UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

THE LIKELY IMPACT OF THE IMPLEMENTATION OF CARBON TAX FOR SOUTH AFRICA

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A proposal for a research report to be submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Commerce (Specializing in Taxation)

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Abstract

The purpose of this report is to discuss how the implementation of the carbon tax may affect the people of South Africa as well as businesses operating in South Africa, and the likely effects carbon tax might have for South Africa if compared with other countries that have already implemented the tax. According to the National Treasury (2018:3), many countries have implemented carbon pricing through carbon tax and emission trading schemes, in some cases, regulations propose a limit on emissions and businesses are required to keep to that limit, if they do not they are liable to significant penalties. South Africa's economic growth is largely dependent on energy-intensive industries. At the same time, these energy-intensive industries are harming the environment as a result of the amount of emissions related to their production. (Mbadlanyana, 2013:86).

An analysis of the newly introduced Carbon Tax Act and its likely effects for South Africa will be conducted with comparisons to other countries that have already implemented the tax.

Key Words: Australia, Carbon pricing, China, Climate change, Carbon Tax, Emissions, Environment, Fossil Fuels, Greenhouse gas, Sweden, Tax base, Tax liability, Taxpayer, Tax rates, Trade Exposure.

Declaration

I hereby declare this research report to be my own unaided work. It is submitted for the degree of Master of Commerce in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination in any other university.

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Nomawethu Cyble Nkomo

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Chapter 1: Introduction

Environmental challenges, like climate change, air and water pollution, according to National Treasury arise when the absorption capacity of an environmental resource is exceeded. The subsequent excessive pollution affects the public, and the polluter often does not take responsibility for the effects of such pollution. Governments intervene in these environmental distresses through legislation or market-based tools such as taxes or carbon trading schemes to influence producers and consumers investments, production and consumption decision-making processes. (National Treasury 2018:3).

Global climate change has very specific effects for South Africa and is expected to further reduce the countries water supply. According to Greenpeace Africa (2012:8), 'the government's Water for Growth and Development Framework recognises that climate change is a significant risk to the sustainability of water resources and that it has a possibility of significantly affecting the accessibility of water in South Africa. Climate change may lead to more severe and extreme weather conditions (droughts and floods) in several areas of the country. This may significantly affect river flows and the availability of water'. (Greenpeace Africa 2012:8).

To combat these environmental damages, the Minister of Finance introduced the Carbon Tax Bill in the National Assembly on 20 November 2018. The primary carbon tax legislation was promulgated in May 2019 as the Carbon Tax Act 15 of 2019 (the Act) and the Customs and Excise Amendment Act, 13 of 2019, for the money bill and administrative provisions respectively, with effect from 1 June 2019.

The main objective of the implementation of carbon tax is to assess the cost related to the environmental and health damages of extreme greenhouse gas emissions and to ensure that these costs are taken into account by the public in their production,

consumption and investment decision making processes. It also aims to encourage businesses to transform into cleaner technologies. (Mason and De Jager, 2019).

The carbon tax according to s 1 of the Act, is 'a tax on the carbon dioxide (CO_2) equivalent to greenhouse gas emissions levied in terms of s 2 of the Act'. According to s 2 of the Act, 'a carbon tax must be levied and collected for the benefit of the National Revenue Fund, a tax to be known as the carbon tax'.

Greenhouse gasses are defined in s 1 of the Act, 'as gaseous [elements] of the atmosphere, both natural and [man made], that absorb and re-emit infrared radiation, and includes carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6)'.

According to the Climate Neutral Group (2019), greenhouse gases are those gases in the air that affect the earth's energy balance. According to the National Treasury (2018), many jurisdictions have implemented carbon pricing and the appropriate measures are normally based in line with the 'Polluter Pays Principle'. As the National Treasury (2018:3) puts it:

> Those responsible for harming the environment must pay the costs of remedying pollution and environmental degradation and supporting any consequent adaptive response that may be required.

According to the Department of Environmental Affairs (2014), many factors can influence a nation's greenhouse gas emission, including government infrastructure, economic growth, energy consumption, technology development, climate and soil, agriculture and land use management.

In Africa, carbon is the dominant factor for middle-income countries with fossil fuel dominant markets contributing greater than 50 percent of South Africa's footprint. The South African Green Economy Modelling Report by the United Nations Environment Programme states that the welfare of South Africans and its economic sustainability is dependent on the services supplied by the ecosystem such as air, food, water, energy,

medicines as well as recreational, spiritual and cultural benefits. (United Nations Environment Programme 2013:8).

According to a report by Winkler and Marquard (2011:61), for South Africa, the issue of carbon emissions was framed concerning an intensifying debate about the implementation of a carbon tax. The carbon tax was aimed to take into account the main priorities recognised in the National Development Plan, to minimise poverty and inequalities. The National Development Plan aims at ensuring continuous development, which requires an equitable transition to a low-carbon economy and in its context supports the pricing of carbon. (Winkler and Marquard 2011:61).

There is a possibility of 50 percent that global temperatures may rise by 5 degrees centigrade and above by the year 2100 and a possibility of an increase of less than 2 degrees is zero. The costs of these drastic global warming effects are indefinite and could be greatly harmful and even with this uncertainty, there is a far-reaching agreement that low-income countries will be affected first. (Alton, Arndt, Davies, Hartley, Makrelov, Thurlow, and Ubogu 2014:345).

