



South African renewable energy law and the mitigation of climate change

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Abstract

The negative effects of climate change such as unpredictable weather patterns resulting in flash floods, drought and heat wave to mention only a few had forced countries, United Nations and non-governmental organisations to urgently seek solutions to address climate change. One way of preventing climate change is the reduction in greenhouse gases. It is an open secret that humans are a major emitter of greenhouse gases hence the need to focus on changing human behaviour towards energy use. South Africa is fortunate to have varied sources of renewable energy hence it is upon herself to capitalise and diversify its energy mix by deploying more renewables. Surely South Africa has taken a step in moving towards green economy through the deployment of renewable energy sources but a stumbling block remains lack of single renewable energy law that governs the rolling out of renewables.

The research seeks to investigate the relationship between renewable energy law and policies and climate change mitigation. In other words to what extent renewable energy policies mitigate climate change? The research starts by the historical development of climate change mitigation followed by the state of renewable energy sources and development of renewable energy policies. The discussion ends by evaluating renewable energy policies. The paper also highlighted the potential conflict between the deployment of renewable energy and the realisation of socio-economic rights. The research also recognises the Constitution of the Republic of South Africa as a point of departure in analysing renewable energy policies.

Key words: climate change mitigation, renewable energy policies, greenhouse gas and renewable energy.

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1 Introduction

South Africa (SA) is the most industrialised country in Africa and is considered semi-developed in terms of per capita income with a population of over 56,5 million as of 31 July 2017.¹ As an emerging economy, SA's economy is heavily dependent on fossil fuels, which emit a lot of greenhouse gases. In 2013 SA was ranked number 18 in terms of GHG emissions which is astonishing considering the size of the economy by world standards.² The main source of the emission is the burning of coal, which is believed to contribute more than 80 per cent to the total. The high emissions level is a result of SA's meeting approximately 77 per cent of its energy needs through coal-fired electricity generation.³ The country's dependence on coal usage derives largely from the abundance of its coal reserves, which makes coal cheaper than other energy sources.⁴ With the addition of the Kusile and Medupi Power Plants, SA's emissions are set to increase. The increase in emissions is also attributable to Eskom's out-dated and poorly maintained equipment, which is operating at its maximum capacity by 2013 93 per cent of the electricity in SA was produced from coal.⁵

As a global citizen, SA has ratified the United Nations Framework Convention on Climate Change (UNFCCC) 1992, the Kyoto Protocol 1995, and recently the Paris Agreement 2015, which shows its commitment towards climate change mitigation. The commitment towards the reduction in GHG emissions can be traced to article 2 of UNFCCC, which encourages Annex 1 countries to stabilise their emissions to 1990 pre-industrial level.⁶ As a non-annex 1 country SA does not have any commitments for emission reduction during the first commitment period of 2008-2012.⁷ However, there is a need for SA to be seen as a responsible citizen by curbing its emissions. The global pressure leaves South Africa with no choice but to mitigate climate change. Enacting relevant legislation is a must if effective climate mitigation is to happen. This is a daunting task since SA is also confronted by a myriad of challenges such poverty,

1 STATS SA 2017 www.statssa.gov.za.

2 Department of Energy date unknown <https://www.energy.gov.za/files/>.

3 Department of Energy date unknown <https://www.energy.gov.za/files/>.

4 Department of Energy date unknown <https://www.energy.gov.za/files/>.

5 Department of Energy date unknown <https://www.energy.gov.za/files/>.

6 Article 2 of United Nations Framework Convention on Climate Change, 1992(UNFCCC).

7 Moodley S, Mabugu RM and Hassan R: Analysing scenarios for energy emissions reduction in South Africa 34.

unemployment and inequality, which some think could be worsened by a shift towards renewable energy sources. A recent report (2017) by statistics South Africa revealed that 55 per cent of the population live in abject poverty and more than 50 per cent of the young are unemployed.⁸ Therefore, SA must balance social and economic challenges with environmental considerations. The fact that South Africa is faced with the need to alleviate poverty through economic growth and also respond to international pressure to reduce GHG emissions makes the implementation of renewable energy policies as a way of mitigating climate change more important.

Climate change mitigation can be defined as an intervention to reduce the effect of anthropogenic forces on the climate system.⁹ It can also be defined as taking action to prevent and limit further climate change by developing, gathering and sharing information on greenhouse gas emissions, and effective policies and best practices to temper climate change.¹⁰ Mitigation involves minimising greenhouse emissions in the atmosphere, for example by using alternative sources of energy like wind or solar energy instead of dirty coal energy that pollutes the environment. It includes strategies to reduce GHG sources and emissions and enhance GHG sinks.¹¹ In order to mitigate climate change the UNFCCC in its objective of Article 2 emphasises the need for all parties to the Convention to adopt measures that reduce the concentration of GHG emissions in the atmosphere to a level that will prevent dangerous human interference with the climate system.¹² Industrialised countries that fall under Annex I are expected to play a leading role in mitigation.¹³ In other words, the UNFCCC places a mandatory obligation on industrialised countries to cut their emissions. This confirms the principle of common but differentiated responsibility given to different countries. The principle acknowledges that our common enemy is climate change, but to address this monster developed nations should take the lead in reducing emissions to agreed levels and also ensure financial and technological support for less developed countries.¹⁴ The inclusion of the principle of common but differentiated responsibility (CBDR) in the UNFCCC

8 STATS SA www.statssa.gov.za/?page_id=1859.

9 Watchman *Climate Change: A guide to Carbon Law and Practice* 18.

10 Anon date unknown <http://www.wmo.int...international>.

11 Watchman *Climate Change: A Guide to Carbon Law and Practice* 18

12 Article 2 of the *UNFCCC* of 1992.

13 Article 3.1 of the *UNFCCC* of 1992.

14 Article 4.3 of the *UNFCCC* of 1992.

seeks to address the disparity in national capacity terms of global climate change liability with regard to mitigation.¹⁵ Parties should try to take precautionary measures and anticipate, prevent or minimise the causes of climate change and mitigate its adverse effects.¹⁶ It is further emphasised that the lack of scientific certainty should not be used as an excuse to avoid taking measures that reduce climate change.¹⁷ However, all measures taken to address climate change should be cost-effective, balancing the social, economic and environmental benefits that accrue to the society. This also confirms to the principle of sustainable development. In addressing mitigation, the principle of sustainable development should be a guiding factor.

That being said, SA is fortunate to have a variety of energy sources besides its abundant coal reserves. These include solar, wind, small-scale hydro power and ocean or tidal energy, which if correctly tapped will reduce the present over-reliance on coal energy. The White Paper on Renewable Energy, 2003 defines renewable energy as "sun, wind, biomass, water(hydro), waves, tides, ocean current, geothermal and any other natural phenomena which are cyclical and non-depletable"¹⁸ It is noteworthy that SA is ranked number three in the world when it comes to receiving solar radiation, with an average of more than 2 500 hours of sunshine per year and average direct radiation levels ranging between 4,5 and 6,5 kwh/m² per day.¹⁹ This is a huge renewable energy potential that can be tapped as an alternative to coal energy. The use of renewable energy is one of the ways in which climate mitigation can be achieved. Naturally, switching to a low-carbon economy is not an easy task, given that South Africa has a carbon-intensive economy at present. What is needed now is effective legislation to govern the deployment of renewables. Yes, laws have been put in place to accelerate the deployment of renewables, but are these laws effective in addressing climate change mitigation? What are the challenges these RE policies present, and how best can they be aligned in order to mitigate climate change? These are some of the questions that need to be addressed in this research.

15 Carter and Barnard *Demystifying the global climate change regime* 8.

16 Article 3.3 of the *UNFCCC* of 1992.

17 Article 3.3 of the *UNFCCC* of 1992.

18 White Paper on Renewable Energy 2003.

19 State of Renewable Energy in South Africa 2015 2.

Renewable energy law relates mainly to:

The transitional legal policy issues that revolve around the development, implementation and commercialisation of SA's renewable energy that is solar, wind, geothermal and tidal energy. It also refers to land use and financial issues encountered by developers of renewable energy projects, focusing on the practice of serving the legal needs of renewable energy project developers and companies to ensure the development of clean technologies.²⁰

In addition to climate change mitigation, renewable energy usage may contribute to social and economic development, allowing citizens to access energy and also to allow for a secure energy supply.²¹ McCarthy states that "Replacing fossil fuels as an energy source with green power is the most important action we can take to address the impact of climate change on health and to reduce pollutants that can lead to diseases."²² Long and Steinberger reiterate that renewable energy is one of the most effective tools to use in fighting climate change.²³ Generating an energy supply is one of the largest sources of carbon emissions, and replacing fossil fuels with renewable energy could make a big impact on climate change mitigation.²⁴ Renewable sources that include biomass, hydroelectric, wind, solar and hydrothermal systems release relatively low emissions.²⁵ Wuester *et al* claim that renewable energy offers an immediate means to decarbonise the global energy mix and increasing the use of renewable energy could deliver most of the required carbon emissions.²⁶ They also suggest that developing renewable energy means providing a secure and clean energy supply while supporting the growth of the GDP, improving trade balances and creating local value and jobs.²⁷

The definition of renewable energy law is broad and it consists of policies and laws that govern the deployment of renewable sources. Further renewable energy law covers matters like financial issues and land use in the implementation of renewables.²⁸

20Anon 2012 Renewable Energy Law www.werthschroeder.com/.

21 McCarthy *Importance of renewable energy in the fight against climate change*.

22 McCarthy *Importance of renewable energy in the fight against climate change* 2015.

23 Long and Steinberger 2016 <http://www.nrdc.org/experts/noah-long/renewable-energy-key-fighting-climate-change>.

24 Elum and Momodu 2017 <http://www.sciencedirect.com/science/article/pii>.

25 Elum and Momodu 2017 <http://www.sciencedirect.com/science/article/pii>.

26 Wuester *et al* 2015 <http://.irena.org7/rethinking-renewable-energy-and-climate-change>.

27 Wuester *et al* 2015 <http://.irena.org7/rethinking-renewable-energy-and-climate-change>.

28Wuester *et al* 2015 <http://.irena.org7/rethinking-renewable-energy-and-climate-change>.

In short, regulatory mechanisms relating to renewable energy use qualify as renewable energy law. There is a need for South Africa to strengthen its policy commitment to renewable energy. Where there are enabling policies and a regulatory framework, then a stable and predictable investment can be established. Wuester *et al* also suggest that setting renewable energy targets and formulating dedicated policies to implement them can provide strong market signals reflecting the government's commitment to the sector's development.²⁹ South Africa's renewable energy policies and laws and other aspects of the related RE regulatory framework will therefore be discussed below. These documents include the 1998 Renewable Energy White Paper, the White Paper on Renewable Energy 2003, the Integrated Resource Plan 2010-30, the National Energy Act 1998, the Green Accord 2011, the National Development Plan-Vision 2030, the National Climate Change Response White Paper 2011, and the Proposed Carbon Tax and Energy Efficiency 2005.

The focus of this research is to ascertain to what extent existing SA policies and legislation facilitate the mitigation of climate change via increased renewable energy generation. The research is based mainly on a review of relevant textbooks, renewable energy laws in SA, relevant laws and policies pertaining to climate change mitigation, and international conventions on climate change mitigation.

The research is structured into five parts. Section one is mainly the introduction Section two focuses on the relationship between climate change mitigation and renewable energy sources. The section will look at sources of renewable energy and highlight the potential for RE sources in SA. In other words the paper looks at the state of RE sources and how it (RE) could mitigate climate change. However, the section starts by looking at the historical background of climate change mitigation. This gives us a clear picture of the duties imposed on Parties to the United Nations Framework Convention on Climate Change and subsequent climate change treaties.

This is followed by section 3, which deals with the historical background of SA's RE laws and policies. The chapter unpacks these RE laws and policies from 1998 until

²⁹ Wuester *et al* 2015mhttp://.irena.org7/rethinking-renewable-energy-and-climate-change.

2017. The section will look at the objectives, goals and targets of renewable energy policies.

Section 4 analyses these RE laws and policies, highlighting their weaknesses and strengths. The section also deals with other climate change mitigation measures as they indirectly encourage a move towards the use of RE sources.

Section 5 is the conclusion. It aims to provide an overview of the RE legal framework. The section also describes the challenges to the deployment of renewables, and makes some recommendations to enhance the chances of the successful implementation of renewables.

2 Renewable energy sources and climate mitigation

2.1 Climate Change Mitigation – the Historical Background

The need to address climate change or environmental challenges led to a sequence of events that culminated in the United Nations Conference on the Environment and Development (UNCED) in Rio de Janeiro in 1992. The Conference resulted in the birth of the Rio Instruments that contain the international treaty on climate change commonly known as the United Nations Framework Convention on Climate Change (UNFCCC). The inclusion of climate action as a sustainable development goal in Agenda 2030 is a serious attempt to address climate change mitigation. Goal 13 of Agenda 2030 (SDGs) acknowledges that the United Nations Framework Convention on Climate Change is the primary international, inter-governmental forum for negotiating the global response to climate change.³⁰ This SDG for climate action refers specifically to the UNFCCC and its institutional framework. Countries are expected to integrate climate change measures into their national strategies and policies and improve educational awareness on climate mitigation.³¹ Not surprisingly, developed nations are tasked with mobilising 100 billion dollars per year for the use of developing countries in addressing climate change mitigation. A closer look at Goal 13 of Agenda 2030

³⁰ United Nations 2015 <https://sustainabledevelopment.un.org>.

³¹ United Nations 2015 <https://sustainabledevelopment.un.org>.

shows that there is similar commitment given to Annex 1 and non-Annex 1 countries in climate change mitigation as envisaged by the UNFCCC.

In this chapter the focus will fall on the historical development of the UNFCCC, its legal enforcement mechanisms, and the evolution of the UNFCCC through the various Conferences of the Parties (COPs).

2.2 The concept of mitigation within the UNFCCC

The United Nations Framework Convention on Climate Change (UNFCCC) is an agreement that deals with environmental issues and it is an international agreement. In 1992, the treaty was made available for signature in Rio de Janeiro in Brazil ³²Two years later in 1994, the treaty became operational. The principal aim of the convention is to control the amount of greenhouse gas concentration in the atmosphere in order to make sure that they do not end up going to high levels that are detrimental to the climate.³³ The UNFCCC is a benchmark document that guides parties on how to mitigate climate change. The Convention, among other things, requires all Parties to mitigate climate change according to their ability to come up with and enforce the required measures.³⁴ All Parties that are members to the Convention are required to set forth and update amounts of greenhouse gas emissions. Furthermore, all Parties are required to promote and cooperate in the development and application of climate friendly technologies.³⁵ The emphasis is on developed countries taking the lead in adopting national policies and measures to limit GHG emissions and enhance sinks and reservoirs.³⁶ At the same time, developing countries are given a flexible mandate to implement their commitments, depending on their financial resources. Although the UNFCCC failed to specify mandatory limits for Parties, it does give direction to Parties to voluntarily take measures to reduce GHG emissions. It also recognises the need for all Parties to the Convention to take action against climate change through mitigation. A host of principles related to the achievement of the objective of mitigation is listed in the document, namely: the principle of common but differentiated responsibilities

³²Carter and Barnard *Demystifying the global climate change regime* 6-7.

³³ Article 2 of the *UNFCCC* of 1992.

³⁴ Article 4.1 of UNFCCC.

³⁵ Article 4.1 of UNFCCC.

³⁶ Article 4.1 of UNFCCC.

and respective capabilities,³⁷ the precautionary principle,³⁸ the principle of sustainable development,³⁹ the cost-effectiveness principle,⁴⁰ and the principle of inter-generational equity.⁴¹ The principle of common but differentiated responsibilities and respective capabilities (CBDR) has two fundamental elements, namely the emphasis on the common responsibility of all Parties to protect the environment, and the need to consider the different circumstances of each Party, meaning each country's contribution towards emissions, and the ability to curb emissions.⁴² The members of the UNFCCC that are developed countries and some members in Annex 1 are the ones that must be at the forefront in climate mitigation⁴³ The treaty itself is thought to be not mandatory, as it does not set limits on greenhouse gas emissions for different countries.⁴⁴

As the UNFCCC did not set mandatory limits on greenhouse gas emissions for individual countries, the Kyoto Protocol remedied the vagueness by providing clear targets for countries. The Kyoto protocol was an attempt to put flesh on the skeleton of the UNFCCC. It was adopted in 1997. It is a confining treaty that consummate the objective set out in article 2 of the UNFCCC. The Convention has 197 parties. 37 of these parties are industrialised countries that have committed to cut carbon emissions by at least 5% below their 1990 levels in the commitment period 2008 to 2012.⁴⁵ The Protocol outlines the measures each Party is required to implement in order to cut emissions. These include the improvement of energy efficiency in the sectors of the economy that are relevant; the preservation and improvement of the reservoirs of greenhouse gases; the advancement of the use of sustainable methods of agriculture which are climate friendly; research into the promotion of other forms of energy such as renewable forms of energy and technologies that are friendly to the environment; the stimulation of relevant changes in different sectors that will help in bringing about policies and measures that reduce emissions; the reduction of market mechanisms and incentives, tax and subsidies in all sectors that emit

37 Article 3(1) of the UNFCCC of 1992.

38 Article 3(3) of the UNFCCC of 1992.

39 Article 3(4) of the UNFCCC of 1992.

40 Article 3(3) of the UNFCCC of 1992.

41 Article 3(1) of the UNFCCC of 1992.

42 Carter and Barnard *Demystifying the global climate change regime* 7.

43 Article 3(1) of the UNFCCC of 1992.

44 Anon date unknown <http://www.wmo.int.../international>.

45 Article 3 (1) of the *Kyoto Protocol of 1997*.

greenhouse gases and the cutting of methane production using recovery methods and waste management and also in production, transport and distribution of energy.⁴⁶

In addition, the Kyoto Protocol introduced three market-based mechanisms as a way of curbing emissions in line with Article 2 of the Convention, namely: the Clean Development Mechanism⁴⁷ (CDM), Joint Implementation⁴⁸ (JI) and Emissions Trading⁴⁹ (ET). CDM allows Annex 1 Parties to implement measures that reduce emissions in Non-Annex 1 Parties in exchange for Certified Emission Reductions (CER).⁵⁰ CDM allows Annex 1 Parties to combat carbon emissions through afforestation or reforestation, while JI allows an Annex 1 Party to implement emission-reducing projects that promote emission reduction by sinks in the territory of another Annex 1 Party.⁵¹ Lastly, ET provides for Annex 1 Parties to acquire emission reduction units from Annex 1 Parties.⁵² The first commitment period has elapsed with notably conflicting results. EU countries had a major decrease in emissions while major increases in emissions were recorded in emerging economies and in China due to the increased production of goods and services for export. Worldwide emissions increased by nearly 40% from 2008 to 2008.⁵³ The second commitment period of the DOHA Agreement started in 2013 and it ends in 2020. 38 developed countries including the European Union (EU) are participating. This second commitment period is covered by

46 Article 2 of the *Kyoto Protocol, 1997*.

47 Article 12 of the *Kyoto Protocol, 1997*; [Unfccc.int/Kyoto-protocol/mechanisms/item/1673](http://unfccc.int/Kyoto-protocol/mechanisms/item/1673) United Nations Framework Convention on Climate Change: The mechanisms under the Kyoto Protocol: Clean Development Mechanism, Joint Implementation and Emissions Trading.

