 1994 democratic transition (Le Roux et al. 1992).

The technical component of the LTMS was carried out by four research teams: Energy Emissions, Non-energy Emissions, Economy-Wide Modelling, and the team looking at climate change impacts described above. There was ongoing interaction

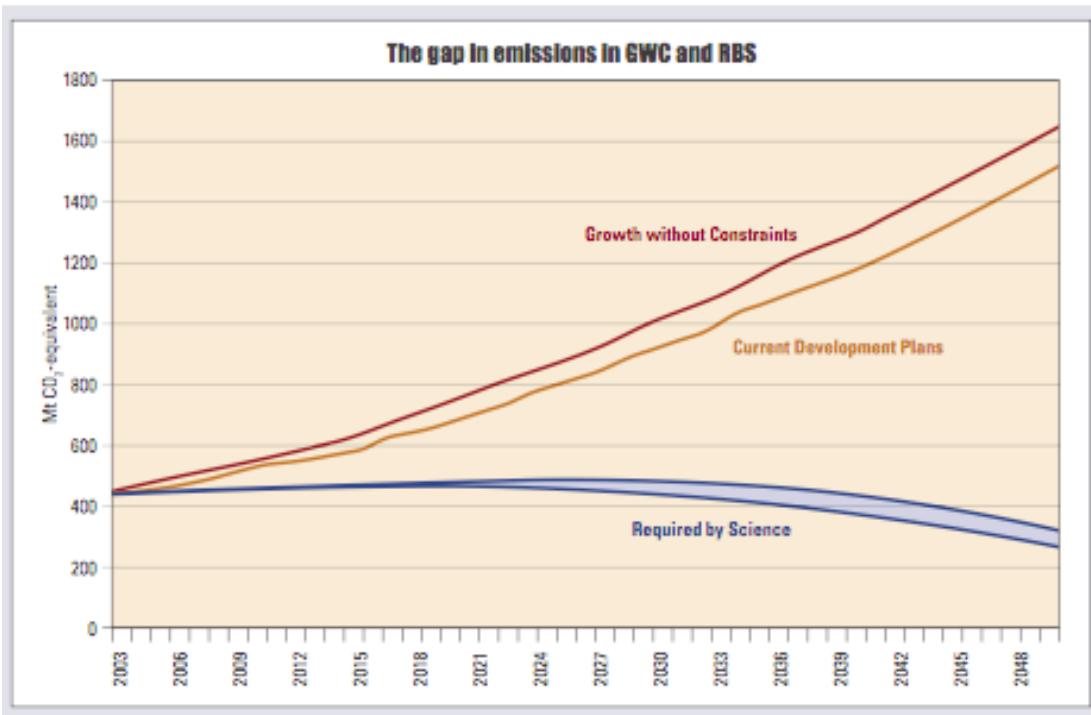
between the SBT and the research teams, with a closed website for work in progress to be made available to all participants. Underlying the LTMS methodology was the fact that the SBT effectively “commissioned” the research teams to undertake their research with SBT-agreed input data (Raubenheimer 2011). The LTMS outputs therefore were a product of a degree of consensus achieved at both technical and political levels.

To start the process, a MARKAL energy model of the South African energy sector was used to project the country’s emissions to 2050 as the “Growth without Constraints” (GWC) envelope scenario. (This scenario stripped out the few existing climate mitigation and energy efficiency policies, which were included in a “Current Development Plans” scenario.) A second envelope scenario, “Required by Science” (RBS) was then identified as an emissions path whereby South Africa would take a hypothetical equitable share of the global 2°C mitigation effort based on the Fourth IPCC Assessment Report and identified as a target band of between -30 percent and -40 percent from 2003 levels by 2050 (SBT 2007). The band reflects the uncertainty in the burden-sharing discussion at the international policy level. The two envelope scenarios are shown in Figures 1a and 1b below.