According to South African Revenue Service (2019:3), South Africa's annual greenhouse gas emissions have increased at a faster rate than the world average of 1.8 percent per year, greenhouse gas emissions are sensitive to the business cycle and South Africa's greenhouse emission levels are expected to further increase exponentially as economic growth recovers. The Earth experienced such an equivalent concentration of carbon dioxide was three to five million years ago when the temperatures on earth were significantly warmer (United Nations World Meteorological Organization cited in South African Revenue Service, 2019:2).

The United Nations Environment Programme (2013:8) states that measures of environmental sustainability indicate that South Africa has surpassed its environmental carrying capacity. Environmental Affairs (cited in the United Nations Environment

Programme 2013:10) states that South Africa sees a green economy as a direction towards sustainable development aimed at resolving the interdependence between economic growth, social protection, and natural ecosystems. It can be concluded that this view is in line with the country's vision for sustainable development which per the United Nations Environment Programme (2013:10) states:

> South Africa aspires to be a sustainable, economically prosperous and self-reliant national state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration.

The department of Environmental Affairs (2014:44), states that South Africa contributes to global climate change and as such, has taken steps to implement measures to ease and adapt to a changing climate, as such it is estimated that the introduction of a carbon tax can reduce South Africa's greenhouse gas emission by an approximation of 35 percent per year (South African Revenue Service 2019:3).

The Carbon Tax is administered under the Customs and Excise Act by the South African Revenue Service. The carbon tax seeks to reduce local greenhouse gas emissions by encouraging businesses to implement cleaner technologies in a cost-effective and sustainable way. (South African Revenue Service, 2019).

A phased approach to implementation was employed on the introduction of the Carbon Tax Act, accompanied by substantial tax incentives. The first phase is from 1 June 2019 to 31 December 2022, to assist in transitioning to a low-carbon economy and to minimise the impact on businesses and electricity prices (Strydom and Bradfield, 2019).

According to s 5(1) of the Act, 'phase 1 of the carbon tax is levied at a rate of ZAR 120 per ton of carbon dioxide equivalent of greenhouse gas emissions of a taxpayer and the rate of tax specified must be increased by the amount of consumer price inflation plus 2 percent for the preceding tax period as determined by Statistics South Africa per

year until 31 December 2022, after 31 December 2022, the rate must be increased by the amount of the consumer price inflation for the preceding tax year as determined by Statistics South Africa'.

Research questions: With South Africa being a developing country, the cost of administering carbon tax may be quite expensive, which may lead to efficiency reduction. How will the implementation of carbon tax affect the people of South Africa as well as businesses operating in South Africa, and what likely effects will carbon tax have for South Africa based on a comparison to other countries which have already implemented the tax?

To answer the main research, question the following sub-questions are addressed: Who are the people of South Africa? Relevant case law and the Income Tax Act is used to define what is meant by the people of South Africa.

What is meant by businesses operating in South Africa? The research will examine for the purpose of this report what is meant by businesses operating in South Africa.

How is carbon tax levied in South Africa? This question will examine the carbon tax design in South Africa which according to the National Treasury (2018:4) is reinforced by the administrative feasibility and practicality to cover most greenhouse gas emissions. The question will further examine whether the Carbon Tax Act takes into account the need for a structural transition to a low carbon economy (National Treasury 2018:4).

What effects has carbon tax had in countries that have already implemented the tax and how do those countries' carbon tax legislation compare to that of South Africa? A comparison of the South African carbon tax legislation is done to the legislation of other countries that have experienced both successes and failures in the introduction of Carbon Tax such as Sweden, China, and Australia.

What likely effects will carbon tax have for South Africa? The research will examine the possible economic and environmental effects of carbon tax in South Africa.

Research Methodology: The research is qualitative in nature. The primary sources to be analysed will include the Carbon Tax Act 15 of 2019, journal articles and relevant case law.

Other source material will include the Income tax legislation of South Africa and South African government publications. Other countries such as Sweden, Australia, and China's carbon tax legislation is examined to analyse the likely effects of the carbon tax in South Africa when compared to countries that have already implemented the tax.

The South African carbon tax formula will also be broken down to analyse the calculation of carbon taxes in South Africa.

The structure of this report is as follows:

Chapter 2: Who are the people of South Africa and businesses operating in South Africa that are likely to be affected by the implementation of carbon tax?

According to the National Treasury (2018:8), carbon tax is derived from every entity that conducts activities that emits greenhouse gasses. It can, therefore, be expected that consumers such as companies purchasing carbon emitting products from other companies as well as individuals purchasing carbon emitting products from companies could face higher charges. This chapter defines what is meant by people of South Africa and businesses operating in South Africa for the purposes of this research report.

Chapter 3: The provisions of the Carbon Tax Act in South Africa

Business entities that produce direct greenhouse gas emissions must report their carbon emissions under the National Atmospheric Emissions Inventory System monitored by the Department of Environmental Affairs. The carbon tax design is aligned to this obligatory emissions reporting to the Department of Environmental Affairs and only those who exceed the National Atmospheric Emissions Inventory System thresholds for reporting, also functioning as the carbon tax threshold, will be liable for the carbon tax. (South African Revenue Service 2019:5).