48 Article 6 of the *Kyoto Protocol, 1997*; [Unfccc.int/Kyoto-protocol/mechanisms/item/1673](http://unfccc.int/Kyoto-protocol/mechanisms/item/1673) United Nations Framework Convention on Climate Change: The mechanisms under the Kyoto Protocol: Clean Development Mechanism, Joint Implementation and Emissions Trading.

49 Article 17 of the *Kyoto Protocol, 1997*; [Unfccc.int/Kyoto-protocol/mechanisms/item/1673](http://unfccc.int/Kyoto-protocol/mechanisms/item/1673) United Nations Framework Convention on Climate Change: The mechanisms under the Kyoto Protocol: Clean Development Mechanism, Joint Implementation and Emissions Trading.

50 2017 [Unfccc.int/Kyoto-protocol/mechanisms/item/1673](http://unfccc.int/Kyoto-protocol/mechanisms/item/1673) United Nations Framework Convention on Climate Change: The mechanisms under the Kyoto Protocol: Clean Development Mechanism, Joint Implementation and Emissions Trading.

51 [Unfccc.int/Kyoto-protocol/mechanisms/item/1673](http://unfccc.int/Kyoto-protocol/mechanisms/item/1673) United Nations Framework Convention on Climate Change: The mechanisms under the Kyoto Protocol: Clean Development Mechanism, Joint Implementation and Emissions Trading.

52 [Unfccc.int/Kyoto-protocol/mechanisms/item/1673](http://unfccc.int/Kyoto-protocol/mechanisms/item/1673) United Nations Framework Convention on Climate Change: The mechanisms under the Kyoto Protocol: Clean Development Mechanism, Joint Implementation and Emissions Trading.

53 Henson 2011 <https://www.theguardian.com/environment>.

the Doha amendment under which participating countries have committed to reducing emissions by at least 18% below 1990 levels. The main shortfall of the Kyoto Protocol is that it only requires developed countries to take action. This problem is exacerbated by the exclusion of the United States and China from both commitments. Given the significant greenhouse gas emissions (GHG) contributed by these two huge economies, one wonders whether there will be any tangible reductions in GHG emissions. Fortunately Russia, Japan and New Zealand have realised their mistakes and are fully involved in the second commitment period.

2.3 Institutional Framework of Climate Mitigation within the UNFCCC

For them to fulfill the requirements of Article 2 of the UNFCCC, different institutions and bodies were established. These comprise of the Conference of the Parties, Subsidiary Bodies, the Bureau and the Secretariat, and various committees, working groups and expert bodies.

2.3.1 Conference of the Parties (COP)

This is the principal body of UNFCCC.⁵⁴ It encourages the competent implementation of the convention. One of the roles of the COP is to prepare inventories of greenhouse gas emissions by sources and removals by sinks and checking the competitiveness of measures to reduce GHG emissions and enhance the removal of these gases.⁵⁵ In order to mitigate climate change, the COP mobilises financial resources, technology and the exchange of information among various parties.

2.3.2 Subsidiary Body for Scientific and Technological Advice (SBSTA)

This body was established to provide the COP and other subsidiary bodies with timely information and advice on scientific and technological matters relating to the convention.⁵⁶ Scientific knowledge is crucial to the reduction of emissions. Quantified estimates provide insight on how far parties are reducing GHG emissions and also determines the effects of global warming. The role-players (the participants in this

54 Article 7 of the *UNFCCC*.

55 Article 7(2) (a) of the *UNFCCC*.

56 Article 9.1 of the *UNFCCC*.

body) include governments and independent organizations that possess scientific and technological “know how”.

2.3.3 Subsidiary Body for Implementation (SBI)

This body complements the duties of the COP. It considers information communicated in accordance with Article 12, paragraph 1, to assess the overall aggregated effect of the steps taken by the parties in the light of the latest scientific assessments concerning climate change.⁵⁷

2.3.4 Secretariat

Article 8 of UNFCCC establishes the secretariat. The Secretariat is also known as the climate change Secretariat. It services the COP, the subsidiary bodies, the Bureau, and other bodies established by the COP.⁵⁸ Its mandate includes the provision of support to the parties, particularly developing countries, in the compilation and communication of information required in accordance with the provisions of the convention.⁵⁹ This information is about measures implemented to mitigate climate change.

2.3.5 The Ad Hoc Group on the Berlin Mandate

This body was established to conduct the negotiations that led to the adoption of the Kyoto Protocol. Other specialized groups include the Expert Group on Technology Transfer (EGTT) and the Least Developed Countries Expert Group (LDCEG). As their names suggest, they focus on different areas, with the sole aim of addressing climate change.

2.4. Evolution of Climate Change Mitigation within the UNFCCC

The evolution of climate change mitigation under the UNFCCC spans twenty-five years with the recent adoption of Paris Agreement. Various COPs were held, namely the Bali Action plan 2007, the Copenhagen Accords 2009, the Cancun Accord 2010, the Durban Platform 2011, the Warsaw Outcome 2013, the Lima Call for Climate Action 2014, and

⁵⁷ Article 10(2) (a) of the *UNFCCC*.

⁵⁸ Article 8 of the *UNFCCC*.

⁵⁹ Article 8(2) (c) of the *UNFCCC*.

the Paris Agreement 2015. Here I will focus on those COPs that directly or indirectly relate to climate change mitigation.

2.4.1 The Bali Action Plan 2007

The Bali Action Plan came up with two tracks, namely the UNFCCC Track and the Kyoto Protocol Track.⁶⁰ The UNFCCC Track refers to “a comprehensive process to enable the full, effective and sustained implementation of the UNFCCC through long-term cooperative action.”⁶¹ Its main focus is on mitigation, technology transfer, deployment and financing.⁶² The focus of the Kyoto Protocol Track is emissions reduction targets and mechanisms to achieve those targets.⁶³ However, some major emitters such as the US, Canada, Japan and Russia did not commit themselves, leading to the achievement of little progress, even though the inclusion of the US in the negotiation process was a positive development towards climate change mitigation.

2.4.2 The Copenhagen Accords (2009)

This accord was viewed as a total failure since it failed to bring about a binding global climate treaty.⁶⁴ It allows different countries to design their own GHG emissions targets and baselines, with the result that the whole process lacks uniformity.⁶⁵

2.4.3 The Cancun Accord/Agreements (2010)

The main objectives of this agreement include mitigation, the transparency of actions, the exchange of technology, finance, capacity building and adaptation.⁶⁶ At least the Cancun accord put the Bali Action Plan on track, since it refocused on a 2° C warming target, effective monitoring, technology and financial support in mitigating climate change.

60 Carter and Barnard *Demystifying the global climate regime* 15.

61 Decision 1/CP.13.2007.

62 Carter and Barnard *Demystifying the global climate regime* 16.

63 Carter and Barnard *Demystifying the global climate regime* 15.

64 Carter and Barnard *Demystifying the global climate regime* 18.

65 Draft decision-/CP.15.2009.

66 Carter and Barnard *Demystifying the global climate regime* 1.

2.4.4 The Durban Platform (2011)

The 17th COP and the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) was established in Durban, South Africa.⁶⁷ The agreement put in place the *Ad Hoc* Working Group on the Durban Platform for Enhanced Action, which focuses on mitigation, adaptation, finance, technology development and transfer, the transparency of action, and support and capacity building, drawing upon submissions from Parties and relevant technical, social and economic information and expertise.⁶⁸ All governments were required to put together plans that will help to deliver the ultimate objective of the Climate Change Convention and to stabilize the GHG concentrations at levels that are less harmful to the climate, and hence preserve the right to sustainable development.⁶⁹

2.4.5 The Warsaw Outcome (2013)

The Conference of the Parties established the Warsaw Outcome in 2013. The most important decisions that were adopted at this conference include: advancing the Durban Platform, the Green Climate Fund and long term finance, the Warsaw Framework for REDD + Plus, and the Warsaw International Mechanism for loss and damage.⁷⁰

2.4.6 The Paris Agreement (2015)

The Paris Agreement (COP 21) was adopted recently. The adoption was a new beginning in the global response to climate change, thanks to the adoption of the 2030 Agenda for sustainable development, which seeks to move economies toward low carbon emissions. This new climate Agreement is highly regarded not because of the specific targets given to ANNEX 1 country Parties but the speed with which global governments ratified the Agreement. By 5 October 2016 the Paris Agreement had surpassed the threshold for entry into force, when at least 55 Parties representing the emitters of 55 per cent of global greenhouse gas emissions had ratified the climate

67 Draft Decision 5/CP.17/2011.

68 Draft Decision 5/CP.17/2011.

69 Draft Decision 5/CP.17/2011.

70 Carter and Barnard *Demystifying the global climate regime* 18.

treaty. What is unique about Paris Agreement is that it allows country Parties to the agreement to determine national targets. These Nationally Determined Contributions (NDCs) are national climate plans outlining climate-related targets, policies and actions every Government wishes to implement in response to climate mitigation. This means that the Agreement is flexible. It allows country Parties to determine their NDCs based on their capacities and their specific national circumstances. The agreement reaffirms the commitment to mitigate greenhouse gas emissions by strengthening the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty. It focuses on: (a) holding the increase in the global temperature to well below 2° C above pre-industrial levels and to pursuing efforts to limit the temperature increase to 1.5° C above pre-industrial levels,⁷¹ (b) increasing the ability to adapt to the adverse impact of climate change and fostering climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production,⁷² and (c) making finance flows consistent with pathways towards low greenhouse emissions and climate-resilient development.⁷³ Article 2 of the Paris Agreement reaffirms the objective of the Convention (UNFCCC) by seeking to lower the global average temperature to below 2° C and to limit the temperature increase to 1.5° C, as this would help to reduce the risks and impact of climate change and at the same time accelerate the implementation of adaptation measures. In order to meet the above objective all Parties are expected to timeously update or communicate their NDCs with the secretariat.⁷⁴ Each Party's successive NDC will represent a progression beyond the Party's then current NDC and reflect its highest possible ambition in the light of their common but differentiated responsibilities and respective capabilities.⁷⁵ This further confirms the need to consider national circumstances when making climate change mitigation targets. Further, the Parties aim to reach a global peaking of greenhouse gas emissions as soon as possible, taking into account that peaking for developing country Parties takes longer.⁷⁶ The Agreement therefore recognises that poor countries' climate mitigation measures are obviously

71 Article 2 of the *Paris Agreement* 2015.

72 Article 2 of the *Paris Agreement* 2015.

73 Article 2 of the *Paris Agreement* 2015.

74 *Article 3 of the Paris Agreement* 2015.

75 Article 4.2 of the *Paris Agreement* 2015.

76 Article 4.1 of the *Paris Agreement* 2015.

affected by the need to balance economic growth, poverty reduction and the move towards clean renewable energy. The Paris Agreement also seeks a balance between anthropogenic emissions by sources and removals by sinks in the second half of the century, thus by 2050, but on the basis of equity and sustainable development.⁷⁷

The Paris Agreement has remedied the shortfalls of the Kyoto Protocol to some extent. The Agreement brought some major emitters such the USA and China back into the fold, but a recent development in the new USA administration led by President Donald Trump has thrown a spanner into the works. It is worrying that the USA, as one of the major emitters, has decided to pull out of the climate agreement. This surely includes the withdrawal of some commitments such as financial and technological transfer to the developing country Parties.

The Paris Agreement seems to depart from a static differentiation where Annex 1 countries (industrialised countries) have mandatory commitments at the exclusion of Non-Annex 1 (developing countries). The industrialised countries believed that the differentiation was out-dated, since the developing countries are significantly contributing to global emissions.⁷⁸ This political bickering was solved by the provision of Article 4 of the Paris Agreement, which is inclusive in nature. The provision encourages developed countries to:

continue taking the lead by undertaking economy-wide emission reduction targets while developing countries are called upon to continue enhancing their mitigation efforts and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.⁷⁹

Therefore developed countries will provide financial resources to assist developing country Parties in their efforts at mitigation, while other Parties are encouraged to offer their support voluntarily.⁸⁰ Further, Parties are to share technological development ideas and transfer them to others in order to fully realize the long-term objective of reducing greenhouse gas emissions.⁸¹ Thus, developed and industrialised Parties,

⁷⁷Article 4.2 of the *Paris Agreement* 2015

⁷⁸Obergassel Phoenix from the Ashes-An Analysis of the Paris Agreement to the United Nations Framework Convention on Climate Change 8.

⁷⁹Article 4(3) of the *Paris Agreement*, 2015.

⁸⁰Article 9 of the *Paris Agreement* 2015.

⁸¹Article 10.1 of the *Paris Agreement* 2015.

given their technological advancement, must take the lead in transferring technology to developing Parties. In other words, there must be capacity building in the least developed countries, which entails technological development, being granted access to climate finance, education, training and public awareness, and the transparent, timely and accurate communication of information on their NDCs.⁸²

The need to cut GHG emissions forced the Parties to establish a support mechanism that aims:

- a) To promote the mitigation of GHG emissions while fostering sustainable development
- b) To incentivize and facilitate participation in the mitigation of GHG emissions by public and private entities authorized by a Party
- c) To contribute to the reduction of emission levels in the host Party, which will benefit from mitigation activities resulting in emissions reductions that can also be used by another Party to fulfil NDC
- d) To deliver an overall mitigation in global emissions.⁸³

The Paris Agreement recognises that some Parties choose to pursue the voluntary implementation of their NDCs, to allow for a higher ambition in their mitigation, and to promote sustainable development and environmental integrity.⁸⁴ A closer look at Paris Agreement suggests that all Parties should come on board to mitigate climate change as a matter of urgency.

Given the historical development of climate change mitigation, the next discussion will be on the role of South Africa as a global citizen in climate change mitigation through the development of renewable energy.

2.5 Renewable energy and climate change mitigation

2.5.1 Introduction

South Africa is the largest emitter of greenhouse gases in Africa largely because it generates most of its energy from coal. South Africa was ranked number 18 by 2013 in the world in terms of total carbon dioxide (CO₂) output and it is the fifth largest

82 Article 11.1 of the *Paris Agreement 2015*.

83 Article 6.4 of the *Paris Agreement 2015*.

84 Article 6.1 of the *Paris Agreement 2015*.

producer of climate-change fossil fuel.⁸⁵ With the construction of Medupi coal-power station, the largest dry-cooled coal-fired power station in the world, greenhouse gas emissions are set to increase. Hence the need to go green by introducing renewable energy (RE) sources. In this part of the discussion the focus will be on renewable energy sources and climate change mitigation. In other words, to what extent RE sources could assist us in mitigation and also the general composition of RE sources in South Africa.

In order to address the ever-increasing temperatures caused by carbon emission, South Africa has joined other nations by investing in research and development in renewable sources of energy that are believed to minimise greenhouse gas emissions (GHG). South Africa's commitment to emissions reduction is evidenced by the ratification of the Kyoto Protocol and most recently of the Paris Agreement. Although these international agreements do not make it mandatory for non-Annex 1 countries such as South Africa to embark on emissions reduction, the country has thought it wise to voluntarily reduce GHG emissions by introducing renewable energy into the energy grid or mix. South Africa's initiative to invite private bidders to contract to supply RE to the grid is in line with Article 2 of the United Nations Framework on Climate Change Convention (UNFCCC), which states the need to stabilize GHG emissions to the pre-industrial levels of the 1990s.⁸⁶ The shift towards the use of renewable energy is viewed as the panacea for climate change, as it is believed that RE has no direct greenhouse gas emissions, as against fossil fuels such coal, oil and gas. In this chapter the focus is on understanding RE sources, the extent of RE use in SA, and the relationship between RE and climate change mitigation.

2.5.2 Defining renewable energy

Renewable energy is defined as the "sun, wind, biomass, water, waves, tides, ocean current, geothermal and any other natural phenomena which are cyclical and non-depletable".⁸⁷ RE sources are generally natural and virtually infinite, and they take a shorter duration to replenish than non-renewables such as coal. The major obstacles

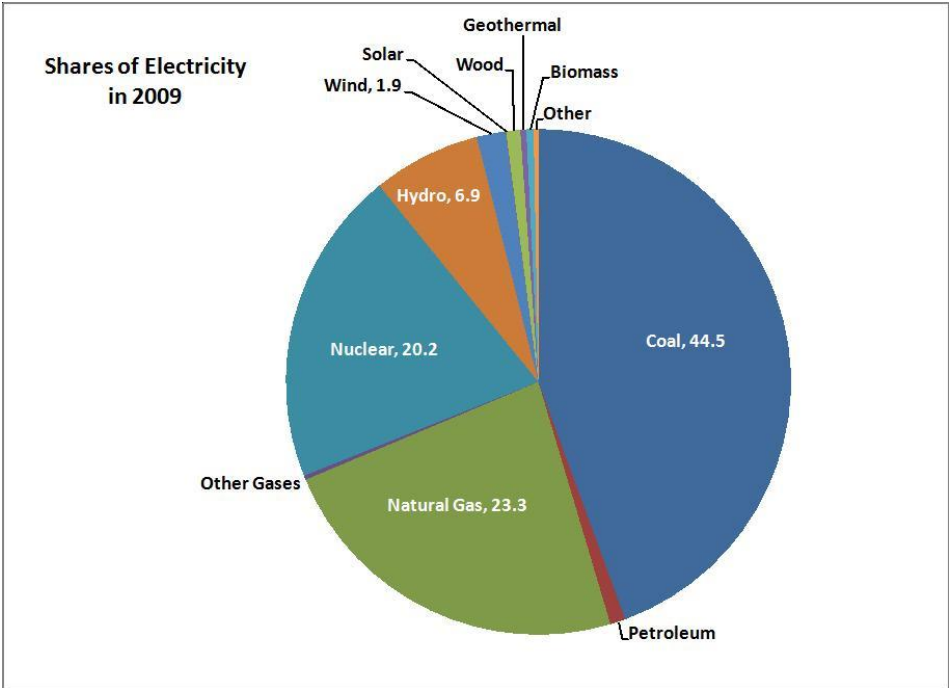
85 Barbee J 2015 <https://www.the-guardian.com/environment/2015/jun/01>.

86 Article 2 of UNFCCC

87 The White Paper on Renewable Energy 2003 v.

to transforming the SA energy mix, which is presently predominantly coal intensive, to RE sources are the cost of the transformation, the need to balance the energy demand and environmental concerns, and the reliability of some RE sources such as solar, hydro and wind energy. SA is a relatively water scarce country. This is witnessed by the frequent water rationing imposed in many parts of the country, notably Gauteng, Kwazulu Natal, the Free State and the Northwest Provinces. Hence the viability of hydro-power is not entirely certain. The same can be said about solar and wind energy, which are vulnerable to unpredictable weather from day to day. Again, approximately 77 per cent of SA’s primary energy needs are serviced from coal, which is relatively cheaper than other energy sources.⁸⁸ Analysts believe coal is cheap because the SA coal seam is shallow and easily mined through open-cast mining, and furthermore because the coal deposits are readily available.⁸⁹ Therefore there is no or little political will to transform the energy mix, considering the positives derived from the use of coal.

2.5.3 Sources of Renewable Energy



Source: State of renewable energy 2015

⁸⁸ Department of Energy date unknown www.energy.gov.za/file,coal-frame.
⁸⁹ Department of Energy date unknown www.energy.gov.za/file,coal-frame.