When the modelers presented the two envelope scenarios to the SBT, there was shock in the room at the extent of the disparity, and a general sense that this was an unacceptable and high-risk path (Midgley et al. 2007; SBT 2007). The technical team then developed three modeled trajectories (or “strategic options”), shown in Figure 1b. The research team’s methodology for developing each of the three trajectories differed, guided by the needs of the SBT.

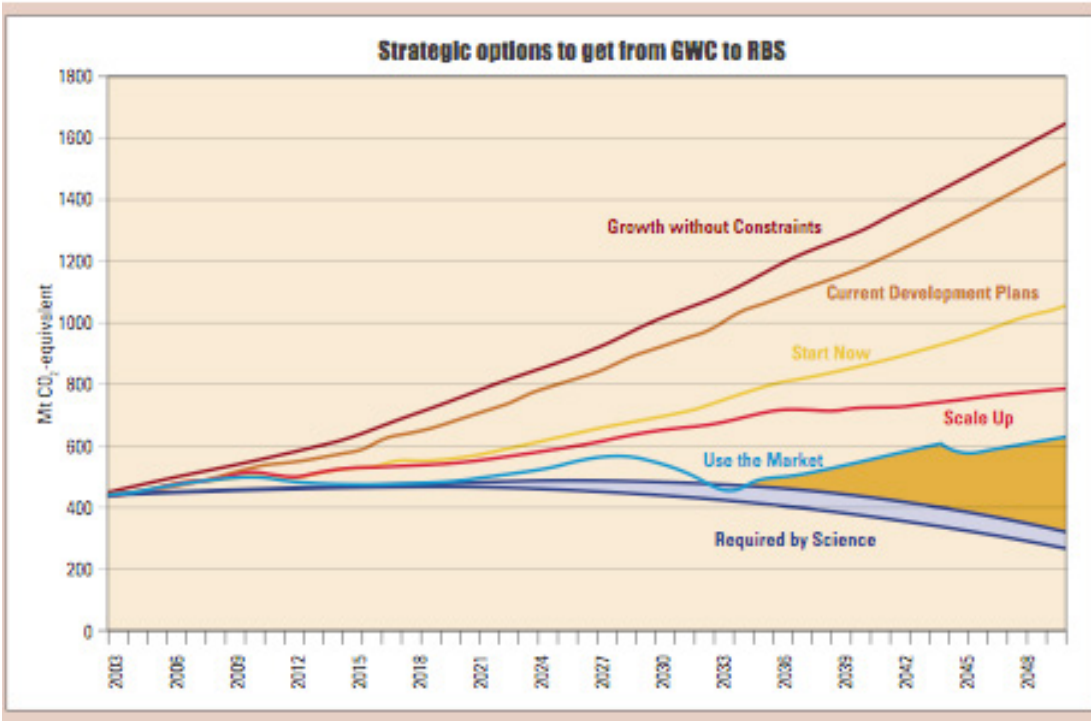
The first two trajectories, “Start Now” and “Scale Up,” were generated by combining cumulative sets of mitigation wedges in the tradition of Pacala and Socolow (2008). Feasible mitigation options based on South Africa’s abatement potential were researched and modeled across three categories: energy supply, energy use, and nonenergy emissions. Each option, or “mitigation action,” was then depicted as a wedge: the horizontal axis depicting time from 2003 to 2050 and the vertical axis depicting the potential megaton carbon dioxide equivalent (MtCO<sub>2</sub>e) mitigation. The average cost in South African rand per metric ton carbon dioxide equivalent (R/t CO<sub>2</sub>e) is superimposed on the wedge. The trajectory “Start Now” includes those actions “that save money over time” (SBT 2007), with “Scale Up” extending these actions to include wedges with a positive cost. The main wedges for “Start Now” are presented by way of example in Figure 2 below.