The Carbon Tax Act is administered in terms of the Customs and Excise Act as an environmental levy. According to s 54AA of the Customs and Excise Act, a taxpayer as defined in s 1 of the Act must in terms of s 54E of the Customs and Excise Act, license any premises on which emissions as defined in the Carbon Tax Act, 2019, occur, in a manner and subject to the requirements as may be prescribed by rule. It can, therefore, be concluded that business entities that produce greenhouse gases will still need to license any premises on which emissions occur regardless of whether they do not exceed the carbon tax threshold. This chapter examines the provisions of the Carbon Tax Act.

Chapter 4: The South African carbon tax legislation in comparison to other countries.

This chapter examines the effects the implementation of the carbon tax has had for Australia, Sweden, and China and compares each of these countries' carbon tax legislation to the South African Carbon Tax Act. Australia, Sweden, and China's carbon tax legislation have been selected as a comparison to South Africa due to the successes as well as failures the implementation of the carbon tax has had for the countries as a result of political, economic and social impact.

Australia, for example, implemented a carbon pricing scheme in 2012, which lacked extensive political support and was withdrawn in 2014 (Springmann, Sacks, Ananthapavan, Scarborough 2018:523).
According to Ackva and Hoppe (2018:16), many factors are often cited detailing the political success of the Swedish carbon tax. Its implementation as part of a greater tax reform and in conjunction with decreases of the related energy tax reduced its political salience (Ackva and Hoppe 2018:16).

According to Zou L, Xue J, Fox A, Meng B (2016:341), there is no specific tax for energy in China, rather a 'value-added tax for energy selling, a consumption tax for energy use, and a resource tax for energy exploration'. China according to Zou *et al.* (2016:341) has implemented many policy instruments, but most of them are not efficient.

Chapter 5: The likely effects of the carbon tax for South Africa.

Tyler, Du Toit and Dunn (cited in Mbadlanyana 2013:79) states that both on a per capita basis and from an emission intensity perspective, South Africa is one of the world's biggest polluters. The country discharges more greenhouse gases than all the other Sub-Saharan African countries combined due to its carbon-intensive economic industries. These oil and coal dependent industries are accountable for most of South Africa's greenhouse gas emissions profile. (Tyler, Du Toit, and Dunn cited in Mbadlanyana 2013:79). It can, therefore, be concluded that the introduction of the carbon tax in South Africa will have a substantial impact on greenhouse gas emitting industries.

Studies both in developed and developing countries tend to demonstrate that environmental taxes, particularly energy taxes, may result in a negative impact on the income distribution of households, for instance, in most cases, a less well-off household spends a higher percentage of its income on heating than its better-off

neighbors, so a carbon tax that increases costs for the national electricity generator and distributor (ESKOM – a major greenhouse gas emitter) could result in price increases (Mbadlanyana 2013:84).

The alarming prospect of the increasing effects of climate change will hit across a broad spectrum, including heatwaves, wildfires, sea-level rise, hurricanes, flooding, drought and shortages of clean water (South African Revenue Service 2019:2). This section of the research looks at the likely effects carbon tax may have for South Africa.

Chapter 6: Conclusion

In this concluding chapter, the analysis made in the preceding chapters is used to answer the research question. Areas into which further research may be conducted that were not addressed in this research report are identified in this chapter.

Chapter 2: Who are the people of South Africa and businesses operating in South Africa that are likely to be affected by the implementation of carbon tax?

According to s 3 of the Act, 'a person who conducts an activity in South Africa resulting in greenhouse gas emissions above the threshold determined by matching the activity listed in the column 'Activity Sector' in Schedule 2 of the Act, with the number in the corresponding line under column 'Threshold' of that table is liable for the carbon tax'.

Greenhouse gas emitting activities consist of 'emissions from stationary combustion of fossil fuels, for example, diesel generators and boilers, fugitive emissions from venting and flaring of mine methane, emissions from industrial processes and product use like cement' as well as lime and glass production' (Climate Neutral Group, 2019).

An extract of schedule 2 of the Act with sectorial activities and their corresponding thresholds and allowances is provided in Appendix A of this report.

In order to analyse the question on 'who the people of South Africa and businesses operating in South Africa are'? there must first be an understanding of who is liable to pay carbon tax in South Africa and how the carbon tax is levied according to the Carbon Tax Act.

According to s 3 of the Act, 'a person is defined as a taxpayer liable to pay an amount of carbon tax as contemplated in s 6 of the Act, in respect of a tax period as specified in section 16 of the Act, if that person conducts an activity in South Africa resulting in greenhouse gas emissions beyond the threshold determined by matching the activity listed in the column 'Activity/ Sector' in schedule 2 of the Act with the number in the corresponding line of the column 'Threshold'.

The Carbon Tax Act does not make a distinction to whether both resident and non-resident persons could be liable for the carbon tax, but rather makes reference to a person conducting an activity in South Africa per s 3 of the Act.

