A legal framework for the promotion of renewable energy in South Africa through fiscal instruments

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It all starts here ™

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“You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make.”

Jane Goodall

ABSTRACT

South Africa's current energy sector places undue reliance on fossil fuels to fulfil the country's energy requirements. The use of these non-renewable energy resources are unsustainable, as millions of tonnes of harmful emissions are released and estimates are made that these resources will be depleted within the next 100 years. Therefore the country has to source alternative energy resources. Renewable energy resources (for example solar energy) are considered to release little or no harmful by-products and have an infinite supply. Therefore the South African government has to promote the use of renewable energy as part of its commitments to address climate change and to ensure sustainable energy resources.

Some of the most popular regulatory tools that a state uses to control human behaviour, is through command-and-control instruments and fiscal instruments. The latter promotes behavioural changes by rewarding desired behaviour which ultimately advances the user's own best interest. Because of the nature of renewable energy governance, energy users can not be forced or compelled through command-and-control instruments to use renewable energy. They should rather be encouraged or persuaded to use this form of energy through market-based instruments. This is also the central hypothesis of this dissertation.

The purpose of this study is to determine the extent to which the South African legal regime makes provision to promote the use of renewable energy resources through fiscal instruments. Therefore the various energy-related white papers, policy papers and legislation will be analysed. This study found that South Africa's legal regime only partly makes provision to promote the use of renewable energy resources through fiscal instruments. The policy part of the legal regime is fairly well developed, but the statutory regime lacks detail and in its current form, environmental/energy-related legislation does not fully correspond with the lofty objectives of the policy framework.

OPSOMMING

Suid-Afrika se energiesektor is oormatig van fossiel brandstowwe afhanklik om aan die land se energiebehoeftes te kan voldoen. Die gebruik van nie-hernieubare energiebronne is onvolhoubaar, weens die tonne skadelike gasse wat in die atmosfeer vrygestel word; en na bewering sal hierdie energiebronne binne die volgende 100 jaar uitgeput wees. Om hierdie redes moet die regering dringend alternatiewe energiebronne bevorder. Hernieubare energiebronne (soos sonlig) skep geen of baie min byprodukte en is feitlik onuitputbaar. Die Suid-Afrikaanse regering moet daarom die gebruik van hernieubare energie bemark as deel van sy verbintenis daartoe om klimaatverandering aan te spreek en volhoubare energiebronne te benut.

Twee gewilde metodes wat die staat gebruik om menslike gedrag te reguleer, is deur bevel-en-beheer- en markgebaseerde instrumente. Laasgenoemde bevorder gedragsverandering deur die gewenste gedrag te beloon – tot voordeel van die verbruiker. Die manier waarop die regering hernieubare energie beheer, maak nie voorsiening vir afdwingbaarheid of strafsanksies wanneer hernieubare energie nie gebruik word, soos in die geval van bevel-en-beheer instrumente nie. Verbruikers moet eerder deur markgebaseerde instrumente aangemoedig en beloon word om hierdie vorm van energie te gebruik. Dit is ook die kernhipotese van hierdie studie.

Die doel van hierdie studie is om te bepaal tot watter mate die Suid-Afrikaanse regstelsel voorsiening maak om die gebruik van hernieubare energiebronne te bevorder deur middel van fiskale instrumente. Hiervoor word verskeie witskrifte, beleide en wetgewing geanaliseer. Hierdie studie het tot die gevolgtrekking gekom dat Suid-Afrika se regstelsel slegs gedeeltelik voorsiening maak om die gebruik van hernieubare hulpbronne deur markgebaseerde instrumente te bevorder. Die beleidsaspek van Suid-Afrika se regstelsel is redelik goed ontwikkeld, maar die statutêre sfeer bevat onvoldoende besonderhede en omgewings-/energie-verbonde wetgewing stem nie in geheel ooreen met beleidsraamwerk se oogmerke nie.

KEY WORDS

Renewable energy resources

Non-renewable energy resources

Energy sector

Fiscal instruments

Market-based instruments

Environmental law

South Africa

SLEUTELWOORDE

Hernieubare energiebronne

Nie-hernieubare energiebronne

Energie sektor

Fiskale instrumente

Markgebaseerde instrumente

Omgewingsreg

Suid-Afrika

LIST OF ABBREVIATIONS AND ACRONYMS

Art	Article
CO_2	Carbon dioxide
CO_2-eq	Carbon dioxide equivalent
CTO	*Carbon Tax Option*, 2010
CTPP	*Carbon Tax Policy Paper*, 2013
EFRPP	*Environmental Fiscal Reform Policy Paper*, 2006
FIT	Feed-in Tariff
GHG	Greenhouse gas
GW	Gigawatt
GWh	Gigawatt hour
REIPPP	Renewable Energy Independent Power Producer Procurement Programme
kWh	Kilowatt hour
kWh/m^2	Kilowatt hour per square metre
M	Metre
MBIs	Market-based instruments
MJ/kg	Mega joule per kilogram
Mtoe	Million tonnes of oil equivalent
MW	Megawatts
NERSA	National Energy Regulator of South Africa
NDP	*National Development Plan*
Par	Paragraph
PetroSA	Petroleum Oil and Gas Corporation of South Africa Ltd
RAF	Road Accident Fund
REFIT	Renewable Energy Feed-In Tariff
Reg	Regulation
Sec	Section
SETRM	South African Solar Energy Technology Road Map
UNFCCC	*United Nations Framework Convention on Climate Change*
VAT	Value Added Tax
2010/2030	*Integrated Resource Plan* 2010 - 2030

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Contents

1 Introduction

Since the dawn of the Industrial Revolution, mankind has been burning fossil fuels, such as crude oil, coal and gas, as the primary source of energy.[1] The burning of these non-renewable energy resources is considered to be unsustainable. Once the supply is depleted, this source of energy will cease to exist. Scientists predict that oil, gas and coal reserves will be depleted in approximately 35, 37, and 107 years, respectively.[2] Apart from the limited reserves, the burning process results in the release of millions of tonnes of carbon dioxide (hereafter $CO_{2)}$ and other harmful gasses into the atmosphere.[3] These emissions contributed to the global crisis of a rapidly changing climate.[4]

It is estimated that around 77% of the electricity generated in South Africa is produced from coal,[5] making non-renewable energy resources South Africa's primary source of energy. It seems that the main rationale for the country's overreliance on non-renewable energy is because of its affordability and the fact that it is widely available and relatively easily accessible.

In an environment where the current primary energy fuel sources are limited and the use thereof additionally causes irreversible changes to the global climate,[6] it is of paramount importance to switch to energy sources that are clean, renewable[7] and sustainable.[8] To limit the anthropogenic contribution[9] to an accelerated change in the earth's climate, renewable energy resources may be the key. Research has shown that these energy resources (for example solar energy) lead to far less pollution and/or hazardous waste.[10] This may be attributed to the fact that no burning is required during the use/production of the energy.[11] It should be noted that for the

1 Shafiee and Topal 2009 *Energy Policy* 181.
2 Shafiee and Topal 2009 *Energy Policy* 181.
3 Core Writing Team, Pachuari and Reisinger (eds.) *Climate Change 2007: Synthesis Report.* 37.
4 Core Writing Team, Pachuari and Reisinger (eds.) *Climate Change 2007: Synthesis Report.* 37.
5 South Africa.info 2013 http://www.southafrica.info.
6 IPCC Fourth Assessment Report (AR4) *Climate Change 2007: The Physical Science Basis* 97.
7 Renewable refers to energy sources which are continually replenished by natural processes.
8 Sustainable refers to the potential of a resource to be used for a long term, whilst maintaining ecological, economical and social well being.
9 Human made contributions such as industrial emissions.
10 Brower 1990 *Environmental Protection Agency Journal* 20.
11 Renewable green 2013 http://www.renewablegreen.net/?p=124.

purpose of this research paper, the focus of energy production will only be on the generation phase of energy, and not the complete cycle.

Due to South Africa's growing economy and ever-expanding population, there is a constant increase in the demand for electricity and energy.[12] This was evident when in early 2008, South Africa experienced an energy crisis where energy demand greatly exceeded supply. It is believed that this was due to a deficient coal production and delivery system.[13] Despite the fact that South Africa's primary energy resources are rapidly depleting and emit harmful gasses, the Government has yet to diversify its energy sources to ensure energy security. Harnessing alternative energy resources may increase energy security as it may provide additional base load or peak load support for the national energy grid.[14]

A clear distinction has to be drawn between non-renewable and renewable energy.

1.1 Non-renewable energy

Non-renewable energy resources are defined as "an energy resource that is not replaced or is replaced very slowly by natural processes".[15] As previously mentioned, non-renewable energy resources are fossil fuels, which comprise primarily of coal, gas and oil. There are many advantages to the use of fossil fuels, they are cheaper, easy to use and produce,[16] transport, distribute[17] and are not affected by climate conditions.[18] However, studies indicate that at the current global consumption rate, these resources will be depleted within the next approximately 100 years.[19] There are methods of extending this period, but it will not solve the problem.

Fossil fuel plants require vast amounts of fuel and results in huge quantities of toxic pollutants and waste generation. In general, a 1 000 megawatt-electric coal plant annually produces an average of 22 000 tonnes of nitrous oxides and 44 000 tonnes

12 South Africa.info 2013 http://www.southafrica.info.
13 Fell H-F "The renewable imperative:" 61-62.
14 During 2013 the country's electricity usage was 233 105 Gigawatt hour. Statistics South Africa 2014 http://beta2.*statssa*.gov.za/publications/P4141/P4141January2014.pdf
15 CPAST 1998 www.cpast.org.
16 Scheid J Date Unknown. http://www.greenliving.lovetoknow.com.
17 Jones JC 2009 http://www.ezinearticles.com.
18 Renewable green 2013 http://www.renewablegreen.net.
19 Madhavan *Environment Law, Pollution and Management* 30.

of sulphur oxides which are dispersed into the atmosphere. A further 320 000 tonnes of ash containing 400 tonnes of heavy metals (arsenic, cadmium, cobalt, lead, mercury, nickel and vanadium) are also released into the atmosphere.[20]

1.2 Renewable energy resources

Renewable energy is sourced from natural resources (such as solar and wind energy) which are continuous[21] and infinite. There are various advantages associated to the use of renewable energy resources, primarily its infinite supply. It is believed that most renewable energy technologies[22] result in little or no pollution or hazardous waste,[23] and many do not have any environmental input costs. Furthermore, they are immune to foreign disturbances[24] or to the Rand/Dollar exchange rate, as they are sourced entirely domestically. Unlike fossil fuels, they are not subjected to inflation due to the depletion of their reserves. Renewable energy is especially suited to off-grid application,[25] which makes it particularly valuable in a country such as South Africa, where thousands of homes in rural areas do not have access to the national electricity grid. The development of renewable energy technologies may very well hold economical advantages in the sense of employment, as more labour is required in renewable energy development and industries when compared to fossil fuel industries.[26] It appears that there is a clear rationale to invest in renewable energy. However, due consideration needs to be applied with renewable energy to establish whether green is indeed better than coal.

The disadvantages associated with renewable energy may be the predominant reason why it plays such a miniscule part in the global energy supply. The initial costs involved with renewable energy technologies are very high and unaffordable for the majority of the population.[27] They may not be as energy dense as fossil

20 Time for Change 2011 www.timeforchange.org.
21 As the energy source can be used be used over and over again.
22 Technologies refer to the physical equipment which converts, for example, solar energy into electricity.
23 Brower 1990 *Environmental Protection Agency Journal* 20.
24 An example of foreign disturbances, is the 1973 oil crisis. In this instance, Arab members of the Organisation of the Petroleum Exporting Countries, Egypt, Syria and Tunisia had a complete prohibition of oil trade with the United States of America.
25 Winkler H 2005 *Energy Policy* 28.
26 Brower 1990 *Environmental Protection Agency Journal* 20.
27 Westplainsenergy 2013 http://www.westplainsenergy.com.

fuels,[28] thus a greater volume or supply of energy is required to produce the same result that one would get with fossil fuels.[29] They cannot easily be substituted or integrated into existing energy systems without making significant infrastructure changes.[30] Land availability presents a problem for projects such as wind farms as large areas need to be reserved exclusively for such projects. Renewable resources may also be an inadequate and/or intermittent power source as most sources depend entirely on climatic conditions and time of day, such as wind and solar energy,[31] making them unreliable.[32] Wind turbines, for example, require an adequate force of wind to propel the blades to generate electricity. Even biomass energy is dependent on seasonal crop harvests. Therefore additional technologies to limit losses during energy storage and release have to be developed.[33]

The type and volume of resources and energy required to utilise a renewable energy source also presents a challenge.[34] This refers to the manufacturing technologies and rare earth elements needed to harness the renewable energy source. These requirements may limit the scalability and feasibility of such a resource. It is therefore important to note that in developing the technologies and tools needed to harness a renewable energy resource, the demand for natural materials should not be raised to such an extent that those materials or minerals are depleted. Furthermore, in the process of extracting, transporting, constructing and manufacturing the materials needed, fossil fuel inputs are required. In other words, no renewable energy process can reproduce itself without the use of non-renewable energy resources.[35] Therefore the input requirements of a renewable energy form may constrain its use and development.

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28 Fridley D 2012 *Post Carbon Institute* 4.

29 An example of this would be the storage capacity of a lithium ion battery, which contains approximately 0.5 megajouls per kilogram of battery, whereas gasoline contains roughly 46 megajoules per kilogram.

30 Fridley D 2012 *Post Carbon Institute* 2. In order for electric cars, for example, to run on renewable energy, significant infrastructure changes would have to be made. These infrastructure changes include vehicle and battery production, recharging facilities, the spare part industry, transmission capacity, software and equipment design etc. Therefore making the substitution or integration of renewable energy into existing systems, very costly.

31 Westplainsenergy 2013 http://www.westplainsenergy.com.

32 Renewable green 2013 http://www.renewablegreen.net.

33 Fridley D 2012 *Post Carbon Institute* 3.

34 Fridley D 2012 *Post Carbon Institute* 3.

35 Fridley D 2012 *Post Carbon Institute* 3-4.

Despite the apparent challenges and disadvantages of renewable energy, the fact of the matter is that the earth's fossil fuels are inevitably going to be depleted. Therefore it is imperative that measures be set in place to establish alternative sources of energy. Owing to the fact that renewable energy is more expensive than conventional energy sources, (as set out above *inter alia* technology development, new infrastructure, material input requirements, low energy density, etc.) the Government has to give individuals and industries a reason to want to use or invest in renewable energy technologies. Incentives can be used to create an environment to promote the use of renewable energy resources.[36] This paper looks at how renewable energy resources can be promoted and to what extent South Africa's legal regime contributes to promote renewable energy.

It is also important to realise the potentials that renewable energy technology's have in the context of South Africa's developmental needs. Besides the fact that they are favourable in the environmental sense, they may also contribute the society, in the form of economic benefits and employment.

1.3 Key considerations

This research paper seeks to explore the principal question of: what extent does the South African legal regime make provision to promote the use of renewable energy resources through fiscal instruments?[37] In order to answer this question and ensure that the legal question is both theoretical and practical, this research paper explores five sub-questions:

1. What is South Africa's current energy regime comprised of?
2. Is the technology to implement renewable energy currently available and practical?
3. Which regulatory instruments can be used to promote the use of renewable energy?
4. What policy instruments are currently being used in South Africa?

36 Oniemola 2011 *Dublin Legal Review Quarterly* 37.

37 Fiscal instruments refer to the variety of different mechanisms which can be used to promote the use of renewable energy.

5. To what extend does South Africa's legal regime make provision to promote the use of renewable energy?

The objective of this study is thus to discover what the current energy regime is, what instruments are available to promote renewable energy, and the extent to which South Africa's legal regime makes provisions to promote renewable energy.

1.4 Structure and method of research

In order to successfully answer the research question, this study will look at the context of the issue at hand, which is the Government's current approach adopted in the energy regime. Secondly, the law relating to the promotion of renewable energy will be dealt with, whereby the available fiscal instruments and their potential to promote renewable energy will be critically assessed. In this regard, a legal analysis and evaluation of relevant energy- and fiscal regulations and policies regarding renewable energy promotion will be conducted. Finally a critical assessment on how renewable energy can/is being promoted in South Africa will be done.

