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CLIMATE CHANGE AND KNOWLEDGE SYSTEMS IN SOUTH AFRICA

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Abstract

The region of South Africa, is rich in natural resources, has diversified ecosystems, biodiversity, however, due to its geographic location it is particularly vulnerable to the impact of climate change. Realizing this vulnerability, the country has adopted a prominent role in the climate change negotiations. South Africa has made adaptation plans but the success of these plans depends on the public will- the decisions of the households and companies to join them. Thus, the question is that will these decisions happen naturally as the people learn about climate change or should the government provide incentives for people to make these decisions? This is where knowledge systems come into play. If the people are aware- they have normative and scientific knowledge about climate change, then they will be willing to utilize the technological knowledge provided to them to find pragmatic solutions to the problem of climate change. Over here, the role of the government becomes crucial. This paper explores all of these linkages.

Keywords

Climate change, Knowledge systems, South Africa

South Africa, is a region rich in natural resources, with varied ecosystems, biodiversity, but, because of its geographical location it is particularly vulnerable to the effects of climate change, with threats of increased drought in the Northern and Western provinces while the Eastern coast is threatened by increased incidents of floods. Variations in temperature, affects the food security,



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the livelihood of the people, leading to economic vulnerabilities and rising inequalities. The South African economy is dependent on sectors like agriculture and mining, which are energy intensive and natural resource dependent. Therefore, climate change is likely to exacerbate these challenges, as it will have direct impact on South Africa's natural resources and infrastructure. For instance, less rainfall will mean less agricultural productivity, which will lead to rising food prices as well as food insecurity. These impacts will be felt heavily by the poor, as they have less resources to cope with the challenge of climate change. A decrease in crop yield will mean that not only the farmers will have less to eat but even lesser to sell. Thus, impacting their health, food security and their very livelihood. Climate change will further widen the inequalities between the rich and the poor. This means, that now the State will have to divert more of its resources in welfare measures, providing subsidies in order to bridge the gap between the rich and the poor. In this way climate change will have a dual effect on South Africa's economy.

Recognising this vulnerability, the country has adopted a prominent role in the climate change negotiations. South Africa has a unique position in the international climate negotiations. It is seen as a country that builds bridges between the developed and the developing world. Being a part of various developing country groupings like Africa Group, G77, BASIC and BRICS, it acts as a driver, rather than a blocking force. But, South Africa's approach to climate change is heavily conditioned by an emphasis on fossil fuel dependent development and economic growth. South Africa is the world's 14th biggest emitter of greenhouse gases, with per capita emissions within the ranks of the developed world but significantly lower total GHG emissions.