Figure 1a. The Gap in Emissions in GWC and RBS



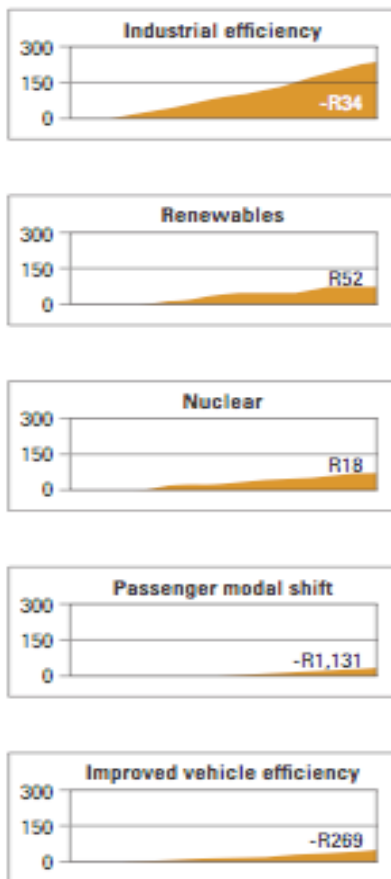
Source: SBT (2007).

Figure 1b. The LTMS: Scenarios and Strategic Options



Source: SBT (2007).

**Figure 2. Mitigation Wedges for the “Start Now” Trajectory**



Source: SBT (2007).

A third option, “Use the Market,” was modeled according to a different methodology: the application of a rising carbon price and economic incentives for mitigation to the GWC scenario. The starting price is R100/t CO<sub>2</sub>e, which escalates to R250 by 2020 and R750 by 2050, a price path designed to approximate an anticipated slowing, plateauing, and then declining of emissions growth internationally. The tax revenue is recycled as a renewable energy subsidy of 38 cents per kWh.

The resulting three trajectories are shown in Figure 1b. The social implications (GDP, employment, and household welfare) of the three trajectories were assessed and reported. A final strategic option, the orange shaded area in Figure 1b, closed the gap between “Use the Market,” and RBS was described qualitatively as “Reach for the Goal.”

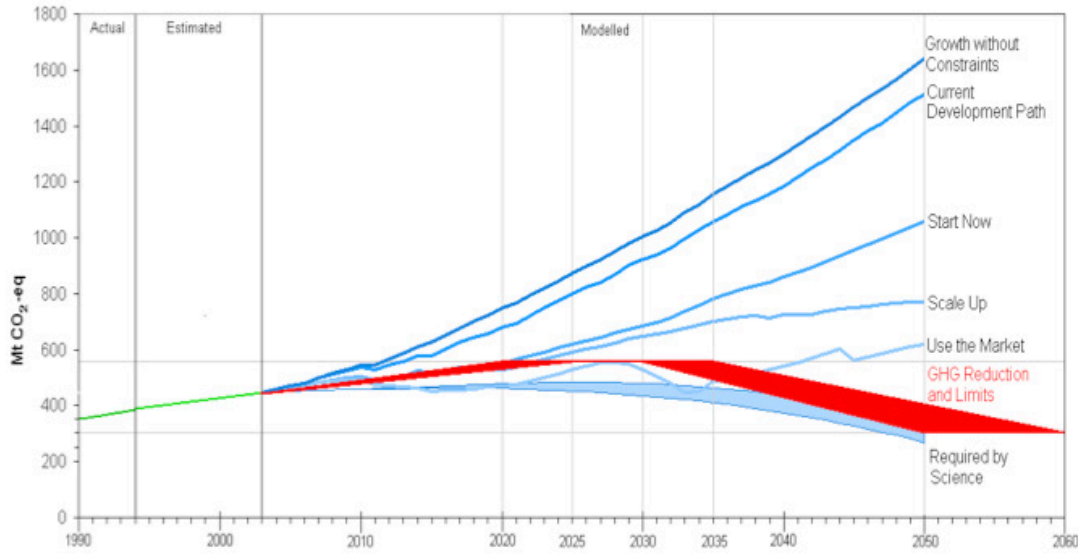
Once the scenarios and trajectories were developed, the LTMS process and outputs were presented to leaders of the four main organized social institutions in South Africa (government, civil society, labor, and business) in four separate high-level round tables (Raubenheimer 2011).