2. South Africa's current energy regime

In order to understand why incentives need to be used to promote renewable energy, one first has to understand the context of South Africa's current energy regime. This chapter will answer the first part of the research question, namely the composition of South Africa's current energy regime. This chapter will critically highlight South Africa's primary energy sources and the extent to which the country relies on these resources.

2.1 Coal

South Africa's national energy supply is currently dominated by coal, which accounts for 77% of the country's energy.[38] South Africa is also the world's fourth largest exporter of coal, as it exports roughly 28% of the country's coal production.[39] It is evident that South Africa's energy supply is carbon dioxide-intensive. It is also necessary to beneficiate the coal mined as a great deal of it is of low quality, thus resulting in approximately 65 million tonnes of solid waste being discarded annually.[40]

South Africa's coal is primarily bituminous[41] thermal grade with a heating value of approximately 27 MJ/kg.[42] Coal mining in South Africa is relatively inexpensive as it is laid in thick shallow seams. According to the Department of Minerals and Energy, it is estimated that South Africa has about 38 billion tonnes of coal reserves, making it the world's sixth biggest coal reserves.[43] The most coal in South Africa is produced in Mpumalanga province (83.8%), followed by Free State (8.5%), Limpopo (6.1%) and Kwa-Zulu Natal (0.8%).[44] The Country's primary coal production is from

38 South Africa.info 2013 http://www.southafrica.info.
39 Department of Energy Date Unknown www.energy.gov.za/files/coal_frame.html.
40 Department of Energy Date Unknown www.energy.gov.za/files/coal_frame.html.
41 Bituminous coal is the most common coal and includes two subtypes, namely thermal and metallurgical - Lyons W Date Unknown *Bituminous Coal* http://energy.about.com/od/Coal/a/Bituminous-Coal.htm.
42 Mega joule per kilogram.
43 Winkler H 2006 *Energy Research Centre, University of Cape Town* 5.
44 Mining Weekly 2010 http://www.miningweekly.com/article/a-brief-look-at-sas-coal-mining-industry-2010-09-03.

opencast mines (53%) while the remainder is done by bord-and-pillar[45] (40%), stoping (4%) and longwall mining (3%).[46]

2.2 Petroleum

Petroleum products also account for a significant percentage of South Africa's energy demand. During 2009, South Africa consumed roughly 9.1 billion litres of diesel and 11.3 billion litres of petrol.[47] These products are derived from crude oil, liquefied natural gasses, and coal to oil process. Crude oil accounts for 72% of the liquid fuels energy consumption and most of the crude oil which South Africa refines is imported.[48] Thus petroleum supplies have a great import dependency. The production of synthetic fuels is also expected to be phased out over the next few decades since these fuels are derived from coal.

2.3 Natural gas

By international standards, South Africa's natural gas consumption is low, as it contributes to only 1.5% of total primary energy supply.[49] This may be attributed to the facts that the country has very small gas reserves and that no real industrial gas networks have been established. South Africa has no inland gas fields in production and the country's primary natural gas supply is found 120km off the shore of Mosselbay in the Western Cape, which supplies the South African company Petroleum Oil and Gas Corporation of South Africa Ltd (hereafter PetroSA) Mossgas plant. The PetroSA plant was the first gas-to-liquids refinery in the world and remains the third largest refinery of its kind. The plant converts natural gas into synthetic fuels by using Fischer Tropsch technology. The fuels which are produced include paraffin,

45 A mining method by which miners first extracted coal along the bords, while the coal in between the bords acted as pillars supporting the roof. Then the outer pillars are then mined, allowing the roof to collapse in a controlled fashion, allowing the miners to escape - Jordaan JT 2003 *The Journal of The South African Institute of Mining and Metallurgy.*

46 Mining Weekly 2010 http://www.miningweekly.com/article/a-brief-look-at-sas-coal-mining-industry-2010-09-03.

47 South African Petroleum Industry Association 2013 http://www.sapia.co.za/industry-overview/fuel-industry.html.

48 Winkler H 2006 *Energy Research Centre, University of Cape Town* 4.

49 Department of Energy Date Unknown http://www.energy.gov.za/files/naturalgas_frame.html.

diesel, unleaded petrol, liquid nitrogen and oxygen, propane, eco-fuels, alcohols and process oils.[50]

2.4 Oil

South Africa has limited oil reserves and the bulk of the country's oil requirements have to be imported. It is estimated that around 17% of the country's energy needs is based on crude oil, which is primarily sourced from Saudi Arabia, Iran and Nigeria.[51] Since South Africa is greatly dependent on these outside sources of oil, the country is left vulnerable to supply disruptions, price shocks (resulting from fluctuations in the exchange rates), political and other external factors.

South Africa has a few primary oil fields, namely Oribi, Oryx and the Sable fields, which are located off-shore on the south coast and are all largely owned by PetroSA.[52] It is estimated that the Oribi and Oryx oil fields produce approximately 1 800 barrels of crude oil on a daily basis,[53] while the Sable fields manage between 30 000 and 40 000 daily.[54] These oil reserves have the potential to replace 7% to 10% of the oil that is currently being imported.[55]

Scholars such as Nkomo believe that medium term oil demands are inelastic as there are no immediate substitutes or replacements. This exposes South Africa to interrupted supplies, higher oil prices which inevitably undermine the country's economic growth and development. In order to maintain an energy security plan, Nkomo strongly advises access to sustainable sources of energy, the promotion of diverse energy resources, and the promotion of sustainable energy development.[56]

50 PetroSA Date Unknown http://www.petrosa.co.za/innovation_in_action/Pages/Operations-and-Refinery.aspx.
51 Nkomo 2009 *Journal of Energy in Southern Africa* 20.
52 South Africa.info 2003 http://www.southafrica.info/business/success/sableoil.htm#.VFSSDBY9j9k.
53 PetroSA *Crude* http://www.petrosa.co.za/products_and_services/Pages/Crude.aspx.
54 Winkler H 2006 *Energy Research Centre, University of Cape Town* 47.
55 Winkler H 2006 *Energy Research Centre, University of Cape Town* 47.
56 Nkomo 2009 *Journal of Energy in Southern Africa* 21.

2.5 Renewable energy

Despite the fact that non-renewable energy resources play such a dominant role in South Africa's current energy regime, renewable energy also contributes to the country's energy supply. As part of answering the research sub-question, this section will discuss the technologies currently available in South Africa to generate and utilise renewable energy.

In order for a country to make a simple, gradual shift towards renewable energy, the technology has to be available and it has to be practical and possible. This chapter seeks to identify the current renewable energy projects in South Africa and whether or not such projects are practical and viable alternatives.

2.5.1 Solar energy

There are various types of renewable energy, and the best known is arguably solar energy. Energy is generated by gathering and storing the heat and light from the sun's rays. It can either be captured on special solar panels, or captured in the fabric of a building, or converted directly into electricity[57].

The South African government has already shown great interest in solar energy by introducing the South African Solar Energy Technology Road Map (hereafter SETRM). The objectives of the SETRM are to develop an implementation plan to reduce electricity usage, promote independent power production and to reduce the reliance on carbon fuels. The SETRM plans on doing this through the development of solar photovoltaic technologies;[58] solar heating and cooling technologies; and solar power.[59] Furthermore, the Government has launched the Solar Water Heating Programme, which is managed by Eskom. The programme encourages individual households to replace their conventional geyser with a solar water heater.[60] This is done by offering a rebate on all units installed. Additionally, many insurance

57 *Energy for the Future: Renewable Sources of Energy: White Paper for a Community Strategy and Action Plan* (1997) 7.

58 Photons, which are light particles from the sun, are converted directly into electricity or stored in a chemical reaction. Solar Energy Development Programmatic Date Unknown http://solareis.anl.gov/guide/solar/pv/index.cfm.

59 RECORD 2013 http://www.record.org.za.

60 Eskom Date Unknown. http://www.eskom.co.za.

companies allow individuals to use the money claimed for burst geysers to pay for a new solar system. The Government has also announced its intentions to establish a solar park,[61] which operates on concentrated solar power systems.[62] Several potential sites within the Northern Cape have been identified because of the province's ideal weather conditions and spacious flat lands which are sparsely populated. The Government is still in the initial phase as studies regarding the feasibility of the park have yet to be conducted.

Although solar energy may present some risks and uncertainties, the technology is proven and is ideal for South African conditions. South Africa has the potential for an excellent solar regime as it has plentiful resources of solar energy for future electricity generation.[63] The annual irradiation of South Africa ranks among the highest globally and the Northern Cape in particular has the highest radiation figure in the country, with 30% higher figures than the best sites in Spain.[64] The potential for solar energy in South Africa is therefore considerable and it is estimated that the country's theoretical energy potential is 8 500 000 petajoule[65] per year.[66] Solar energy is therefore a viable energy alternative as its supplies are abundant and the technologies are readily available and in use.

2.5.2 Wind energy

Wind energy is produced by converting the force of the wind into mechanical work (such as windmills and wind turbines) or electricity[67]. Wind turbines are used to harvest wind energy to generate electricity. Since wind energy is abundant and inexpensive, it is the world's fastest-growing energy technology.[68].

South Africa has established a wind farm in the Western Cape, namely the Darling Wind Farm, which consists of four German-designed wind turbines. Each turbine

61 Department of Energy Date Unknown. http://www.energy.gov.za.
62 Renewable Energy Market Transformation Project Date Unknown. http://www.remtproject.org/TechSolar.aspx.
63 Edkins M, et al 2009 *Energy Research Centre, University of Cape Town* 3.
64 Edkins M, Marquard A, Winkler H 2010 *Energy Research Centre, University of Cape Town* 4.
65 When converted, it amounts to roughly 2361111111113 GW/h - 1015.
66 Winkler H 2005 *Energy Policy* 28.
67 Strydom and Surridge "Energy" 777.
68 Diehl 2007 *Journal of Land, Resources, & Environmental Law* 349.

produces approximately 1,3 megawatts (hereafter MW) of electricity.[69] In one year, the four turbines are able to produce 8,6 gigawatt hour (hereafter GWh) of electricity, which will be able to provide 700 average South African households with electricity for an entire year.[70] It is estimated that during the lifetime operation of the four turbines, a massive 222 000 tonnes of CO_2[71] will be avoided.[72] Additionally, 118 000 tonnes of coal and 443 million litres of water, which would otherwise be used in coal power production will be saved during the lifetime operation of the four turbines.[73] The turbines are able to start producing electricity at wind speed of a mere 8 kilometres per hour. The aim of the farm is to sell the electricity produced to the City of Cape Town as part of a long-term power agreement.

Wind energy is therefore a viable alternative source of energy as large part of the country experience sufficient wind forces[74] and the technology is already being successfully harnessed in some parts of the country.

2.5.3 Hydroelectric energy

By international standards, hydroelectric energy is considered the most traditional form of renewable energy[75]. Electricity is generated by the flow of water over hydraulic turbines that drive electricity generators[76]. Once the water has passed over the turbines, it is discharged back into the power station's downstream rivers[77].

South Africa does not have great potential for hydropower, due to its below average rainfall and frequent droughts. However, hydropower plants are used in parts of the country and represents approximately 2,3% of the country's total energy output.[78] Construction is currently underway on the Ingula pumped storage scheme, which is

69 South African Government Information 2013 http://info.gov.za.
70 Darling Wind Power Date Unknown. http://www.darlingwindfarm.co.za.
71 Darling Wind Power Date Unknown. http://www.darlingwindfarm.co.za.
72 The equivalent power when produced through coal power stations, will result in approximately 222 000 tons of CO2 emissions.
73 Darling Wind Power Date Unknown. http://www.darlingwindfarm.co.za.
74 Ayodele TR *et al* 2012 http://www.erc.uct.ac.za/jesa/volume23/23-2jesa-ayodele-etal.pdf.
75 *Energy for the Future: Renewable Sources of Energy: White Paper for a Community Strategy and Action Plan* (1997) 7.
76 Strydom and Surridge "Energy" 778.
77 Eskom 2013 http://www.eskom.co.za.
78 Microhydropower Date Unknown. http://www.microhydropower.net.

expected to start operation from 2016. It is estimated that the station will add about 1 332 MW of electricity to the country's power grid.[79]

Hydroelectric energy is therefore a viable alternative source of energy. Although South Africa does not have a variety of opportune sites to construct such plants, investments are still being made to establish hydro plants where appropriate water supply is available. The technology is also available and as soon as these hydro plants are fully operational, they can play a vital role in contributing to the national energy supply.

2.5.4 Biomass energy

Biomass energy is derived from materials that have either been specifically cultivated, are the product of forestry and agricultural operations, or are organic waste from industrial processes[80]. This form of energy is widely used in households, as well as industries. An example of industrial use would be sugar cane refineries which use the husks from the sugar cane crops to raise steam for electricity generation with a capacity of approximately 245 MW. Poorer households rely greatly on wood and other vegetable matter for heating and cooking purposes.[81] As indicated, biomass energy can directly be derived from organic matter, such as wood, but it can also be used to produce solid, liquid or gaseous fuels such as biodiesel, ethanol, methanol and hydrogen.[82]

In South Africa, the eThekwini Municipality[83] wants to implement a biomass energy project that will make use of three landfill sites to generate electricity. It is estimated that the project will be able to supply 9 000 small households with electricity, which is equivalent to 10 MW of electricity, saving approximately 80 000 tonnes of coal per year.[84]

79 South African Government Information 2012 http://info.gov.za/business/economy/infrastructure/ingula-121112.htm#.UksY51I3XTo.
80 Flavin and Dunn 1997 *Buffalo Environmental Law Journal* 3.
81 Winkler H 2006 *Energy Research Centre, University of Cape Town* 49.
82 Skye Date Unknown www.greenliving.lovetoknow.com.
83 Also known as the Greater Durban Municipality.
84 EnviroTeach Date Unknown. http://www.enviroteach.co.za.

According to a study conducted by Lynd *et al,*[85] South Africa has a very large capacity to not only produce crops, but to also grow total plant biomass. It was found that annual supplies of approximately 18 million tonnes of agricultural and forestry residues, as well as 8 million tonnes of invasive species would be readily available for biofuels productions. It was also found that 67 million tonnes of crops could be cultivated on a mere 10% of land. All in all, the estimated total biomass production capacity of South Africa is around 94 million tonnes of biomass annually.[86]

Biomass energy seems to be a viable alternative source of energy. It has the potential to be less expensive than other fossil fuels and can be manufactured from a range of natural materials, making it a valuable step in recycling. Biofuels can also be produced locally, thus decreasing the country's dependence on foreign fuel sources. Biofuels also produces far less CO_2 emissions compared to fossil fuels.[87] Municipal waste can also be used as a source in the production of biomass energy[88], thus further relieving municipalities of their duties to dispose of residential waste. Fortunately is does seem like the South African government has realised the potential that biomass energy holds as an alternative source of energy. Strategies and policies have been created to promote the use and production of biofuels. These documents will be discussed in greater detail in Chapter 4.

2.5.5 Geothermal energy

Geothermal energy is a relatively unknown form of renewable energy. It entails the use of the earth's core temperature, by drilling boreholes into a hot aquifer[89] or injecting cold water through hot, dry rock[90]. This process heats water which can either be used to heat homes and industrial facilities or be converted into electricity[91]. One of the reasons why South Africa has not yet tapped into this form of energy, is

85 Lynd L.R. *et al* 2003 *South African Journal of Science* 501.
86 Marrison CI and Larson ED 1996 *Biomass and Bioenergy* 341.
87 Skye Date Unknow www.greenliving.lovetoknow.com.
88 *Energy for the Future: Renewable Sources of Energy: White Paper for a Community Strategy and Action Plan* (1997) 7.
89 An underground layer of water-bearing permeable rock or unconsolidated materials from which groundwater can be extracted using water wells.
90 *Energy for the Future: Renewable Sources of Energy: White Paper for a Community Strategy and Action Plan* (1997) 7.
91 Renewable Energy Market Transformation Project n.d. http://www.remtproject.org/TechGeothermal.aspx.

because of the enormous costs involved. In order to extract the heat, drills will have to go down to depths of 4 000 m to 6 000 m.[92] Ochse[93] estimates that with a capital cost of approximately R1,45 billion, a 50 MW geothermal plant can be constructed. Despite the great costs involved, engineering experts believe that South Africa has great potential for geothermal energy. Additionally, Eskom has stated that it welcomes energy-reducing technologies and has met with geothermal energy companies to discuss geothermal power plant possibilities.[94] It can therefore be said that although the necessary infrastructure and resources to harness geothermal energy is not yet in place, South Africa does have the future prospective of utilising this alternative source of energy.