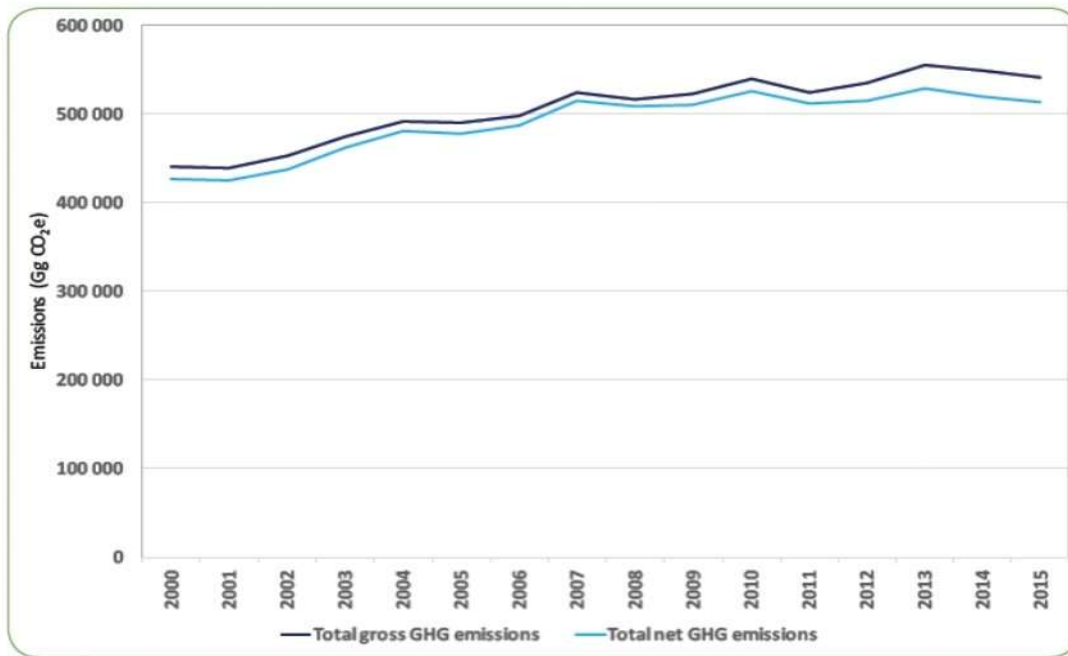


Fig. 4.1 National inventory trend (gross and net) for aggregated GHG emissions, 2000-2015¹

Gross emissions increased by 1.2% between 2012 and 2015. The increase was due to a 0.05% (195 Gg CO₂e), 9.3% (1667 Gg CO₂e) and a 7.5% (2927 Gg CO₂e) increase in the emissions from the Energy, Waste and IPPU sectors respectively. CO₂ gas is the largest contributor to South Africa's gross and net emissions, thereby contributing 91.9% of gross emissions between 2000 and 2015 and 92% in 2015. This is followed by CH₄ contributing 9.4% in 2015 and then N₂O contributing 4.5% in 2015. The contribution from CH₄ and N₂O to the gross emissions decreases between 2000 and 2015, while CO₂ and F-gases increased over the same period.²

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¹ Department of Environmental Affairs, South Africa, "South Africa's 3rd Biennial update Report to the United Nations Framework Convention on Climate Change," (2019), p. 28.

² Ibid. P. x



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The success of the adaptation plans depends upon the public will- the decisions of the households and companies to partake in them. Thus, a question of importance is that will such decisions occur naturally as people learn about climate change or should the government provide incentives to people to partake in such decisions? This is where knowledge systems come into play. In order to understand how people will respond to climate change it is important to understand their perceptions of climate change and what influences those perceptions. If the people are aware- they have normative and scientific knowledge about climate change, then they will be willing to utilise the technological knowledge provided to them for combating and finding pragmatic solutions to the problem of climate change. Over here, the role of the government becomes very important. It should provide incentives to the people and the private sector to adapt and invest in climate friendly measures.

The concept of climate knowledge systems captures which actors develop and provide the new background knowledge that other actors draw upon, as well as what kind of dynamic order may derive from this. The concept uncovers the underlying knowledge paradigms that connect policymakers, scientists, experts, civil society and business.³ When these actors connect, they exchange ideas and knowledge, which further leads to the generation of new knowledge and ideas. These new ideas then take the shape of policies and practices. Thus, a knowledge system connects different actors and their interests across sectors. It contains a set of ideas of what climate change actually is and means to different actors and how they intend to deal with it. In

³ Babette Never, *Knowledge Systems and Change in Climate Governance: Comparing India and South Africa*. (New York: Routledge, 2015): 3.



this way, these knowledge systems influence climate change governance of the country and in turn are influenced by them.

In an analysis of the knowledge systems in South Africa it was found that most actors who work directly on the climate change issue have a basic understanding about climate change and opined that something must be done about it. Although awareness about climate change has increased, it is still limited.