As a result, the Carbon Tax Act not differentiating between residents and non-residents, this report makes reference to the Income Tax Act and relevant case law to analyse the meaning of these words to answer the question on who the people of South Africa and businesses operating in South Africa are.

Referring to the Income Tax Act and the relevant case law is imperative for this report since it will assist in determining who are residents and non-residents that are likely to be liable for the carbon tax according to s 6 of the Act, and which residents and non-residents are expected to license emissions facilities according to s 54FD.02(a)(i) of the Customs and Excise Act.

The courts have considered the meaning of resident and have established principles to be applied in determining the meaning of resident. In the case of *Cohen v Commissioner for Inland Revenue* (2d Cir. 1930), the court had to decide whether a natural person who had not been physically present in South Africa for the entire year of assessment could be ordinarily resident in South Africa.

In the case of Cohen v Commissioner for Inland Revenue (1930:305), it was found that ordinary residence is 'the country to which a person would naturally and as a matter of course return to from their wanderings'.

According to s 1(a)(i) of the Income Tax Act, a is defined as 'any natural person who is ordinarily resident in the Republic'.

The purpose of this section of the report is not solely to revisit the residence principles of South Africa in terms of the Income Tax Act. It is rather to determine who is likely to be affected by the carbon tax in South Africa.

It can, therefore, be concluded from the above that the people of South Africa and businesses operating in South Africa for the purpose of this report means taxpayers who conduct activities within the borders of South Africa whether resident or not, that according to s 3(b) of the Act, 'result in greenhouse gas emissions above the threshold determined by matching the activity listed in the column 'Activity Sector' in Schedule 2 of the Carbon Tax Act with the number in the matching line of the column 'Threshold' of that table'.

The people of South Africa and businesses operating in South Africa for the purposes of this report also means every other person or business that may be affected indirectly whether negatively or positively by the implementation of carbon tax through the potential increase of consumer prices on carbon intensive product and services or better health conditions through a reduction of water and air pollution.

According to Environmental Affairs (2014) carbon-emitting activities include but are not limited to:

The energy sector

The South African energy sector is one of the major carbon emitters since it is extremely reliant on coal as the primary energy provider. The main source of emissions in the energy sector in South Africa is carbon dioxide (CO_2) as a result of the combustion of fossil fuels which includes both mobile and stationary sources. (Environmental Affairs 2014:73).

According to Environmental Affairs (2014:80), due to the combustion of fuels by large quantities, energy producing industries, electricity producers and petroleum refineries are the main source of emission from fossil fuels in South Africa. There are cases where fuels are used as raw materials in the production process. The iron and steel industry, for example, use coal as feedstock in the manufacture of steel (Environmental Affairs 2014:79).

The industrial processes and other product use sector

The industrial processes and other product use (IPPU) sector comprises of 'greenhouse gas emissions from manufacturing activities that generate emissions not exactly through energy consumed in the process and the use of man-made greenhouse gases in products. These consist of the release of carbon dioxide (CO_2) as a by-product of cement production and the use of fossil fuel (mostly natural gas) as raw materials in ammonia production'. (United Nations Framework Convention on Climate Change 2010:85).

Industrial Processes are processes that chemically or physically transform materials discharging greenhouse gases, other product use refers to greenhouse gases used in products such as 'refrigerators, foams or aerosol cans' (Intergovernmental Panel on Climate Change 2016:4). The largest source of emissions in the industrial processes and other product use sector in South Africa is from the production of steel and iron. (Environmental Affairs 2014:121).

Cement production

The main greenhouse gas emission in cement production is carbon dioxide (CO_2) emitted through clinker, which is an intermediate stage in the cement production process. According to Mineral Resources (cited in Environmental Affairs 2014:126), it is estimated that about 50 percent of cement demand goes to the residential building

market, as such, any changes in the prices of cement due to the carbon tax will affect cement sales and might have an adverse impact in the residential building market. (Environmental Affairs 2014:126).

Road Transport

According to the Intergovernmental Panel on climate change (cited in Environmental Affairs 2014:92), road transportation emitting activities include fuel consumption by cars, delivery vehicles, trucks, buses, tractors, and motorcycles. According to National Treasury (2018:24) non-stationary and stationary direct emissions for liquid fuel related emissions from diesel and petrol use or transportation activities will qualify for a basic 75 percent tax-free allowance to allow for administrative ease given that the carbon tax will be implemented through the fuel tax regime and applied at the refinery gate, the carbon tax will become payable for emissions above the threshold.

Agriculture

Methane (CH_4) is the only greenhouse gas produced from agricultural livestock production. Methane from enteric fermentation is according to Environmental Affairs (2014:157), 'produced in herbivores as a by-product of the digestive process by which carbohydrates are broken down into simple molecules for absorption into the bloodstream'. Methane emissions in the agricultural industry is dependent on the animal's digestive system and the amount and type of feed the animal consumes. (Environmental Affairs 2014:157).

Waste sector

Amongst the sectors that contribute to the growing quantities of greenhouse gas emissions is the waste sector. A large percentage of greenhouse gas emissions come from the managed solid waste landfills and waste treatment systems. There are also

significant emissions from the open burning of waste, emissions from the biological treatment of organic waste and emissions of greenhouse gas from the incineration of solid waste. (Environmental Affairs 2014:236).