2.5.6 Wave power, tidal power and ocean currents

Water can also be used to generate electricity. Hydropower produces electricity through turbines that are driven through the gravitational force of water. Wave power, tidal power and ocean currents also make use of the strong powers of the ocean to drive turbines.[95] As the name suggests, tidal power makes use of the rising and falling of ocean tides. A system called a barrage is constructed across an ocean inlet. Water is allowed to freely move through the system during high tide, but during low tide, the returning waters drive the turbines built into the barrage and this produces electricity.[96] Wave power uses the motion of the waves to propel air through a pipe, which drives a turbine in the pipe to generate electricity.[97]

Considering South Africa's vast expanse of coastline, the country has large wave power resources. To date, South Africa has no wave power projects in operation. However, Eskom has shown interest in this form of energy and states that once the

92 Smith 2010 http://www.engineeringnews.co.za.
93 The engineering director of the power generation solutions company, HRP Geothermal Power.
94 Smith 2010 http://www.engineeringnews.co.za.
95 Part 1.2 of the *White Paper on Renewable Energy Policy for the Republic of South Africa.*
96 Renewable Energy Market Transformation Project Date Unknown. http://www.remtproject.org/TechTidal.aspx.
97 Renewable Energy Market Transformation Project Date Unknown. http://www.remtproject.org/TechWave.aspx.

necessary assessments have been completed, it will decide whether or not to invest in wave power technologies.[98]

2.6 Eskom

Eskom is South Africa's power house when it comes to the national energy supply, accounting for 95% of the country's energy supply.[99] Eskom is a state-owned utility and operates 27 plants around the country, and produces roughly 40.7 Gigawatts. Additional capacity is sourced from independent power producers and imports. The bulk of the energy is derived from coal plants, whilst 5% is derived from nuclear and a further 5% from hydroelectricity.[100] Eskom is said to be the fourth cheapest electricity supplier in the world,[101] which can greatly be attributed to the fact that South Africa's coal supply is plentiful and relatively easy to access.

It is apparent that Eskom has a monopoly when it comes to energy production and distribution in South Africa. In order to promote the generation of renewable energy, it may be advantageous to involve private energy producers. Fortunately, the Government has identified the potential advantages which private renewable energy producers may hold. To this end, programmes have been initiated to allow independent and/or private renewable energy producers to contribute to the national electricity grid. These programmes allow for an increase in electricity supply and promote the use of diverse energy sources. The Renewable Energy Feed-In Tariff[102] Programme is an example of such a programme. It encourages the production of renewable energy by allocating a set tariff, depending on the form of energy. [103] The tariff is designed to cover the cost of energy generation, whilst allowing a reasonable profit for the generators. The Renewable Energy Feed-In Tariff will be discussed in greater detail in Chapter 4.

98 Eskom Date Unknown http://www.eskom.co.za/AboutElectricity/ElectricityTechnologies/Pages/Wave_Power. aspx.
99 Eskom Date Unknown http://www.eskom.co.za/AboutElectricity/ElectricityTechnologies/Pages/Understandin4g_Electricity.aspx.
100 Eskom Date Unknown http://www.eskom.co.za/AboutElectricity/ElectricityTechnologies/Pages/Understandin4g_Electricity.aspx.
101 Department of Energy Date Unknown http://www.energy.gov.za/files/electricity_frame.html.
102 GN 382 in GG 32122 of 14 April 2009.
103 Cory, Couture and Kreycik 2009 *National Renewable Energy Laboratory* 2.

2.7 Summary

South Africa's economy is energy intensive, whereby large energy input is required for every rand of economic output.[104] Thus large quantities of non-renewable energy resources, such as oil and coal, are required to produce international dollars equivalents. Therefore, in order to keep up with the country's economic growth, alternative energy resources have to be sourced.

This chapter highlighted South Africa's current energy regime and illustrates how overly reliant South Africa is on non-renewable energy resources. This can be attributed to many factors, such as the fact the South Africa currently has large reserves of easily accessible coal supplies, which in turn results in cheap energy production. Therefore, because current energy production is cheap with large reserves, energy producers and users are not compelled or greatly encouraged to resort to alternative energy sources. However, South Africa's overreliance on non-renewable energy resources is not sustainable. The country's fossil fuel reserves will be depleted approximately within the next century.[105] Apart from the limited reserves, the burning process of conventional energy production results in the release of millions of tonnes of harmful emissions.[106] For these reasons, energy consumers and producers should be greatly encouraged to use and invest in alternative/renewable sources of energy.

This chapter also aimed to establish whether South Africa currently has the technology available to successfully utilise renewable energy resources. It dealt with some of the country's most prominent renewable energy projects and critically evaluated their performance. From the projects discussed in this chapter, it would appear that South Africa does already have the technology available to fully take advantage of this opportunity and advance the implementation and use of renewable energy. Thereby answering the second sub-question of this research paper – South Africa does indeed have the technology available to implement the various forms of renewable energy.

104 Hughes A, *et al* 2002 *Energy efficiency baseline study.*
105 See par. 1.
106 See par. 1.

It should be noted that although renewable energy resources may be a cleaner alternative to non-renewable energy resources as the negative environmental impacts are less, not all renewable energy sources are equal. Solar-, wind- and wave energy seems to be the energy sources which are least reliant on external resources and cause the least environmental harm. Renewable energy such as biomass energy depends on a constant supply of natural materials. Therefore alternative materials (such as forestry wood) may have to be sourced once the primary materials are depleted. Secondly, the burning process associated with biomass energy production still results in the release of CO_2 emissions.[107] Both geothermal energy as well as hydroelectric energy has an impact on the environment. Geothermal energy requires drilling into the earth's crust to release heat that drives geothermal turbines[108] and hydroelectric energy often requires the construction of dams, which impacts the surrounding environment as well as the water supply down river. Therefore since solar-, wind- and wave energy does not rely on the physical environmental inputs (such as burning materials required for biomass energy) and does not require physical alterations to the environment (such as dam constructions for hydro plants and drilling for geothermal energy) these three energy sources appear to be the most sustainable and clean forms of renewable energy. This research paper thus suggests that solar-, wind- and wave energy should be the preferred form source of renewable energy resources.

Now that it has been established what the current energy regime is and that renewable energy technologies are indeed in place and quite capable to integrate and/or supplement the current energy regime, one has to look at the regulatory instruments available to promote these resources and/or deter the use of non-renewable energy resources. The following chapter will look at the available regulatory instruments and which is best suited to promote renewable energy in South Africa.

107 Flavin and Dunn 1997 *Buffalo Environmental Law Journal* 5.
108 See par. 2.2.5.

3 Regulatory instruments

The third sub-question to be answered in this research paper, is what regulatory instruments can be used for purposes of promoting the use of renewable energy resources? There are various types of instruments by which government can regulate and, to an extent, guide society's behaviour.[109] This study distinguishes between two types of instruments, market-based instruments (hereafter MBIs) and command-and-control instruments. MBIs are aimed at promoting a desired behaviour by offering financial incentives or rewards.[110] Command-and-control instruments, on the other hand, refer to the means used by the Government to compel compliance. Examples of command-and-control instruments are, *inter alia*, design standards and performance standards.[111] Design standards require the use of a particular technology, while performance standards prescribe the amount of pollution allowed to be emitted. Command-and-control instruments also make use of licences and criminal sanctions to ensure compliance.

Command-and-control instruments are most commonly used to enforce environmental compliance[112] in South African environmental governance.[113] These instruments are mainly founded upon legislative regulations and consequently rooted in the state. Seeing as there are various factors which make switching to renewable energy resources difficult, one cannot expect the usual command-and-control instruments to apply. The technologies needed for renewable energy is much more expensive than conventional energy. Therefore individuals and industries cannot *per se* be forced into using renewable energy. Furthermore, renewable energy governance cannot be administered and enforced in the same way as other environmental matters. This is due to the fact that it is not a crime to fail to use renewable energy. Therefore it would seem that command-and-control instruments are better suited for other environmental matters and offences.

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109 *Inter alia* legislation, regulations, taxes, fees, subsidies, etc.
110 Rademaekers *et al.* 2011 *ec.europa.eu/environment/enveco/taxation/pdf/role_marketbased.pdf.*
111 Keohane *et al*. 1998 *Harvard Environmental Law Review* 313.
112 Paterson "Incentive-based Measures" 296.
113 Environmental management is defined by Kotzé in "Environmental Governance" 105 as: "A management process executed by institutions and individuals in the public and private sector to holistically regulate human activities and the effects of human activities on the total environment at international, regional, national and local levels, by means of formal and informal institutions, processes and mechanisms embedded in and mandated by law, so as to promote the common present and future interests human beings hold in the environment".

A possible feasible solution to promote the use of renewable energy resources may be to influence the market in such a way to make it beneficial to use renewable resources. There needs to be a reason for consumers and industries alike to want to use renewable energy sources. Energy users need to be encouraged and enticed to use renewable energy. Incentives such as tax rebates and direct subsidies are believed to have the potential to promote individuals and industries to willingly switch to renewable energy as it will be in their best interests. The following section will deal with the various forms of MBIs which can be used to promote renewable energy, therefore omitting all the irrelevant instruments. This research paper will not deal in depth with command-and-control instruments as the focus of this study is on the fiscal instruments which can be used to promote the use of renewable energy resources.

3.1 Market-based instruments

There are a number of different MBIs which can be used to achieve various environmental objectives. However not all of them are suitable instruments to promote the use of renewable energy resources. This section will firstly deal with the scope and nature of MBIs and why MBIs are best suited to promote renewable energy. Secondly the various forms of MBIs which may be used to promote the use of renewable energy will be discussed.

MBIs refer to measures and mechanisms that the Government can use to ensure compliance and enforcement of environmental laws and policies. It is defined as:[114]

> ... a package of policy instruments that seek to correct environmentally-related market failures through the price mechanism ...

There are various terms used for MBIs: scholars refer to self-regulatory instruments, economic instruments, price-based instruments and incentive-based instruments. This paper will refer to the term MBIs.

114 A Framework for Considering Market-Based Instruments to Support Environmental Fiscal Reform in South Africa (2006).

In contrast to command-and-control instruments where compliance is imposed through criminal sanctions, MBIs offer rewards for compliance, therefore encouraging compliance with state objectives and standards, instead of direct regulations.[115] MBIs can also be used to discourage a specific type of behaviour by penalising non-compliance through, for example, taxes and fees.

It is believed that MBIs have the potential to be more effective than traditional regulatory instruments.[116] This is due to the fact that the behavioural changes that MBIs cause are in the individual's own interest, and consequently lead to improved environmental outcomes.[117] MBIs can be used to internalise environmental costs,[118] control the quantity of resources used to a desired level, improve information flow and stimulate a market to produce a desired resource.[119] Additionally, MBIs help to ensure that developmental as well as economic growth are sustainable, and discourage activities that have high environmental costs.[120] Due to the flexibility offered by MBIs, it can be used to address specific environmental problems[121] (such as reducing the country's reliance on non-renewable energy resources). Thus firms are driven to take appropriate steps to reduce their reliance on non-renewable resources as a result of financial incentives created by MBIs. MBIs can be implemented across different economic sectors and across an entire economy.[122] In order for these instruments to function effectively, it is important to align the instruments and policy options, to remove previous ineffective incentives, to source out problems, and to make sure the instruments are performance-based and not overly prescriptive.[123] The aim of MBIs is thus to manipulate the market or economy to achieve the desired objectives.

MBIs can be used as self-prescribed mechanisms that are used by industries to achieve their own voluntary objectives and standards.[124] These mechanisms are not

115 Paterson "Incentive-based Measures" 298.
116 Stavins 1997 *The University of Chicago Legal Forum* 298-299.
117 Rademaekers *et al.* 2011 *ec.europa.eu/environment/enveco/taxation/pdf/role_marketbased.pdf*
118 Paterson "Incentive-based Measures" 298-299.
119 Paterson "Incentive-based Measures" 304.
120 Paterson 2006 *Potchefstroom Electronic Law Journal* 3.
121 Stavins 1992 *Environmental Protection Agency Journal* 22.
122 Rademaekers *et al.* 2011 *ec.europa.eu/environment/enveco/taxation/pdf/role_marketbased.pdf.*
123 Whitten *et al.* "An Overview of Market-Based Instruments and Environmental Policy in Australia" 1.
124 Paterson "Incentive-based Measures" 297-298.

state-centred, but rather industry-centred and the state has very little interference. The success of these objectives and standards is often reliant on the discretion of the industry, therefore reducing the state's burden to enforce compliance, determine emission quantity for each plant, etc.[125] MBIs can be used as regulatory tools which encourage people to go beyond the set regulatory standards.[126] This is done by reducing costs, administrative and enforcement obligations as a reward for those who go beyond the set regulatory standards. Examples include the reduction of inspections, the reduction of reporting requirements and fast-track permitting procedures for various activities that the person undertakes.[127]

With regards to pollution regulation of old and new firms, command-and-control regulations presented some disparity, as greater compliance regulations were imposed on new firms as opposed to older ones.[128] In addition to the disparity between old and new firms, command-and-control instruments hold firms of all sizes to the same emission reduction target.[129] These rigid targets are often very expensive, and may even prove to be counterproductive in certain circumstances. This is due to the fact that the costs involved with reducing emissions vary greatly between firms. In both these instances, MBIs may eliminate prejudice as firms are offered the flexibility to reduce their emissions and face the same taxes and/or allowance prices.

MBIs can promote sustainable development by providing incentives for industries to decrease their pollution and resort to more resource-efficient technologies and methods.[130] Seeing as MBIs allow firms the freedom to find the most cost-effective measure of reducing its pollution, firms only need to install end-of-the-pipe[131] devices. This can also encourage firms to seek new and better ways of producing its products, and to use fewer materials, which can result in decreased pollution and efficient fuel usage.[132] MBIs can also decrease the Government's enforcement

125 Stewart 1992 *Environmental Law Review* 554.
126 Turpie "Environmental and Resource Economics" 64.
127 Turpie "Environmental and Resource Economics" 64.
128 Stewart 1992 *Environmental Law Review* 554.
129 Stavins 1992 *Environmental Protection Agency Journal* 21.
130 Stewart "Economic Incentives for Environmental Protection" 173.
131 End-of-the-pipe devises refers to use of processes or devises created to reduce or treat pollution or emissions which have already been formed.
132 Stewart 1992 *Environmental Law Review* 554.

burden as individuals and industries voluntarily comply with regulations.[133] MBIs can be used to internalise environmental costs, as in some instances, the environmental costs of a product are not internalised and thus, the use of the resource is not maximised. MBIs are more flexible than command-and-control instruments as it allows firms the freedom to make their own appropriate adjustments to reduce its pollution and emissions,[134] thus allowing firms to reduce their overall emissions at a lower cost when compared to command-and-control standards. Studies in the USA have shown that MBIs produced a cost saving of up to 50% when compared to command-and-control policies.[135] MBIs can also be used to influence the price of the product, to account for the environmental costs and to promote the efficient use and management of the particular environmental resource.[136] This will also help to raise the revenue finance for environmental expenditure.

A valuable characteristic of most MBIs is that they are mostly transparent.[137] Transparency ensures that everyone subjected to the regulations are aware of its impacts, and furthermore, that everyone is treated the same. However, under some circumstances it may not be possible for the particular instrument to be completely transparent. An example of such a limitation is the requirement of some trading instruments to keep the sale details of an individual confidential in order to protect commercially sensitive information. There are ways to enhance the transparency of trading instruments. This can be done by making use of an oversight body to monitor the market and prevent any abuse of market power. The body will have access to all information, sensitive or not, in order to effectively monitor the performance of the market and to report on the market's operations.