2.5.3.1 Solar Energy

There are generally three sources of solar energy, namely the solar thermal application, solar thermal electricity power, and the solar photovoltaic system.⁹⁰ Solar thermal electricity power has solar panels (cells) that collect solar energy to be converted into electricity. Similarly the solar photovoltaic (PV) system involves the conversion of direct solar energy into electricity. PV modules generate electricity directly from the sun without emissions.⁹¹ The harvesting of solar energy is not difficult in the Karoo and the Northern Cape, which receive many sunny days. These North-Western areas are more arid than other parts of the country. On average South Africa receives more than 2 500 hours of solar radiation per annum,⁹² which is more radiation than countries in the northern hemisphere such as the USA and the UK.⁹³ This makes SA suitable for the harvesting of solar energy. Solar energy is generated when the sun shines on special photovoltaic cells that use the sun's radiation energy to generate an electric current.⁹⁴ Presently solar energy contributes about 10% to SA's primary energy needs and is a significant component of the rural energy programme.⁹⁵

No direct carbon emission is linked with solar energy, and it can supply rural or peripheral regions with potentially less expensive power.⁹⁶ However, the extensive clearance of an area to erect a solar plant indirectly leads to a reduction in carbon dioxide (CO₂) absorption, resulting in an increase in GHG emissions especially in forested areas.

2.5.3.2 Hydro-energy

This energy is generated when gravity feeds water from a dam or a flowing river through a tunnel into the propellers of a generator, which turns and creates an

90 Sanaeepur S 2014 International Journal of Sustainable Energy Vol 33.

91 Sanaeepur 2014 International Journal of Sustainable Energy Vol 33.

92 Department of Energy date unknown www.energy.gov.za/file,coal-frame.

93 Department of Energy date unknown www.energy.gov.za/file,coal-frame.

94 Smit Alternative *sources of energy for South Africa in various shades of green* 26.

95 Glazewski *The legal framework for Renewable Energy in South Africa* 1.

96 Glazewski *The legal framework for Renewable Energy in South Africa* 1.

electrical current.⁹⁷ Therefore it harnesses the energy of water moving from a higher to a lower elevation. Hydro-power projects with reservoirs and flowing rivers.⁹⁸

The use of hydro-power in SA is relatively rare. It contributes approximately 1% to the energy mix.⁹⁹ The contribution of hydro-power to the energy mix is largely hampered by water shortages. SA is a relatively water-scarce country and the problem is exacerbated by the need to balance the multiple uses of water such as irrigation and domestic uses. Again, the need to control flooding and the frequent droughts have curtailed hydro-power generation. The National Development Plan (NDP) has highlighted the need for regional cooperation with neighbours in the region so as to promote mutually beneficial collaboration on mitigation.¹⁰⁰ SA is in partnership with Zambia and Mozambique to invest in hydro-power generation in the Zambezi and from the Cahorra Bassa lake respectively.¹⁰¹

Although hydropower has some ecological effects and social effects such a disruption of biodiversity and the ecosystem, and the relocation of communities, it is highly regarded as clean energy. It creates none of the atmospheric pollutants or waste associated with fuel combustion.¹⁰² However, the lifecycle of hydropower that involves construction, operation and maintenance, and dismantling, which accounts for 4-14gCO_{eq}/kwh₂ in GHG emissions.¹⁰³ To minimise emissions during the lifecycle phases, the technology used in hydropower generation must be environmentally friendly. The major hindrance to hydropower generation is the high investment costs. These costs include licensing, plant construction, planning, and environmental impact assessment costs that involve the assessment of the impact of hydropower generation on fisheries, heritage sites and communities.¹⁰⁴

97 Smit *Alternative sources of energy for South Africa in various shades of green* 26

98 Smit *Alternative sources of energy for South Africa in various shades of green* 26.

99 Glazewski *The legal framework for Renewable Energy in South Africa* 1.

100 National Development Plan-Vision 2030, Chapter 5: Ensuring Environmental Sustainability and Equitable Transition to Low-Carbon Economy 200.

101 Knopjes 2016 www.infrastructurene.ws.

102 *Ippc Report* 84.

103 *Ippc Report* 84.

104 *Ippc Report* 85.

2.5.3.3 Bioenergy

This energy is produced from biomass such as forests, agricultural and livestock residues, and municipal solid waste.¹⁰⁵ It is believed that bioenergy offers constant, reliable energy output. Examples of bioenergy technologies include biogas and biodiesel. Biogas is a mixture of gases such as methane (CH₄), carbon dioxide (CO₂).¹⁰⁶ Because it is produced from the digestion of organic solid material in the absence of oxygen it is considered to be energy efficient and environmentally friendly. Gasifier-based power generation uses biomass for power generation. Instead of using biomass to fire gas turbines directly, it is gasified and cleaned before combustion. This process enables considerably lower emissions of harmful gases and particles.¹⁰⁷ On the other hand, improved cookstoves are fuel efficient and reduce indoor air pollution, unlike traditional cookstoves, which produce large quantities of products under incomplete combustion, which is associated with fine and ultra-fine particles which have more global warming potential than CO₂.¹⁰⁸

2.5.3.4 Geothermal energy

Geothermal energy is harvested from under the earth's surface. Heat is extracted from geothermal reservoirs to generate electricity.¹⁰⁹ Geothermal energy is a renewable resource because geothermal fluids are continuously replenished or restored by natural recharge and reinjection of the cooled fluids.¹¹⁰ The mere fact that geothermal energy is restored by natural heat production from hot regions underground makes it renewable. Geothermal energy can be used to complement a variable energy supply especially from intermittent wind energy. Thus it can reduce load shedding.

The main GHG emission from geothermal energy is carbon dioxide (CO₂), which is emitted from natural sources.¹¹¹ A general survey on the world use of geothermal

105 *Ippc Report 85.*

106 Sanaeepur S *Renewable Energies: Climate-Change Mitigation and International Climate Policy: International Journal of Sustainable Energy* Vol 33, No 1 2014 203-212.

107 Sanaeepur S *Renewable Energies: Climate-Change Mitigation and International Climate Policy: International Journal of Sustainable Energy* Vol 33, No 1 2014 203-212.

108 Sanaeepur S *Renewable Energies: Climate-Change Mitigation and International Climate Policy: International Journal of Sustainable Energy* Vol 33, No 1 2014 203-212.

109 *Ippc Report 8.*

110 *Ippc Report 71.*

111 *Ippc Report 74.*

energy in 2011 suggests that direct CO₂ emission rates vary between 4 to 740g/kwh_e.¹⁰⁰ The emissions vary according to the technology used. The more efficient, the technology, the greater the reduction in GHG emissions. In general. The quantity of direct CO₂ emissions from direct use applications is negligible.¹¹²

2.5.3.5 Ocean energy

Ocean energy is generated from the potential, kinetic, thermal and chemical energy of seawater, which can be transformed to provide electricity.¹¹³ Therefore, ocean energy can be defined as energy generated from technologies that use seawater. Ocean energy is named after its sources. These are wave energy, tidal energy, tidal currents, ocean currents, ocean thermal energy conversion and salinity gradients (osmotic power).¹¹⁴

The SA potential for wave energy is high, given the vast coastline of over 2,500km.¹¹⁵ Research conducted by the Centre for Renewable and Sustainable Energy Studies (CRSES) at the Stellenbosch University shows that the Western Cape has the highest wave energy of around 35kw/h than Kwazulu-Natal with an Annual mean rating of 15kw/h.¹¹⁶ Similarly, South Africa is fortunate to have two major currents that can be used to generate tidal energy. These are the Agulhas current on the east coast and the Benguela current on the west coast. Tidal energy is limited in South Africa due to environmental regulations and the sensitive nature of estuarine environments along the coast.¹¹⁷ Huge investments in ocean energy will boost the energy grid, thereby limiting excessive dependent on fossil fuel like coal. Like other forms of RE, ocean energy does not directly emit CO₂ during its operation, but it is during the construction involved in its lifecycle that emissions take place.¹¹⁸

112 *Ippc Report* 74.

113 *Ippc Report* 8.

114 *Ippc Report* 86-87.

115 www.urbanearth.co.za/articles/ocean-energy-generation accessed 31 January 2017.

116 www.urbanearth.co.za/articles/ocean-energy-generation accessed 31 January 2017

117 www.urbanearth.co.za/articles/ocean-energy-generation accessed 31 January 2017.

118 *Ippc Report* 2012 87.

2.5.3.6 Wind energy

Wind energy is harnessed (generated) by means of windmills in areas with reasonably consistent and strong winds.¹¹⁹ It is generally free from pollutants. However, the unpredictable weather patterns militate against its reliability. It is common knowledge that wind is intermittent, which means it does not blow all the time. Hence this hinders the reliability of wind energy.

Currently, the Cookhouse wind farm located in the Eastern Cape is the biggest wind system in Africa, with 66 turbines generating 138MW of clean power.¹²⁰ It was commissioned at the end of 2014. This project has brought positive blessings to the community in the form of affordable cheap electricity, job creation, and as a side-effect, the transformation of the local health and education services. A community trust was established where 15% of the profits generated from the project are channelled towards health care, education and job creation.¹²¹ These are some of the positive externalities associated with RE.

Unfortunately, the clearance of vegetation in the process of erecting a wind power plant may have unintended consequences such as the disruption of habitats in the ecosystems. While there are no global warming emissions associated with operating wind turbines, there are emissions associated with other stages of wind turbines' life cycles, such as materials production, transportation, onsite construction and assembly, operation and maintenance, decommissioning and dismantlement.¹²² It is estimated that the global emissions during a wind turbine's life-cycle are between 0,002 and 0,04 pound of CO₂ equivalent per kilowatt.¹²³ Thus, although wind energy is relatively clean compared to fossil energy sources, its operation causes global emissions. Although the contribution to global emissions is negligible compared with that of fossil fuels, it is

¹¹⁹ Sanaeepur S *Renewable Energies: Climate-Change Mitigation and International Climate Policy: International Journal of Sustainable Energy* Vol 33, No 1 2014 203-212.

¹²⁰ Barbee 2015 <https://www.the-guardian.com/environment/>.

¹²¹ Barbee 2015 <https://www.the-guardian.com/environment/>.

¹²² Sanaeepur S *Renewable Energies: Climate-Change Mitigation and International Climate Policy: International Journal of Sustainable Energy* Vol 33, No 1 2014 203-212.

¹²³ Sanaeepur S *Renewable Energies: Climate-Change Mitigation and International Climate Policy: International Journal of Sustainable Energy* Vol 33, No 1 2014 203-212.

helpful to minimise emissions during the life-cycle of wind energy by using energy-efficient technologies.

3 Mitigation measures in climate change laws and policies

The starting point in any legal study pertaining to South African environmental issues such as climate change and mitigation is section 24 of the Constitution of the Republic of South Africa. This section states that:

Everyone has the right –

- a) To an environment that is not harmful to their health or well-being and
- b) To have an environment protected, for the benefit of present and future generations through reasonable measures that –
 - i) Prevent pollution and ecological degradation
 - ii) Promote conservation and
 - iii) Secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.¹²⁴

The Constitution is unambiguous as to the link that exists between the promulgation of environmental legislation and a sustainable environment. It makes it clear that the state must respect, protect, promote and fulfil the rights in the Bill of Rights.¹²⁵ Therefore, the state must enact laws through parliament and establish policies that help to address climate change. In response to the provision in section 24(b) of the Constitution that calls for the state to take reasonable measures to ensure a sustainable environment, the national government has drafted a series of policy documents related to the topics of climate change and mitigation. The current SA climate change policy framework includes:: the White Paper on Energy Policy of 1998, the White Paper on Renewable Energy Policy of 2003, the Energy Act of 2008, the National Climate Change Response Policy White Paper of 2011, the National Integrated Energy Plan (IEP), the Renewable Energy Market Transformation (REMT) policy; the Renewable Energy Feed in Tariffs (REFIT) policy, the New Growth Path, the National Development Plan 2030, and the proposed Carbon Tax Bill. This chapter will provide

¹²⁴ Section 24 of the *Constitution of the Republic of South (Constitution) 1996*.

¹²⁵ Chapter 2 of the Bill of Rights of the *Constitution*.

an overview of the manner in which these policy documents deal with the topic of renewable energy as a climate change mitigation driver in South Africa.

3.1 White Paper on Energy Policy of 1998

The policy has five objectives, namely granting increased access to affordable energy, improving energy governance, stimulating economic development, managing energy-related environmental impacts, and securing supply through diversity.¹²⁶ The fifth objective of the policy addresses the need to tap alternative sources of energy such as renewables. Not only does it consider the negative effects of the current energy use but it works towards the establishment of acceptable broad national targets for the reduction of energy-related emissions harmful to the environment. Many were pessimistic about the move towards renewable energy use, given the intensive coal use in the country. Worse, it is believed that developing RE would require a huge capital outlay which would inevitably be too expensive. The policy signalled the taking of a new direction, because it noted with great concern the contribution of the energy sector to global greenhouse gas emissions. There is actually international recognition that the energy sector makes a larger environmental impact than most other economic sectors. Hence the need to curb such emissions.¹²⁷

In order for SA to achieve its emissions reduction targets, the White Paper suggested two renewable energy paths which are to be pursued concurrently:

- i) To extend renewable energy to remote rural areas where grid electricity is not practical. Hence the introduction of solar systems, solar cookers, solar water supply systems for schools and clinics. The approach was also meant to reduce the adverse effects environment and health of air pollution caused by the use of coal and wood in households.¹²⁸
- ii) The second path was the examination of how the electricity generated in the country where almost 96% was generated by Eskom and mainly from coal.¹²⁹ There was clear recognition of the monopoly in the energy sector, hence the policy wanted expansion in energy supply. Therefore it wanted the inclusion of independent power producers in the production of electricity. Unfortunately this move is highly opposed by social partners such as labour through the Congress of South African Trade Unions (COSATU).

126 White Paper on Energy Policy of the Republic of South Africa 1998 8-9.

127 White Paper on Energy Policy of the Republic of South Africa 1998 7.

128 White Paper on Energy Policy of the Republic of South Africa 1998 14.

129 White Paper on Energy Policy of the Republic of South Africa 1998 14.

In addition to the above ways of rolling out a renewable energy programme, the government committed itself towards the establishment and acceptance of broad national targets for the reduction of energy-related emissions that are harmful to the environment and to human health.¹³⁰ In the policy the government committed to ensuring a offset between exploiting fossil fuels and the maintenance of acceptable environmental requirements. To ensure acceptable emission reduction the government made itself responsible for facilitating greater energy efficiency through cleaner energy end-use technologies, environmental performance auditing and the incorporation of environmental costs per sector.¹³¹ To further achieve objective four, the government intends to investigate placing an environmental levy on energy sales to fund the development of renewable energy, energy efficiency and sustainable energy activities.¹³² Government will also monitor or respond to international standards in order to minimise losing business internationally exports because of violating of the environmental policies of SA's trading partners. It also commits itself to monitoring and participating in international developments and negotiations around responses to global climate change in order to offset its environmental responsibilities and developmental needs.

3.2 White Paper on Renewable Energy November 2003

This White Paper was published to ensure that SA increase the use of renewable energy renewable energy.¹³³ It takes cognisance of some of the negative effects of using fossil fuels, including the fact that such a practice leads to the emission of huge amounts of carbon dioxide gas into the atmosphere, and the fact that the Africa has a vast of renewable energy resources.

The ministry committed itself to the White Paper, which purported to emphasise the development of renewable energy. To achieve this aim the Government set a target at 10 000 GWh (0.8 Mtoe) renewable energy consumption by 2013, to be produced

130 White Paper on Energy Policy of the Republic of South Africa 1998 9.

131 White Paper on Energy Policy of the Republic of South Africa 1998 10.

132 White Paper on Energy Policy of the Republic of South Africa 1998 28.

133 White Paper on Renewable Energy 2003 i.

mainly from biomass, wind, solar and small-scale hydro.¹³⁴ The renewable energy was to be used for generating and non-electric technologies such as solar water heating and biofuels.¹³⁵ This was approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW).¹³⁶

The White Paper on Renewable Energy supplements the White Paper on Energy Policy, which acknowledges that the use of renewable energy is significant now and in the long run. The position taken in the White Paper on Energy was based on the integrated resource planning criterion of guaranteeing that a fair amount of the country's resources is used in renewable energy¹³⁷

SA uses a lot of coal, which is a fossil fuel emits a greenhouse gas, but at the same time there is a vast quantity of renewable resources in the country that can be used to reduce the emission of greenhouse gases in the atmosphere and therefore to mitigate climate change. These worries about the effect of climate change worldwide were discussed at the Johannesburg World Summit on Sustainable Development in 2002 and a thereafter a commitment to stimulate renewable energy in all the countries that were part the Johannesburg Declaration was made.¹³⁸ SA thus signalled its intention to try to and reduce GHG emissions. The Government intended to develop policies which will guide the operation, growth and add value to the economy locally and internationally.¹³⁹

The diversification of supply in SA is one of the White Paper on Energy Policy's key goals.¹⁴⁰ As SA is partly dependent on income generated from the production, processing, export and consumption of coal, it might be affected by climate change response measures that might be implemented by developed countries.¹⁴¹ The Integrated Energy Plan (IEP) which was developed by the DME recognised the need

134 White Paper on Renewable Energy 2003 i.

135 White Paper on Renewable Energy 2003 i.

136 White Paper on Renewable Energy 2003 i.

137 White Paper on Renewable Energy 2003 vii.

138 White Paper on Renewable Energy 2003 vii.

139 White Paper on Renewable Energy 2003 viii.

140 White Paper on Renewable Energy 2003 viii.

141 White Paper on Renewable Energy 2003 viii.

for the use of renewable energy, and the purpose of the IEP was to balance offset the amount of energy required with the resource while taking cognisance of the safety, health and environmental effects¹⁴²

The development of renewable energy requires financial incentives, and SA on its own has limited financial resources, so it will need to receive international financial resources to supplement its own.