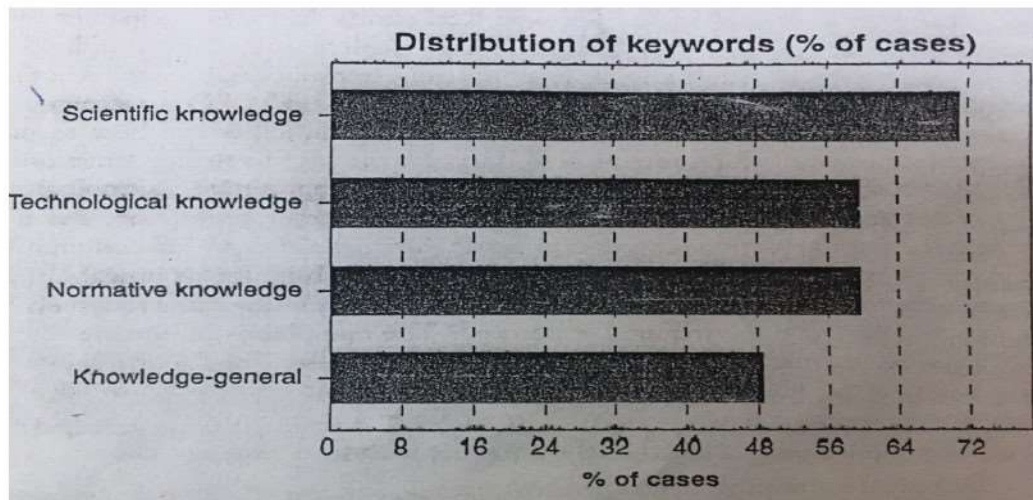


Fig. 4.4 Knowledge System in South Africa⁴

Fig. 4.4 clearly demonstrates that scientific knowledge receives most attention in South Africa, with 67% of respondents clearly knowing about it. Technological knowledge and normative knowledge are almost the same. In terms of scientific knowledge, interviewees emphasised South Africa's dependence upon coal and its role as a major emitter. Many actors showed awareness of modelling problems in climatology and the lack of data concerning the impacts of

⁴ Ibid. p. 131



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climate change. Water scarcity, energy and GHG emissions were mentioned as areas of concern.⁵ Technical knowledge is not widespread in South Africa, with companies searching for technical climate change related knowledge and competing to employ those few people who actually have the required expertise.⁶ Members of government and scientists stressed that there is an increased need for scientific information and feasible options for solutions- both to help overcome uncertainty and guide governance processes.⁷ Ben Joubert, Minister of Plenipotentiary, South Africa in answering the questionnaire on climate change awareness, advocated the need to use both penalties and incentives as a solution for the problem of climate change. Below are his answers to the questionnaire,

⁵ Ibid. p. 131-132.

⁶ Ibid. p. 132.

⁷ Ibid. p. 137.



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Climate Change Awareness South Africa

Urban

- 1.—Do you know about climate change- Yes /No
2. Do you perceive it as a threat- Yes /No
3. From where did you know about climate change- Books and Newspapers / Government Efforts /NGOs
4. Do you think its actually happening- Yes /No
- 5.—Are you aware about the technology that would help in mitigating climate change- Yes /No
6. Who is responsible for combating climate change- Public / Government, Both – Government for Policy.
All for implementation
7. Do you trust the government to mitigate climate change- Yes /No
- 8.—Are you willing to make efforts in combating climate change- Yes / No
- 9.—Are you willing to use hybrid vehicles- Yes / No
10. What achieves results- Penalties / Incentives. Both, significant monetary incentive and severe penalties.

Questionnaire answered by Ben Joubert, Minister of Plenipotentiary, South Africa



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Evolution of Climate Change Governance in South Africa

South Africa has one of the highest Gini co-efficient in the world⁸, perpetuating both exclusion and inequality. Post apartheid, developing a climate change policy in South Africa was a slow process, as the government's central concerns were poverty alleviation, job creation and economic growth. The new democratic government was mainly concerned with departmental reforms and addressing the economic and developmental concerns of the country. Although South Africa had signed the UNFCCC in 1993 and ratified it in 1997, climate change did not receive a great deal of attention as the government had socio-economic issues to contend with and the majority of the people i.e. blacks considered nature conservation as environmental protection, leaving the issue of climate change to the white elites. It was only in the 2000s that the issue of climate change started coming to the forefront. In 2004, *A National Climate Change Response Strategy* was released, which included contributions from different stakeholders like academic institutions, public utility Eskom, individual experts and research organisations. It provided an outline of the government's approach to climate change governance- keeping an inventory of GHG emissions and air pollutants, highlighting the importance of integrating climate change response strategies in different parts of the government with Department of Environment and Tourism as the nodal agency, increasing awareness about climate change by educating the government officials as well as the common public about it, focusing on capacity building, increased R&D in adaptation and mitigation and assessing and managing financial resources for climate change. This was a good strategy but it was diluted by the government's cautious stance towards fossil fuel based energy. Also, the government did not give a specific