A good example to illustrate how MBIs have been successfully used, was the United States Acid Rain Programme. In this programme, the Government implemented a trading scheme to reduce the emissions of sulphur dioxide that was responsible for the production of acid rain. The programme was established in 1995 and exceeded expectations. Industries went beyond their reduction target, at costs less than half of

133 Stewart 1992 *Environmental Law Review* 554.
134 Stewart 1992 *Environmental Law Review* 553.
135 Stewart 1992 *Environmental Law Review* 553.
136 Paterson "Incentive-based Measures" 298-299.
137 Hepburn 2006 http://www.oecd.org/gov/regulatory-policy/42245468.pdf.

what was predicted.[138] This programme resulted in a market of sulphur dioxide trading. When comparing the costs saved under this trading system to other command-and-control regulatory alternatives, the annual cost saving amounted to one billion United States dollars.[139] The main reason for the cost savings was as a result of remarkable technological change in the electricity generation sector along with the opportunity to utilise low-sulphur coal. Similar emission trading schemes can be found under the Kyoto Protocol.[140]

Furthermore, MBIs have the potential to minimise government expenses by significantly reducing the need for regulatory enforcement.[141] Developing countries like South Africa should be particularly interested in MBIs as it results in a more cost-effective use of the country's limited resources allocated to the environmental regime. The global community started using MBIs in a more integrated and effective manner,[142] therefore setting an example for South African policymakers on how other regulatory instruments have the potential to successfully assist to promote renewable energy resources.[143]

The primary reason for using MBIs is the fact that they have the potential to reach the same outcomes as command-and-control mechanisms, but at lower financial costs. It is however paramount for effective implementation of MBIs that environmental goals and trading programmes should be clearly defined.[144] Furthermore, targets should be set after conducting a comprehensive assessment of all the costs and benefits implied by the target. A consultative process will be a useful tool for conducting such assessments. It goes without saying that such a process should be open to all and be free from political abuse or interference. The

138 Ellerman 2000 *Cambridge University* Press 7-8.
139 Stavins "Lessons from The American Experiment" 177-178.
140 The Kyoto Protocol is an international agreement which sets binding targets for emission reduction which is applicable to the Parties to the Protocol. Article 17 of the Kyoto Protocol deals with the trading in emission units among countries. Therefore countries which have already used up all their emission units, can now buy units from countries which are still below their targets. Thus a new commodity was created whereby and the market in which these emission units are sold, is known as the "carbon market". United Nation Framework Convention on Climate Change http://unfccc.int/kyoto_protocol/items/2830.php.
141 Craigie *et al.* "Dissecting Environmental Compliance and Enforcement" 51.
142 Paterson "Incentive-based Measures" 296.
143 Sec. 32 *National Environmental Management Act* 107 of 1998.
144 Whitten *et al*. "An Overview of Market-Based Instruments and Environmental Policy in Australia" 15.

operation of MBIs should be definite, it should have clear rules and it should be free of manipulation. Furthermore, for MBIs to function successfully, it is important to specify a legal basis for MBIs to prevent arbitrary reallocation of rights or resources.[145] Finally, to fully understand and successfully utilise MBIs in environmental trading, stakeholders will have to undergo new management skills training as they may be unprepared to fully utilise the instruments.[146]

Scholars sub-divide MBIs in different ways. Some divide them into three types, namely price-based instruments, rights-based instruments and market friction.[147] Price-based instruments alter behaviour by changing the prices of goods and services in existing markets to reflect their negative impact, *inter alia* through taxes, levies and by giving subsidies. This is internationally the most widely used form.[148] Rights-base instruments alter behaviour by specifying new rights or obligations, thus controlling the quantity of the resource used to a desired level, for example a "cap and trade" scheme or offset scheme. Market fiction alters behaviour by stimulating existing markets to produce a desired resource and to improve information flow, for example eco-labelling.[149] The second way in which scholars divide MBIs, is into positive and negative MBIs. This study will use the latter method to sub-divide MBIs, as it provides a clear distinction between MBIs that reward desirable behaviour, and MBIs that penalise undesirable behaviour.

3.1.1 Positive market-based instruments

Positive market-based instruments directly reward the sustainable and efficient use of resources. The aim is to minimise the user's environmental impact and to promote the conservation and protection of the natural resource. It comprises of tax benefits and direct subsidies.[150]

145 Whitten *et al*. "An Overview of Market-Based Instruments and Environmental Policy in Australia" 16.
146 Whitten *et al.* "An Overview of Market-Based Instruments and Environmental Policy in Australia" 17.
147 Rademaekers *et al.* 2011 *ec.europa.eu/environment/enveco/taxation/pdf/role_marketbased.pdf.*
148 Rademaekers *et al.* 2011 *ec.europa.eu/environment/enveco/taxation/pdf/role_marketbased.pdf.*
149 Whitten *et al.* "An Overview of Market-Based Instruments and Environmental Policy in Australia" 4.
150 Paterson "Incentive-based Measures" 299-300.

3.1.1.1 Tax benefits

In essence, a tax benefit encourages and rewards the user for certain desired behaviour. These benefits or rebates can be implemented across the wide range of taxes that the taxpayers are subjected to.[151]

Tax benefits to encourage renewable energy production have already been implemented in South Africa. The *Income Tax Act* 58 of 1962 provides deductions on taxable income for all persons who invest in or develops renewable energy technology.[152] Section 12B(1) and (2) of the *Income Tax Act* also makes provision for deductions of a person's taxable income if the taxpayer buys machinery and implements to produce either bio-diesel, or bio-ethanol,[153] or to generate electricity (limited to 30MW) from solar, wind, water forces or biomass.[154] The *Income Tax Act* also makes provisions for deductions where improvements are made to the abovementioned machineries and implements.[155]

3.1.1.2 Direct subsidy

A direct subsidy is a financial grant that the state pays to promote desired activities that are considered advantageous to the general society or economy.[156] Activities are encouraged which would otherwise be economically unsustainable.[157] Subsidies are used globally and in the environmental context they can be positive as well as negative. In a positive sense, they could encourage a desired activity or behaviour, such as making renewable energy technologies more affordable. Therefore the Government subsidises renewable energy and technologies which in turn promotes the use of these energies as they are more affordable. However subsidies in the negative sense can extend environmentally unsustainable activities which otherwise would cease due to financial reasons.[158] In a bid to promote the use of renewable

151 Paterson "Incentive-based Measures" 300.
152 Section 11D of the *Income Tax Act* 58 of 1962.
153 Section 12B(1)(g).
154 Section 12B(1)(h).
155 Section 12B(1)(i).
156 Paterson "Incentive-based Measures" 301.
157 Richardson 2001 *European Journal of Law Reform* 442.
158 Stavins 1992 *Environmental Protection Agency Journal* 25.

energy, the Government can subsidise renewable energy technologies, making them more affordable and competitive with conventional fossil fuels.

The South African government, through its power utility Eskom, has made use of subsidies to promote the use of renewable energy resources. In 2008 Eskom introduced a Solar Water Heating Rebate Programme as part of the power utility's efforts to reduce the country's electricity demand.[159] The Programme encouraged electricity consumers to buy solar water geysers as opposed to conventional geysers. The Programme subsidised the cost of the solar water geysers in order to make it a more attractive option for consumers.[160] The detail of the Solar Water Heating Rebate Programme will be discussed in greater detail in Chapter 4.

In a time when renewable energy technology, for the most part, is more expensive than conventional energy, direct subsidies may be a viable tool to level the energy playing field, so to speak. With the help of the state's financial assistance in the form of subsidies, renewable energy technologies will be able to compete with conventional energy. Direct subsidies are therefore a viable instrument to influence energy consumers to rather use or invest in renewable energy resources as the financial costs involved are greatly reduced.

As mentioned earlier, the initial costs involved with renewable energy technologies are usually quite high, however, over time the running costs of renewables decrease considerably.[161] Direct subsidies may therefore provide just the financial aid needed to decrease initial costs to introduce renewable energy resources into the competitive energy market. After time consumers will reap the benefits of lower energy costs. This analysis suggests the Government should make greater use of direct subsidies as an instrument to promote the use of renewable energy.

159 Eskom 2008 http://www.eskomdsm.co.za/sites/default/files/u1/ZA10ESKD103124_DSM Programme.pdf.
160 Eskom 2011 http://www.eskom.co.za/search/Pages/Results.aspx?k=solar%20water%20 heating%20rebate.
161 Westplainsenergy 2013 http://www.westplainsenergy.com.

3.1.1.3 Feed-in Tariff

A Feed-in Tariff (hereafter FIT) is a policy with the objective of supporting the generation of renewable energy.[162] The FIT provider could contract with the renewable energy generator for a guaranteed period and provides a guaranteed payment per kilowatt hour (hereafter kWh). The guaranteed payment is designed as to cover all the development's costs, whilst allowing a reasonable profit for the generators.[163] The payment amount may vary, depending on the type of technology used, size of the project and the quality of the resource.[164]

Two methods are used to determine the renewable energy generator's return. The first is based on the renewable energy generation's levelised cost, which is either set by the regulators, administrators or policy makers.[165] This approach affords the opportunity to design the FIT payment as to create conductive market growth conditions whiles ensuring a reasonable return rate for project investors. The second method is based on the renewable energy's value. The value can be determined either by internalising the external environmental and social costs of conventional energy generation, or by establishing the energy utility's avoided costs.[166] According to Klein, Europe's most successful FIT policies with substantial and fast renewable energy expansion, were structured to cover renewable energy project costs with an added profit.[167]

Unfortunately this instrument is not free from challenges. Administrative requirements for FIT's are high. Payment levels require detailed analysis in order to ensure the revenues cover the project cost, but that developers do not receive unwarranted profits.[168] FIT policies have to be revised regularly to account for costs change and market shifts. Secondly, unlike grants and rebates, the developer's initial up-front costs are not decreased by FIT programmes. Finally, since FIT programmes

162 Cory, Couture and Kreycik 2009 *National Renewable Energy Laboratory* 2.
163 Part 1 of GN 382 in GG 32122 of 14 April 2009.
164 Klein A et al 2010 *Fraunhofer Institut für Systemtechnik und Innovationsforschung* 11.
165 Cory, Couture and Kreycik 2009 *National Renewable Energy Laboratory* 2.
166 Klein A et al 2010 *Fraunhofer Institut für Systemtechnik und Innovationsforschung* 12–15.
167 Klein A et al 2010 *Fraunhofer Institut für Systemtechnik und Innovationsforschung* 49-50.
168 Cory, Couture and Kreycik 2009 *National Renewable Energy Laboratory* 11.

have to be updated frequently, it may lead to uncertainty. This may cause the renewable energy investment and development to be more risky.[169]

In recent years the South African government has implemented FIT policies. Unfortunately, this form of MBI had little success in South Africa.[170] Chapter 4 of this research paper will divulge in South Africa's proposed FIT policies as well as the reasons why these policies were unsuccessful in South Africa. Despite the failure of the FIT policies, an improved and greatly successful MBI was created, namely the Renewable Energy Independent Power Procurement Programme.[171] The concept of the Programme was very similar to the FIT policies (which were to encourage renewable energy producers) but instead of paying for each kWh provided, renewable energy producers have to take part in a competitive bidding process to be chosen as a renewable energy producer for the country's national energy grid.[172] In Chapter 4 the operation and success of the Renewable Energy Independent Power Procurement Programme will discuss in greater detail.

3.1.2 Negative market-based instruments

The second type of MBI is negative in nature and aims at discouraging the unsustainable and ineffective use of resources. Activities which negatively impact the environment will thus have financial implications. These costs come in different forms and include, licensing fees, taxes and performance bonds.

3.1.2.1 Licence fees

Licence fees have been used by government authorities for a variety of different activities and services. There are a variety of licence fees that the Government can impose and these license fees can be charged once-off, periodically or annually. These license fees can be charged to electricity providers which rely and/or prefer the use of non-renewable sources of energy. Which in turn will raise the price of non-renewable energy consumption. These increases will be transferred to the

169 Cory, Couture and Kreycik 2009 *National Renewable Energy Laboratory* 12.
170 Edkins M, Marquard A, Winkler H 2009 *Energy Research Centre, University of Cape Town* 7.
171 Fritz W 2012 *Energize* 78.
172 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 4.

consumers as the price of conventional electricity will inevitable increase. The extent of the fees may depend on the availability of the resource and the Governments urgency to switch to renewable energy sources. These license fees will not be charged to electricity providers or private users who make use of renewable energy resources. Thus promoting the use of renewable energy resources. Additionally, licence fees have several positive features: it raises income for state initiatives, covers expenses incurred in licence applications and users are charged for the right to harvest non-renewable energy resources.[173]

Licensing fees are currently being used in a variety of legislation. An example of legislation using licensing fees on the production of non-renewable energy resource is the production of liquid fuels under the *Petroleum Products Amendment Act* 58 of 2003.[174] It is however unclear whether these licensing fees are a means of regulating the industry, rather than deterring the use and production of non-renewable energy resources. The latter may be the more probable answer.

3.1.2.2 Taxes

Taxes can be used to raise the cost of a product and serve as a method to discourage the use or purchase, such as taxes on non-renewable energy consumption. Product taxes are imposed at point of sale and internalises the environmental costs involved in the production, use and disposal of products.[175] The amount of tax charged per product can vary in order to promote or discourage the use of a particular product. The cost of environmental externalities may also be factored into the product's price in a bid to reduce the demand for the product.[176]

In the past, environmental taxes were primarily used to raise revenue.[177] Recently, governments have realised the valuable role taxes can play in promoting environmental compliance and achieving environmental goals. An example of how environmental tax incentives have worked successfully is in Sweden, where the Government imposed a tax on the sulphur content of fuel. Administrative charges

173 Paterson "Incentive-based Measures" 302-303.
174 Section 2B of the *Petroleum Products Amendment Act* 58 of 2003.
175 Stewart 1992 *Environmental Law Review* 552.
176 Paterson "Incentive-based Measures" 303.
177 Stewart "Economic Incentives for Environmental Protection" 204.

only managed a 1% reduction, while tax charges managed a 30% reduction.[178] A tax system therefore has the potential to promote renewable energy resources as it may decrease the use of non-renewable resources and promote alternative forms of energy. For example, the Government can impose high environmental taxes on cars that run on fossil fuels, while charging no environmental taxes on cars that rely on alternative fuel sources (such as biofuels).

Environmental taxes can also be used as a revenue source to finance environmental protection measures.[179] The revenue generated can thus be used to develop and invest in renewable energy technologies. This makes the purpose of environmental taxes twofold; it penalises undesirable environmental practices (the use of fossil fuels) and it can generates financing for technology development in renewable energy. Apart from financing technological development, environmental taxes can also supplement the budgets of national as well as local environmental departments. Revenue raised can be used to cover the administrative costs of implementing environmental taxes.[180] Careful administration will be required to ensure that the revenue generated from environmental taxes do not go to the country's general budget, but is allocated to the appropriate sector. A third role that these environmental taxes can play, is to raise the price of a product to such an extent that environmental friendly products are able to compete.[181] Taxes are thus a very good and practical instrument to promote the use of renewable energy.

In most instances, environmental taxation is used in conjunction with direct regulation. However, scholars believe that environmental taxes will be most practical to address problems where environmental policy is not yet in place.[182] This approach will place minimal burden on resources and cross-purpose regulations do not have to be changed.

Stewart however believes that environmental tax results are well below the levels needed to meet environmental goals.[183] This is due to various factors, such as

178 Stewart "Economic Incentives for Environmental Protection" 205.
179 Määttä *Environmental Taxes* 19-20.
180 Johnson *Economics, Equity, and the Environment* 20.
181 Määttä *Environmental Taxes* 20.
182 Määttä *Environmental Taxes* 23.
183 Stewart "Economic Incentives for Environmental Protection" 207.

political resistance from industries which would particularly be affected by environmental taxes, causing the Government to reduce these taxes. In other instances where environmental taxes were high, its effectiveness was lessened through adjustments, *inter alia* carbon tax exemptions and tax refund grants. In addition, governments generally try to avoid over complicated tax structures. Johnson states that environmental taxes are unable to guarantee any particular level of renewable energy promotion and that the success or failure of the instrument relies on the Government's ability to set taxes at an appropriate level to balance environmental protection and the economy.[184] Monitoring and enforcing difficulties, as well as political difficulties are additional obstacles in adopting an environmental tax system.

Environmental taxes can possibly be implemented

From the above analysis of environmental taxes it is apparent that it has great potential to promote the use of renewable energy resources through the implementation of high taxes on products or processes that rely heavily on non-renewable energy resources. However, it seems that political influences and other factors may hamper the effectiveness of this instrument.