The South African Government has the long-term goal of establishing an industry that use renewable energy sources that will ensure a wholly non-subsidised option to fossil fuels.¹⁴³ The medium-term (10-year) target is

10000 GWh (0.8 Mtoe) renewable energy consumption by 2013, to principally come from biomass, wind, solar and small scale hydro. The renewable energy is to be used for generating and non-electric technologies such solar water heating and bio-fuels. This is approximately 4%(1667 MW) of the projected electricity demand for 2013(41539 MW).¹⁴⁴

The White Paper stated that a Strategy on Renewable Energy would be created, which would then be implemented. A number of investigations were to be carried out during the development of the strategy and working in how the targets will be assessed.¹⁴⁵

The principal goal of the policy was to come up with requirements for advancement and commercial administration of renewable energy technologies.¹⁴⁶ The Government was to divide the implementation in stages and work together with the stakeholders and ensure that there is a high level of social, environmental and financial returns to all involved.¹⁴⁷ The purpose of this was to lessen the strain on fiscal resources and thus to increase the chances of successful implementation.¹⁴⁸

142 White Paper on Renewable Energy 2003 viii.

143 White Paper on Renewable Energy 2003 viii.

144 White Paper on Renewable Energy 2003 ix.

145 White Paper on Renewable Energy November 2003 xiii.

146 White Paper on Renewable Energy November 2003 xiii.

147 White Paper on Renewable Energy November 2003 xiii.

148 White Paper on Renewable Energy November 2003 xiii.

The policy was to be evaluated mid-term, after five years, to check if the targets, objectives and deliverables were being met. The policy was to be updated to assess whether any amendments were required. According to the White Paper, the Government was to check the changes the renewable technologies trend and identify what SA might adopt¹⁴⁹

The White Paper on Renewable Energy is based on the World Summit on Sustainable Development (WSSD): Johannesburg Plan of Action (CSD-11, 2002), which intended to expand the energy supply by creating a more sophisticated, cleaner, progressive energy technologies inclusive of fossil fuels and renewable energy acknowledging that there is need for a prompt rise in renewable energy use locally and internationally.¹⁵⁰

The White Paper on Renewable Energy November 2003 stated that the overall vision for the role of renewable energy was to have an economy where there is more of renewable energy use and affordable energy to all SA citizens¹⁵¹

The goal of this White Paper was to set out Government's principles, goals and objectives for renewable energy. It also committed Government to different ways that will lead to development of renewable energy in the ten years that were to follow.¹⁵²The difficulty that the Government endured was to make available an acceptable financial benefit for the renewable energy industry to advance and grow.¹⁵³ The Government also committed itself to setting a framework and conditions necessary for the development of renewable energy and also how it could add value to the economy locally and internationally.¹⁵⁴

The long-term goal was to come up with the framework of how to produce, sell, trade, transfer and buy energy. This was inclusive of an energy industry that is

149 White Paper on Renewable Energy November 2003 xiii.

150 White Paper on Renewable Energy 2003 1.

151 White Paper on Renewable Energy 2003 1.

152 White Paper on Renewable Energy 2003 1.

153 White Paper on Renewable Energy 2003 2.

154 White Paper on Renewable Energy 2003 3.

sustainable and also has an acceptable BEE share and a job market which would provide a wholly sustainable and non-subsidised option to fossil fuel use.¹⁵⁵

The White Paper on Renewable Energy took note of a handful of barriers to the development and use of renewable energy were: 1) the machinery for renewable energy is costly considering that it will have to supply a wide range of industries and households;¹⁵⁶ 2) The consumers are not aware of the benefits of renewable energy;¹⁵⁷ 3) adoption of renewable energy needs to settle in until a point where it can make profits.¹⁵⁸

3.2.1 Factors that affect renewable energy use

The quantity of renewable energy that would actually be consumed within the next 10 years would be a function of: 1) the policies that regulate electricity, liquid fuels, housing and building market¹⁵⁹; 2) the changes in the prices of electricity¹⁶⁰; 3) the financial benefits available¹⁶¹; 4) knowledge of the consumers about renewable energy and 5) the Clean Development Mechanism(CDM)¹⁶²

3.2.2 Principles of the policy

These are the basic premises that Government purposed to apply in developing and testing policy and subsequent actions, including decision-making legislation, regulation and enforcement.¹⁶³ The principles of this White paper are based on the Constitution, the Bill of Rights and the White Paper on the Energy Policy (DME, 1998).¹⁶⁴

The key policy principles of renewable energy are as follows: The assessment of various costs including environmental, economic and social and also the benefits

155 White Paper on Renewable Energy 2003 1.

156 White Paper on Renewable Energy 2003 1.

157 White Paper on Renewable Energy 2003 1.

158 White Paper on Renewable Energy 2003 2.

159 White Paper on Renewable Energy 2003 2.

160 White Paper on Renewable Energy 2003 2.

161 White Paper on Renewable Energy 2003 2.

162 White Paper on Renewable Energy 2003 26.

163 White Paper on Renewable Energy 2003 26.

164 White Paper on Renewable Energy 2003 26.

of the policies, plans , programmes, projects and activities in the production and use of energy; basic services must be equally available to everyone and the citizens should not be disadvantaged; the Government was to accomplish its international duty as far as global issues are concerned; all the parties involved in energy will be encouraged to participate and the government was to apportion the functions to different institutions according to the constitution in a way that will bring about accomplishment of the goals of the energy policy.¹⁶⁵

3.2.3 Essential elements of renewable energy implementation

3.2.3.1 Sustainable development

The use of renewable energy will lead to sustainable development since the energy is produced from sustainable natural resources. Moreover as the renewable resources are naturally available, there will be more energy security.¹⁶⁶ The use of renewable energy will reduce the use of fossil fuels and hence reduce harmful emissions and in the end minimise South Africa's contribution to climate change.¹⁶⁷

3.2.3.2 Financial instruments

The Government will provide funds through budgetary allocation, subsidies, levies, tax rebates and other incentives.¹⁶⁸ The intention is that the process will be monitored and evaluated in order to withdraw the funding at a time when the renewable technologies are competitive and can be driven by market forces alone.¹⁶⁹

Some of the methods that have helped in stimulating the use of renewable energy are investment incentives, production incentives and set asides.¹⁷⁰ "Investment incentives are direct subsidies and/or tax credits to promote investment in renewable energy technology."¹⁷¹ Production incentives occur when it is mandatory for an electricity distributor to buy a certain minimum feed-in tariff and the funds to enable the

165 White Paper on Renewable Energy 2003 26.

166 White Paper on Renewable Energy 2003 26.

167 White Paper on Renewable Energy 2003 27.

168 White Paper on Renewable Energy 2003 27.

169 White Paper on Renewable Energy 2003 27.

170 White Paper on Renewable Energy 2003 28.

171 White Paper on Renewable Energy 2003 28.

distributor to buy the feed-in tariff are direct subsidies and/or a cross-subsidy from the electricity consumer.¹⁷² A set aside is a block of energy supply that is earmarked by law for renewable energy capacity. Winning projects receive financial support; for example, subsidies per kWh or a guaranteed fixed electricity tariff.¹⁷³ For South Africa a combination of set-asides and investment incentive could be used as the benchmark to using renewable energy. There are also Tradable Renewable Energy Certificates (TRCs). A renewable energy generator may obtain a TRC, which s/he can trade nationally or internationally to users who want the "Green" attribute.¹⁷⁴ The "green" premium will help to reduce Government financial assistance.¹⁷⁵

3.2.4 Legal and Regulatory Instruments

- The development of a code that will give direction on the minimum requirements needed to connect the grid or pipeline network¹⁷⁶
- There is need for a relationship between renewable energy supplies and the available transport infrastructure.¹⁷⁷
- To come up with a procedure to minimise transport tariffs for renewable energy¹⁷⁸
- The build-up of a frame of reference to recompense loss incurred through producing electricity from different technologies and different locations.¹⁷⁹

The White paper also gave a mandate to the Government to devise a training strategy to promote the use of renewable energy by the private and public sector.¹⁸⁰

3.2.5 Strategic goals, objectives and deliverables of the White Paper Renewable Energy 2003

3.2.6.1 Financial and Fiscal Instruments

172 White Paper on Renewable Energy 2003 28.
173 White Paper on Renewable Energy 2003 28.
174 White Paper on Renewable Energy 2003 29.
175 White Paper on Renewable Energy 2003 29.
176 White Paper on Renewable Energy 2003 29
177 White Paper on Renewable Energy 2003 29
178 White Paper on Renewable Energy 2003 29.
179 White Paper on Renewable Energy 2003 30.
180 White Paper on Renewable Energy 2003 32.

The White Paper aimed to encourage the use of renewable energy through the creation of relevant financial and fiscal instruments.¹⁸¹ Some of the objectives were to ensure that national resources are used in renewable energy technologies, to set targets for the directing of public resources towards the implementation of renewable energy technologies in combination with international sources of funding for this purpose, to introduce appropriate fiscal incentives for renewable energy, to broaden government funding and to come up with inventive ways to aid in establishing funding systems for delivering renewable energy systems, and to stimulate the development of an investor-friendly environment climate for developing a renewable energy .¹⁸² In order to achieve this, the White Paper intended to analyse the existing financial framework and identify limitations that hamper the adoption of renewable energy.¹⁸³ The White Paper also intended to establish financial benefits and regulation of thermally efficient housing and to elucidate what the Central Energy Fund is responsible for in the implementation of renewable energy.¹⁸⁴

3.2.6.2 Legal instruments

The White Paper intended to come up, with, adopt, sustain and keep on revising a legislative system that encourages the use of renewable energy.¹⁸⁵ It purported to develop policies that will guide the pricing and tariff structures that stimulate the adoption of renewable energy and also attract foreign investors.¹⁸⁶

3.2.6.3 Technology development

With respect to technology development, the White Paper aimed to promote, and encourage the technologies for renewable energy.¹⁸⁷ This would be achieved through the development of standards that guide the technologies.¹⁸⁸ In addition,

181 White Paper on Renewable Energy 2003 32.

182 White Paper on Renewable Energy 2003 32.

183 White Paper on Renewable Energy 2003 32.

184White Paper on Renewable Energy 2003 32

185 White Paper on Renewable Energy 2003 33.

186 White Paper on Renewable Energy 2003 33.

187 White Paper on Renewable Energy 2003 33.

188 White Paper on Renewable Energy 2003 33.

the White Paper also intended to find some public/private partnerships that would stimulate renewable energy technology development.¹⁸⁹

3.2.6.4 Awareness raising, capacity building and education

The White Paper aimed to educate people on the benefits of renewable energy.¹⁹⁰ It also purported to carry out renewable energy awareness training and education.¹⁹¹

3.2.6.5 Technology support centres

The White Paper also intended to establishment technology support centres which would help the government in approving and certifying and approval of technological systems.¹⁹²

3.3 South African National Climate Change Response Strategy, September 2004

This strategy recognized the need to ensure sustainable development. It defined sustainable development as development which meets present needs without compromising the ability of future generations to meet their needs.¹⁹³ Sustainable development encompasses the social, environmental and economic dimensions of development. In order to promote sustainable development and fulfil its UNFCCC obligations, SA as a signatory to this international climate treaty was supposed to establish national inventory of GHG emissions and sinks in collaboration with regional mitigation measures.¹⁹⁴ It also seeks to encourage regional cooperation in scientific research, technological and financial transfers towards climate change mitigation.¹⁹⁵ The policy encourages educational, training and public awareness in climate change

189 White Paper on Renewable Energy 2003 33.

190 White Paper on Renewable Energy 2003 34.

191 White Paper on Renewable Energy 2003 34.

192 White Paper on Renewable Energy 2003 35.

193 South African National Climate Change Response Strategy 2004 iii.

194 South African National Climate Change Response Strategy 2004 iv.

195 South African National Climate Change Response Strategy 2004 iv.

related issues.¹⁹⁶ Finally there is strong emphasis on government policies to incorporate environmental challenges such climate change mitigation whenever addressing social and economic challenges.¹⁹⁷

Furthermore, the strategy envisaged the integration of the climate change response into the work of most government departments. This means that the national climate change strategy would cut across many government departments, thereby promoting the coordination of all climate response measures and the development of a clear national focus. In other words, departments would know what was required of them and at the same time conflicts of interests between different departments would be avoided.

3.4 Energy efficiency Strategy of the Republic of South Africa, March 2005

This policy was based on the fact that the realisation that South Africa's energy consumption is higher than it should be. The policy was also based on the appreciation that in this era of climate change, urgent measures are needed to reduce energy usage.

The Energy Efficiency Strategy for South Africa took its mandate from the White Paper on Energy Policy of 1998, and linked the development of the energy sector with national socio-economic plans. It also accorded with the initiatives of other government departments.¹⁹⁸ The vision of the Energy Efficiency Strategy is to contribute towards affordable energy for everyone in South Africa while minimising the negative effects of energy usage on human health and climate change. The strategy set a national target for the improvement of energy efficiency of 12% by 2015.¹⁹⁹

Energy efficiency can be of great benefit to the country and the rest of the world as far as climate mitigation is concerned. Since South Africa is one of the greatest emitters of the greenhouse gas CO₂ per capita in the world, energy efficiency can address the different aspects of pollution. The vision of the strategy is:

196 South African National Climate Change Response Strategy 2004 iv.

197 South African National Climate Change Response Strategy 2004 iv.

198 Energy Efficiency Strategy of the Republic of South Africa, 2005 2.

199 Energy Efficiency Strategy of the Republic of South Africa, 2005 2.

to encourage sustainable energy sector development and energy use through efficient practice, thereby minimising the undesirable impact of energy usage upon health and the environment and contributing towards a secure and affordable supply of energy for all.²⁰⁰

The strategy has eight goals, and in this instance the research will focus on goal number five, which is to reduce CO₂ emissions.²⁰¹ The strategy states that energy efficiency is one of the most cost-effective methods of reducing greenhouse emissions and thereby combating climate change.²⁰² It also appreciates the fact that addressing climate change opens the door to utilising novel financing mechanisms, such as CDM, to reduce CO₂ emissions.²⁰³

At the time when the strategy was formulated, only a few countries had set comprehensive targets for energy efficiency improvements. They included Slovenia, Japan, the Netherlands and New Zealand.²⁰⁴ The Energy Efficiency Strategy of the Republic of South Africa provided the implementation of sector programmes in a three-phase approach as follows: Phase 1 March 2005 - February 2008; Phase 2 March 2008 - February 2011; Phase 3 March 2011 - February 2015.²⁰⁵

The strategy proposed a final energy demand reduction of 12% by 2015. The intention was that the target would be monitored continuously for progress, using a monitoring system, and an annual report will be issued.²⁰⁶ The Department of Minerals and Energy (DME) would assess the progress towards the targeted outcomes and address areas where additional input might be required.²⁰⁷

3.5 Electricity generation levy 2009

An electricity generation levy is to be charged on non-renewables such as coal and natural gas. It is payable on locally generated electricity. The following role players are excluded from paying the levy:

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- 200 Energy Efficiency Strategy of the Republic of South Africa, 2005 4.
 - 201 Energy Efficiency Strategy of the Republic of South Africa, 2005 4.
 - 202 Energy Efficiency Strategy of the Republic of South Africa, 2005 5.
 - 203 Energy Efficiency Strategy of the Republic of South Africa, 2005 5.
 - 204 Energy Efficiency Strategy of the Republic of South Africa, 2005 12.
 - 205 Energy Efficiency Strategy of the Republic of South Africa, 2005 12.
 - 206 Energy Efficiency Strategy of the Republic of South Africa, 2005 14.
 - 207 Energy Efficiency Strategy of the Republic of South Africa, 2005 14.

1. Electricity generation plants with an installed capacity not exceeding 5 megawatts
2. Electricity generation from renewables
3. Electricity generated from non-renewables sources of which energy input does not exceed 15% of the total energy input in a year.²⁰⁸

In a case of non-compliance with the electricity generation levy, the concerned parties are liable for monetary penalties, criminal prosecution, suspension or cancellation of registration, licence or accreditation.²⁰⁹

3.6 Long-Term Mitigation Scenarios (LTMS) 2008

The South African cabinet officially accepted the outcomes of the Long-Term Mitigation Scenarios (LTMS) in 2008. The LTMS process explored South Africa's options for climate mitigation in a multi-stakeholder process. The government initiated the LTMS process in 2005 and concluded it in 2007. The aim was to produce a LTMS that would produce a sound scientific analysis which the cabinet would use in drawing up a climate policy.²¹⁰ The intention was that such a policy would give South African negotiators under the UNFCCC a clear and mandated position for their positions.²¹¹ The policy would also allow South African stakeholders to understand and commit to realistic strategies for climate mitigation.²¹² The LTMS emphasised that three areas needed to be brought together into a coherent vision to give rise to a plan of action that was economically risk-averse and which was in line with the international effort to combat climate change.²¹³ The three areas were:

- Technology - There was a need for the greater use of climate-friendly technology that already exists and also to commercialise emerging technologies and on-going research and to develop new technology.²¹⁴
- Investment - The sources, mechanisms and extent of investment in a low-carbon society needed to be found and to be pursued actively.²¹⁵

208 www.sars.gov.za/AllDocs/ops/policies/Environmentallevy.

209 www.sars.gov.za/AllDocs/ops/policies/Environmentallevy.

210 Scenario Building Team 2007. Long Term Mitigation Scenarios : Scenario Document, Department of Environmental Affairs and Tourism, Pretorias, 1.

211 Scenario Building Team 2007. Long Term Mitigation Scenarios : Scenario Document, Department of Environmental Affairs and Tourism, Pretorias, 1.

212 Scenario Building Team 2007. Long Term Mitigation Scenarios : Scenario Document, Department of Environmental Affairs and Tourism, Pretorias, 1.

213 Scenario Building Team 2007. Long Term Mitigation Scenarios: Scenario Document, Department of Environmental Affairs and Tourism, Pretorias, October 2007 3.

214 Scenario Building Team 2007. Long Term Mitigation Scenarios: Scenario Document, Department of Environmental Affairs and Tourism, Pretorias 3.

215 Scenario Building Team 2007. Long Term Mitigation Scenarios: Scenario Document, Department of Environmental Affairs and Tourism, Pretorias 3.

- Policy - The country needed clear guidance through policy frameworks that would send sustained and legally-enforced messages to the markets.²¹⁶

3.7 National Energy Act 34 of 2008

The Act was influenced by the two RE White Papers of 1998 and 2003. It aims to strengthen energy planning in order to ensure that diverse energy resources are available in a sustainable manner and at reasonable prices and, more importantly, to provide for energy planning, increased generation and consumption of renewable energies.²¹⁷

3.8 New Growth Path: Accord 4: Green Economy Accord 2011

The main aim of the New Growth Path (NGP) was job creation through public infrastructure development and diversification in the energy sector. The energy mix was identified as being pivotal in the creation of a green economy. Accord Four of the NGP is devoted to greening the energy sector. The accord identifies twelve commitments, namely the rollout of solar water units; investment in the green economy; the rollout of renewable energy; energy efficiency; waste recycling, re-use and recovery; bio-fuels; clean-coal initiatives; retrofitting; reducing carbon emissions on our roads; the electrification of poor communities and the reduction of fossil-fuel open fire cooking and heating; economic development in the green economy; and lastly cooperation around the United Nations COP17 and its follow-up.²¹⁸

The Department of Economic Development failed in its endeavour to rollout one million solar-water heating systems by 2014/15 in order to reduce over-reliance on thermal electricity, but at least 140 000 solar-water heating systems were installed in households.²¹⁹ On the topic of the green economy, the Industrial Development Corporation (IDC) promised a capital injection of 25 billion between 2011 and 2016.²²⁰ The finance was meant for commercially valuable green economy projects such as renewable energy investments. This financial incentive was a marketing strategy

216 Scenario Building Team 2007. Long Term Mitigation Scenarios: Scenario Document, Department of Environmental Affairs and Tourism 3.