⁸ There is a huge disparity in household incomes in South Africa.



timeframe to achieve the objectives of the response strategy. South Africa clearly specified that as a Non-Annex I country, economic and social development was its priority.

In 2007, the African National Congress adopted a policy resolution on climate change which stated the government's intention to mitigate GHG emissions and to adopt a low carbon growth path. It resolved to set a GHG mitigation target and to diversify the energy concentration away from being coal intensive, with a strong emphasis on renewable energy, particularly solar and wind. It focused upon mandatory energy efficiency programmes, ambitious renewable energy targets and setting a price on carbon emissions- to achieve GHG reductions. In the same year, the *Long Term Mitigation Scenario* document was released. It analysed South Africa's climate change mitigation challenge as a set of different mitigation scenarios. The LTMS can be summarised in a set of graphs, with the baseline of business as usual emissions growth for South Africa from 2003 to 2050. The first, 'Growth without constraints' acted as a reference point for other scenarios, highlighting the implication of taking no action to mitigate climate change while maintaining a growth trajectory of 3-6% per annum. GWC scenario assumed that growth would be mainly dependent on the use of fossil fuels with renewable energy forming a small share. Thus, this scenario will lead to a very high increase in the country's GHG emission profile. The second scenario is 'Required by Science', which requires South Africa to reduce its GHG emissions by 30-40% from 2003 levels by 2050. This will require an increased usage of nuclear and renewable energy, improving emission standards and increasing energy efficiency. The four strategic options- Start now, Scale up, Use the market and Reach for the goal, use different mitigation options to get them near the RBS trajectory. Start now includes using renewable and nuclear energy for electricity generation, accelerated energy and vehicle efficiency measures.



Scale up incorporates renewable and nuclear energy for electricity generation, carbon capture and storage technologies for synthetic fuels, and electric vehicles. Use the market, as the name suggests, puts a price on carbon, together with subsidies for solar water heaters, renewable and biofuels. The Reach for the goal scenario anticipates the use of new technologies and behavioural change.