Consumers

According to Mbadlanyana (2013:85), a carbon tax might also have an adverse impact on individual customers both rich and poor and corporate customers. According to Jorgenson (cited in Mbadlanyana 2013:85), a carbon tax has possible distributional consequences because it may have an impact on prices faced by consumers, the effect of a change in consumer prices could vary extensively among consumer groups with different needs.

It can, therefore, be concluded that any person who conducts activities in South Africa that results in greenhouse gas emissions may be liable for the carbon tax if they exceed the carbon tax threshold. In addition, s 54FD, of the Customs and excise Act 91 of 1964, requires 'every taxpayer to license each of their emissions facilities as a customs and excise manufacturing warehouse for the generation of emissions'.

This can result in consumers such as companies purchasing greenhouse gas emitting goods or services from other companies as well as individuals purchasing greenhouse gas goods or services from companies facing higher charges as a result of producers or service providers not being able to absorb the cost of the carbon tax.

The people of South Africa and businesses operating in South Africa who conduct activities that emit greenhouse gases will furthermore have to account for their emissions in South Africa by submitting environmental levy accounts on an annual basis. Carbon taxpayers will, therefore, need to possibly budget for the related costs to comply with the Carbon Tax Act. (Mason and De Jager, 2019).

Chapter 3: The provisions of the Carbon Tax Act

Businesses that produce direct greenhouse gas emissions must disclose their carbon emissions under the National Atmospheric Emissions Inventory System monitored by the Department of Environmental Affairs. The carbon tax design is aligned to this obligatory reporting to the Department of Environmental Affairs and only those who exceed the National Atmospheric Emissions Inventory System thresholds, also functioning as the carbon tax threshold, will be liable for the carbon tax. (South African Revenue Service 2019:5).

3.1. The implementation of carbon tax

The South African Revenue Service (2019:5) states that the gradual implementation of carbon tax provides for the first phase which runs from 1 June 2019 to 31 December 2022 and the second phase from 2023 to 2030. According to the National Treasury (2018:6), this will assist in providing certainty to businesses and also give a clear long-term price signal and coincides with the Carbon Tax Policy Paper of 2013.

3.2. Administration of the Act

The carbon tax works parallel with the environmental levy as contemplated in s 54A of the Customs and Excise Act. According to s 15 (1) of the Act, 'the Commissioner must administer the provisions of the Carbon Tax Act as if it were an environmental levy that must be collected and paid as stated in s 54A of the Customs and Excise Act'.

In administering the carbon tax as an environmental levy s 54AA of the Customs and Excise Act, states that a taxpayer as defined in s 1 of the Act, must according to s 54E of the Customs and Excise Act, license any premises on which emissions as defined in the Carbon Tax Act, occur. Emissions are defined in s 1 of the Act 'as the release of

greenhouse gases or their precursors into the atmosphere, in a specific area and over a period'.

It can be concluded that business entities that produce greenhouse gases within the borders of South Africa will still need to license any premises on which emissions occur regardless of whether they do or not exceed the carbon tax threshold as stated in s 3(b) of the Act, but only those that exceed the carbon tax threshold will be liable to pay for the carbon tax.

3.3. The carbon tax liability

According to National Treasury (2018:10) to determine an entity's carbon tax liability, the greenhouse gas emissions amount is calculated based on the combusted fuel or product processed as determined by an approved methodology per 4 of the Act.

Section 4(1) of the Act states that 'the carbon tax must be levied in respect of the sum of the greenhouse gas emissions of a taxpayer in respect of a tax period expressed as the carbon dioxide equivalent of those greenhouse gas emissions resulting from fuel combustion, industrial processes, and fugitive emissions in accordance with the emissions factors determined in accordance with a reporting methodology approved by the Department of Environmental Affairs'.

An approved methodology entails a Department of Environmental Affairs approved clear and authenticated monitoring process and the use of official emission factors as specified in Schedule 1 of the Act. Schedule 1 of the Act, provides country-specific and default Intergovernmental Panel on Climate Change (IPCC) emission factors for energy combustion, process emissions and fugitive emissions that must be used for mandatory reporting requirements through the National Atmospheric Emissions Inventory System monitored by Environmental Affairs. (National Treasury 2018:10).

The National Atmospheric Emissions Inventory System is an online portal monitored by the Department of Environmental Affairs. It is used to apply for an Atmospheric Emission License (AEL) in terms of the National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004) as well as the reporting of emissions data. (Environmental Affairs n.d.).

According to s 4(2) of the Act, 'if a reporting methodology approved by the Department of Environmental Affairs to determine emission factors does not exist for the calculation of greenhouse gas emissions from fuel combustion, industrial processes, and fugitive emissions the carbon tax must be levied in respect of the sum of the greenhouse gas emissions of a taxpayer in respect of a tax period expressed as the carbon dioxide equivalent of those greenhouse gas emissions'.

Section 4(2) also sets out the formulae for the calculation of fuel combustion in respect of fugitive emissions and industrial processes in a tax period. The contents of the formulas are shown in appendix B of this report. The purpose of the report is to determine the likely effects of the implementation of carbon tax in South Africa, as such the contents of the formula in Appendix B will not be analysed.