3.1.2.3 Performance bond

A performance bond is an amount paid to the state or other organisation when a person wants to undertake an activity that may be harmful to the environment. The whole or part of the bond is then refunded to the person undertaking the activity, provided he or she met all the relevant targets, objectives or conditions. The bond thus creates an incentive to comply with specific targets and permit conditions. Should the person undertaking the activity fail to fulfil the set environmental obligations, the bond then acts as financial security enabling the state to remedy any damage caused to the environment.[185] This type of MBI could be enforced on all energy generators, regardless of the source of energy. Targets, objectives and conditions should then be set for all these generators, and those generators who

184 Johnson *Economics, Equity, and the Environment* 25.
185 Paterson "Incentive-based Measures" 303-304.

cause harm to the environment, be it emissions or excess waste, should be penalised by forfeiting their bonds. This may promote the use and generation of renewable energy r as these resources result in less harmful emissions and waste.[186]

3.1.3 Shortfalls of MBIs

Despite the various advantages and scenarios in which MBIs can be used to promote renewable energy resources, it is not without shortfalls and may not suit every situation. In areas where pollution is localised and immediate action needs to be taken, MBIs would be inefficient and command-and-control instruments would be better suited to remedy the situation.[187] MBIs should generally not be used in instances where small enterprises are dominant, where alternative technologies are absent or where the institutional structure is corrupt or weak.[188]

MBIs require information regarding the market to function effectively, therefore MBIs should not be used when market information is lacking.[189] Furthermore, for MBIs to effectively change behaviour, economic incentives have to be adequate.[190] Therefore the external rewards must not undermine the intrinsic motive of the instrument. The instrument thus has to impose a fee or fine which is high enough to discourage the particular behaviour. In instances where a pollution fine is inadequate and industries benefit more from polluting than taking measures to reduce their emissions, MBIs are inefficient and counterproductive.[191]

3.1.4 Obstacles in implementing MBIs

Despite the many potential advantages of MBIs as opposed to command-and-control instruments, there are obstacles in adopting MBIs into environmental governance. Command-and-control instruments have traditionally been the primary instruments to enforce compliance. It has had some success in addressing environmental

186 Brower 1990 *Environmental Protection Agency Journal* 20.
187 Hahn and Stavins 1992 *The American Economic Review* 464, 467.
188 Oniemola 2011 *Dublin Legal Review Quarterly* 39.
189 Carrico *et al.* 2011 *George Washington Journal of Energy & Environmental Law* 61, 63.
190 Oniemola 2011 *Dublin Legal Review Quarterly* 39.
191 Carrico *et al.* 2011 *George Washington Journal of Energy & Environmental Law* 63.

problems. Stewart believes that governments are apprehensive of implementing MBIs, as they fear the uncertainty and loss of control which MBIs may present.[192] Individuals may be equally apprehensive in having MBIs as the primary means of enforcing environmental compliance as they also fear uncertainty and loss of control associated with MBIs. Under command-and-control instruments, individuals have the right to take legal steps and sue for non-compliance of environmental regulatory requirements. This right may be greatly reduced if MBIs are the only compliance enforcement tools.[193]

Furthermore, for the Government to accept and implement MBIs as a tool to promote the use of renewable energy resources, the instrument has to be politically acceptable.[194] In instances of economic constraints (e.g. a recession) MBIs may not be politically acceptable[195] as citizens are most likely to oppose it.

Industries have made contributions in terms of how they are managed by command-and-control instruments. Switching to MBIs as the primary regulatory instrument may increase the regulatory compliance outlays and reduce the regulatory advantages of older firms over new ones.[196] Firms that are politically powerful are able to alter command regulations to suit them by gaining cost advantages over their competitors and gaining compliance. Firms can also use and design the command system to prevent new competitors from entering the market, thus keeping all the financial benefits to existing firms. MBIs will level the playing field as the same pollution prices are applicable to everyone. Although this is a great advantage, it may also cause disparity, as industries with less regulatory burdens under command-and-control instruments are now subjected to exactly the same treatment as large industries, thus possibly imposing losses. There is thus apprehension from large and small industries to move towards MBIs.[197]

When considering the motivations to why the Government, individuals and industries are apprehensive of MBIs it seems that each party may have a valid point, although

192 Stewart "Economic Incentives for Environmental Protection" 200.
193 Stewart "Economic Incentives for Environmental Protection" 201-202.
194 Oniemola 2011 *Dublin Legal Review Quarterly* 39
195 Reid 2008 *Cambridge Law Journal* 126, 143.
196 Stewart "Economic Incentives for Environmental Protection" 203.
197 Stewart "Economic Incentives for Environmental Protection" 201-202.

some are more admirable than others. Therefore, it would be impractical and problematic to switch from a primary command regulatory system, to a pure MBI system. Scholars such as Gunningham and Grabosky believe that a mixture of instruments is required in order to successfully meet environmental objectives.[198] A more viable solution would be to have a mixture of command-and-control instruments and MBIs. Then the instrument which has the potential to best suit a particular situation can be used. MBIs can be used to promote the use of renewable energy whilst command-and-control instruments can be used to punish non-compliance. This will therefore eliminate any uncertainty, apprehension and reservation regarding command-and-control instruments and MBIs.

In the same way that MBIs and command-and-control instruments cannot be used in isolation, so can no one form of MBI soley be used to promote renewable energy. The different forms work uniquely and have to be used in a symphony to successfully promote renewable energy.

3.2 Summary

This section set out to establish the regulatory instruments which are best suited to promote the use of renewable energy. From the above analysis it seems that despite the obstacles which may possibly hinder the implementation of MBIs, MBIs are still more suited to promote the use of renewable energy than command-and-control instruments.

Owing to the fact that it is still early days for renewable energy technology, conventional energy sources are still more affordable than renewable energy. Therefore the Government has to give energy consumers a reason to want to use or invest in renewable energy technologies. This research paper suggests using incentives such as MBIs, to create an environment to promote the use of renewable energy resources. One of the primary rationales for implementing MBIs in this situation, is because MBIs offer a reward for compliance. Thus it encourages compliance with state objectives and standards, instead of imposing direct

198 Gunningham and Grabosky *Smart Regulations: Designing Environmental Policy* 14-15.

regulations[199]. This is a valuable characteristic as the use of non-renewable energy resources is not a crime. However, efforts have to be made to alter human behaviour to such an extent that it is more advantageous to use renewable energy than non-renewable energy. The success of MBIs lies in the fact that they alter the individual's or industry's behaviour by ultimately advancing their own best interest. MBIs can be used to internalise environmental costs, control the quantity of resources used to a desired level, improve information flow and stimulate a market to produce a desired resource. Additionally, MBIs can be implemented across an entire economy[200].

When comparing positive MBIs and negative MBIs, positive MBIs (such as subsidies and rebates) may be even more successful in attaining a desired effect.[201] The main rationale for this reasoning, is that energy users[202] who receive positive reinforcement or benefits for a particular behaviour, may be more inclined to repeat such behaviour. Secondly, energy users may more easily associates the use of renewable energy with a positive response. Thereby connecting renewable energy with a reward.

Negative MBIs may be less effective in promoting the use of renewable energy. The mere fact that the cost of conventional energy is raised by taxes and licence fees, may not necessarily promote energy users to opt for renewable energy instead. In other words energy consumers may not comprehend that the increased taxes is designed to discourage the use of conventional energy. This research paper therefore suggests that the MBIs which create a direct connection between the desired behaviour (use of renewable energy resources) and the reward may be the most effective.

199 See par. 3.
200 See par. 3 and 3.1.
201 See par. 3.1.1.
202 In this instance all industrial and private energy consumers.

4 South African environmental legal framework

The fourth sub-question to be answered in this research paper, is what policy instruments are currently being used in South Africa to promote the use of renewable energy? In answering the sub-question, this section will examine energy policies and fiscal policies currently implemented to promote the use of renewable energy resources.

Some policy instruments offer a form of a reward for a desired behaviour (such as tax benefits), whilst others discourage unwanted behaviour through financial repercussions (such as carbon taxes). Some instruments serve as financial support for investments in renewable energy technologies, such as renewable energy feed-in tariffs. These instruments can be found in policy documents, tax legislation and regulatory instruments. The contents of these instruments will be analysed, after which each instrument will be critiqued and a conclusion made as to the extent that these instruments are able to promote the use of renewable energy resources in South Africa.

4.1 Energy Policies

This section will identify and critically discuss the various energy-related policies which are used, or proposed to be use, to promote the use of renewable energy.

4.1.1 Renewable Energy Feed-in Tariff

The idea of a Renewable Energy Feed-in Tariff (hereafter REFIT) was first discussed in the 2006 *Electricity Regulations on new Generation Capacity*.[203] These regulations served as a legal and regulatory framework for renewable energy, which was made under section 35(5) of the *Electricity Regulation Act.*[204] These regulations apply to all electricity generation technologies, which include renewable energy.[205] The objective of the regulations with regards to renewable energy, was to provide a framework for

203 GN 721 in GG 32378 of 5 August 2009.
204 4 of 2006.
205 Reg. 1(a) of *Electricity Regulations on new Generation Capacity.*

the REFIT Programme which is a tariff levied on renewable energy generators.[206] The regulator had to determine what the tariff for the REFIT Programme should be and had to consider the integrated resource plan, appropriate locations for the plants to contribute to the grid without transmission losses and select projects with advanced environmental approvals.[207]

In 2007 the National Energy Regulator of South Africa (hereafter NERSA) commissioned a study on the REFIT as an incentive to promote the production of renewable energy through independent providers.[208] The REFIT would guarantees a set price for electricity supply. REFIT required the national electricity utility, in this case Eskom, to buy renewable energy at a set price from qualifying generators that will cover the cost of energy generation, whilst allowing a reasonable profit to be granted to the generators.[209] Therefore promoting renewable energy generation and investment in South Africa. Due to the promising advantages associated with this type of programme, NERSA introduced the REFIT Programme into the South African market in early 2009.

4.1.1.1 National Energy Regulator of South Africa: South Africa Renewable Energy Feed-in Tariff Regulatory Guidelines[210]

In order to regulate the various aspects of the REFIT Programme, NERSA issued regulatory guidelines. The guidelines also explain the various aspects of the REFIT Programme, such as its advantages, how it will work, its objectives, as well as provide a framework of the proposed tariffs.

The projected advantage associated with the REFIT Programme seems very advantages. It allows for the penetration of renewable energy into the energy market as the tariffs provided will cover investment as well as generate a profit. Renewable energy generators will have increased access to finance and investment is stimulated by the long term certainty of a 20 year contract.[211] In the long term, the

206 Reg. 2(f).
207 Reg. 2, 3(a), 3(c), 3(g).
208 Edkins M, Marquard A, Winkler H 2009 *Energy Research Centre, University of Cape Town* 7.
209 Part 1 of GN 382 in GG 32122 of 14 April 2009.
210 GN 382 in GG 32122 of 14 April 2009
211 Appendix: Tariff Scale of GN 382 in GG 32122 of 14 April 2009.

investments generated from the REFIT Programme will drive down costs for renewable energy generation as technology development and investment is promoted.[212] The REFIT Programme's objectives are to create an environment for renewable energy generation, equalise the playing field with conventional electricity generation, and to promote renewable energy investment as well as establish a self-sustaining market.[213]

The REFIT Programme was divided into two phases. The sources of renewable energy included in the first phase of the REFIT Programme, were wind, concentrated solar, land-fill gas and small hydro plants. The tariffs for these respective sources were R1.25 kWh for wind, R2.10 kWh for concentrated solar, R0.90 for land-fill gas and R0.94 kWh for small hydro plants.[214] The second phase was the *National Energy Regulator of South Africa: Renewable Energy Feed-In Tariff Phase 2* of 2009 (hereafter REFIT Phase 2), which was a draft phase. The REFIT Phase 2 was created to consider additional renewable energy sources and tariffs. The renewable energy sources and tariffs which were added to the REFIT Phase 2 was concentrated solar power trough without storage at R3.14 kWh, solid biomass at R1.18 kWh, biogas at R0.96 kWh, photovoltaic systems at R3.96 kWh and concentrated solar power at R2.31 kWh.[215] Wave, tidal and geothermal energy were excluded as the technologies for these energy sources were unavailable during the draft of the REFIT Phase 2.

In order for renewable energy generators to be eligible energy suppliers, they have to acquire a licence issued by NERSA in terms of Section 11 of the *Electricity Regulation Act* 4 of 2006. Additionally, these generators would have to be connected to the transmission and distribution system in order to qualify for the REFIT Programme, as off-grid power generation is excluded.[216]

212 Appendix 2 Part 1 of GN 382 in GG 32122 of 14 April 2009.
213 Part 3.5 of GN 382 in GG 32122 of 14 April 2009.
214 Appendix 2 Part 7 of GN 382 in GG 32122 of 14 April 2009.
215 Part 3.4 of REFIT Phase 2.
216 Part 5.6 of GN 382 in GG 32122 of 14 April 2009.

4.1.1.2 Critique

The general rationale for introducing the REFIT in South Africa, was based on the success the programme had in the European renewable energy markets.[217] Under well-designed REFIT programmes and policies, development and financing of renewable energy can happen faster due to the stable investment environment.[218] Project developers may now also be inclined to take on larger projects at higher costs as the contract terms of the REFIT Programme are guaranteed. Arguably the single most important element of a REFIT Programme is the guarantee of a reliable stream of revenue.[219] Small and large developers alike can now invest in renewable energy technology development for a profit, with the assurance of a reliable revenue stream and guaranteed contract terms. This may promote and increase investment in renewable energy technology which development, which could ultimately result in lower renewable energy generation in the long term.

Despite the anticipated success of the REFIT Programme, there was little interest in the initial REFIT rates and NERSA had to increase the rates. By early 2011, Eskom still failed to enter into any purchase agreements with renewable energy generators.[220] To make matters worse, NERSA announced that the feed-in tariffs should be reduced since the cost of debt and the exchange rates have changed.[221] The failure of the REFIT Programme is said to be due to bureaucracy and excessive difficulty to obtain licenses, among other issues.[222] In 2011 NERSA decided that a new approach needed to be taken in order to encourage independent renewable energy producers to take part in the programme. Hence the introduction of the Renewable Energy Independent Power Procurement Programme (hereafter REIPPP)

217 Edkins M, Marquard A, Winkler H 2009 *Energy Research Centre, University of Cape Town* 8.
218 Cory, Couture and Kreycik 2009 *National Renewable Energy Laboratory* 9.
219 Cory, Couture and Kreycik 2009 *National Renewable Energy Laboratory* 9.
220 Gary Pienaar 2012 https://cleanenergysolutions.org/blogs/128/refit-rebid-south-africas-renewable-energy-auctions.
221 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 7.
222 Fritz W 2012 *Energize* 77.

4.1.2 Renewable Energy Independent Power Procurement Program

The REIPPP, which is also known as the Renewable Energy Bid Programme, was set to be the chosen replacement for the REFIT Programme as the next best initiatives to promote independent renewable energy production. The REIPPP allowed for independent renewable energy producers to take part in a competitive bidding process to tender for a contract as an energy supplier to Eskom. Unlike the REFIT Programme, the REIPPP would be managed by the National Treasury and not by the NERSA.[223]

The first bidding round in August 2011 saw a large number of local as well as international investors and developers who were very keen to invest in renewable energy production.[224] A total of 28 projects were awarded, with a combined energy capacity of 1415,5 MW from solar, wind, biomass, landfill gas, biogas and small hydro plants.[225] The second round of bidding in May 2012 saw even greater competition and price reductions among bidders. In this round 19 projects were announced with a total energy capacity of 1043,9 MW from solar and wind energy.[226] The third bidding round proved to be just as successful, with 17 projects awarded at an energy capacity of 1473 MW.[227] Each round had a reasonable set deadline by which projects have to be operational.

The REIPPP has exceeded expectation as positive results were seen in record time and three triumphant bidding rounds were already held, and many projects are already in operation or under construction.[228] South Africa is currently ranked in the top 10 countries for investments in renewable energy independent power producers projects. A total of 64 renewable energy production projects have been selected and an incredible 120 billion rand has been invested since the REIPPP's inception.[229]

It would appear that the REIPPP holds great potential to advance renewable energy technology and promote the use of renewable energy. It seems that even the

223 Fritz W 2012 *Energize* 78.
224 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 4.
225 Fritz W 2012 *Energize* 77.
226 Fritz W 2012 *Energize* 77.
227 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 14.
228 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 4.
229 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 4-5.