217 Section 2 of National Energy Act 2008.

218 New Growth Path: Accord 4: Green Economy Accord 1.

219 New Growth Path: Accord 4: Green Economy Accord 9.

220 New Growth Path: Accord 4: Green Economy Accord 15.

meant to attract investments in the green economy. The private sector recognised the investment opportunities in the green economy and promised to attract both multilateral and bilateral green funding to support investments in the areas that would contribute to the realisation of a lower carbon growth path.²²¹ Provincial governments such as Gauteng promised to establish climate innovation centres that would train 100 people every year on climate-related matters.²²²

Commitment Three of the Green Economy Accord addresses the major issue of the reduction in GHG emissions. Government committed to the procurement of RE as a way to improve the energy mix. It estimated that it would be able to supply 3 725 MW of RE by 2016 in line with Integrated Resource Plan (2010-2030).²²³ To achieve this the solar PV and wind industry would work together with the assistance of the government to develop solar and wind industry localisation with the aim of producing 75% of the RE components locally. This import substitution would have spill-over effects such self-sufficiency, the expansion of the manufacturing sector, job creation and on-the-job training. The commitment further highlighted the need for R&D in order to improve technological expertise in SA, establish an organisation that would promote the RE sector and finally develop a roof-top programme that aimed to install 300 000 solar PV power generation units on or at residential, commercial and industrial buildings by 2020.²²⁴ Fortunately, by 2011 some industries such as sugar, pulp and paper had already embarked on renewable energy strategies, producing around 40% of the energy they used from RE sources such as bagasse and mill waste.²²⁵

The Green Accord not only promoted investments in renewable energy sources but also aimed to strengthen energy efficiency by reducing the energy intensity of the economy and moving to a lower carbon economy in order to improve environmental quality. To achieve energy efficiency, companies pledged to develop internal energy efficiency targets appropriate to company operations but in line with government policy and strategy.²²⁶ They were expected to report back on the progress made towards

221 New Growth Path: Accord 4: Green Economy Accord 15.

222 New Growth Path: Accord 4: Green Economy Accord 15.

223 New Growth Path: Accord 4: Green Economy Accord 18.

224 New Growth Path: Accord 4: Green Economy Accord 20.

225 New Growth Path: Accord 4: Green Economy Accord 20.

226 New Growth Path: Accord 4: Green Economy Accord 21.

achieving their set targets, the technical support needed and the progress they had made on employee skills development towards energy efficiency programmes. The following energy efficiency targets were set per sector: reductions of 10% for commercial and public buildings; 15% for residential buildings; 10% for transport; 15% for industry; and 15% for mining.²²⁷ Each sector was supposed to meet its energy efficiency target by 2015. Parties to the Accord also agreed to include green awareness issues in a future curriculum.

Another important element in promoting green economy advanced in the accord is waste recycling, re-use and recovery. The Accord commits to finalise a Waste Innovation Programme that aims to promote waste recycling, re-use and recovery.²²⁸ Further the Accord encouraged the production of biofuels for mandatory blending in the petrol and diesel national fuel pool. The mandatory blending regulations targets of 2% bio-ethanol and 5% bio-diesel for South African markets were set.²²⁹ The promotion of green economy accord would be incomplete without the mention of commitment seven, clean-coal initiatives. It is common knowledge that SA has a massive coal reserves hence high coal intensity electricity generation. Therefore there is a need to exploit massive coal reserves in a sustainable manner that takes cognisance the damage done by greenhouse gas emission associated with coal exploitation. To achieve clean-coal usage government established a Carbon Sequestration Leadership Forum which aims to develop clean coal technologies.²³⁰ Furthermore, the government commits to explore carbon capture and storage initiatives under South African National Energy Development Institute (SANEDI). Business also commits to the development of local capacity and expertise in carbon capture and storage.

Retrofitting was also seen a complementary measure to high carbon emission. It is defined as the addition of new technologies and methods to existing systems and buildings.²³¹ Retrofitting of inefficient incandescent lighting is thought to improve energy

227 New Growth Path: Accord 4: Green Economy Accord 22.

228 New Growth Path: Accord 4: Green Economy Accord 23.

229 New Growth Path: Accord 4: Green Economy Accord 25.

230 New Growth Path: Accord 4: Green Economy Accord 26.

efficiency in residential and public buildings. In other words phasing out of incandescent lighting helps to reduce emissions at the same time promoting energy efficiency.

With the increase in pollutants from vehicles, parties to the Accord committed to reducing carbon emission on our roads through a massive public transport rollout. PRASA promised to invest R20 billion by 2014 and R130 billion thereafter to promote rail transport.²³² In addition to the promotion of rail transport, the parties pledged to move towards electric vehicles as against petrol-powered vehicles.

3.9 The Integrated Resource Plan 2010-2030

The Integrated Resource Plan 2010-2030 (IRP 2010) is South Africa's first fully-fledged IRP. It was adopted in March 2011 (and promulgated in May 2011). It laid out the country's proposed generation fleet for the period 2010-2030. It is considered to be a "living plan" and an update of the IRP 2010 was published in 2013 for public comment. The DoE released another draft update (Draft IRP 2016) in November 2016.

A Revised Balanced Scenario (RBS) was developed in discussion with other Departments incorporating different policy objectives, and the cost optimisation was part of the modelling process.²³³ The RBS represented an appropriate balance between the expectations of different stakeholders, considering a number of key constraints and risks including reducing carbon emissions.²³⁴

The RBS was adjusted from a cost-optimised scenario developed under a carbon emission constraint of 275 million tons per year from 2025, incorporating localisation objectives and bringing forward the renewable roll-out.²³⁵ Bringing the construction programme for renewable technologies forward and maintaining a stable roll-out provided an opportunity for localisation in the construction of the equipment and in the development of skills to support the provision of renewable energy.²³⁶

233 IRP 2010-2030 Final report 7.

234 IRP 2010-2030 Final report 8.

235 IRP 2010-2030 Final report 7.

236 IRP 2010-2030 Final report 8.

Some of the scenarios that appeared in the 2013 update of the IRP were that regional hydro projects in Mozambique and Zambia were to be realised, including the infrastructure development that that might have spin-offs in unleashing potential in the region.²³⁷ The current renewable bid programme was to continue with additional annual rounds (of 1000 MW PV capacity; 1000 MW wind capacity and 200 MW CSP capacity), with the potential for generating hydro at competitive rates.²³⁸

According to the DoE's Draft IRP, the generation portfolio would by 2050 consist of 15GW from coal, 20,3GW from nuclear, 13,3GW from open-cycle gas turbines, 21,9GW from combined-cycle gas turbines, 17,6GW from solar PV, 37,4GW from wind, 2,5GW from the Inga hydro-electric project, 250MW from landfill gas, and 500MW from demand response.²³⁹

3.10 National Climate Change Response White Paper, October 2011

The National Climate Change Response objective recognises lowering GHG emissions as its priority. It intends to reduce GHG emissions thereby minimising the risk of climate change.²⁴⁰ In line with the UNFCCC, the policy also identified various principles that guide its implementation. These include among others common but differentiated responsibilities and the acknowledgement of different capabilities. This allows SA to align domestic measures to reduce the country's GHG emission with the country's national circumstances, stage of development and ability to implement various measures.²⁴¹ Further, the policy seeks equity in climate change mitigation by ensuring a fair allocation of effort, cost and benefits. This would help to address disproportionate vulnerabilities, responsibility capabilities, disparities and inequalities. It also takes into consideration vulnerable groups such as women, the poor, rural people and children. It seeks to uplift the poor and vulnerable by safeguarding their human dignity. It further calls for intra- and inter-generation sustainability, and thus for managing climate change in the interests of current and future generation.²⁴² It asserts that

237IRP 2010-2030 UPDATE REPORT 8.

238 IRP 2010-2030 UPDATE REPORT 9.

239 Lilley R and Yelland C.DoE's draft IRP 2016 roasted 2017.

240 National Climate Change Response White Paper October 2011 11.

241 National Climate Change Response White Paper October 2011 11.

242 National Climate Change Response White Paper October 2011 11.

sustainability in managing climate change is attainable if the players take a cautious approach to environmental use. The precautionary principle takes into account the limits of current knowledge about the effects of environmental decision taken or to be taken.

Acknowledging that society views the environment as a common resource that is susceptible to negative externalities, the policy included the polluter pays principle. This principle acts as a deterrent to would-be polluters as it punishes those harming the environment. The policy further addressed public participation by the citizens of the country. This principle is the cornerstone of constitutional democracy in SA. It promotes public awareness and understanding of the causes of climate change and of how to cut GHG emissions.

The White Paper set strategic priorities in the effort to curb GHG emissions. These were mitigation actions with significant outcomes, prioritising cost-effective and beneficial mitigation measures and interventions that positively contribute to the country's deviation from the GHG emission "business as usual trajectory" as measured against a benchmark peak, plateau and decline.²⁴³ GHG emissions were expected to peak between 2020 to 2025, to plateau for a decade till 2035, and to begin to decline by 2050.²⁴⁴ It called for all sectors to prepare, submit, implement, monitor and report on the implementation of their detailed climate change response strategies, and to draw up action plans that clearly spell out their roles, policies and interventions towards the feasible achievement of their climate change response objectives.²⁴⁵ It also sought to formulate new and align existing policies so as to realise such objectives. It noted that climate change mitigation could not be achieved in isolation, and that there was therefore a need for cooperation between the provinces and various departments. To this end the White Paper envisaged integrated planning and called for the incorporation of climate change considerations and responses in all relevant sectors and three spheres of government.²⁴⁶ It prioritised technological research, development and

243 National Climate Change Response White Paper October 2011 13.

244 National Climate Change Response White Paper October 2011 13.

245 National Climate Change Response White Paper October 2011 13.

246 National Climate Change Response White Paper October 2011 13.

innovation in low-carbon and energy-efficient technologies by all concerned sectors.²⁴⁷ It also sought to inculcate behaviour change towards a low-carbon society and economy through the use of incentives and disincentives that included regulatory economic and fiscal measures.²⁴⁸ Behavioural change could be facilitated through education, training and public awareness programmes focusing on the causes and effects of global warming and how to lower GHG emissions.²⁴⁹ However, the success of every project heavily depended on resource mobilisation. It invited both the private and the public sectors to mobilise their resources towards the realisation of climate mitigation. It appealed for a further broadening of cooperation at the domestic, sub-regional, regional and international levels in technological transfers.²⁵⁰

In order to achieve this objective, the White Paper identified key elements. These elements include the setting of desired emissions targets by companies, introduction of carbon budget, and establishment of mitigation plans in line with desired emissions reduction targets and national collection of greenhouse gas inventory.²⁵¹

The benchmark National GHG Emissions Trajectory Range with a base year of 2050 is to be used as the benchmark against which the efficacy of mitigation action will be measured.²⁵² It aims firstly to reflect SA's fair contribution to the global effort to limit anthropogenic climate change to well below a maximum of 2°C above pre-industrial levels.²⁵³ Secondly, the trajectory range details the peak, plateau and decline. SA's GHG emissions will peak in the period 2020 to 2025 with a lower limit of 398 megatonnes (mt) of carbon dioxide equivalent (CO₂ eq) and an upper limit of 583Mt of CO₂ eq and 614Mt of CO₂ eq for 2020 and 2025 respectively.²⁵⁴ The plateau period will last for ten years with a lower limit of 398Mt of CO₂ eq and an upper limit of 614 Mt of CO₂ eq.²⁵⁵ From 2036 emissions are expected to decline in absolute terms to a

247 National Climate Change Response White Paper 2011 13.

248 National Climate Change Response White Paper 2011 14.

249 National Climate Change Response White Paper 2011 14.

250 National Climate Change Response White Paper 2011 14.

251 National Climate Change Response White Paper 2011 14.

252 National Climate Change Response White Paper 2011 14.

253 National Climate Change Response White Paper 2011 27.

254 National Climate Change Response White Paper 2011 27.

255 National Climate Change Response White Paper 2011 27.

range with a lower limit of 212 Mt of CO₂ eq and an upper limit of 428 Mt of CO₂ eq by 2050.²⁵⁶

Another approach to climate change mitigation discussed in the NCCRP is carbon budgeting (CB). CB stipulated the required emission reduction targets in line with GHG emissions range trajectory.²⁵⁷ CBs were supposed to be drawn within two years of the publication of the policy, particularly by the major suppliers of energy sources.²⁵⁸ CBs will be reviewed in line with historical emissions and trends. The White Paper also seeks to identify mitigation programmes and measures such as carbon tax and incentives to households.²⁵⁹ The policy intends to analyse current and future emissions trends by sector and sub-sector while at the same time looking at mitigation challenges in the economy as whole.²⁶⁰ This is intended to facilitate the development of the desired emission reduction outcomes for each sector and sub-sector of the economy.²⁶¹ That is, each sector and sub-sector is to develop short-, medium- and long-term CBs. Sectoral mitigation and low-carbon development strategies must conform to the Air Quality Management Act of 2014 for the Pollution Prevention Plans.²⁶² For CB principles such as fiscal measures, incentives and carbon tax to be effectively implemented, the policy encourages consultation with the National Treasury, the Department of Trade and Industry and the Department of Economic Development.²⁶³

The policy calls for a mandatory GHG emissions inventory for entities that emit more than 0,1Mt of GHGs annually or that consume electricity which results in an emission of more than 0,1Mt from the electricity sector.²⁶⁴ In addition the policy calls for a scaled-up renewable energy programme based on the Integrated Resource Plan 2010 and the full implementation of energy efficiency. The Department of Energy was tasked

256 National Climate Change Response White Paper 2011 27.

257 National Climate Change Response White Paper 2011 28.

258 National Climate Change Response White Paper 2011 28.

259 National Climate Change Response White Paper 2011 28.

260 National Climate Change Response White Paper 2011 28.

261 National Climate Change Response White Paper 2011 28.

262 National Climate Change Response White Paper 2011 29.

263 National Climate Change Response White Paper 2011 28.

264 National Climate Change Response White Paper 2011 29.

with promoting solar water heating through the promotion of a domestic supply of products for solar heating.²⁶⁵

A sector that was identified as a major emitter was transport. To curb emissions in the transport industry, the transport flagship programme led by the Department of Transport promotes the development of an enhanced public transport system in major metros and cities. This will create an Efficient Vehicles Programme by 2020.²⁶⁶ The transport flagship programme focuses on rail re-capitalisation, and it also encourages a move towards new efficient vehicle technologies such as electric vehicles.²⁶⁷

Notwithstanding the costs associated with GHG emission reduction efforts, SA is expected to benefit in the long run through the transition to a lower-carbon economy and society.²⁶⁸ The long-term benefits include foreign direct investments in the renewable sector, a flow of technology from industrialised companies, and local capacity building to manage the unintended consequences of climate change.

3.10.1 Mitigation potential in South Africa

The National Climate Change Response White Paper accepts that SA has limited opportunities through legal and enforcement mechanisms to cut emissions by preventing deforestation, which would be a form of near-term emissions reduction.²⁶⁹ Poor enforcement mechanisms are a major contributing factor to this inability, as is the fact that the environment is regarded as a common resource meant to benefit everyone, including those who commit depredations against it. This has resulted in the cutting down of trees without due care. Worse, the imposition of a criminal sanction for the perpetration of environmental damage is regarded as morally incorrect. However, the White Paper proposed policy decisions that promote new infrastructure investment that takes cognisance of the need to develop emissions-intensive technologies in future.²⁷⁰

265 National Climate Change Response White Paper 2011 31.
266 National Climate Change Response White Paper 2011 31.
267 National Climate Change Response White Paper 2011 32.
268 National Climate Change Response White Paper 2011 10.
269 National Climate Change Response White Paper 2011 26.
270 National Climate Change Response White Paper 2011 26.

The policy would encourage having a mix of economic instruments including market-based instruments such as carbon taxes and emissions trading schemes and incentives across all sectors.²⁷¹ It also emphasises the need to shift towards lower-carbon electricity generation options in the medium term, significant up-scaling of energy efficiency and in public, commercial, residential buildings and transport, and promotes transport-related interventions such as a move from road to rail, a move from private to public transport, and switching to electric vehicles and cleaner fuels.²⁷² Other short and medium-term measures include carbon capture and storage in the synthetic fuels industry, options for mitigating non-energy emissions in agriculture and land-use, and moving the economy to more sustainable consumption and production patterns. This focuses on reduction in mass consumption patterns that are thought to increase energy use and emissions. The policy focuses not only on mitigation but also broadly on socio-economic development indicators such as employment and income distribution.²⁷³ These are major challenges (high unemployment and income inequalities) facing the current government. Thus the policy strikes a balance between emissions reduction and the socio-economic needs of society.

3.10.1.1 Regulatory measures under the National Climate Change Response Strategy

The policy suggests the establishment of the following market-based instruments: carbon pricing, carbon budgets, and incentivising already existing climate change-related measures such as the electricity generation levy, the motor vehicle emissions tax, and the levy on incandescent light bulbs.²⁷⁴ Carbon pricing helps the emitter to internalise negative externalities, can induce behavioural change among stakeholders in favour of greener technologies.²⁷⁵ The carbon pricing should be equivalent to the external damage caused by GHG or pollution. Therefore, major emitters must be taxed more and minor emitters less. Carbon pricing allows for flexibility, meaning that at first the tax rate must be low, allowing the tax bearer to adjust with time. However, the

271 National Climate Change Response White Paper 2011 26.

272 National Climate Change Response White Paper 2011 27.

273 National Climate Change Response White Paper 2011 27.

274 National Climate Change Response White Paper 2011 27.

275 National Climate Change Response White Paper 2011 40.

design of carbon tax pricing should never over-burden poor households. The spill-over effects of the carbon tax must not be detrimental to vulnerable groups such the poor.

Carbon markets are mechanisms for exchanging emission reductions between entities. They include cap-and-trade mechanisms and off-set schemes where actors voluntarily pay compensation for emissions.²⁷⁶ Lastly, incentives given to actors are meant to encourage and reward efforts to curb GHG emissions. Examples of such incentives include lower fuel taxes on cleaner fuels and energy efficiency incentives.

3.11 National Development Plan 2030

The NDP notes that the vast quantity of minerals in South Africa can be used to finance a low-carbon economy, and also that developmental challenges should be addressed in an environmentally sustainable way.²⁷⁷

It also takes cognisance of the fact that investment in skills, technology and institutional capacity is important in supporting the development of a more sustainable environment and a low-carbon society²⁷⁸ It also signals the need to introduce carbon-pricing mechanisms that target specific mitigation opportunities.²⁷⁹ Furthermore, it notes that developing green products and services including renewable energy could lead to the creation of jobs.²⁸⁰

3.11.1 Vision 2030 goals related to climate mitigation

- Plan an economy that takes cognisance of climate mitigation at the same time addressing social and economic rights as provided in the constitution²⁸¹
- Investment in consumer education on renewable energy.

276 National Climate Change Response White Paper 41.

277 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 198.

278 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 198.

279 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 19.

280 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 198.

281 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 199.

- South Africa to reduce its carbon emissions by 2030 through deployment of renewables.²⁸²
- The deployment of renewable energy to be in line with the Integrated Resource Plan (IRP 2010)²⁸³
- Regional cooperation is required to encourage the successful implementation of renewable energy in the region by 2030²⁸⁴ The National Development plan 2030 recognise the over reliance on coal as a source electricity generation hence the need to diversify the energy sector in order to the nation's greenhouse gas emissions (GHG).²⁸⁵

Some of the ways in which the vision intends to achieve a low-carbon economy are through:

Introducing more energy efficient and less carbon intensive industrial processes in the mining sector, increasing the contribution of renewable energy to electricity generation, reducing the carbon footprint of existing and planned coal-powered power stations through retrofitting, clean coal technologies and investigating the financial and environmental feasibility of carbon capture storage.²⁸⁶

As a way of moving towards the vision, measures such as carbon taxation will be implemented in a flexible manner that takes into consideration employment and the environmental impact of sustained production.²⁸⁷ The National Development plan also acknowledges that there is an abundance of natural resources in South Africa, which can be utilised to move from coal-powered electricity generation towards the decarbonisation of the economy.²⁸⁸ As time goes by the competitiveness of renewable energy will improve and this will give South Africa a competitive advantage since globally the issue of low-carbon is increasingly becoming a concern.²⁸⁹

282 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 199.

283 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 199.

284 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 201.

285 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 201.

286 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to low carbon economy 202.

287 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 202.

288 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 202.

289 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 202.