## THE LTMS AS THE FOUNDATION FOR SOUTH AFRICA’S CLIMATE MITIGATION POLICY

Once the LTMS process concluded, the final documentation was sent to the Cabinet together with other information relating to climate change and South Africa. In 2008, the Cabinet released its “Vision, Strategic Direction and Framework for Climate Change” in a statement by the environment minister (Van Schalkwyk 2008). This statement speaks directly to the LTMS. It confirms, among other things,

- ◆ that South Africa’s GHG emissions must peak between 2020 and 2025, plateau for a decade thereafter, and then decline;
- ◆ that the government would implement the “Start Now” strategic option, and invest in the “Reach for the Goal” strategic option through R&D; and
- ◆ that both regulatory and economic mechanisms would be used to set both mandatory energy efficiency and transport emission reduction targets, and renewable energy and nuclear targets. Such mechanisms would also be used to transition away from coal and toward a less energy-intensive economy.
- ◆ The “Peak, Plateau and Decline” (PPD) trajectory was a political construct, loosely based on the RBS scenario, and superimposed over the LTMS scenarios and trajectories. But it was not modeled and its enumeration was never specified (see Figure 3 below, from a DEA presentation).

**Figure 3. The “Peak, Plateau and Decline” GHG Emissions Trajectory**



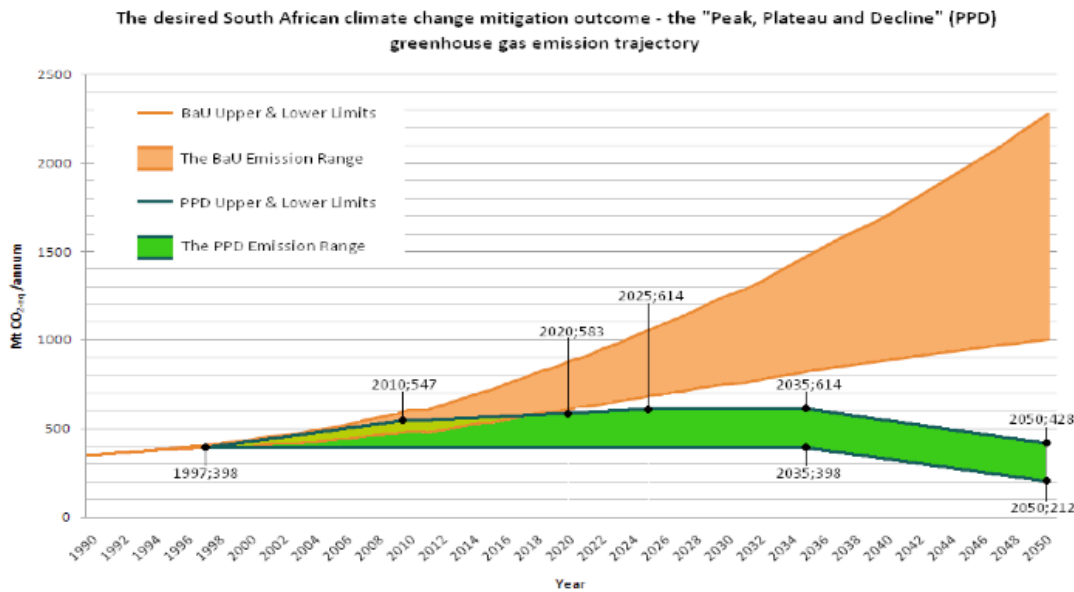
Source: DEAT (2008).