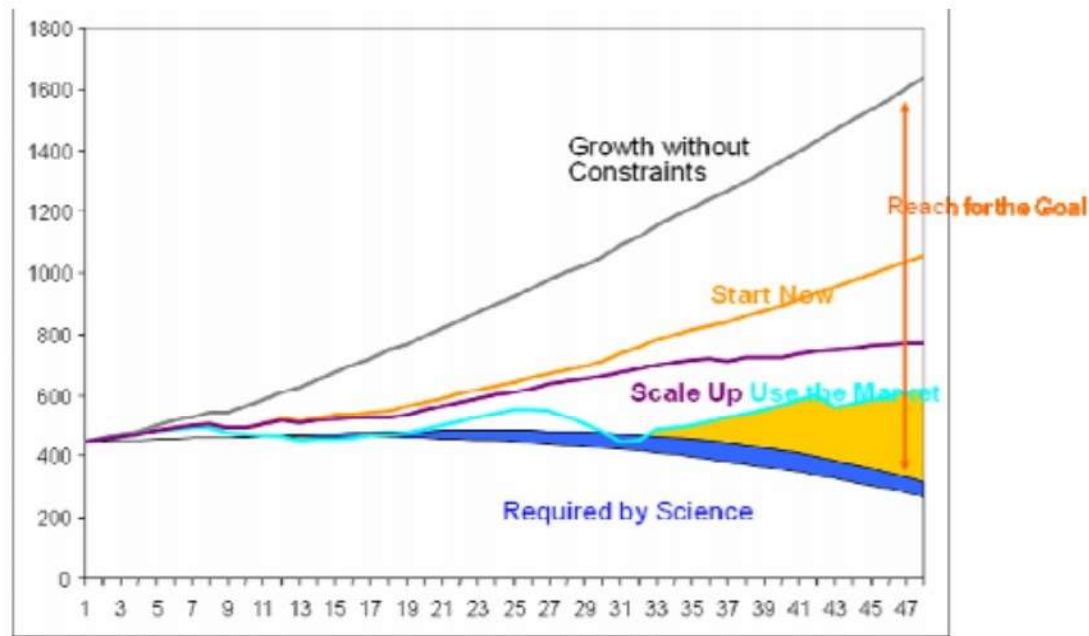


Fig. 4.7 The LTMS Scenarios⁹

While the LTMS was helpful in providing information about the costs of mitigation, it received strong opposition from civil society groups because of its dependency on nuclear energy and continued use of fossil fuels. Based on the LTMS, the government decided on a peak, plateau and decline trajectory for South Africa's emissions that corresponded to the Copenhagen Accord.

⁹ Emily Tyler, "Aligning South African energy and climate change mitigation policy," University of Cape Town, Energy Research Centre (2009), p. 3.

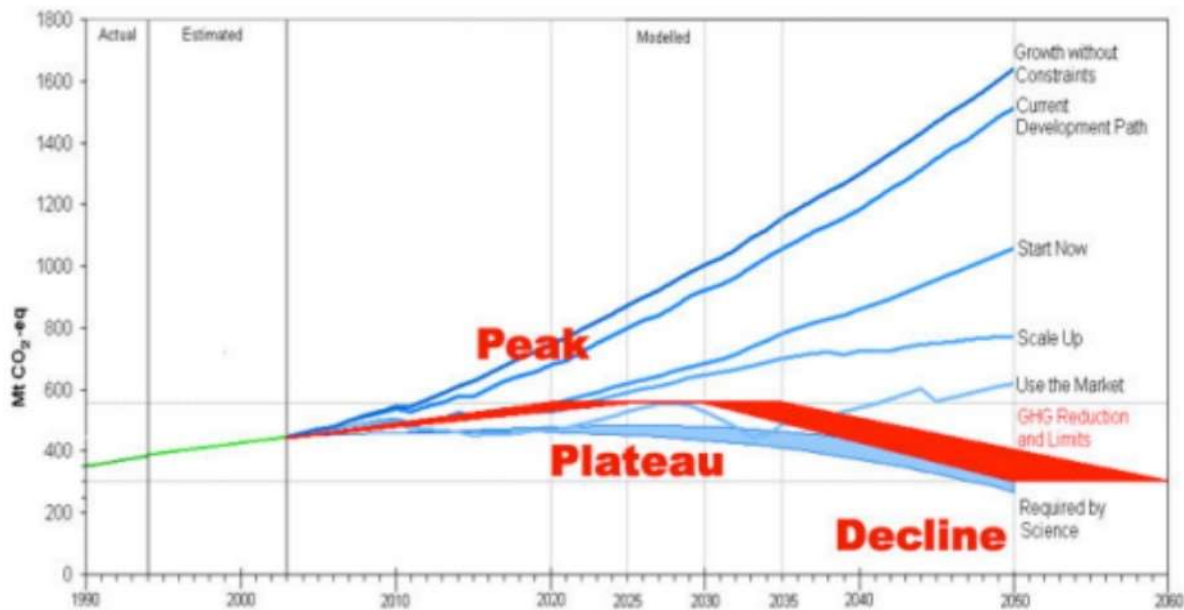


Fig. 4.8 Peak, Plateau and Decline Trajectory¹⁰

The peak will occur between 2020 and 2025, emissions will then plateau until 2035 and decline after this date until 2050.