3.11.2 Proposed interventions and planning imperatives related to renewable energy and climate change mitigation

The Department of Energy and other government departments were expected to devise instruments that would mitigate climate change.²⁹⁰ The National Treasury using its fiscal policy was tasked to incentivise or disincentive the role players with the aim to accelerate the deployment of renewables.²⁹¹

The National Development Plan also targets building sustainable communities. For the purpose of this research the principles of interest are namely lowering GHG emissions in the transport sector at the same time ensuring affordable urban transport, making sure buildings complies with environmental standards and lastly promoting waste management in line with National Waste Management Strategy.²⁹²

The National Development Plan also notes that the building of sustainable communities requires both the Government and communities to participate, for which reason there is a need to promote the awareness of sustainability issues in communities for them to be able to appreciate the causes and effects of climate change.²⁹³ If people understand the issues and change their behaviour, this might reduce the environmental footprint in communities and help the country to meet its national mitigation commitments.²⁹⁴

3.11.3 The response of the National Development Plan 2030 to climate change mitigation

South Africa as a country has the ambition to act responsibly to mitigate the effects of climate change and has made both "domestic and international commitments which are based on cabinet's approval of the 'peak, plateau, and decline' emission trajectory

290 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 202.

291 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 202.

292 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 203.

293 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

294 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

in 2008, which was formalised internationally in South Africa's Copenhagen Pledge in 2009.²⁹⁵ The government committed itself to investing in a range of renewable energy developments to an extent sufficient to build a local technological and manufacturing base and create employment.²⁹⁶ The country will also "diversify its energy mix away from fossil fuels through partnering with neighbouring countries to develop hydropower stations, initially in Mozambique and Zambia and then with the Democratic Republic of Congo."²⁹⁷ South Africa also intends to explore the use of natural gas as a less intensive transitional fuel.²⁹⁸ Industry has also committed itself to an energy efficiency programme and further improvements to be achieved through the implementation of a new set of South African building standards and a change in carbon pricing.

The National Development Plan also aims to reduce emissions from the transport sector through "improvements in vehicle efficiency and standards, the promotion of public transport, integrated transport, a potential increase in bio-fuel content in fuel requirements, a major expansion in public transport and rail freight infrastructure, the promotion of electric and hybrid vehicles through public-sector investment in product development, and non-motorised transport and cycling."²⁹⁹ In order to reduce fugitive emissions, the plan suggests that improvements can be achieved through capturing coal-mine methane emissions, improvements in the design of petroleum plants, more stringent fuel storage requirements, and increased bio-fuel production.³⁰⁰ South Africa also seeks to expand the forestry sector and re-establish natural plant cover in areas such as thicket biomes, since they act as carbon sinks.³⁰¹ The country will also reduce

295 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

296 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

297 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

298 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

299 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

300 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

301 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

solid waste and promote the composting and recycling of organic waste.³⁰² Emissions from the residential sector will be reduced through promoting greater household energy efficiency and implementing new building design standards such as the incorporation of solar water heaters and reducing domestic use of electricity through universal electrification.³⁰³

The South African Government needs to build capacity to effectively administer the monitoring, reporting and verification systems, which will need to be supported by the participation of industry and other stakeholders in order to be able to develop a carbon budget approach which will set the amount of carbon that can be emitted in a given amount of time, benchmarked against the national GHG trajectory range. The time frame when this approach will be feasible is until 2050.³⁰⁴ The carbon budget approach will first target the sectors with the greatest mitigation potential and will be aligned to international standards in terms of the United Nations Framework Convention on Climate Change for the monitoring, reporting and verification of GHG emissions.³⁰⁵

The government has accepted the principle of imposing a carbon tax as a mechanism for establishing a domestic price for carbon, but the National Treasury is still consulting on how to implement it.³⁰⁶ “The creation of properly regulated domestic carbon offsets will enable industry to identify least-cost emissions reductions and drive private-sector investment in renewable energy mitigation.”³⁰⁷

3.12 Proposed Carbon Tax Bill

Carbon tax means a tax on the CO₂ equivalent of greenhouse gas emissions imposed in terms of section 2 Part 1 of the Draft Carbon Tax Bill.³⁰⁸ Alternatively, it is a tax

302 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

303 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

304 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 207.

305 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 208.

306 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 208.

307 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 208.

308 Section 1 Proposed Carbon tax 2017.

charged on the CO₂ emitted when fossil fuels are burned to make electricity or heat or to power engines.³⁰⁹ It is therefore a form of carbon pricing. The main aim of a carbon tax is for the polluter to internalise the costs, thereby minimising the related negative externalities. That is in accordance with the polluter pays principle incorporated in the NEMA Section 2.

3.12.1 The scope and extent of carbon tax liability

Juristic persons including Trusts and Close Corporations (CC) conducting activities under annexure 1 of GN 172 of 14 March 2014 will be liable to pay the tax. The Bill defines a taxpayer as a person who conducts an activity set out in Annexure 1 of the declaration of greenhouse gases as priority air pollutants.³¹⁰

3.12.2 Responsibilities of tax liable entities

The responsibilities of tax liable entities are as follows:

- Set the reporting boundary. Carbon tax-liable entities need to assess the definitions of the boundaries for collecting SA emissions data by comparing the provisions of the Bill and those of the NEMAQA
- Identify the emissions sources, for example combustion emissions such as engines, furnaces, industrial processes, and product use emissions from physical or chemical processes
- Collect the emissions data. The data collected can be verified by SARS and the National Atmospheric Emission Inventory System (NAEIS)
- Apply the emissions factors. The carbon tax calculation is based on full inputs with approved emission factors or an approved, transparent and verified monitoring procedure. Emission factors are listed in schedule 1 of the Bill
- Apply allowable threshold and allowances. According to the Explanatory Memorandum, stationary emissions and entities with a thermal capacity of around 10 megawatts will be subject to the carbon tax in the first phase from 2017-2020
- Consolidate the emission data. Each liable entity will compile emissions data at company level. However, the consolidation should avoid double counting and under-estimations
- File the environmental levy accounts with SARS.³¹¹

In conclusion, SA intends to increase the deployment of renewable energy in electricity generation in order to cut GHG emissions, at the same time ensuring the provision of

309 www.worldbank.org.

310 Parker, Rumble and Momberg 2015 [https:// www.ensafrica.com](https://www.ensafrica.com).

311 Proposed Carbon Tax Bill 19; Parker, Rumble and Momberg 2015 [https:// www.ensafrica.com](https://www.ensafrica.com).

a reliable electricity supply. There is general acceptance that the deployment of RE only will not limit GHG emissions. These policies therefore call for behaviour change in various sectors such as the transport sector, waste management, and the agricultural sector. It is also clear that the RE policies need the support of legislation that focuses mainly on RE to ensure the successful implementation of renewables. However, these policies are crystal clear on their main objective, which is reducing GHG emissions in order to engage in climate change mitigation. What is needed is effective legislation that governs RE across the energy sector.

4: Analysis of South African laws and policies pertaining to renewable energy

4.1 Introduction

The dawn of South African independence in 1994 saw the drafting of a plethora of laws and policies aimed at fast-tracking the development of the country. These developmental policies include among others the Reconstruction and Development Programme (RDP) and the Growth, Employment and Redistribution (GEAR) strategy. They do not make explicit or implicit reference to climate change and the mitigation thereof. Instead, emphasis is placed on economic growth, income redistribution, the democratisation of society, poverty eradication, and employment creation. Even the overarching environmental legislation, the National Environmental Management Act, 1998 (NEMA) is devoid of specific provisions dealing with climate change mitigation by exploiting renewable energy sources. However, credit must be given to the 1998 White Paper on Renewable Energy, which sets out the following objectives: increasing access to affordable energy, stimulating economic growth, improving energy governance, managing energy-related environmental impacts, and securing an energy supply through diversity.³¹² It was noted that by 2009 the activities of the energy sector were the chief sources of SA's GHG emissions, accounting for about eight-nine percent of the total emissions.³¹³ Although the policy does not specifically refer to sustainable

312 White Paper on Renewable Energy 2003 8-9.

313 Meyer L Edson and Odeka O Kola Climate Change, Energy and Sustainable Development in South: Developing the African Continent at the Crossroads Article 17, Volume 9, Issue 2 Winter 2009: Climate Law Reporter 2009 Sustainable Development Law and Policy 50.

development, it does refer to the environmental, social and economic aspects of energy, which in this context means sustainable energy usage and development. It seeks to balance the use of natural energy resources with environmental considerations. Not only would the procurement of renewable energy guarantee the energy supply and transformation in the sector presently monopolised predominantly by Eskom, but it would act as a catalyst in the reduction of GHG emissions. This section of the discussion will primarily analyse SA's renewable energy policies as they pertain to climate change mitigation by looking at the extent to which they are being implemented, and will also identify the challenges these policies encounter during implementation. Reference will also be made to other climate change mitigation measures such as the carbon tax, carbon budget and energy efficiency strategies, as they may indirectly result in a shift towards renewable energy.

4.2 Renewable Energy Policy White Paper, 1998

The 1998 White Paper identifies the following as potential barriers to the implementation of renewable energy:

- a) Many renewable energy technologies remain expensive on account of their higher capital costs compared with those of conventional energy sources such as coal
- b) The implementation of renewable energy technologies requires a huge investment for a long time before economic profits are realised
- c) Consumers are sceptical about RE due to a lack of public awareness and public participation in the forward planning
- d) The economic and social system of energy services is based on centralised development around conventional sources of energy, specifically electricity generation, gas supplies and sometimes liquid fuel provision
- e) There is a lack of non-discriminatory open access to key energy infrastructure such as the national electricity grid, certain liquid fuels and gas infrastructure.³¹⁴

If one takes into account various submissions by various analysts on the feasibility of renewable energy one can safely say the implementation of RE is costly and expensive. Notwithstanding the cost impact, SA has set itself a target of 10 000GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro.³¹⁵ It is also important to note that the

314 Murombo T and Du Plessis W: Energy edited by Du Plessis A : Environmental Law and Local Government in South Africa 889, White Paper on Renewable Energy, 67.

315 Murombo T and Du Plessis W: Energy edited by Du Plessis A : Environmental Law and Local Government in South Africa 889, White Paper on Renewable Energy, 67.

White Paper is in line with the National Energy Act, which promotes the production, consumption, investment in, research in and development of renewable energy.³¹⁶ Section 19 of the same Act also calls for the adoption of measures aimed at minimising the negative impact energy carriers may cause to health and the environment.³¹⁷ The objectives of the White Paper were further supported in the Electricity Regulation Act, the objectives of which include the promotion of the use of diverse energy sources and energy efficiency.³¹⁸ What is encouraging about the Electricity Regulation Act is that it empowers the National Energy Regulator South Africa (NERSA) to consider among other things the types of energy sources from which electricity is to be generated, bought or sold, and to require compliance with energy efficiency standards, including demand side management, before issuing a licence.³¹⁹

Although the White Paper on Energy Policy, 1998 predicted the generation of a staggering 10 000GWh from renewable energy by 2013, it is evidently clear that it has failed to hit that target. By December 2015 the Department of Energy had procured 6 377MW of renewable energy and had connected 44 projects with a potential capacity of 2 021MW to the national grid.³²⁰ The former Minister promised that the quantum of renewable energy that would be supplied by independent power producers would be approximately 7 000MW by mid-2016.³²¹ This target is still pie in the sky, although there is significant progress. The major challenge is the implementation of the policies and laws that mandate renewable energy, and this is compounded by the misalignment between the national energy laws, environmental laws and planning laws that aim to promote sustainable development. The environmental laws have been viewed with suspicion by the business community, which considers them to be counter-productive rather than promoters of green growth.³²² It looks as if there is lack of synchronisation between environmental law and energy law. Any lack of co-ordination between the

316 Section 19(1) (f) of National Energy Act.

317 Section 4 of National Energy Act.

318 Section 2(e) of Electricity Regulation Act.

319 Section 15 of Electricity Regulation Act, Murombo T and Du Plessis W: Energy edited by Du Plessis A: Environmental Law and Local Government in South Africa 890.

320 2016 Budget Speech by the Minister of Energy: Joemat-Pettersson T (MP) 11 May 2016 4.

321 2016 Budget Speech by the Minister of Energy: Joemat-Pettersson T (MP) 11 May 2016 4.

322 Murombo T and Du Plessis W: Energy edited by Du Plessis A: Environmental Law and Local Government in South Africa 891.

NEMA and the legal and regulatory framework for renewable energy generation and consumption may cause inconsistencies in the implementation process.³²³

However, this policy sets a benchmark in the promotion of the use of renewable energy. It gives hope that the government's ambitious target of cutting emissions to 2° below industrial levels by 2012 as espoused by Kyoto Protocol, may be reached.

The discussion that follows looks at the steps taken in order to give effect to this policy and ultimately to the reduction in GHG emission.

4.3 White Paper on Renewable Energy 2003

The White Paper was developed taking cognisance of both the national and international driving forces. The reintegration of South Africa into the global economy and the WSSD made it necessary for a policy on renewable energy to be formed. The White Paper on Energy said something about renewable energy but there was a need for a more developed policy specific to renewable energy.³²⁴

The renewable energy target was a 10-year target of 10 000GWH (0.8mtoe) of renewable contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro.³²⁵ Renewable energy was to be utilised for power generation and non-electric technologies such as water solar heating and biofuels. That was approximately 4% (1667 MW) of the estimated electricity demand (4139MW) by 2013.³²⁶

The level of implementation of the White Paper to date has been very low. The implementation plan has not yet been developed. It has simply never been done, and no explanation has been given.³²⁷ A renewable energy summit held in March 2009 resolved that the mid-term review specified in REWP 2003 should be undertaken by the end of the 2009/2010 financial year. A world bank-funded contract for the review was awarded in February 2010, and the South African Department of Energy

323 Murombo T and Du Plessis W: Energy edited by Du Plessis A: Environmental Law and Local Government in South Africa 891.

324 White Paper on renewable energy 2003 6.

325 White Paper on renewable energy 2003 25.

326 White Paper on renewable energy 2003 25.

327 Stiftung Southern Africa 2014 <https://za.boell.org>.

announced that the Renewable Energy Policy Review would be released by the end of the first quarter of 2011.³²⁸ Less than 10% of the targeted new renewable energy capacity has been achieved by 2010. This can largely be ascribed to the absence of the implementation plan in the REWP 2003 and the very low capacity.³²⁹

4.4 Long-Term Mitigation Scenarios (LTMS) 2008

One of the achievements of the LTMS is that the South Africa Integrated Resource Plan (IRP) was released in 2010 (with climate change considerations).³³⁰ The first round of the renewable feed in the programme is complete and the second one is underway.³³¹ The Low Emissions Pathway is in process and aims to update some aspects of LTMS and look at the implications of IRP and renewable energy programmes in South Africa.³³² There is also a need for periodical updates in order to adjust for changes in externalities.³³³

According to Earthlife Africa, the LTMS has done some work on climate change mitigation, but it wants to encourage an open, well-informed public debate that campaigns for people-directed solutions to climate change. The organisation is also of the view that some of the assumptions of the LTMS are highly questionable - for example, the belief that carbon capture and storage is a viable technology, the real effects of energy efficiency measures in an economy striving for growth, and the view that nuclear is an appropriate response to climate change. It suggests that a real South African response to climate change will be an open-ended process of transition to a society in which people are actively and consciously making decisions that shape their future.³³⁴ Unfortunately, a decade later the LTMS has not been successfully integrated into the policy agenda of departments other than its champion, the DEA.

328 Stiftung Southern Africa 2014 <https://za.boell.org>.

329 Stiftung Southern Africa 2014 <https://za.boell.org>.

330 Letete T Date unknown South Africa's baseline defined from the Long-Term Mitigation Scenarios (LTMS): "Growth Without Constraints (GWC)".

331 Letete T Date unknown South Africa's baseline defined from the Long-Term Mitigation Scenarios (LTMS): "Growth Without Constraints (GWC)".

332 Letete T Date unknown South Africa's baseline defined from the Long-Term Mitigation Scenarios (LTMS): "Growth Without Constraints (GWC)".

333 Letete T Date unknown South Africa's baseline defined from the Long-Term Mitigation Scenarios (LTMS): "Growth Without Constraints (GWC)".

334 Earthlife Africa Climate change research; LTMS critique 2016.

4.5 Integrated Resource Plan for Electricity 2010-2030

From the time of the promulgation of the Integrated Resource Plan (IRP) 2010-2030 there have been a number of developments in the energy sector in South and Southern Africa.³³⁵ There has been a significant reduction in South Africa's electricity demand and also massive reductions in the cost of renewable energy in the form of wind, solar PV and solar CSP.

The initial IRP of 2010 was updated in November 2013, when changes were introduced, and a draft update (Draft IRP 2016) was released in November 2016. Comments were invited and inputs through a public participation process, and the deadline for feedback was 31 March 2017.³³⁶ There has been some progress since the promulgation of IRP 2010-2030 in executing the programmes identified in the plan. Furthermore, a number of ministerial determinations have been issued, which include renewable energy, nuclear, coal and gas.³³⁷

The IRP constitutes the first tangible attempt to commence the process of integrating and aligning South Africa's climate mitigation objectives through a reduction of GHG emissions associated with electricity usage with the traditional and critically important energy planning functions.³³⁸ The document marked the first point in the energy planning process at which a scenario containing a GHG reduction limit is recommended.³³⁹ The IRP also provides the first recognisable action to support the regulatory framework for renewable energy in South Africa since the adoption of the Energy Act in 2008.³⁴⁰

The institutional arrangements around the planning process has improved under the leadership of the DoE. Information asymmetry problems, politicised decision-making

335 IRP 2010-2030 UPDATE REPORT 8.

336 Lilley and Yelland DoE's draft IRP 2016 roasted
2017.www.moneyweb.co.za/news/industry/does-draft-irp-2016-roasted/.

337 Lilley and Yelland DoE's draft IRP 2016 roasted
2017.www.moneyweb.co.za/news/industry/does-draft-irp-2016-roasted/.

338 McNamara A Case Study-Renewable Energy and the Draft IRP2010:"The Winds of Change" 2010 5.

339 McNamara A Case Study-Renewable Energy and the Draft IRP2010:"The Winds of Change" 2010 5.

340 McNamara A Case Study-Renewable Energy and the Draft IRP2010:"The Winds of Change" 2010 6.

processes and the lack clarity on the responsibility of each institution still need to be addressed.³⁴¹ The strength of the IRP lies in its providing policy options relevant to the electricity sector, with a good degree of flexibility and adaptability.³⁴² There is, however, a need for further research. Research on price elasticity related to demand should be conducted to better inform long-term forecasts.³⁴³

4.6 National Development Plan - Vision 2030

The national development plan has many goals, but the ones that are important for the purpose of this research are those pertaining to climate mitigation. The plan intends to reduce South Africa's carbon emissions by 2030, by using renewable energy sources, while remaining competitive in the global economy. The vision of the National Development Plan (NDP) was to achieve a low-carbon economy through the introduction of more energy-efficient and less carbon-intensive processes in the mining sector, increasing the contribution of renewable energy to electricity generation, reducing the carbon footprint of existing and planned coal-power stations through retrofitting, the development and use of clean coal technologies, and interrogating the environmental feasibility of carbon capture storage.³⁴⁴ The National Development Plan also emphasised that South Africa will diversify its energy mix away from fossil fuels through partnering with neighbouring countries to develop hydropower stations.³⁴⁵ South Africa also intended to explore the use of natural gas as a fuel.³⁴⁶ The National Development Plan also noted the commitment of the country to an energy efficiency programme.³⁴⁷ It also aimed to reduce emissions from the transport sector.³⁴⁸ The

341 Montmasson-Clair G and Ryan Repositioning electricity planning at the once: An evaluation of South Africa's Integrated Resource Plan 2014 6.