The following year was the highly anticipated 2009 Copenhagen Conference of the Parties (COP), where developing countries were expected to provide some form of mitigation commitment. In a move on the eve of the COP that surprised both the domestic and international mitigation policy communities, South Africa’s president, Jacob Zuma, announced the country’s commitment to deviate from its “business as usual” (BAU) emissions with a 34 percent reduction by 2020 and 42 percent by 2025, by which time emissions will have peaked (Wills 2010). The BAU of the Copenhagen Pledge was, however, neither quantified nor associated with underlying research such as the LTMS. Given this, the derivation of the Copenhagen emission-reduction percentages, while aligned to the findings of the LTMS (DEA 2011; DEAT 2008) remains a mystery to most, including those close to the process (Tyler and Torres Gunfaus 2015). On a careful read, the lack of definition of the BAU in the Copenhagen Pledge reduced the pledge’s ambition in international policy at the time, important given the subsequent determination of the nationally determined contribution mechanism that each commitment under the international climate policy process must be increasingly ambitious. It also resulted in both confusion and opportunity in the domestic climate mitigation policy space, and could be argued to have undermined the status of the LTMS as a policy-informing process.

In 2010 an Integrated Resource Plan (IRP) to 2030 was developed for the South African electricity sector. According to the latest GHG inventory at the time, the sector contributed roughly 50 percent of the country’s emissions. In order to reflect South Africa’s international commitment, the IRP process included a carbon constraint in its modeling equivalent to 50 percent of the PPD (275 MtCO<sub>2</sub>e in the period to 2030). The inclusion of this constraint contributed to the decision to launch the highly successful 2014 Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

Two years after Copenhagen, South Africa hosted the 2011 COP in Durban. Hosting this international event cast a spotlight on South Africa’s domestic climate change policy, and provided a focus to conclude policymaking, resulting in the National Climate Change Response White Paper (NCCRWP). Central to the mitigation aspects of the NCCRWP is the Benchmark National GHG Emissions Trajectory Range (hereafter the Benchmark Trajectory Range), which is used as the “benchmark against which the efficacy of mitigation action will be measured” (Republic of South Africa 2011, 27). The Benchmark Trajectory Range, depicted in green fill in Figure 4 below, is directly derived from the LTMS work (DEA 2011). The range is expressed in absolute MtCO<sub>2</sub>e, defining an upper and lower limit over time to 2050. Peaking and decline points are indicated, as is a BAU range.

**Figure 4. The Desired South African Climate Change Mitigation Outcome—“Peak, Plateau and Decline” GHG Emission Trajectory**



Source: DEA (2011, 8).

The Benchmark Trajectory Range remains the extent to which national targets are identified for South Africa, apart from the electricity sector’s claim to a 50 percent portion in 2010. The NCCRWP provides for processes to allocate the carbon budget below the Benchmark Trajectory Range, but work on this is incomplete at the time of this writing, mired in politics.

At the Paris COP of 2015, national mitigation commitments evolved to “nationally determined contributions” (NDCs). South Africa’s NDC builds on both its Copenhagen pledge and the NCCRWP. The NDC advances South Africa’s mitigation commitment from a PPD relative to an undefined BAU trajectory, to the absolute Benchmark Trajectory Range of the NCCRWP. While the NDC itself only enumerates the targets for 2025 (as a firm commitment) and 2030 (an indicated commitment) in accordance with the IPCC guidance, the document explicitly refers to the NCCRWP for further detail (a nod to an aspirational 2050 target). Hence, the LTMS can be said to have directly informed South Africa’s NDC.

## THE LTMS CONTRIBUTION TO SOUTH AFRICA’S CLIMATE MITIGATION POLICY TO DATE

The LTMS was an innovative and, at the time, unique policy process, made possible by auspicious timing, champions, and expertise. The LTMS achieved a number of significant climate mitigation policy gains:

- ◆ A common understanding of the parameters of climate mitigation in the South African context was established.
- ◆ A climate mitigation policy community was constituted and capacitated across business, government, academia, and civil society.
- ◆ An evidence base of best available data was generated.
- ◆ Climate mitigation was firmly established on the national policy agenda.
- ◆ A carbon constraint was included in the 2010 IRP.