Government is now more optimistic when it comes to renewable energy usage. The past renewable energy target was set in the 2003 *White Paper on Renewable Energy Policy for the Republic of South Africa* at 10 000 GW. The Government's latest renewable energy target is set at 3 200 MW for the years 2017 to 2020.[230] This is a massive increase in projected renewable energy usage and a welcomed move into the direction of a more sustainable energy future. The regulations[231] of the REIPPP are contained in the 2011 *Electricity Regulations on New Generation Capacity.*[232]

4.1.2 Critique

It is apparent that the REIPPP has been very successful in securing renewable energy production projects, increasing energy production targets and enforcing project completion deadlines. However, the same cannot be said for Eskom's transmission planning.[233] Eskom has yet to strengthen the national grid to such an extent as to accommodate the energy feed-in from all the new renewable energy projects.[234] Failure to do so will render completed projects unable to connect to the national grid. Eskom will be held liable for the deemed energy payments, regardless of the fact that energy is not being fed into the national grid. It is unfortunate to see that a programme such as the REIPPP with such spectacular potential may be hampered due to yet another governmental blunder.

Eskom's lack of planning and the fact that a multitude of renewable energy producers have come forth to supplement the country's electricity requirements, one can argue that a need has arouse for the establishment of an independent transmission and distribution company. Such a company, private or state-owned, can relinquish Eskom's burden to accommodate additionally REIPPP projects. However the proposal to delegate Eskom's functions has been fiercely debated for

230 GN 1074 in GG 36005 of 19 December 2012.
231 Despite the fact that it the REIPPP was introduced in 2011, the first regulations on the REIPPP were already published in GN 721 GG 32378 of 5 August 2009. These regulations were later repealed in 2011 by GN 399 in GG 34262 of 4 May 2011.
232 GN 399 in GG 34262 of 4 May 2011.
233 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 35.
234 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 35.

the last couple of years.[235] It is therefore still unclear whether the Minister of Energy will truly consider this option, or keep Eskom in the centre of conventional as well as renewable energy distribution.

In a time when South Africa's unemployment rate is at 25.5%,[236] initiatives such as the REIPPP have added advantages. The last three rounds of the REIPPP resulted in a total of 64 new renewable energy generation projects and it is estimated that approximately 35 000 operations jobs and roughly 20 000 temporary construction jobs will be created.[237] Therefore the REIPPP has the potential to make a positive contribution to the environmental, social as well as economical aspects of sustainable development.

4.1.3 Draft Position Paper on the South African Biofuels Regulatory Framework, 2014[238]

The *Draft Position Paper on the South African Biofuels Regulatory Framework* (hereafter Biofuels Paper) is the first phase of the implementation of the *Biofuels Industrial Strategy of the Republic of South Africa*[239] (hereafter Biofuels Strategy). The Biofuels Strategy was a five-year pilot phase in which the Government proposed 2% or 400 million litres per year penetration target of the national liquid fuel supply by 2013.[240] This proposed penetration target would have contributed to 30% of the national Renewable Energy target for 2013.[241] The Strategy offered investment support and programmes for agricultural development of small-scale and emerging farmers.[242] The Biofuels Strategy also proposed a fuel tax exemption, whereby bio-ethanol receives a 100% petrol tax exemption and biodiesel receives a 50% diesel tax exemption.[243] During the time when the Biofuels Strategy was drafted, biofuels plants which produce less than 300 000 litres per annum were exempt from fuel tax.

235 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 35.
236 Statistics South Africa 2014 *Unemployment* http://beta2.statssa.gov.za.
237 Eberhard A *et al* 2014 *Public-Private Infrastructure Advisory Facility* 28.
238 GN 24 in GG 37232 of 15 January 2014
239 2007.
240 *Biofuels Industrial Strategy of the Republic of South Africa* Part 3.
241 The 2003 *White Paper on Renewable Energy Policy for the Republic of South Africa* set a renewable energy target of 10,000 GW to be reached by 2013.
242 *Biofuels Industrial Strategy of the Republic of South Africa* Part 3.
243 *Biofuels Industrial Strategy of the Republic of South Africa* Part 7.

It was recommended in the Biofuels Strategy that this exemption continues.[244] The Biofuels Strategy also undertook to invest in research and development to improve biofuels. The research aspect aimed at developing energy crops, improve technologies and to investigate alternative feedstock.[245]

It has been seven years since the approval of the Biofuels Strategy, and not a single large-scale biofuels industry producer has emerged. It is believed that this may be because such biofuels projects are not financially attractive.[246] To this end, it seems that the Biofuels Paper intends to counteract this dilemma by introducing a Biofuels Pricing Framework. This aims to facilitate investments in bio-ethanol and biodiesel manufacturing facilities, returns on investments and subsidising biofuels manufacturing.[247] In order for individual biofuels manufacturers to be eligible for government support, the project has to benefit the country at a macro-economic level.[248] Furthermore, the Biofuels Paper sets out other criteria which have to be complied with: 25% ownership by historically disadvantaged South Africans, mandatory part sourcing of feedstock from emerging farmers, small holder farmers and historically disadvantaged farmers; prior written consent from landowners; labourers must consist of 70% South Africans; commercial farmlands may not be converted to biofuels feedstock production; and deforestation must be prevented.[249]

Financial models are used which calculate local pricing, variable cost information, as well as fixed costs factorised on capital expenditure and turnover. Under the current markets, biofuels manufacturers are guaranteed a 15% return on assets to reward their risk-taking as well as private capital investments.[250]

To date, the only real development has been a 3,2 billion rand approval by South Africa's Industrial Development Corporation[251] and the Energy Development

244 *Biofuels Industrial Strategy of the Republic of South Africa* Part 8.3.
245 *Biofuels Industrial Strategy of the Republic of South Africa* Part 9.2.
246 GN 24 in GG 37232 of 15 January 2014 Part 2.
247 GN 24 in GG 37232 of 15 January 2014 Part 5.
248 GN 24 in GG 37232 of 15 January 2014 Part 6.
249 GN 24 in GG 37232 of 15 January 2014 Part 7.1
250 GN 24 in GG 37232 of 15 January 2014 Part 5.
251 The Industrial Development Corporation is a state owned institution, supervised by the Economic Development Department, which finances national development to promote economic growth and industrial development - http://www.idc.co.za/about-the-idc.html.

Corporation[252] to construct two bio-ethanol plants. It is estimated that these two plants may produce approximately 190 million litres of bio-ethanol per year.[253] The third investment is that of Rainbow Nation Renewable Fuels (Pty) Ltd to construct a soybean crushing facility by 2015 and it is expected to produce 228 million litres of biodiesel.[254]

At this stage, only biodiesel is produced by various small scale producers. However these producers were established before the introduction of the Biofuels Strategy. Unfortunately, there is no way of knowing whether or not the funding of the two bio-ethanol plants will ensure biofuels production, as there have been plans in the past to construct commercial biofuels plants, yet none of them materialised. An example of a plant which never materialised, was in 2006 when Ethanol Africa planned to construct eight biofuels plants near Bothaville at a cost of $1 billion.[255]

4.1.3.1 Critique

Despite the past failed attempts to invest and promote biofuels development and production, it is evident that the Government is making efforts to promote the use of biofuels. It seems that the Government has realised the potential that MBIs hold to promote desired activities in society. The Government can now assess the impact which the Biofuels Paper has on biofuels investments, and accordingly alter, build and improve policies to best promote biofuels.

4.1.4 Solar Water Heating Rebate Programme

As part of its efforts to reduce energy demand, Eskom embarked on a programme to reduce power demand by 10% through behavioural and technical measures. The programme aimed to achieve a 3 000 MW energy saving by 2013 and a further 5 000 MW saving by 2026[256] The programme started in 2008 and is known as the

252 Energy Development Corporation is an innovative company that develops and commercialises the use of renewable energy - http://www.energy.com.ph/about-edc/the-company.
253 Van Zyl E and Prior B. A 2009 *IEA Taskgroup 39 Progress Report* 2.
254 Van Zyl E and Prior B. A. 2009 *IEA Taskgroup 39 Progress Report* 3.
255 Marvey BB 2008 http://www.scienceinafrica.com/old/index.php?q=2008/october/biodiesel.htm.
256 Eskom 2008 http://www.eskomdsm.co.za/sites/default/files/u1/ZA10ESKD103124_DSM Programme.pdf.

Solar Water Heating Rebate Programme (hereafter Eskom Programme)[257] This Eskom initiative is set to encourage consumers to switch to solar water heating as opposed to conventional geysers. The funds for the Eskom Programme were allocated by the NERSA. The rebates were to be paid for a period of five years, where after the programme would be reviewed. The Eskom Programme received support in the 2009 *Integrated Resource Plan for Electricity*[258] which set a target to install one million solar water heaters by 2014.[259]

According to the statistics, the Eskom Programme did fairly well. Between 2008 and 2011, the Eskom Programme received 156 000 claims, which amounts to a yearly energy saving of approximately 60 GWh. Such an energy saving translates to an annual CO_2 saving of 60 kilotonnes.[260] In May 2012, Eskom stated that a total of more than 262 000 solar water heaters were installed across the country. Eskom's goal was to install a total of 1 million solar water heaters by 2014.[261]

The price of the systems are not controlled or set by Eskom, however there is a set minimum quality standard. Depending on the type and size of the solar water heaters, costs may vary from R7 000.00 up to R35 000.00. The rebate used to depend on the size of the system as well as its energy saving potential, and the rebates used to range from R3 280.00 to R8 964.00 and were typically paid back within five years.[262] However since 2011 this rebate value is no longer applicable and the rebate value since then depended on the storage capacity of the system as well whether the system was imported or locally manufactured.[263] The Eskom Programme required consumers to only install systems which have been approved by the South African Bureau of Standards. The system also had to have a functioning timer and it had to be installed by an Eskom approved installer.

257 Eskom 2011 http://www.eskom.co.za/search/Pages/Results.aspx?k=solar%20water%20heating%20rebate.
258 GN 1243 in GG 32837 of 31 December 2009.
259 Article 10.
260 Eskom 2011 http://www.eskom.co.za/OurCompany/Investors/IntegratedReports/Pages/Annual_Statements.aspx.
261 Webb M 2013 http://www.engineeringnews.co.za/article/eskom-places-temporary-hold-on-energy-efficiency-rebate-programmes-2013-12-09.
262 Eskom 2011 http://www.eskom.co.za/search/Pages/Results.aspx?k=solar%20water%20heating%20rebate.
263 Aquasolar 2012 http://www.aquasolar.co.za/eskom-rebates/.

4.1.4.1 Critique

The rebate system of Eskom seems to be a fine initiative to encourage consumers to switch from conventional geysers to solar water heating systems. However, when one looks at the figures of solar water heaters installed across the country as well as the total households across the country, it does not seem that the initiative has been very successful. In an effort to accelerate the number of solar water heating systems installed, Eskom announced that it would phase out the rebate system from December 2012 and switch to a contractual procurement model.[264] In a government like South Africa which is riddled with corruption,[265] the proposal of a contractual procurement model sets alarm bells ringing. The usual questionable tender processes and undue allocations of funds, may see the best intentions of the Eskom Programme ruined.

In addition, many solar water heater manufacturers and distributors may now be left in a position where sales are diminished due to the retraction of the Eskom Programme's rebates. This may also have a damming effect on the market for solar heating systems as competition may decrease. A decrease in market competition may result in less competitive prices.

Nevertheless, the success or failure of the Eskom Programme hangs in the balance. Eskom will have to ensure that the contractual procurement model will indeed be more beneficial for all parties involved. Tendering processes need to be transparent and free from undue government interference. Above all, the programme has to succeed in promoting solar water heating systems above conventional geysers.

4.1.5 White Paper on Renewable Energy Policy for the Republic of South Africa, 2003

Although the *White Paper on Renewable Energy Policy for the Republic of South Africa* (hereafter 2003 White Paper) does not serve as an instrument or a programme to promote the use of renewable energy resources, it does serve

264 Maqutu A 2014 http://www.bdlive.co.za/national/science/2014/04/11/solar-water-heater-rebate-uncertainty.

265 Schoeman 2014 *HR Future* 40-41.

framework to which renewable energy programmes and initiatives can be created. It makes recommendations, sets objectives and targets, and outlines the shortcomings of renewable energy. It does however clearly state that fiscal instruments are the way to go in order to successfully promote renewable energy. [266]

The 2003 White Paper sets out the Government's principles, strategies, goals and objectives on how it intends to promote and implement renewable energy in South Africa over the next 10 years. The Government's overall vision for renewable energy in its energy economy is:[267]

> An energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy throughout South Africa, thus contributing to sustainable development and environmental conservation.

The 2003 White Paper elaborates on the various forms of renewable energy, such as solar, wind, biomass, bio-fuels, hydropower, wave power, tidal power and ocean currents as well as finally geothermal activity.[268] It plans on successfully implementing a renewable energy programme by changing the basic structure of how energy is produced, transferred, traded, sold and bought.

The primary goal of the 2003 White Paper is to increase the commercial implementation of renewable technologies in South Africa. The country's long-term goal is to establish a renewable energy industry that offers a sustainable source of energy for the future.[269] The 2003 White Paper's long-term goal is to create a renewable energy industry that is sustainable, has a fair job market and Black Economic Empowerment[270] shares which produces a non-subsidised, sustainable energy source for future years. The 2003 White Paper states that the development of

266 Part 2.
267 Part 1.1.
268 Part 1.2.
269 Part 1.3.
270 Black Economic Empowerment is a South African programme aimed at remediating the inequalities of *apartheid*, by giving previously disadvantaged groups economic privileges which were previously not available to them.

large scale renewable energy supply schemes is very important, as it will avoid energy imports as well as reduce environmental impacts.[271]

4.1.1.1 The National context of the 2003 White Paper

The 2003 White Paper acknowledges the fact that the investment costs of renewable energies are often higher, but also states that the costs for their operation and maintenance are generally lower than current coal-based energies. The 2003 White Paper further acknowledges that the Government has to make use of fiscal instruments to succeed in implementing and promoting renewable energy as a viable and competitive source of energy.[272] In this regard, the 2003 White Paper refers to the Minister of Finance's Budget Speech in February 2002, where he indicated that the Government will promote the production of bio-fuels by reducing the fuel tax on such fuels by 30%.[273]

4.1.1.2 Renewable energy targets

Despite the advantages, energy potential and detailed solutions that the 2003 White Paper proposes on how to implement a renewable energy system, the set target for renewable energy use is quite low. Government estimates renewable energy to account for only 4% of the estimated electricity demand:[274]

> 10 000 GWh (0.8 Mtoe) renewable energy contributions to final 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 estimated electricity demand (41539 MW) by 2013. This is equivalent to replacing two (2x 660 MW) units of Eskom's combined coal fired power stations.

The 2003 White Paper identifies the various problems and limitations associated with the implementation of renewable energy. It makes numerous recommendations on how to address these problems, from financial solutions to implementation instruments. It seems that the 2003 White Paper is a comprehensive document

271 Part 1.4.
272 Part 2.
273 Part 3.1.6.
274 Part 5.

aimed at promoting the use of renewable energy resources. The main reason for promoting renewable energy, is because the use of fossil fuels are unsustainable. Yet it seems that the 2003 White Paper fails to recognise this fact, as it merely adds renewable energy resources as another form of energy. According to Kidd, this is one of the 2003 White Paper's major shortcomings as renewable energy is not seen as a source to fulfil individual consumer's energy needs, but rather an additional source to "feed into the grid".[275]

4.1.4 National Development Plan: Vision for 2030[276]

The *National Development Plan* (hereafter NDP) is also not an instrument or a programme to promote the use of renewable energy resources, but it does set out South Africa's low-carbon economy vision. The NDP was developed in 2011 by the National Planning Commission to aid in converting to a low-carbon economy.[277] The vision of the NDP is to reduce South Africa's dependency on carbon, natural resources and energy by 2030. It also aims to promote environmental sustainability by reducing pollution and mitigating the effects of climate change.[278] The NDP acknowledges the fact that an electricity production energy mix is important not only from a climate change point of view, but also to enhance energy supply security.[279]

The NDP does not refer to a variety of MBIs that can aid in converting to a low-carbon economy, but it does however include carbon taxing as a possible option.[280] However the NDP does not believe that carbon taxes on its own will lower carbon intensity unless consumers have a choice of alternative, cleaner energy supplies. Low carbon policy actions along with carbon taxes need to be introduced to accomplish meaningful shifts in technologies for electricity generation.[281] Additionally, the NDP believes that carbon taxes on fuel send a weak signal to consumers to conserve fuel. It suggests that a more effective approach would be to tax vehicles based on the levels of carbon emissions which a particular car emits.