342 Lilley R and Yelland C DoE's draft IRP 2016 roasted 2017. www.moneyweb.co.za/news/industry/does-draft-irp-2016-roasted/.

343 Lilley and Yelland DoE's draft IRP 2016 roasted 2017. www.moneyweb.co.za/news/industry/does-draft-irp-2016-roasted/.

344 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 202.

345 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

346 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

347 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 205.

348 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

Plan also intended to reduce fugitive emissions through capturing coal-mine methane emissions, improvements in the design of petroleum plants, and more stringent fuel storage requirements, and to increase bio-fuel production.³⁴⁹ Through the implementation of the Plan the country also intends to expand the forestry sector and re-establish natural plant cover in areas such as thicket biomes, since they act as carbon sinks.³⁵⁰ The country will also reduce solid waste and promote recycling and the composting of organic waste.³⁵¹ The National Development Plan also acknowledged that the government accepted the principle of a carbon tax as a mechanism for establishing a domestic price for carbon.³⁵²

All these proposals of the National Development Plan would directly lead to climate change mitigation in South Africa. However, for environmental sustainability and an equitable transition to a low-carbon economy to be successful it is paramount to align these goals with other NDP goals such as poverty alleviation, unemployment and a reduction in income inequalities. A low-carbon economy can be realised only if these three major challenges are incorporated into whatever climate change mitigation scenario is eventually adopted.

4.7 Other Climate Change Mitigation Measures

4.7.1 National Energy Efficiency Strategy 2005

The National Energy Efficiency Strategy (NEES) was first introduced in March 2005 and its vision was to “reduce the energy intensity of the economy through energy efficiency.”³⁵³ The main objectives of the NEES were to:

- Develop measures to promote energy saving
- Reduce the negative impact of energy use on the environment
- Reduce energy costs on the environment

349 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

350 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

351 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

352 National Development Plan 2030 Chapter 5: Ensuring environmental sustainability and an equitable transition to a low carbon economy 206.

353 Overview on the National Energy Efficiency Strategy(NEES)-current and post 2015.

- Contribute towards sustainable development³⁵⁴

These objectives are geared towards achieving the mission of the Department of Energy. Although the NEES does not directly target GHG emission reductions, it sets a national target of energy efficiency improvement of 12% by 2015, and this will contribute to overall reductions in GHG emissions³⁵⁵ and hence contribute to climate mitigation. Energy efficiency is generally geared towards energy security and environmental conservation, and makes a contribution towards climate change mitigation.³⁵⁶ There is a great potential for energy efficiency in South Africa across a range of sectors from industry, commerce and transport to the residential sector.³⁵⁷

The National GHG inventory 2000-2010 suggested that in the period 2005-2015 emissions from the building sectors generally increased instead of decreasing as planned under NEES.³⁵⁸ In the first review of the NEES in 2008 the Power Generations Sector was added, but the targets in the Strategy are voluntary and there are no penalties for not entering into the voluntary agreements, or for a failure to achieve the desired results. Most of the measures are therefore yet to be implemented.³⁵⁹

The second review of the NEES was approved by Cabinet in October 2012 to be sent for public consultation, which closed in January 2013. It noted that there was an improvement in general awareness and understanding the importance of energy efficiency, but emphasised that there was still a need for more to be done to increase the awareness.³⁶⁰ The second review of the NEES (2011) aimed to achieve many of the targets outlined in the previous version (2008) and proposed similar instruments and mechanisms in order to achieve the objectives of the strategy.³⁶¹ Some of the new

354 Covary and Aversch efficiency and energy conservation policies and initiatives of the Republic of South Africa 2013 593

355 Ampofo-Anti, Dumani and Van Wyk Potential for reducing greenhouse emissions in the South African Construction

356 Rosenberg and Winkler Policy review and analysis: Energy efficiency strategy for the Republic of South Africa 2.

357 Mwakasonda S.A South Africa Low Carbon Report 2007 7.

358 Ampofo-Anti, Dumani and Van Wyk Potential for reducing greenhouse emissions in the South African Construction Sector 34.

359 Covary and Aversch Overview and assessment of the energy efficiency and energy conservation policies and initiatives of the Republic of South Africa 595.

360 Covary and Aversch Policy review and analysis: Energy efficiency strategy for the Republic of South Africa 593.

361 Covary and Aversch Policy review and analysis: Energy efficiency strategy for the Republic of South Africa 595.

approaches in the strategy relate to the development of an independent systems operator, the introduction of Energy Performance Certificates (EPC), and the exploration of solutions for building owners to gain financial benefit from installing EE improvements.³⁶² According to Covary and Aversch, in broad terms the uptake of the strategy is hampered by the lack of clear and guiding legislation focused on energy efficiency in South Africa, including an outline of key measures, programmes and targets. Issues related to the self-funding approach also remain unresolved.³⁶³ The outputs of the study provided a comprehensive policy and legislative context for the development of the National Energy Efficiency Implementation/Action Plan (NEEAP) for the Republic of South Africa.³⁶⁴ The review focused more on identifying the gaps, how the gaps were being addressed, and potential areas of improvement, or on strengthening opportunities. The review also makes recommendations.³⁶⁵

4.8 National Climate Change Response White Paper October 2011

The National Climate Response White Paper (NCCWRP) suggested various measures to mitigate climate change. These include a carbon budget, waste management, a transport flagship programme, and a scaling up of renewable energy. Therefore, this next part of the discussion will focus on the analysis of some these issues.

4.8.1 Carbon budget

The NCCRWP invited all companies that emit more than 100 000 tonnes of GHG per annum to voluntarily participate in a carbon budget. A carbon budget (CB) is defined as a greenhouse gas GHG emission allowance against which direct emissions arising from the actions of a company during a specific time period will be accounted.³⁶⁶ In other words it is a form of direct regulation that compels companies to meet specified emissions threshold. SA's CB sets cumulative five-year emissions caps for companies.

362 Covary and Aversch Policy review and analysis: Energy efficiency strategy for the Republic of South Africa 595.

363 Covary and Aversch Policy review and analysis: Energy efficiency strategy for the Republic of South Africa 595.

364 Overview on the National Energy Efficiency Strategy (NEES)-current and post 2015 8.

365 Overview on the National Energy Efficiency Strategy (NEES)-current and post 2015 10.

366 Cloete B et al Department of Environmental Affairs: Carbon Budget Final Report: Social and Economic Impact Assessment of Phase 1 Carbon Budget in South Africa 3.

The first phase runs from 2016-2020. This phase is voluntary, as it excludes compliance mechanisms for companies that exceed their CB over the period.³⁶⁷ Although the CB may result in the reduction of GHG emissions, it is important to note that it improperly excludes those companies that emit less than 100 000 tonnes of GHG per annum. No emission of a GHG is negligible. All sectors or companies, regardless of size, should be encouraged to participate in carbon budgets so as to reduce emissions. If carbon budgets are left to big companies, this may be construed as unfair discrimination against them. Furthermore the first phase is voluntary, meaning there are no legal consequences for non-compliance with the carbon budget allowance. One may be tempted to call the first phase a white elephant, because it is devoid of enforcement capacity. It is further noted that the design features of carbon budgets have omitted national or sectoral mitigation targets.³⁶⁸ Worse off companies are discouraged from undertaking any additional mitigation plans when already implementing carbon budgets.³⁶⁹ The proposal will demotivate companies by blocking them from transferring unused portions of their carbon budgets from the first phase to subsequent phases, and companies are not allowed to trade their carbon budgets among themselves.³⁷⁰

4.8.2 Renewable flagship programme

By May 2016, REIPPPP had attracted R53,4 billion in foreign investment and financing.³⁷¹ South Africa was ranked third and fourth most attractive renewable energy investment destination among energy markets by Climate Scope Index in 2014 and 2015.³⁷² It is encouraging that at the end of 2015 , 6376MW of power was procured from renewable energy independent power producers. This represents an

367 Cloete B et al Department of Environmental Affairs: Carbon Budget Final Report: Social and Economic Impact Assessment of Phase 1 Carbon Budget in South Africa 3.

368 Cloete B et al Department of Environmental Affairs: Carbon Budget Final Report: Social and Economic Impact Assessment of Phase 1 Carbon Budget in South Africa 4.

369 Cloete B et al Department of Environmental Affairs: Carbon Budget Final Report: Social and Economic Impact Assessment of Phase 1 Carbon Budget in South Africa 4.

370 Cloete B et al Department of Environmental Affairs: Carbon Budget Final Report: Social and Economic Impact Assessment of Phase 1 Carbon Budget in South Africa 4.

371 Luthuli M 2016 [http:// www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/](http://www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/).

372 Luthuli M 2016 [http:// www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/](http://www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/).

astonishing 92,1 percent of the target of 6 925 MW renewable energy to be operational by 2020.³⁷³ This shows a huge commitment towards RE roll-out in line with NCCRWP 2011. Of the 6376MW procured just over 2GW has been connected to the national grid. In reality SA's renewable energy share has grown from zero per cent to five per cent in five years making it one of the world's fastest growing renewable energy. Research done by Council for Scientific and Industrial Research found that the wind and solar power capacity contribute R800 million net benefits to the economy in 2015.³⁷⁴ Not does RE contributes to the reduction in GHG emission but it also contributes to gross domestic product, job creation and reliable electricity supply. Research has shown that RE at full operation will displace 45 million tonnes of CO2 emissions per annum.³⁷⁵ This surely makes a significant contribution towards a green economy. However, the recent announcement by the Minister of Finance Malusi Gigaba on the launch of New Development Bank (NDB) in Johannesburg that R2 billion rand given to Eskom by NDB was put on ice because of lack of commitment by Eskom to procure RE is a hindrance towards full scale roll-out of RE. But credit must be given to New Development Bank as it realises green economy is the future.

4.8.3 The transport flagship programme

It is no secret that there is a massive roll-out of public transport in major metros such as Pretoria, Johannesburg, EThekweni, Cape Town and Nelson Mandela Bay. In 2013 Johannesburg commissioned the second phase of its multi-billion bus rapid transit (BRT) system. This BRT system connects peripheral nodes or communities previously underserved, such as Soweto in Johannesburg and Soshanguve in Pretoria. Although the primary purpose of these programmes is to create economic opportunities such as jobs, surely the promotion of public transport reduces vehicle emissions and this will ultimately curb GHG emissions.

373 Luthuli M 2016 [http:// www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme](http://www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme).

374 Luthuli M 2016 Tallying the benefits of South Africa's renewable energy programmes [http:// www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/](http://www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/).

375 Luthuli M 2016 [http:// www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/](http://www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/).

4.9 Proposed Carbon Tax

There is a renewed global interest in putting a price on GHG emissions through the adoption of carbon tax. This is evidenced by the considerable number of countries that have already implemented or intend to implement a carbon tax. The desire for a shift towards a carbon tax is in line with Nationally Determined Contributions (NDCs) under the Paris Agreement, which encourages countries to initiate measures that can mitigate climate change. As a global citizen and the highest GHG emitter in Africa, South Africa has seen it fit to join the world by designing a carbon tax. The introduction of a new tax system is seldom without a hurdle. Anxiety is engulfing the business sector and climate activists about the proposed carbon tax. One wonders when the actual signing of the Bill into law will occur. Hopefully this is the year of reckoning.

A carbon tax is a tax on the CO₂ equivalent of GHG emissions imposed in terms of section 2 of the Carbon Tax Bill.³⁷⁶ Alternatively it was defined by OECD as a form of explicit carbon pricing that is directly linked to the level of CO₂ emissions, often expressed as a value per tonne of CO₂ equivalent (pertco₂).³⁷⁷ The carbon tax is seen by some as the solution to reducing GHG emissions. Not only does it provide us with the specific measures to curb GHG emissions but it will be the first climate law. This part of this discussion looks at the feasibility of the carbon tax by analysing the pros and cons of the tax. The focus is also on action that could be taken to ensure the success of carbon tax.

A carbon tax provides certainty with regard to the marginal cost faced by emitters per tonne of CO₂ equivalent, but many think imposing such a tax will not guarantee a significant level of emission reductions, unlike other emissions reduction measures such trading schemes.³⁷⁸ This view has been shot down by other analysts, who believe that a carbon tax aims to internalise the negative externality, meaning that the final price of the emission should include the external cost and not just the private cost. For some it is a necessary evil. They suggest that it should be calculated so that the

376 Section 1(Definitions) of Draft Carbon Tax Bill 2017.

377 OECD Environment Policy Paper 2013 www.oecd.org Climate and Carbon-Aligning Prices and Policies, October 2013 1.

378 OECD Environment Policy Paper: Climate and Carbon-Aligning Prices and Policies, October 2013 1.

marginal cost of carbon emissions equals the marginal benefit of the reduced quantity of greenhouse gases emitted.³⁷⁹ Unlike other taxes, a direct carbon tax imposes the lowest distortion on the market, and for a carbon tax that reduces emissions by 15 per cent the cost is roughly 0,3 per cent per household, compared to a tax on energy-intensive sectors that would be about 10 times that amount.³⁸⁰ Devarajan et al further argues that a tax on carbon is feasible because the CO₂ coefficients are known. A carbon tax per unit of energy input purchased for each production activity is the carbon tax per unit times the CO₂ coefficient. This method of taxing would help to quantify the carbon tax needed to reduce CO₂ emissions by a given target. This is in line with the polluter pays principle agreed to at the Rio Summit of 1992. The polluter pays principle simply means that those who cause environmental damage must bear the costs.³⁸¹ Putting a price on each tonne of GHG emitted would send a price signal to the market, thus creating an incentive for emitters to shift to less greenhouse-gas intensive ways of production, and would ultimately result in lower emissions. In other words, it would motivate would-be polluters to change their behaviour towards energy-efficient methods such the use of renewable energy sources. Some organisations such as the Organisation Undoing Tax Abuse (OUTA) concur with the emissions reduction narrative but believe that it would be successful only in the medium to long term, and not in the short term. OUTA further argues that a carbon tax is not ring-fenced and directed to support initiatives to combat GHG emissions, and that the tax will therefore end up by falling into the general tax category.³⁸² The Organisation also argues that a carbon tax would not deter emitters as they (the businesses) will shift the tax burden to consumers.³⁸³ Managing the tax would weigh heavily on already overburdened

379 Devarajan S et al Tax Policy to Reduce Carbon Emission in South Africa: Policy Research Working Paper 4933 by the World Bank, Africa Region, Sustainable Development and the Chief Economist; may 2009 2.

380 Devarajan S et al Tax Policy to Reduce Carbon Emission in South Africa: Policy Research Working Paper 4933 by the World Bank, Africa Region, Sustainable Development and the Chief Economist; may 2009 3.

381 Devarajan S et al Tax Policy to Reduce Carbon Emission in South Africa: Policy Research Working Paper 4933 by the World Bank, Africa Region, Sustainable Development and the Chief Economist; may 2009 12.

382 Organisation Undoing Tax Abuse(OUTA) 2016 [https:// www.oua.co.za/carbon-campaign/oua-challenging-new-carbon-tax/](https://www.oua.co.za/carbon-campaign/oua-challenging-new-carbon-tax/).

383 Organisation Undoing Tax Abuse(OUTA) 2016 [https:// www.oua.co.za/carbon-campaign/oua-challenging-new-carbon-tax/](https://www.oua.co.za/carbon-campaign/oua-challenging-new-carbon-tax/).

businesses when it comes to auditing and accounting for their emissions. It would therefore be costly.

Although the carbon tax is expected to inject roughly R13,7 billion into the fiscus, thus promoting revenue recycling, the country's poor track record on wasteful expenditure has shown that the implementation part is bound to fail, and its intended consequences may therefore not be realised.

4.9.1 Arguments against a carbon tax

Economists are of the view that production may shift to countries with no or lower carbon taxes, which are commonly referred to as pollution havens. That makes sense, because it would be cheaper to do business there, but at the expense of the environmental damage. It is also argued that the cost of administering the tax may be high, rendering the process inefficient. It would also be difficult to know the actual external cost; hence the quantification process would be based on estimates. The other possibility is tax evasion by businesses, especially if they feel that the carbon taxes are too costly.

4.9.2 Arguments for a carbon tax

It is believed that levying a carbon tax may lead businesses to consider alternative production processes, meaning that placing a cost on carbon emissions might encourage firms and consumers to use carbon-efficient technologies. We might see people cycling to work, shifting towards green sources of power such as solar systems, or making more use of public transport. Since a huge sum is expected to accrue from the tax, the money might be channelled towards producing green electricity and responding to the damage caused by air pollution.

4.10 Conclusion

Firstly RE policies must translate into a single piece of legislation governing RE, which gives direction to the implementation process. A practical implementation of the RE legal framework is needed. All parties (the energy sector, the transport sector, the building industry, the demand side, etc) must be encouraged to move towards RE by being offered attractive incentives such as production subsidies, tax rebates and tax

exemptions for using green technologies. Lastly combining RE policies with other climate mitigation measures, as discussed above, will surely mitigate climate change.

5 Conclusion

As provided in the introductory remarks, Section Two of this discussion focused on the historical background of climate change mitigation and renewable energy sources in relation to climate change mitigation. It is clear from the discussion that the starting point in climate change mitigation is the UNFCCC, followed by the Kyoto Protocol and lastly the Paris Accord. These international climate change treaties have shaped or influenced SA's national RE policies and laws directly and indirectly - in particular article 2 of the UNFCCC, which refers particularly to the stabilisation of greenhouse gases to required level. Taking lessons from these treaties, SA ventured in an audacious move towards the roll-out of RE in order to mitigate climate change. In promoting RE sources SA has also been guided by the principles contained in the UNFCCC, such as the common but differentiated responsibility, the acknowledgement of differences in capacity, and inter-generation equity. The acknowledgement of difference takes into account the national circumstances of each country - that is, the level of its development, the availability of resources, and its R&D capability while the latter calls for sustainable development. Sustainable development involves social, economic and environmental considerations in development. The third leg, environmental concerns, is better addressed by the use of RE, which is the focus of this research.

Although international treaties on climate change mitigation set the tone on mitigation, they are devoid of specific timelines. For instance, they do not say what must be done, how it must be done, and for how long. What these treaties provide are general guidelines. For example, developed countries are expected to take the lead in mitigating climate change by providing funding and technology to the non-Annex 1 countries. What is the sanction if developed countries fail to honour the pledge to financially and non-financially assist developing countries? The wording of these international climate change treaties sounds soft on non-compliance. No specific sanctions are provided for a failure to mitigate climate change. Therefore, to ensure the effectiveness of climate change agreements specific sanctions must be spelt out, the absence of which may render these treaties useless.