These achievements largely resulted from the process design, which enabled facilitated stakeholder engagement with robust technical work in an environment of hard-earned trust (Raubenheimer 2011). The LTMS was proposed by the government as a process to inform policy and was nonprescriptive and advisory (DEAT 2008). It was an exercise to understand South Africa's options in relation to climate mitigation. The LTMS was not intended as a plan, or to agree targets. As such, SBT members were, in general, able to engage with the issue at hand largely without agendas. That said, there was always a slight unease within the SBT as to how the LTMS outputs were to be used.

The period post-LTMS was dominated by international climate mitigation policy progress, with less continuation on the domestic policy front. This was exacerbated by a reorganization of government ministries in 2009, which resulted in Minister Marthinus van Schalkwyk's losing the environmental portfolio. There was no post-LTMS pathway to take the LTMS vision into a plan, and neither the NCCRWP nor subsequent policy implementation work have made clear progress on this. The SBT unease turned out to have been well founded, as the LTMS numbers were "frozen" into the Copenhagen Accord pledge in an unusually opaque policy action. The domestic climate mitigation policy community became adversarial and defensive, as stakeholders entrenched their positions. This period of resistance also corresponded with the policy task of formulating policy instruments—establishing who will bear the cost of the GHG emission reductions in the short term, a far more contentious policy activity than the long-term focus of the LTMS. As a result, the LTMS work was actively undermined by groupings within the business community for a period, resulting in the DEA's also distancing itself from the work. This toxic environment influenced the NCCRWP process, with the "range" aspect of the PPD being expanded in the NCCRWP's evaluative benchmark, the GHG Emissions Benchmark Trajectory Range, reflecting reduced political appetite for more ambitious mitigation commitment. The task of updating the figures

underpinning the range became politicized and was therefore resisted by the DEA for many years, although now work is reportedly under way to look at this. The expression of the South African targets as a range in the NDC has come under heavy criticism internationally (Climate Action Tracker 2015; WWF-SA n.d. [2015]).

Despite this, South Africa's NDC has also been praised for its "clear commitments based on a scientific point of departure and a perspective of equity between countries" (WWF-SA n.d. [2015]). Domestically, a direct result of the 2010 IRP's carbon constraint has been the REIPPPP. This program has procured 6,400 MW of installed capacity (IPP Office n.d.), demonstrating cost effectiveness when compared to coal-fired power (Wright et al. 2017). The REIPPPP has been highly instrumental in disrupting the monopolistic position of the coal-fired powered utility Eskom, which is perhaps the most significant mitigation action possible in the South African context.

## CONCLUSION: THE LTMS AS A CONTRIBUTION TO LONG-TERM CLIMATE MITIGATION PLANNING

The LTMS constituted a profound contribution to long-term climate mitigation planning in South Africa. The innovative design, combining process and technical components to build a middle ground in an environment of trust, enabled significant early achievements for the country's climate mitigation policy. Additional factors contributing to these achievements included visionary and tenacious individuals, an openness on the part of all stakeholder groups, the South African culture of consultation and scenario planning, and the particular, time-specific interplay between international and domestic policymaking. It could also be argued that the work's promise as policy-informing rather than policy-prescriptive played a particularly significant role (Tyler and Torres Gunfaus 2017).



While the DEA has laid important building blocks of mitigation policy since the LTMS, including an updated Mitigation Potential Analysis study, the promulgation of mandatory GHG reporting regulations and GHG pollution prevention plans, a draft climate change bill and a number of GHG inventory iterations, it has not yet tackled the critical work of strategic target-setting. Work to define emission budgets and targets on the company and sectoral level has been heavy going, contentious, and subject to ongoing delays. A carbon tax first broached in 2010 has yet to see the light of day. It is not clear whether an LTMS-type design would be appropriate for this largely political work of target-setting, at either a national or sectoral level. A scarcity of political capital in a country currently facing significant development and governance challenges poses a significant barrier to moving forward with this task, although innovative ways around these constraints may yet be found.