275 Kidd *Environmental Law* 313.
276 National Planning Commission 2011 http://www.npconline.co.za/medialib/downloads/home/NPC%20National%20Development%20Plan%20Vision%202030%20-lo-res.pdf.
277 179.
278 140.
279 144.
280 189.
281 146.

This may encourage consumers to rather buy a car which is more fuel-efficient, which will in turn cut emissions from liquid fuels.[282] The NDP also proposes that tax rebates should be provided to individuals and industries that make use of low carbon technologies and practices.[283]

The NDP's phasing of activities to improve South Africa's energy context, with regards to renewable energy, by 2030, includes a short-, medium- and long-term priorities. Its short-term goal is to contract the private sector to produce at least 3,725 MW of renewable energy. Its medium-term goal is to double this figure to at least 7,000 MW and its ultimate long-term goal is to reach more than 20,000 MW, all contracted from the private sector.[284]

4.2 Fiscal Policies

4.2.1 Tax incentives for renewable energy investment and production

As mentioned in Chapter 3, a tax benefit is an attractive instrument to promote the use and production of renewable energy. This section will examine the *Income Tax Act* 58 of 1962 and the *Customs and Excise Act* 91 of 1964 as both provide tax incentives to promote the production of renewable energy, as well as promote investment in renewable energy technologies.

4.2.1.1 *Income Tax Act* 58 of 1962

Taxes can be used in a range of applications to promote and advance environmental objectives. It can be used as an exemption to promote emission reductions;[285] promote energy efficiency incentives;[286] promote the use of renewable energy;[287] promote research and development of green energy;[288] promote recycling,[289] and promote investment in biofuels. Since the focal point of this research paper is the

282 150.
283 190.
284 152-153.
285 Section 12K.
286 Section 12I.
287 Section 12B.
288 Section 11D.
289 Section 37B.

promotion of renewable energy, this section will not deal with tax incentives such as emission reduction, energy efficiency and recycling. This section will examine the relevant sections of the *Income Tax Act* as a fiscal instrument used to promote the use of renewable energy, investment in renewable energy generation as well as the investment in biofuels.

4.2.1.1.1 Tax incentive for investment in renewable energy generation projects

Section 12B(1) and (2) of the *Income Tax Act* makes provision for deductions of a person's taxable income if the taxpayer buys machinery and implements to produce either bio-diesel, or bio-ethanol,[290] or to generate electricity (limited to 30MW) from solar, wind, water forces or biomass.[291] The *Income Tax Act* also makes provisions for deductions where improvements are made to the abovementioned machineries and implements.[292] These equipment cost deductions are made over a period of three years, whereas 50% of the cost is deductable in the first year the equipment is used, 30% in the second year and 20% in the third year.[293] The asset has to be used for the purpose of the taxpayer's trade.[294] These deductions are also available to taxpayers who lease such equipment, as long as such lease produces an income for the taxpayer and that the lease period is at least five years, or the proven useful life of the asset.[295]

The accelerated depreciation on these assets allows for a cash flow advantage and in turn should motivate businesses and taxpayers to invest in renewable energy projects. Furthermore, taxpayers and businesses who implement these renewable energy projects now not only receive benefits for the physical energy-generating equipment, (such as wind turbines and solar panels) but also for the majority of the project's costs.[296]

290 Section 12B(1)(g).
291 Section 12B(1)(h).
292 Section 12B(1)(i).
293 Section 12B(2)(a) - (c).
294 Section 12B(h).
295 Section 12B(4)(a)(i) - (ii).
296 Harris D 2013 http://www.greenbusinessguide.co.za/environmental-financial-incentives-in-south-africa-2013/.

4.2.1.1.2 Tax incentives for research and development

Section 11D of the *Income Tax Act* makes provisions for deductions for taxpayers who participate in research and development activities. In order to qualify for this deduction, the activity must be of a scientific or technological nature, or the activity has to be an improvement on existing technology.[297] Section 11D allows for a deduction equal to 150% of the expenditure incurred directly for research and development, as well as an accelerated depreciation deduction, as is seen in section 12B (50:30:20).[298]

Since this deduction is applicable to the research, development and improvement of technology, it can thus be argued that this section is applicable to renewable energy technologies. Thus section 11D is another MBI which can be used to promote the use and development of renewable energy and renewable energy technologies.

4.2.1.1.3 Critique

The incentives as contained in the *Income Tax Act* appear to be great ways of encouraging the use and production of renewable energy. The deductions that the Act provides for people who carry on business as renewable energy producers seems to be a great incentive for people to start up renewable energy businesses. [299] Furthermore the Act provides financial incentives for research, developments and improvements of renewable energy technology.[300] This may provide financial support for research and development which would and could otherwise not have taken place. The Act greatly incentivises the production of renewable energy, the creation of new renewable energy production businesses, as well as development of renewable energy technology. Therefore the Act actively facilitates and encourages renewable energy usage.

297 Section 11D(1).
298 Section 11D(2)(a).
299 Section 12B(1)(h).
300 Section 11D(1).

4.2.1.2 *Customs and Excise Act* 91 of 1964

The *Customs and Excise Act* makes provision for certain tax exemptions, licence exemptions and rebates where biofuels are used and produced. In terms of the *Customs and Excise Act*, any person(s) who participates in activities regulated by the act, which includes the production of petroleum products, has to be licensed in terms of the act,[301] regardless whether production is done on a small or large scale. However, as a tool to promote the production of biofuels, the Minister of Finance may in terms of the *Customs and Excise Act,* exempt certain people or class of people from licensing their petroleum production operations.[302] This exemption is in respect of any biofuels manufacturing processes or goods used in the production of biofuels. Furthermore, the Commissioner for the South African Revenue Services (hereafter SARS) has the prerogative, in terms of the *Petroleum Products Amendment Act,* to exempt certain people from paying duties/tax on biofuels production.[303] This applies to any person who produces biofuels for their own use, and not for sale, regardless of the scale of production. The *Customs and Excise Act* also allows for a rebate on customs duties, fuel levy and Road Accident Fund[304] levy, where biofuels are imported for home consumption.[305] In order to qualify for the refund, the person/company has to apply and be registered for Value Added Tax[306] (hereafter VAT) purposes.

4.2.1.2.1 Critique

The licensing exemption[307] which the *Customs and Excise Act* offers biofuels producers does not seem to be a particularly attractive incentive for ordinary fuel consumers to produce biofuels. It does not seem that a licensing exemption would prompt energy consumers to abandon conventional fuel usage and start producing their own biofuels. The licensing exemption rather seems to be a reward for current

301 Sec 59A
302 Sec 37B(2)(b).
303 Sec 37B(2)(c)(aa).
304 A state fund which provides cover for all users of South Africa's roads against injuries/deaths arising from motor vehicle accidents within South Africa. The fund acts as indemnity for the person who caused the accident. Road Accident Fund Date Unknown http://www.raf.co.za/Pages/default.aspx.
305 Sec 75(1)(a) and (1)(b).
306 SARS Date Unknown http://www.sars.gov.za/TaxTypes/VAT/Pages/default.aspx.
307 Sec 37B(2)(b).

biofuels producers. However any reward or incentive to rather use renewable energy is a step in the right direction, no matter how big or small the incentive is.

The possible tax exemption (since the commissioner of SARS has the option to grant the exemption or not) on biofuels production for personal use also seems to rather be a reward for current biofuels producers. It does not seem to be a big enough incentive for conventional fuel users to make the switch and produce their own biofuels. However the rebates offered in for biofuels imports[308] seem to be a more enticing incentive as the consumer is offered a rebate on import tax, fuel levies and Road Accident Fund levies. This appears to make the use of biofuels more attractive as the fuel user stands to save much more money by using biofuels than he would by using conventional fuels.

4.2.1.3 *A framework for considering market-based instruments to support environmental fiscal reform in SA*, 2006

Also known as the *Environmental Fiscal Reform Policy Paper* (hereafter EFRPP), this document reflects the preliminary views of the National Treasury and was created to facilitate an open discussion on environmental fiscal reform.[309] The EFRPP outlines the role that MBIs, especially taxes, could play in promoting sustainable development and how to successfully implement MBIs in South Africa. The EFRPP seeks to implement policies which will cater for revenue requirements as well as environmental objectives. Although other MBIs are mentioned in the EFRPP, it primarily focuses on instruments which generate revenue, such as environmental taxes as a means to promote sustainable development and to move away from fossil fuels. The reason why MBIs are believed to best promote the sustainable use of scarce resources, is because of the fact that they provide strong incentives to optimise the use of these resources.[310]

The EFRPP is not a legal document which can effect renewable energy investment, production or use. Instead it provides information on the advantages of MBIs and serves as a guideline as to how it proposes MBIs should be use to effectively

308 Sec 75(1)(a) and (1)(b).
309 Part 1 of EFRPP.
310 Part 1.3.3 of EFRPP.

promote the use of renewable energy. The EFRPP pays particular attention to taxes and the possible advantages thereof. Due to the detailed discussion and reasoning of the EFRPP, this study deemed it necessary to include the EFRPP as part of South Africa's environmental legal framework to promote the use renewable energy.

4.2.1.3.1 Criteria for assessing environmentally related taxes

The EFRPP states that before environmental taxes can be implemented, it has to be established that the tax will indeed achieve the environmental outcomes it was created for, and that the tax is in fact the best instrument to address the particular environmental issue.[311] For an environmental tax system to be viable, the benefits deriving from that system has to outweigh the costs associated with it. Furthermore, the Government has to consider what impact such a tax may have on individuals and the economy. In instances where it is apparent that certain industries or income groups will be disproportionately affected by the tax, the Government has to identify possible compensation measures to rectify the disparity.

With regards to the legislative aspect of environmental taxes, the EFRPP states that different environmental taxes would have to be implemented in terms of different tax legislation. Direct tax legislation, such as the *Income Tax Act,* will be used for direct tax interventions, while indirect taxes will rely on acts such as the *Value-Added Tax Act*[312] or the *Customs and Excise Act.*

4.2.1.3.2 Approach to address market failure

Market failure refers to instances where insufficient consideration of environmental issues is given when determining the prices of environmental goods and services. The EFRPP states that MBIs are better suited to address market failure than command-and-control instruments. This is because MBIs are able to alter the behaviour of individuals and industries by changing the price of a product. Additionally, MBIs achieve the desired effect at the least cost and continuously create new incentives.[313] The EFRPP states that regulatory instruments still have to

311 Part 5.2 of EFRPP.
312 89 of 1991.
313 Part 1.3.3.

be used in conjunction with MBIs in order to monitor and enforce MBIs. The EFRPP further states that there isn't a single approach to address market failure in every aspect, but it recommends a mixed application of different approaches.

4.2.1.3.3 Options for environmental fiscal reform

The EFRPP reiterates the important role that environmental taxes can play to ensure economic growth, promote sustainable development and discourage activities which pose negative impacts on the environment. One of the options which the document discusses is to implement an environmental tax on the generation and consumption of electricity. This would internalise environmental externalities as well as raise revenue. Having input taxes on fuel would ensure that consumers who use electricity generated from renewable resources are exempted from taxes.[314] This may not be the case where electricity consumption tax is charged.

4.2.1.3.4 Critique

Despite that fact that the EFRPP is not a legal document that can effect renewable energy investment, production or use, it still serves as a valuable guideline to which environmental policies can be drafted in the future. The EFRPP contains detailed research on the various aspects of environmental taxes as well as other forms of MBIs. This document therefore proves that government departments are actively researching and developing the South African environmental legal framework in order to address environmental shortcomings and to promote alternative energy consumption.

4.2.2 Taxes on Greenhouse Gas Emissions

As part of South Africa's commitment to reduce the damming effects of climate change, the Government has considered the introduction of taxes on GHG emissions. The result was the introduction of a discussion document, namely the 2010 *Carbon Tax Option,* which was succeeded by the 2013 *Carbon Tax Policy Paper.* Although carbon taxes are not instruments which will promote the use of

314 Part 6.3.1.

renewable energy *per se*, it is still an instrument which can be used to discourage the use of non-renewable energy resources. The contents of these two documents will be discussed, followed by a critical analysis of the possible effectiveness of carbon taxes as a tool to promote renewable energy.

4.2.2.1 The Carbon Tax Option, 2010

The *Carbon Tax Option* (hereafter CTO) is a discussion document that attempts to build on the work of the EFRPP. As with the EFRPP, the CTO is not a document which can effect the use of renewable energies, but rather serves as a guideline and framework for the drafting of carbon tax policies.

The CTO proposes that carbon taxes and emission trading schemes would be the most appropriate instruments to reduce CO_2 emissions in South Africa. Carbon taxes reduce emissions through price mechanisms, whilst trading schemes set appropriate targets within which emissions may be traded. Both these instruments have the potential to achieve the same level of emission reductions under ideal economic conditions.[315] The CTO states that although trading schemes have the potential to reduce emissions, it is doubtful that South Africa's current market structure would be able to effectively implement such a scheme. The Government has to accurately determine the price of emission permits in order to take economic as well as environmental considerations into account. If the price of the permits is too low, then the scheme will not have the effect it was created for, as the accurate cost of carbon is not reflected. Therefore a carbon tax system would be more effective in reducing emissions in the South African context[316] Once again, the CTO suggests that carbon taxes will be the cheapest instrument to efficiently reduce emissions.[317] By increasing the price of goods or services that are emission-intensive, it is possible to promote alternative goods or services, and in so doing advance environmental objectives.

When designing a tax system, it is important to create a system which has the least amount of administrative costs and is uncomplicated. A tax which covers a large

315 Part 5.3.
316 Part 5.3.
317 Part 5.2.

group, such as consumers and producers, will have great administrative costs. Thus a system needs to be designed which will effectively internalise environmental externalities whilst covering a large group at the lowest possible price. The CTO attempts to solve this predicament by analysing the various tax bases. Taxes can either be levied where fuels enter the economy (fuel producers) or at the point where fuels are combusted (fuel users).[318] Levying carbon taxes at the source where they are extracted (coal mines) will entail less administrative costs and require less supervision to prevent tax evasion as less taxpayers are involved. This approach will be the easiest and most practical approach for South Africa to implement and administer. The taxpayers will be limited to coal mines, natural gas processors and petroleum refineries. The CTO acknowledges the fact that consumers will be more aware of carbon taxes if they are implemented at point of combustion, however this appears to be the more expensive approach.[319]

As previously mentioned, the initial implementation and acceptance of environmental taxes may prove to be challenging. Resistance from industries, consumers as well as the political arena is envisaged. In the midst of all the possible concerns, the CTO refers to the issue of competition in the industrial and business sectors. Some industries or businesses may be disadvantaged, particularly in instances where their competitors (internationally) are not faced with the same taxes.[320] The CTO therefore suggests a slow phasing in of carbon taxes, with gradual increases over time, to allow industries and businesses time to adjust. This may also enhance the political acceptance of environmental taxes. Another way to implement environmental taxes without increasing the prices of products, is to “recycle” revenue. This is done by reducing other taxes on the products to include environmental taxes, thus the percentage of tax charged on the product remains the same, but environmental taxes are now included. The concerns expressed in the EFRPP regarding earmarking, remains unchanged.

318 Part 6.1.2.
319 Part 6.1.2.
320 Part 7.

4.2.2.2 The Carbon Tax Policy Paper, 2013

The *Carbon Tax Policy Paper* (hereafter CTPP) is an update of the CTO and was released mid 2013 and sets out the new rules for pollution management which will be introduced from 1 January 2015. The CTPP elaborates on the specific design features of carbon tax and where they should feature in the South African tax system context. In terms of the CTPP, carbon taxes will gradually be implemented, as was suggested by the *Carbon Tax Option.* By implementing a carbon tax system, the Government aims to reduce GHG emissions by 34% in 2020 and 42% by 2025.[321]

Although a tax on GHG emissions is not a fiscal instrument used to promote the use of renewable energy *per se*, it may still serve as an instrument to discourage the use of non-renewable energy sources as the proposed carbon tax will raise the price of conventional energy sources.