The carbon tax rate on greenhouse gas emissions must according to s 5(1) of the Act, be imposed at R120 per ton of carbon dioxide equivalent of greenhouse gas emissions by a carbon taxpayer. The carbon tax rate of R120 per ton of carbon dioxide equivalent to greenhouse gas emissions must according to s 5(2) of the Act, 'be increased by the amount of the consumer price inflation plus two percent for the subsequent tax periods as set out by Statistics South Africa per year until 31 December 2022.

According to National Treasury, this is per the Carbon Tax Policy Paper of 2013 which proposed that 'the tax rate of a R120 per ton of carbon dioxide (CO_2) equivalent be increased at a rate of 10 percent per annum until the end of 2019, followed by a

review during 2019, to announce an updated annual rate of increase in the 2020 Budget' (National Treasury 2018:6).

3.4. Carbon tax allowances

The Carbon Tax Act design goes hand in hand with the design of international carbon pricing schemes which businesses use as carbon offsets to lessen their carbon tax liability. This includes schemes like the European Union Emissions Trading Scheme which approves the use of offset credits produced by projects allowed under the Clean Development Mechanism, as well as schemes in California and the Canadian Province of Alberta. (Republic of South Africa 2018:3).

Tax-free allowances are permitted in the first phase to reduce the effect of the carbon tax. The aim is to take into account the potential adverse impacts the carbon tax might have on the global competitiveness of the main international industries and to allow a smooth shift to a low carbon economy. (National Treasury 2018:4).

Tax-free allowances range from 60 percent and 95 percent. This results in an effective carbon tax rate of between R6 and R48 per ton of carbon dioxide (CO_2) equivalent. (National Treasury 2018:20).

Tax-free allowances are as follows:

3.5. Fossil fuel combustion emissions allowance

According to s 1 of the Act, 'fugitive emissions are emissions that are released into the atmosphere by any other means than through a deliberate release through stack or vent including extraction, processing, delivery and burning for energy production of fossil fuels, including leakages from industrial plant and pipelines.

A taxpayer that conducts an activity in respect of fuel combustion emissions that is listed in Schedule 2 of the Act, in the column 'Activity/Sector' must according to s 7(1) of the Act, 'be entitled to an allowance in respect of those emissions, determined in terms of s 7(2) of the Act'.

According to s 7(2), 'the percentage of the allowance referred to in s 7(1) must be determined by matching the line in which the activity is contained in the column 'Activity/Sector' with the corresponding line in the column 'Basic tax-free allowance for fossil fuel combustion emissions percentage' in Schedule 2 of the Act, of the total percentage of greenhouse gas emissions in respect of a tax period in respect of that activity'.

The basic tax-free threshold is 60 percent for the fuel combustion emissions, excluding for liquid fuel related emissions from diesel and petrol use. (National Treasury 2018:24).

According to Strydom and Bradfield C (2019), taxpayers may utilise allowances in the first phase to decrease their tax liabilities. This is related to the nature of the 'Activity/Sector' generating greenhouse gas emissions.

3.6. Industrial process emissions allowance

Section 8(1) of the Act, states that 'a taxpayer that conducts an activity in respect of industrial process emissions that is listed in Schedule 2 of the Act, under the column 'Activity/Sector' must get an allowance in respect of those emissions, determined in terms of s 8(2)'.

According to s 8(2) of the Act, 'the percentage of the allowance referred to in s 8(1) must be determined by matching the line in which the activity is contained in the column 'Activity/Sector' with the corresponding line in the column 'Basic tax-free

allowance for process emissions percentage' in Schedule 2 of the Act, with the total percentage of greenhouse gas emissions in respect of a tax period for that activity'.

Greenhouse gas emissions from chemical processes that arise in certain chemical processes, for example, 'coal gasification, crude oil cracking and the production of cement, iron, steel, glass, ceramic and certain chemicals, such as calcium carbide and titanium dioxide have little potential for mitigation over the short term'. These emissions are subject to a higher tax-free basic percentage-based threshold than energy combustion emissions apart from liquid fuel related emissions that are, non-stationary and stationary direct emissions from diesel and petrol use. Industrial process emissions of 70 percent are allowed a basic percentage based threshold, the tax is not payable for anything below. (National Treasury 2018:24).

3.7. Allowance in respect of fugitive emissions

Section 9(1) of the Act, states that a 'taxpayer that conducts an activity that is listed in the 'Activity/Sector' on Schedule 2 of the Act, should get an allowance in respect of fugitive emissions in a percentage determined in terms of s 9 (2)'.

The above allowance must according to s 9(2) of the Act, be 'determined by matching the line in which the activity is contained in the column 'Activity/Sector' with the corresponding line in the column 'Fugitive emissions allowance percentage' in Schedule 2 of the Act, for the total percentage of greenhouse gas emissions of the tax period of that activity'.

According to the National Treasury (2018:24), this allowance is provided because the possibility for mitigation of fugitive emissions is limited over the short term.