In hindsight, what happened—or failed to happen—after the LTMS was crucial in curtailing the potential of the LTMS to support adequate long-term target-setting for a South African GHG trajectory compatible with either a 2°C or 1.5°C goal. There was no plan for “what next.” The lack of a clear policy process going forward left the policy community open to the president’s opaque action prior to the Copenhagen COP. The lack of a platform to nurture the nascent climate-mitigation policy community exacerbated its dissipation. And the lack of momentum and erosion of trust resulted in stakeholders entrenching their positions.

The climate mitigation policy world is now very different from that of 2006–7, when the LTMS was undertaken. The idea of low-carbon transitions dominates conceptually, a less linear, more systemic, and temporally nuanced framing. Within this frame questions such as lock-in, social justice, structural economic change, compensation of losers, creation of systemic opportunities, and positive feedback loops are more accessible. However, the translation of the LTMS-derived Benchmark Trajectory Range vision into a plan with strategically determined subnational targets or carbon budget allocations remains a necessary part of such a transition. Careful thought is required on the design of such a planning process. While the interaction of the technical and process components of the LTMS can inform this, engaging the politics is likely to be central.

The post-LTMS lesson that policymaking, particularly with respect to a system-wide transition, is an ongoing activity demanding responsiveness, flexibility, and collaboration as circumstances evolve remains a crucial one. To account for this, thinking and experimenting with approaches to policymaking that explicitly respond to these characteristics will be required. For example, an independent and nimble body of networked and strategically positioned experts may assist in identifying emerging trends and issues and recommending mitigation-aligned policy responses as South Africa’s energy transition unfolds; the institutionalization of climate mitigation as a mainstream economic issue would enable a more direct engagement with the politics, paying more attention to sources of innovation (technical, behavioral, and governance), particularly at the local level, and supporting the replication of these.

## ENDNOTES

1. At the time of the LTMS, the Department of Environmental Affairs and Tourism (DEAT) was responsible for climate change. This department was split into the *DEA* and the Department of Tourism in 2009. The term *DEA* is used throughout this case study for ease of reading.

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### Further reading on the LTMS

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## ABOUT THE LONG-TERM STRATEGIES PROJECT

World Resources Institute and the United Nations Development Programme, working closely with UN Climate Change, are developing a set of resources to help policymakers integrate long-term climate strategies into national policy making.



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**Emily Tyler** is a PhD candidate from the University of Cape Town, South Africa. With an educational background in economics and finance, Emily has worked on the challenge of reducing greenhouse gas emissions since 2001, first in Europe and subsequently in South Africa where her development interest and perspective continues to shape her thinking and vocation.

Emily has predominantly worked as a consultant; to local and international civil society, the private sector, government and academia, both independently and in consulting firms and not-for-profit institutions. Her focus has spanned corporate low carbon strategies, carbon foot-printing, low carbon project mechanisms under the United Nations Framework Convention on Climate Change, national low carbon development strategies, carbon taxes and trading schemes, low carbon transition planning, energy policy, carbon budgeting and most recently, engaging complexity and complex systems thinking to approach low carbon policy in a development context through her current PhD research.

This project contributes to the 2050 Pathways Platform and is undertaken in collaboration with the NDC Partnership.

This vision and direction of the project is guided by the project's advisory committee: Monica Araya, Richard Baron, Ron Benioff, Pankaj Bhatia (co-chair), Yamil Bonduki, Rob Bradley, Carter Brandon, Hakima El Haite, Claudio Forner, Stephen Gold (co-chair), Emmanuel Guerin, Ingrid-Gabriela Hoven, Dr. Martin Kipping, Carlos Nobre, Siddharth Pathak, Samantha Smith, Marta Torres Gunfaus, Laurence Tubiana, and Pablo Vieira.

For more information about the project, and to view the expanding set of resources, visit [www.longtermstrategies.org](http://www.longtermstrategies.org).