Section Two of this paper also highlights the deployment of RE sources in South Africa. Previously, RE technologies were marginalised by the national utility Eskom, and only nine pilot projects were performed by international donors.³⁸⁴ RE sources were predominantly relegated to non-grid usage by rural communities, mainly for small-scale domestic use. But this has changed tremendously, especially in reaction to the 2008 load shedding and with the perception of the need to cut GHG emissions, which have forced Eskom to invite IPPs to supply RE. This is evidenced by the medium-term (10-year) target of:

10000 GWh (0.8 Mtoe) renewable energy consumption by 2013, to be produced mainly from biomass, wind, solar and small scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013(41539 MW).³⁸⁵

Similarly, IRP 2010 set a target of 17 800MW equivalent of 42 per cent new electricity generation from mainly solar and wind.³⁸⁶ This shows government's commitment to RE and ultimately to climate change mitigation. The UNEP 2014 report has placed SA among the top 10 countries in respect of RE investments.³⁸⁷ While RE implementation took more than a decade to realise after the publication of the first policy, the achievements made within three years after the first procurement in 2011 are promising.³⁸⁸ It is further suggested that SA's progress in implementing the REIPPPP has been positive, thus earning the country accolades internationally. The industry has applauded the design of REIPPPP as private-sector friendly.³⁸⁹

The introduction of IPP diversified the energy sector by bringing in RE and thereby transforming the energy sector previously dominated by Eskom. The use of RE not only promotes the development of a green economy but it presents other opportunities as well, including foreign investment and financing, job opportunities, a reliable energy supply and the diversification of the energy sector.³⁹⁰

384 State of Renewable Energy 2015 5.

385 White Paper on Renewable Energy 2003 ix.

386 State of Renewable Energy 2015 5

387 State of Renewable Energy 2015 4.

388 State of Renewable Energy 2015 4.

389 State of Renewable Energy 2015 4.

390 National Climate Change Response White Paper 37; SARI Progress in Renewable Energy in South Africa x.

Section Three of the research is anchored in the development of South African Renewable laws. The section starts by acknowledging the role of the Constitution in shaping current RE energy policies in South Africa. In other words, the country's RE policies are a reaction to section 24 of the Constitution and the Bill of Rights, which seeks to protect the environmental right. The RE policies fully acknowledge the need to roll out renewables in order to mitigate climate change. It is clear that the use of RE as discussed in Section Two, plays a significant role in climate change mitigation in comparison with the use of energy generated from fossil sources. Not only does RE lower GHG emissions but there is a general recognition that RE promotes diversification in the energy supply, the supply of affordable electricity especially to the poor rural communities, and accelerates transformation in the electricity generation sector predominantly controlled by Eskom.

Section Four focuses mainly on the analysis of RE laws pertaining to climate change mitigation. The Section ends by looking at the role of other climate mitigation measures such a carbon tax, a carbon budget and energy efficiency. The main reason these other options were discussed is to highlight how they augment RE in climate change mitigation. It is frankly impossible to discuss RE policies in isolation without taking cognisance of other related climate change mitigation measures.

5.1 Challenges of Renewable Energy Law and Policies

There is no doubt that legislation pertaining to RE is scattered in various statutes, for example in the National Energy Act, the Electricity Regulation Act, and the National Environmental Management Act.³⁹¹ RE laws and policies cut across energy and environmental matters. This renders implementation more difficult because of the overlapping that therefore occurs in the jurisdictional mandate. Conflicts between departments are surely inevitable; any particular matter has to be dealt with by a number of different authorities.

Glazewski believes that the language employed in writing these policies is convincing, given the fact that some RE policies set targets, but he is not convinced by lack of

³⁹¹ Glazewski *The Legal Framework for Renewable Energy in South Africa* 14.

sanctions or penalties for failing to meet the proposed targets.³⁹² This is a worrying trend in government policies - that they sound good, but the absence of sanctions for non-compliance renders them toothless. Furthermore, there is lack of political will in the implementation of RE policy. This is shown by the huge capital investments that have taken place in coal-powered electricity generation at the Medupi and Kusile power stations. Is this not hypocrisy of great magnitude? The world is turning away from coal to cleaner technologies, but SA is investing in fossil energy. Despite the fact that coal is cheaper than RE, there is need to turn to renewable energy for the sake of climate mitigation.

The implementation of RE has deviated a bit from the initial expectations of RE White Paper. For example, the IRP approach has incorporated technologies that do not meet the efficiency criteria provided in the White Paper.³⁹³ Further, progress with respect to the development of biomass and biofuels has been limited. Both of these were expected by the White Paper to contribute significantly to energy production.³⁹⁴

The RE White Paper 2013 sets a positive goal of increasing the contribution of RE to the energy mix, thus lowering GHG emissions and ultimately resulting in sustainable development. The target of a 10 000GWh renewable energy contribution to the final energy mix by 2013 was rather conservative.³⁹⁵ Kidd argues that RE should be seen in the bigger picture as feeding significantly into the national grid, rather than as small-scale power for individual use.³⁹⁶ Surprisingly, solar energy, the source of which is in abundance in SA, is considered for individual use only. Again, although RE is provided for in the IRP 2, 2010 it is still accorded only a peripheral role.³⁹⁷

5.2 Recommendations

There is a need to have one regulatory framework that governs renewables. It has been noted by different writers that the deployment of renewables is hindered mainly by the lack of coordination in the relevant policies and laws. Hence there is a need for

392 Glazewski *The Legal Framework for Renewable Energy in South Africa* 14.

393 State of Renewable Energy 2015 9.

394 State of Renewable Energy 2015 9.

395 Kidd Environmental Law 312.

396 Kidd Environmental Law 313.

397 Kidd Environmental Law 316.

the synchronisation of these scattered policies and laws. This would be in accordance with the NEMA, which calls for the synchronisation of efforts by government departments and for the coordination of environmental laws and policies.³⁹⁸ Such coordination would minimise the conflict between government departments dealing with energy and environmental matters. Glazewski believes that there is a need to boost the renewables market and also to level the playing field.³⁹⁹ As things stand, the electricity supply is dominated by the state-owned power utility, Eskom. This state monopoly must be reviewed in favour of the decentralisation of some functions to independent power producers. In short, the market for electricity generation must be competitive. Competition is feasible only with the involvement of private sector. To attract more private investors, financial incentives must be made available. It is a fact that one of the factors hindering the deployment of renewables is the huge costs involved in its development. To reduce the costs of renewable energy, the government should subsidise it and offer incentives such as tax rebates and tax exemptions. Yes, some tax incentives and other financial instruments were introduced, but they are still insufficient.⁴⁰⁰

Another stumbling block to the large-scale deployment of renewable energy is the absence of an “ambitious policy that would encourage investment”.⁴⁰¹ Although many renewable energy policies exist, as shown above, they are disorderly. Hence the need to consolidate these policies into one focused policy that will constitute a renewable energy law. Further, current regulations must be implemented consistently and efficiently. Paying lip service to renewable energy policies is no longer an option. The world is reeling from effects of climate change.

Considering the fact that South Africa is one of the largest emitters in the world, one of the ways that it can maintain economic growth while minimising negative environmental effects is the use of renewable energy. However the policies on renewable energy need to be more appealing to potential producers and investors,

398 Section 2(1) of NEMA.

399 Glazewski The Legal Framework for Renewable Energy in South Africa 14.

400 Gets Powering the Future: Renewable Energy Roll-out in South Africa 22.

401 Gets Powering the Future: Renewable Energy Roll-out in South Africa 7; Glazewski The Legal Framework for Renewable Energy in South Africa 14.

and if possible made compulsory so that the shift to renewable energy can be hastened. More pressure must be put on big institutions like Eskom to shift to renewable energy.

Public awareness about the benefits of using renewable energy in climate mitigation must also be given more emphasis in the renewable energy policies to enable every citizen to understand why there is a need for a shift to renewable energy.

There is a need for government to seriously consider its continuous investment in coal energy, as exemplified by the Medupi and Kusile coal-powered power stations. Lack of political will is a serious obstacle to the introduction of renewable energy, and that obstacle will have to be overcome if government is to stop investing in coal energy and start investing in renewable energy.⁴⁰²

Yes, targets were provided in the renewable energy policies, but without sanctions for non-compliance they might as well not have been set. The RE policies must specify penalties for non-compliance. In addition, specific timeframes must be included in the policies with timeous reviews to ensure efficiency.

The National Development Plan is also one of the policies that seeks to deal with climate change mitigation as one of its objectives, but for this to be a success, the climate goal must be aligned with other economic goals like poverty alleviation, unemployment and the reduction of income inequalities. If these challenges are incorporated in all efforts to mitigate climate change, then the development of a low-carbon economy will be possible. I want to suggest that when the policy for climate change mitigation is being developed and improved, the provision of employment should be part of the policy so that both the government and the ordinary person will see the policy as being beneficial to the economy in addition to dealing with climate change.

The White Paper on Renewable energy 2003 was a step in the right direction. However, the implementation of the policy has been very lax. There is need for a proper and

402 Gets Powering the Future: Renewable Energy Roll-out in South Africa 7; Eskom 2013 <http://www.eskom.co.za/c/359/medupi/>.

feasible implementation plan to be established, and follow-up needs to be done, or else climate change mitigation will remain a dream yet to be fulfilled.

BIBLIOGRAPHY

Literature

Agama Energy 2003 Employment Potential of Renewable Energy in South Africa

Agama Energy Employment Potential of Renewable Potential of Renewable Energy in South Africa (Agama Energy Cape Town 2003)

Carter and Barnard “Demystifying the Global Climate Change Regime” in Kotze LJ, Humbly TL et al Climate Change Law and Governance

Carter S and Barnard M “Demistifying Global Climate Change Regime” in Kotze LJ, Humbly TL et al Climate Change Law and Governance(Juta 2016)

Glazewski The Legal Framework for Renewable Energy in South Africa

Glazewski J The Legal Framework for Renewable Energy in South Africa (2005)

Eddenhofer Renewable Energy Sources and Climate Change Mitigation: Special Report of the Intergovernmental Panel on Climate Change

Eddenhofer et al Renewable Energy Sources and Climate Change Mitigation: Special Report of the Intergovernmental Panel on Climate Change (IPCC 2012)

Elum and Momodu 2017 Renewable and Sustainable Energy Reviews

Elum and Momodu 2017 Climate change mitigation and renewable energy for sustainable development in Nigeria: A discourse Approach Renewable and Sustainable Energy Reviews Volume 76 Issue C, 72-80

Kidd *Environmental Law*

Kidd M *Environmental Law* 2nd ed(Juta Cape Town 2011)

Murombo and Du Plessis “*Energy*”

Murombo T and Duplessis A “Energy” in *Environmental Law and Local Government in South Africa* (Juta Cape Town 2015)

Sanapepur 2014 *International Journal of Sustainable Energy*

Sanaeepur S *Renewable Energies: Climate Change Mitigation Policy: International Journal of Sustainable Energy* 2014 Vol 33 203-212

Smit *Alternative Sources of Energy for South Africa in Various shades of green*

Smit D *Alternative Sources of Energy for South Africa in Various Shades of green*
2011

Legislation

Carbon Tax Bill, 2017

Constitution of the Republic of South Africa

Electricity Regulation Act 4 of 2016

Green Economy Accord 2011

Integrated Resource Plan for Electricity 2010-2030 Revision 2

Long Term Mitigation Scenarios of 2008

National Climate Change Response White Paper, 2011

National Energy Act 34 of 2008

National Environmental Management Act of 107 of 1998

White Paper on the Renewable Energy Policy of the Republic of South Africa of 1998

National Energy Efficiency Strategy, 2005

State of Renewable Energy in South Africa, 2015

South African National Climate Change Response Strategy, 2004

International Legal Instruments

Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997

Paris Agreement, 2015

United Nations Framework Convention on Climate Change, 1992

World Summit on Sustainable Development, Johannesburg 2002

Rio Declaration on Environment and development, 1992

Internet Sources

Ampofo-Anti, Dumani and Van Wyk 2015 <http://www.sagreenfund.org.za>

Ampofo-Anti, Dumani and Van Wyk *Potential for reducing greenhouse emissions in the South African Construction Sector* 34. Accessed on 07 July 2017

Anon date unknown <https://www.wmo.int...international>

Anonymous date unknown <https://www.wmo.int...international>. Accessed on 01 February 2017

Anon 2012 <http://www.werthschroeder.com/>

Anonymous 2012 *Renewable Energy Law* <http://www.werthschroeder.com/>
Accessed on 03 May 2017

Anon 2017 www.sars.gov.za/AllDocs/ops/policies/Environmentallevy

Anon 2017 *Environmental levy*
www.sars.gov.za/AllDocs/ops/policies/Environmentallevy. Accessed on 05 August 2017

Barbee 2015 <https://www.theguardian.com/environment>

Barbee J *How renewable energy in South Africa is quietly stealing a march on coal* <https://www.theguardian.com/environment/2015/jun/01/> accessed 31 January 2017

Cloete, Cohen, Child and Ramokolowan 2017 <http://www.theguardian.com>

Cloete B Cohen B, Child A and Ramokolowan Y Department of Environmental Affairs: *Carbon Budget Final Report: Social and Economic Impact Assessment of Phase 1 Carbon Budget in South Africa* <http://www.theguardian.com> Accessed on 12 July 2017

Covary and Aversch 2013 <http://www.proceeding.eceee.org>

Covary T and Aversch U *Overview and assessment of the energy efficiency and energy conservation policies and initiatives of the Republic of South Africa* <http://www.proceeding.eceee.org>. Accessed on 02 June 2017

Department of Energy date unknown <http://www.energy.gov.za/files>

Department of Energy date unknown <http://www.energy.gov.za/files>. Accessed on 23 January 2017

Devarajan , Go, Sherman and Thiefelder 2009 <http://elibrary.worldbank.org>

Devarajan S, D S Go, Sherman R and Thiefelder K 2009 *Tax Policy to Reduce Carbon Emission in South Africa: Policy Research Working Paper 4933 by the World Bank, Africa Region, Sustainable Development and the Chief Economist* <http://elibrary.worldbank.org>

Earthlife Africa 2016 <http://www.earthlife.org.za>

Earthlife Africa *Climate Change Research LTMS critique* <http://www.earthlife.org.za>

Gets Powering the Future 2013 <http://www.eskom.co.za/c/359/medupi>

Gets Powering the Future: *Renewable Energy Roll-out in South Africa Eskom* 2013 <http://www.eskom.co.za/c/359/medupi/>. Accessed on 23 January 2017

Henson 2011 <https://www.theguardian.com/environment>

Henson 2011 <https://www.theguardian.com/environment> Accessed on 17 June 2017

Letete date unknown <http://www.oecd.org>

Letete T *South Africa's baseline defined from the Long-Term Mitigation Scenarios (LTMS): "Growth Without Constraints (GWC)"*

<http://www.oecd.org> Accessed on 18 June 2017

Lilley and Yelland 2016 www.moneyweb.co.za/news/industry/does-draft-irp-2016-roasted

Lilley R and Yelland C DoE's draft IRP 2016 roasted

2017.www.moneyweb.co.za/news/industry/does-draft-irp-2016-roasted/

Accessed on 03 June 2017

Long and Steinberger <http://www.nrdc.org/experts/noah-long/renewable-energy-key-fighting-climate-change>

Long N and Steinberger N 2016 *Renewable energy key to fighting climate change*

<http://www.nrdc.org/experts/noah-long/renewable-energy-key-fighting-climate-change> Accessed on 28 September

Luthuli 2016 <http://www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/> 4

Luthuli M 2016 *Tallying the benefits of South Africa's renewable energy programmes* <http://www.moneyweb.co.za/news/industry/tallying-benefits-sas-renewable-energy-programme/> 4.

Accessed on 28 November 2016

McNamara 2010 <https://www.tips.org.za>

McNamara A 2010 *Case Study-Renewable Energy and the Draft IRP2010: "The Winds of Change"* [tips.org.za](https://www.tips.org.za) Accessed on 24 June 2017

Meyer and Odeka 2009 <http://www.digitalcommons.wcl.american.edu>

Meyer L E and Odeka 2009 *Climate Change, Energy and Sustainable Development in South: Developing the African Continent at the Crossroads*

Article 17, Volume 9, and Issue 2 Winter 2009: Climate Law Reporter 2009

Sustainable Development Law and Policy
<http://www.digitalcommons.wcl.american.edu> Accessed on 10 April 2017

Montmasson-Clair and Ryan 2014 <https://papers.ssrn.com>

Montmasson-Clair G and Ryan G 2014 Repositioning electricity planning at the once: An evaluation of South Africa's Integrated Resource Plan
<https://papers.ssrn.com> Accessed on 16 July 2017

Mwakasonda 2007 [www.http://www.erc.za](http://www.erc.za) > papers 2007

Mwakasonda S.A *South Africa Low Carbon Report* <http://www.erc.za> > papers 2007 Accessed on 17 June 2017

Organisation Undoing Tax Abuse (OUTA) Date unknown <https://www.outa.co.za/carbon-campaign/outa-challenging-new-carbon-tax/>

Organisation Undoing Tax Abuse (OUTA) *why is OUTA challenging Carbon Tax*
<https://www.outa.co.za/carbon-campaign/outa-challenging-new-carbon-tax/>. Accessed on 15 July 2017

Ramayia 2012 www.urbanearth.co.za/articles/ocean-energy-generation

Ramayia J 2012 *Ocean energy generation potential in South Africa*
www.urbanearth.co.za/articles/ocean-energy-generation accessed 31 January 2017.

Rosenberg and Winkler 2011 <http://www.scielo.org.za>

Rosenberg S A and Winkler H *Policy review and analysis: Energy efficiency strategy for the Republic of South Africa*. Accessed on 10 April 2017

Stats SA date unknown <http://www.statssa.gov.za>

Stats SA date unknown <http://www.statssa.gov.za> Accessed on 03 February 2017

Stifung 2014 <https://.za.boell.org>

Stiftung 2014 *Southern Africa: Prospects for Renewable Energy in South Africa*
2014 <https://.za.boell.org> Accessed on 15 April 2017

United Nations 2017 <https://sustainabledevelopment.un.org>

United Nations 2017 *Transforming our world transforming our word: the 2030 Agenda for sustainable development...sustainable development knowledge platform* <https://sustainabledevelopment.un.org>

Wuester *et al* 2015 <http://.irena.org7/rethinking-renewable-energy-and-climate-change>

Wuester 2015 Rethinking renewable energy and climate change 2015.
<http://.irena.org7/rethinking-renewable-energy-and-climate-change> Accessed on 22 July 2017

List of Abbreviations

CB	Carbon Budget
CBDR	Common but differentiated responsibilities and respective Capabilities
CER	Certified Emissions Reductions
CH ₄	Methane
CO ₂	Carbon Dioxide
Constitution	The Constitution of the Republic of South Africa
COP	Conference of the Parties
CRSES	Centre for Renewable and Sustainable Energy Studies
COSATU	Congress of South African Trade Unions
DME	Department of Minerals and Energy
EGTT	Expert Group on Technology Transfer

ET	Emissions Trading
EU	European Union
GEAR	Growth, Employment and Redistribution Programme
GHG	Greenhouse Gas
IEP	Integrated Energy Plan
IRP	Integrated Resource Plan
LDCEG	Least Developed Countries Expert Group
LTMS	Long Term Mitigation Scenarios
NCCRWP	National Climate Change Response White Paper
NDCs	Nationally Determined Contributions
NDP	National Development Plan
NEES	National Energy Efficiency Strategy
NEMA	National Environmental Management Act, 1998
NERSA	National Energy Regulator South Africa
RDP	Reconstruction and Development Programme
RE	Renewable Energy
REFIT	Expert Group on Technology Transfer
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDGs	Sustainable Development Goals
WSSD	World Summit on Sustainable Development