4.2.2.2.1 Economics of carbon pricing

The CTPP states that pricing for GHG emissions should have a coherent framework in order to aid companies in making rational decisions regarding investments that have significant energy implications.[322] Additionally, a coherent framework for pricing would provide incentives for companies to alter their behaviours and promote investment in green energy technologies. The CTPP proposes to implement an emission charge that would directly address market failures and promote clean-energy innovations. The reason for using emission charges as opposed to subsidies, is because of its transparency and uncomplicated administration. Subsidies, on the other hand, are often subjected to political influence and present difficulties to deploy. According to the CTPP, carbon pricing should form the main focus of mitigation efforts as it is a cost-effective balance between emission-reduction opportunities and the promotion of energy-efficient technologies.[323] Carbon pricing would be more effective than regulatory policies since these policies are far less effective due to their narrow range of emission-reduction opportunities. The CTPP proposes to introduce carbon pricing through carbon taxes or an emission trading

321 Part 1.
322 Part 3.
323 Part 3.

scheme, which would provide revenue for the Government, allowing the "recycling" of revenues. The recycling of revenues can be used to improve carbon pricing instruments, which may ultimately lead to a low-carbon economy.[324]

4.2.2.2.2 Modelling the economic impacts of a carbon tax

The CTPP made use of different models to ascertain what impact carbon tax will have on the economy. Several studies by different organisations were undertaken to establish what economic impacts carbon tax will have on South Africa.[325] The studies concluded that the ultimate effect will depend on various factors, namely incentives for behavioural changes, the structure of the economy, the way in which revenue is recycled and the extent to which transport, trade, energy and industrial policies are harmonised with environmental policy.

Again, the CTPP highlights the importance of gradually phasing in carbon taxes, as this is believed to have a neutral impact on economic growth.[326] According to the CTPP, carbon taxes will only cover products or processes where emissions originate directly from fuel combustion and gasification. Emissions which indirectly result from fuel combustion and gasification will not be taxed.[327]

Incorporated into the carbon tax design, is tax-free thresholds, which have to be reviewed every five years. The purpose of the threshold is to accommodate low-income households as well as locally-based carbon-intensive sectors and businesses, which would otherwise be disproportionately affected. The tax-free threshold does not wholly exempt a party from carbon tax; it merely decreases its liability by charging a percentage of the initial amount.

All the White Papers and policy documents preceding the *Carbon Tax Policy Paper*, were unable to give a figure or estimate of what the carbon tax rate should be; they merely stated that environmental externalities as well as social costs of the emissions need to be internalised. The CTPP was the first to give a definite value. It

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324 Part 3.2.
325 Part 6.
326 Part 6.1.
327 Part 6.1.

proposes to introduce carbon tax at a rate of R120 per ton carbon dioxide equivalent (CO_2-eq), to be implemented from January 2015.[328] With regards to the annual increase, the CTPP proposes a 10% annual increase until 31 December 2019. The end of 2019 will signal the end of the first 5 year period, after which the carbon tax rate has to be reviewed.

4.2.2.2.3 Revenue recycling and transitional support measures

The CTPP proposes various measures to support low-income households and vulnerable businesses during the transitional phase of carbon taxing.[329] These measures include tax shifting, rebates, free basic electricity, Energy Efficiency and Demand-Side Management Programme, feed-in tariffs and public transport. Tax shifting is done by reducing other taxes on products to include environmental taxes,[330] thus the percentage of tax charged on the product remains the same, but environmental taxes are now included. Rebates are a means of rewarding desired behaviour by giving cash back on taxes paid.[331] The CTPP states that rebates during the transitional phase will only apply to carbon capture and storage.[332] To ensure that low-income houses have access to basic electricity, the Government has launched the Integrated National Electrification Programme. Additionally, the Government is developing the National Liquefied Petroleum Gas Strategy to provide fuel alternatives to low-income households. The Energy Efficiency and Demand-Side Management Programme is another ingenious programme aimed at implementing renewable energy technologies as well as promoting energy-efficiency incentives.[333] Renewable energy technologies are aimed at low-income houses, whilst energy-efficiency incentives target businesses. The latter allows businesses to make deductions on their taxable income if they can verify that efficient energy savings were made. With regards to renewable energy, the Government aims to implement special tariffs, known as feed-in tariffs, for renewable electricity generation.[334] Additionally, the Government is considering implementing a funding mechanism to

328 Part 7.5.
329 Part 8.4.
330 Part 8.1.
331 Part 8.2.
332 Carbon capture and storage is a process where CO2 emissions are captured, compressed, liquefied and transported to a designated site to be permanently stored underground.
333 Part 8.3.
334 Part 8.4.3.

channel international climate change funds to develop renewable energy projects. Finally, the Government intends to reduce emissions in the public transport sector by firstly making alternative fuel efficient modes of transport available to the public and secondly by promoting the use of more alternative fuels.[335] The Government believes that by increasing fuel-efficient public transport, commuters may resort to public transport as opposed to private transport. Furthermore, the Government believes that low-income houses will benefit from fuel-efficient public transport since it will be cheaper.

The CTPP proposes to have carbon tax implemented on the energy sector. This will ensure that the carbon taxes are passed on to the consumers.[336] There will be differentiated between the energy sources, such as fossil fuel based sources, nuclear sources and renewable energy, thus the source producing the most emissions will be taxed the most.

4.2.2.3 Critique

The implementation of a carbon tax appears to be a viable mechanism in reducing GHG emissions as higher prices on non-renewable energy sources may deter the country's overreliance on these energy sources. Environmental costs may now also be factored into the price of the energy source. Industries may also be more inclined to invest in renewable energy technologies as the price for conventional energy will increase with the introduction of carbon tax.[337]

Another advantage of carbon taxes is that it raises revenue. The revenue raised from carbon taxes can be used to finance various renewable energy projects and investments. The revenue raised can also be used to finance environmental subsidies (such as the Eskom Programme) and tax rebates (such as the biofuels tax rebates in terms of the *Customs and Excise Act*). For this to happen, the Government will have to create an environmental fund with an effective administrative system which will allocate carbon tax revenues exclusively for

335 Part 8.4.4.
336 Part 8.6.
337 See par. 4.3.2.2.2.

environmental investments.[338] Careful administration will be required to ensure that the revenue generated from environmental taxes do not go to the country's general budget, but is allocated to the appropriate sector.[339] An administrative system similar to that of the Road Accident Fund can be established. However an environmental fund may have more revenue input sources than the Road Accident Fund. Thus administrating an environmental fund may be problematic.

The implementation of a carbon tax may result in great pressure on large GHG emitters such as Eskom[340] and Sasol.[341]. Various industries, especially those which are already struggling with competition issues, may even be crippled by the proposed carbon tax.[342] However in the beginning of 2014 it was announced that the implementation of the carbon tax will be postponed to 2016. According to the National Treasury's 2014 budget review,[343] the reason for the postponement is to allow enough time for draft legislation consultation.

After analysing the various aspects of carbon taxes, it appears that carbon taxes may not the best instrument to promote the use of renewable energy. The most effective way to promote behavioural changes, may be to create an environment where energy users[344] receives positive reinforcement for a desired behaviour. In this way energy users will associates the use of renewable energy with a positive response. The mere fact that the cost of conventional energy is raised by carbon taxes, may not necessarily promote energy users to opt for renewable energy instead. This research paper therefore suggests that an MBI where the consumer has a direct positive connection between the use of renewable energy and the MBI, may be the most effective.

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338 See par. 4.3.1.3.4.
339 See par. 3.1.2.2.
340 In the 2010/11 financial year, Eskom emitted 230,3 million tonnes of CO_2 from power generation. Eskom 2012 www.eskom.co.za/OurCompany/.../Air_quality_and_climate_change.pdf.
341 Sasol is a South African based energy and chemical company. In 2013 SASOL produced 49.4 million tonnes of direct GHG emissions. SASOL 2013 www.sasol.co.za/sites/default/files/.../Sasol%20IR%202013lores.pdf
342 These industries may be forced to close shop as the financial pressures imposed by the carbon tax may be too great.
343 National Treasury Republic of South Africa 2014 www.treasury.gov.za/.../national%20budget/2014/review/FullReview.pdf.
344 In this instance all industrial and private energy consumers.

4.3 Summary

This section critically highlighted the various instruments which are currently being used to promote renewable energy in South Africa. It would seem that for many years the South African government did not fully commit itself to actively promote the use of renewable energy. This is evident in the lack of programmes and incentives in the market as well as the very low renewable energy target that was set at 10 000 GWh in terms of the 2003 White Paper.[345] Even worse than the fact that such a meagre target was set, was the fact that it was not even met. Fortunately the Government has rectified the situation and more and more programmes and incentives are being created to promote the use of renewable energy. The Government has even raised its renewable energy target to 3 200 MW for the years 2017 to 2020.[346]

Programmes such as the REIPPP, Biofuels Strategy and Eskom Programme may definitely be hailed as great milestones in the Government's quest for a more diverse energy regime. As stated earlier, the Biofuels Strategy and the Eskom Programme have the potential to greatly promote the use of renewable energy. However these two instruments still need a great deal of improvements to make them more attractive for energy consumers. Fortunately the REIPPP has seen great results and should prove to be a key instrument in promoting renewable energy production, usage, as well as technology development.

The incentives as contained in the *Income Tax Act* as well as the *Customs and Excise Act* appear to be great ways of encouraging the use and production of renewable energy. The tax exemptions and rebates offered by these two acts may significantly incentivise the production of biofuels for personal usage.[347]

The deductions that the *Income Tax Act* provides for people who carry on business as renewable energy producers seems to be a great incentive for people to start up renewable energy businesses.[348] Furthermore the provides financial incentives for

345 Part 5 of White Paper on Renewable Energy Policy for the Republic of South Africa, 2003.
346 GN 1074 in GG 36005 of 19 December 2012.
347 See par. 4.2.1.1.3 and 4.2.1.2.1.
348 Section 12B(1)(h).

research, developments and improvements of renewable energy technology.[349] This may provide financial support for research and development which would and could otherwise not have taken place. The Act greatly incentivises the production of renewable energy, the creation of new renewable energy production businesses, as well as development of renewable energy technology. Therefore the Act actively facilitates and encourages renewable energy usage.

Although the EFRPP is not an instrument which promotes the use of renewable energy, it is still a valuable framework for MBIs.

The implementation of a carbon tax, may not always be the best incentive to promote the use of renewable energy. As previously mentioned, the most effective way to promote behavioural changes, may be to create an environment where energy users[350] receives positive reinforcement for a desired behaviour. In this way energy users will associates the use of renewable energy with a positive response. The mere fact that the cost of conventional energy is raised by carbon taxes, may not necessarily promote energy users to opt for renewable energy instead. This research paper therefore suggests that an MBI where the consumer has a direct positive connection between the use of renewable energy and the MBI, may be the most effective. The purpose of a MBI should not be to cripple industries or the economy. It should rather assist in a healthy transition to greener energy usage. Therefore a carbon tax may not be the best choice of instrument.

349 Section 11D(1).
350 In this instance all industrial and private energy consumers.

5 Conclusion and recommendations

South Africa, along with the majority of the global population, relies heavily on fossil fuels as their primary source of energy.[351] The continuous use on these fuels are considered to be unsustainable, due to the fact that the reserves of these non-renewable energy sources are limited and the fact that the burning process results in the release of millions of tonnes of CO2 and other harmful gasses into the atmosphere. These emissions are considered to be the number one cause of the global crisis known as climate change.[352]

Due to the fact that the use of non-renewable energy sources is considered to be unsustainable, alternative energy resources should be considered. Renewable energy resources are considered to be sustainable, non-depletable and result in little or no pollution or hazardous waste.[353] The primary concern with using renewable resources, is the expenses involved. Although the resource itself is free (for example sunshine) the equipment needed to harness and convert the resource to energy is expensive. More often than not, it is much cheaper to use energy produced from fossil fuels, than from renewable resources. However, research indicates that despite high initial costs, the operation and maintenance costs of renewable energy is generally lower than current coal-based energies.[354]

This research paper set out to answer five sub-questions. The first sub-question related the current composition of South Africa's energy regime. It was discovered that South Africa is predominantly driven by non-renewable energy resources such as coal,[355] petroleum,[356] natural gas[357] and oil.[358] The country's reliance on non-renewable energy resources far out way that of renewable energy resources.[359]

351 See par. 1.
352 See par. 1 & 1.1.2.
353 See par. 1 & 1.1.2.
354 See par. 1.1.2.
355 See par. 2.1.
356 See par. 2.2.
357 See par. 2.3.
358 See par. 2.4.
359 See par. 1.

Despite this clear disparity, it is possible to successfully harness energy from renewable energy resources in South Africa.[360] The second sub-question was to establish whether or not South Africa currently has the technology available to use renewable energy. It was discovered that various renewable energy technologies, such as solar heating, wind turbines and biofuels, are currently being used to harness alternative sources of energy.[361] A number of different renewable energy projects are also currently in operation, with great success. Therefore South Africa does have the technology to harness renewable energy and the technology is successfully being used.

The third sub-question was to establish which regulatory instruments can be used to promote the use of renewable energy. This study concluded that fiscal instruments (or MBIs) are the more appropriate tool in promoting the use of renewable energy resources.[362] This study does not suggest that command-and-control instruments as a whole are an ineffective or inappropriate tool to enforce compliance with environmental regulations. It rather suggests that in appropriate situations, command-and-control instruments should be used in conjunction with MBIs. Additionally, there are situations where MBIs may be better suited to reach a desired effect than command-and-control instruments would. Therefore when it comes to the use of renewable energy, users have to be encouraged and enticed to use renewable energy. They cannot be forced to switch to these energy sources, which in effect, is what command-and-control instruments seek to do.[363] MBIs such as tax rebates, direct subsidies and feed-in tariffs have the potential to promote users to willingly switch to renewable energy as it will be in their best interest.[364]

The fourth sub-question was to identify the policy instruments currently being used to promote renewable energy. A range of energy as well as fiscal policies were identified. The most significant instruments currently being used include the REIPPP,[365] the Biofuels Strategy,[366] the Eskom Programme,[367] as well as rebates

360 See par. 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5 & 2.5.6.
361 See par. 2.5
362 See par. 3.1.
363 See par. 3.1.
364 See par. 3.1.1.1. 3.1.1.2 &3.1.1.3.
365 See par.4.1.2.
366 See par. 4.1.3.

and tax deductions in terms of the *Income Tax Act*[368] and *Customs and Excise Act*.[369] As highlighted in the relevant sections, not all these instruments manage the same level of success. Instruments such as the Biofuels Strategy and Eskom Programme still needs improvement in order to be truly successful. Nevertheless, the progress that has been made over the last six years has been remarkable and truly welcome. A variety of policy framework such as the 2003 White[370] Paper, EFRPP, CTO and the CTPP indicate that the Government does appreciate the potential that renewable energy holds as an alternative source of energy as well as the importance of switching to a greener economy.

The final sub-question was to establish the extent to which South Africa's legal regime makes provisions to promote the use of renewable energy. It was discovered that although great progress has been made over the last few years, to date renewable energy still does not form a significant party of the country's current energy regime.[371] This may be attributed to the fact that incentives which promote renewable energy usage is still relatively new and some of the programmes still need to be enhanced and altered. Therefore a deduction can be made that South Africa's legal regime does not properly promote renewable energy as renewable energy currently only forms a small percentage of the country's energy consumption. This position will hopefully change in years to come when more policies are implemented and current instruments are improved. The Government therefore does not have a shortage of legal resources which provide detailed frameworks and implementation recommendations. However, energy and environmental legislation are yet to reflect these improvements and changes. It is now up to the Government to incorporate these MBIs into legislation in a bid to promote the use of renewable energy in South Africa.

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367 See par 4.1.4.
368 See par 4.2.1.1.
369 See par. 4.2.1.2.
370 Seep par 4.1.5.
371 See par. 2.

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