3.8. Trade exposure allowance

Businesses that are trade exposed and sensitive to international competition qualify for a trade exposure allowance. This allowance is industry-based consisting of exports and imports. Trade exposure at a sector or subsector level will be measured on the basis of trade intensity. In cases where satisfactory production information is not accessible, the closest proxy for production will be taken into consideration. (National Treasury 2018: 24).

Trade intensity is used to assess if the value of trade between two countries is higher or lower than expected based on their significance in world trade. It evaluates an economy's incorporation with the world economy. An economy is more vulnerable to external shocks in the world economy if it has a higher trade intensity. (World Bank n.d.).

Section 10 of the Act, states that a 'taxpayer that is liable for the carbon tax in respect of greenhouse gas emissions is entitled to an allowance up to a maximum of 10 percent in respect of trade exposure as measured by the amount of exports plus imports divided by the total production by sector or subsector that must be determined in a manner prescribed by the Minister by regulation'.

According to National Treasury (2018:25), an intensity threshold of 30 percent applies to certify that industries with a trade intensity of 30 percent and above are eligible for the entire 10 percent allowance, this is classified as high trade intensity. Industries with a trade intensity of 30 percent or less but equivalent or more than 10 percent will get a progressive allowance ranging from 3 to 9 percent. This is classified as medium trade intensity. Low trade intensity industries with a trade intensity of less than 10 percent do are not eligible for the allowance. (National Treasury 2018:25).

3.9. Performance allowance

Section 11(1) of the Act provides an added tax-free allowance of up to 5 percent to compensate all businesses that have taken voluntary measures to decrease their greenhouse gas emissions.

The National Treasury (2018:26) states that an approved greenhouse gas emissions intensity benchmark, as well as direct and indirect emissions for the sector or subsector, will be applied to calculate the allowance. Businesses whose emissions intensity is lower then sector or sub-sector benchmark will be rewarded (National Treasury 2018:26).

Section 11(1) sets out a formula for calculating the allowance, the formula is shown in Annexure A of this report.

3.10. Carbon budget allowance

Subject to s 12 (2), s 12(1) of the Act states that 'a taxpayer that conducts an activity that is listed in the column 'Activity/Sector' in Schedule 2 of the Act, and takes part in the carbon budget system during or before the tax period must get a further 5 percent allowance of the total greenhouse gas emissions in respect of a tax period'.

According to the National Treasury (2018:26), this is in acknowledgment of the carbon budget process being developed by the Department of Environmental Affairs. Section 12(2) states that a taxpayer will only be entitled to this allowance if the Department of Environmental Affairs agrees in writing that the taxpayer contributes to the carbon budget system.

3.11. Offset allowance

According to National Treasury (2018:26), Section 13 of the Act, permits the use of carbon offsets by businesses to lessen their tax payments. Carbon offsets are expected to give businesses more flexibility to decrease their greenhouse gas emissions.

Section 13(1) subject to s 13(2) of the Act, states that 'a taxpayer must reduce the amount of the carbon tax that the taxpayer is liable for in respect of a tax period by making use of carbon offsets as prescribed by the Minister'.

The decrease of the liability for the carbon tax allowed in terms of s 13 (1) must according to s 13(2) 'not be more than the percentage of the total greenhouse gas emissions of a taxpayer in a tax period as determined by matching the line in the column 'Activity/Sector' with the percentage in the corresponding line of the column 'Offsets allowance percentage' in Schedule 2 of the Act'.

3.12. Limitation of allowances

A taxpayer, other than those with a maximum total allowance of 100 percent according to schedule 2 of the Act, must according to s 14 of the Act, 'only be entitled to the sum of the allowances in respect of a tax period to the extent that the total of those allowances is not more than 95 percent of the total greenhouse gas emissions of that taxpayer in a tax period as determined in terms of the column 'Maximum total allowances percentage' in Schedule 2' of the Act.

Section 14 of the Act provides a limit on the total tax-free allowances that a liable entity may be entitled to. The general tax-free allowance threshold is mostly limited to 95 percent per schedule 2 of the Act. (National Treasury 2018:26).

In conclusion, the carbon tax liability is calculated based on a sectoral activity with the corresponding threshold per schedule 2 of the Carbon Tax Act. To determine how much allowance an entity is entitled to, reference must be made to schedule 2 of the Act. An extract of schedule 2 of the Act with sectorial activities and their corresponding thresholds and allowances is provided in Appendix A of this report.

3.13. Calculation of the amount of carbon tax payable

Section 6 (1) of the Act subject to s 6(2), sets out the formula for the calculation of the amount of carbon tax payable by a taxpayer in respect of a tax period. The contents of the formula are set out in Appendix B of this report.

According to the National Treasury (2018:20), the amount of carbon tax payable is calculated by multiplying the tax base adjusted by the tax-free allowances with the carbon tax rate of R120. Tax-free allowances will be granted during the first phase of the implementation of Carbon Tax (1 June 2019 to 31 December 2022). (National Treasury 2018:20).

The tax liability for industries that generate electricity for distribution is set out in s 6(2) of the Act, this of the Act also takes into consideration electricity generated from renewable energy. According to the National Treasury (2018:23), based on the renewable energy premium s 6(2) of the Act, also provides an allowance for the actual calculated implicit carbon price, for example, wind, solar and small-scale hydro. The carbon tax impact on electricity prices will be reduced by the Renewable Energy Premium (REP) allowance and will avoid 'double taxation'. The contents of the formula are set out in Appendix B of this report.