The year 2009, saw a flurry of climate change awareness and action with the National Climate Change Summit and National Renewable Energy Summit in March and the Copenhagen Accord in December. At the *Copenhagen Accord*, South Africa committed to a Nationally Appropriate Mitigation Action of achieving a reduction of GHG emissions of 34% by 2020 and 42% by 2025. This was the first time when countries actually committed to reduce their carbon emissions. The *National Renewable Energy Summit* was convened to discuss the future of renewable energy in South Africa. It discussed the slow progress of the implementation of the White Paper on Renewable Energy 2003, which had set up a target of 10,000 GWh of renewable energy

¹⁰ Ibid, p. 4.



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contribution to the total energy consumption by 2013. By 2009 only 4% of the target had been achieved. The Summit also discussed the numerous barriers to the inclusion of renewable energy within the country's prevailing energy mix, including inadequate legal and regulatory frameworks, inadequate research and development, limited funding instruments, low electricity tariffs, lack of technical capacity and lack of clarity on the appropriate level of national ambition.¹¹ *The National Climate Change Summit* included representatives from the government, the private sector and the civil society. It facilitated a dialogue between these various actors, where they put forward their views and position on the issue of climate change. However, the *National Climate Change Response Green Paper* which followed it in 2010, was a disappointment, as it lacked a timeframe to achieve the targets set forth and there was no clear cut division of responsibilities amongst the various government departments. In 2009, South Africa's national treasury introduced a charge of 2 cents per kWh on non-renewable electricity. The Renewable Energy Feed-in Tariff guidelines were introduced in 2009 as a consequence of widespread power shortage of 2008. The REFIT guidelines made it clear that alternate energy sources were important not only for climate protection but also for energy security. It guaranteed power producers a fixed price rate for the energy produced.

The South African government's 2009-2014 *Medium-Term Strategic Framework* includes the protection and enhancement of environmental assets and natural resources as one of the 10

¹¹ Department of Energy, South Africa, Renewable Energy Summit 2009: Summit Resolutions, 2009, p. 3-4.



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strategic priorities that were developed into 12 key outcomes.¹² In outcome 10, the Department of Environmental Affairs seeks to achieve the following outcomes:

- (i) enhanced quality and quantity of water resources
- (ii) reduced GHG, climate change impacts, and improved air and atmospheric quality
- (iii) sustainable environmental management
- (iv) protected biodiversity.

In September 2010, South Africa implemented a *carbon excise tax* for motor vehicles, at a rate of R75 for every gram of carbon dioxide per kilometer it emits over the 120g/km. Carbon taxation is an alternative instrument to the Kyoto protocol mechanisms, which is used to internalize the cost of carbon, by charging the producers for the carbon produced.

In May 2010, a Green Economy Summit was held which took the climate change policy agenda forward. It issued a Draft Statement of Conclusion, titled *Towards a Resource-efficient, Low Carbon and Pro-employment Growth Path*, which deals with a number of climate change policy considerations. The Department of Energy released the *Integrated Resources Plan 2010*, with an aim to “determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost”.¹³ A Revised Balance Scenario was developed, which supported the development of renewable energy technologies, especially wind

¹² Government of South Africa, “Medium Term Strategic Framework,” last modified on 30th October 2019, <http://www.info.gov.za/view/DownloadFileAction?id=103901>

¹³ Integrated Resource Plan for Electricity, South Africa, supra, note 32 (2010), p. vi.



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and solar as well as nuclear, in order to move away from a coal-dominated economy.¹⁴ It proposed an electricity mix by 2030 to be made up of 48% of coal, 16% of renewable energy, 14% of nuclear energy, 9% of gas turbine energy, 6% of pumped storage, 5% midmerit gas and 2% imported hydro energy.¹⁵

In October 2011, South Africa released its *National Climate Change Response White Paper* that outlined the government's vision 'for an effective climate change response and the long term transition to a climate resilient, equitable and internationally competitive lower carbon economy and society'.¹⁶ It set out specific targets and actions for addressing adaptation and mitigation within a specific timeframe. The White Paper signaled South Africa's commitment in meeting its emission reduction targets set under the Copenhagen Accord. The *Green Energy Accord* which was launched at COP 17, set a target of creating 5 million green jobs by 2020. It called for scaling up of renewable energy and energy efficiency projects, electrification projects, biofuels, introduction of solar water heaters and manufacturing them domestically and usage of clean coal.

In 2012, South Africa released its *National Plan*, its long term economic strategy that affirmed the need to move towards a climate resilient, sustainable and low carbon economy by 2030. While focusing upon economic development, it emphasized on an approach that was environmentally sustainable and climate change resilient. It stressed on the usage of market mechanisms for the mitigation of GHG emissions.

¹⁴ Ibid. P. 17-18.

¹⁵ Department of Energy, South Africa, "Executive Summary of the Draft Integrated Electricity Resource Plan for South Africa- 2010 to 2030 (IRP 2010)", last modified 1st November 2019. <uscdn.creamermedia.co.za/assets/articles/attachments/30108_irp2010.pdf>

¹⁶ Department of Environmental Affairs, South Africa, *National Climate Change Response White Paper*, 2011, p.10.



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In July 2012, South Africa directed its state-owned enterprises to develop a climate change response plan with the objective of promoting a green economy and reducing emissions. They were asked to set emissions reductions targets that would not compromise their financial viability.

In 2015, the South African Development Community came out with a *Climate Change Strategy and Action Plan* which stressed on the need for greater climate action and increased national and regional coordination in climate change adaptation responses in Africa.

The *1st Climate Change Annual Report* published in 2016, provided an overview of South Africa's progress in catalysing action in response to climate change impacts and risks. South Africa has designed a National Climate Change Monitoring & Evaluation system composed of the National GHG Inventory System and the National Climate Change Response system, to track South Africa's transition to a climate resilient society, by tracking its transition to a lower carbon economy. This system records the impacts and the vulnerabilities of different sectors brought about by climate change, provides a database of learning for what has worked and what has not worked in climate change adaptation responses, thus, informing future responses to climate change.

In 2017 South Africa published its *Second Annual Climate Change Report*, that built upon the 1st Report to inform future responses to climate change. It provided updates on the various programmes undertaken across sectors to combat climate change. Two new climate change flagship programmes, i.e., The Agriculture, Food Systems and Food Security Flagship Programme and The Low Carbon, Climate Resilient Built Environment, Communities and



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Settlements Flagship Programme were added to the already existing 8 programmes that targeted climate change response public works, water conservation and demand management, renewable energy, energy efficiency and energy demand management, transportation, waste management, carbon capture and sequestration and adaptation research. The 2nd ACCR focused upon the development and implementation of a framework that would strengthen and improve youth participation on climate change related issues. It advocated for the involvement of children and youth in local planning and decision making forums etc. It focused on educating the children and youth on climate change through formal and informal structures.

The Draft Climate Change Bill was published in 2018. It aims to build an effective climate change response and a transition to a climate resilient and low carbon economy. It provides for an integrated response to combat climate change that seeks to enhance adaptive capacity, effectively manage climate change impacts and build resilience. It seeks to phase out synthetic GHG emissions. Carbon budgets and sectoral emission targets are seen as the means to achieve the desired emission reductions and to regulate the implementation of mitigation actions.

On 1 June 2019, South Africa launched its carbon tax, with an aim to reduce 34% carbon emissions by 2020 and 42% emissions by 2025. The first phase of the tax is from June 2019 to December 2022, with a tax rate of R120 rand per tonne of CO₂ equivalent. A review of the impact of the tax will be conducted before the start of the second phase from 2023 to 2030. The carbon tax is an attempt to change consumer behaviour and reduce GHG emissions while stimulating business to participate in low carbon alternatives.



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The *National Climate Change Adaptation Strategy* of South Africa released in 2019, aims to be a cornerstone for adaptation strategies within the country. It has four objectives,

- Build climate resilience and adaptive capacity to respond to climate change risk and vulnerability
- Promote the integration of climate change adaptation response into development objectives, policy, planning and implementation.
- Improve understanding of climate change impacts and capacity to respond to these impacts.
- Ensure resources and systems are in place to enable implementation of climate changes responses

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