According to the South African Revenue Service (2019:9), the Carbon Tax Act excludes fossil fuel combustion emissions of petrol and diesel from the computation of the amount of Carbon Tax payable. The assumption is that these emissions are taxed under the current fuel tax regime and to prevent double taxation. In the 2019 budget,

the Minister of Finance announced the introduction of a carbon fuel levy for petrol and diesel as part of the current fuel levy mechanism to coincide with the implementation of the broader carbon tax. The current fuel levy is imposed in terms of the Customs and Excise Act and its carbon fuel levy component is levied under the Customs and Excise Act, hence, the carbon fuel levy is a separate impost from the broader carbon tax. (South African Revenue Service 2019:9).

3.14. Emission factors for energy combustion emissions

According to National Treasury (2018:12), 'Energy combustion emissions are categorised based on whether they originate from a stationary or mobile source class and their emission factors also vary across these classes. Biomass is generally used as a fuel, often in combination with fossil fuels. Companies must safeguard that carbon dioxide (CO_2) emissions from biomass burning are excluded from fossil fuel emissions that is, methane (CH_4) and nitrous oxide (N_2O) emissions as these gases are not sequestered during the replantation of forests, and regrowth'. (National Treasury 2018:12).

The fossil component of blended fuels or biomass must be submitted to the Department of Environmental Affairs, which is why it is taxable although it is not necessary to report the carbon dioxide element since it is assumed to be carbon neutral. Energy recovery from waste is regarded as energy emissions and the Department of Environmental Affairs must be informed of it**.** The carbon tax is included in the fuel tax regime for stationary and non-stationary mobile emissions resulting from the use of liquid fuels mostly petrol and diesel. (National Treasury 2018:5).

3.15. Administration and collection of the carbon tax

Section 15(1) of the Act, 'states that the Commissioner has to manage the provisions of the Carbon Tax Act as if it were an environmental levy as contemplated in s 54A of the

Customs and Excise Act, that has to be collected and paid in terms of the provisions of that Act'.

According to s 15 (2) of the Act, 'the collection and payment of the carbon tax as an environmental levy or the performance of any duty, power or obligation or the exercise of any right in terms of the Carbon Tax Act are not regulated in the Carbon Tax Act but rather regulated by the Customs and Excise Act, 1964'.

This means that the provisions of the carbon tax are legislated in terms of the Carbon Tax Act, but the Carbon Tax Act is administered as an environmental levy under the Customs and Excise Act.

In administering for the carbon tax, s 17 of the Act states that a taxpayer has to 'submit yearly environmental levy accounts and payments as prescribed by s 54FD of the Customs and Excise Act'.

According to s 54FD (2) of the Customs and Excise Act, every carbon taxpayer must license each carbon emissions facility as a customs and excise manufacturing warehouse for the generation of emissions liable for the carbon tax. Taxpayers that conduct taxable activities of domestic aviation, railways or water-borne navigation must elect the premises of their operational control in South Africa as their emissions facility and license such emissions facility as a customs and excise manufacturing warehouse for the generation of emissions liable to carbon tax.

Every licensee must according to s 54FD (4) of the Customs and Excise Act submit payment of the environmental levy, for each tax period within the period prescribed as:

- 'A separate yearly account on form DA 180 and its annexures that provides the environmental levy liability in accordance with s 54FD (03) of the Customs and Excise Act, for every licensed emissions facility';

- A consolidated payment for the full environmental levy liability.

The licensee must also submit all supporting documents that the Commissioner might require. The above documents and payment must according to s 54FD (4) of the Customs and Excise Act 'be submitted in the month of July of the year following the tax period, but not later than the last working day of that month'.

The carbon tax is administered jointly by the South African Revenue Service and the Department of Environmental Affairs. The Department of Environmental Affairs collates the emissions information which forms the basis of the carbon tax and incorporates it into the South African National Atmospheric Emissions Inventory System. (Mason and De Jager, 2019).

The South African Revenue Service is responsible for the collection and assessment of the tax and is assisted by the Department of Environmental Affairs in validating reported emissions. Alignment amongst the Department of Environmental Affairs and the South African Revenue Service systems has begun already. The intended purpose is that taxpayers can use their Department of Environmental Affairs details for the South African Revenue Service carbon tax registrations. (Mason and De Jager, 2019).

The South African Revenue Service's access to the Department of Environmental Affairs emission databases will force taxpayers in strictly adhering to the applicable emission thresholds, and where exceeded carbon tax will be payable. (Mason and De Jager, 2019).

In conclusion, any person who conducts activities that emit greenhouse gasses above the carbon tax threshold as stipulated in schedule 2 of the Act will be liable for the carbon tax. That carbon tax taxpayer must license any premises where emissions occur per s 54AA of the Customs and Excise Act. To determine the amount of the carbon tax payable the basic calculation is:

Carbon Tax liability = Tax base – Tax free allowances x Carbon tax rate (R120).

While the formula itself seems to be simple, multiple sub formulae go into the calculation of the carbon tax liability which is beyond the scope of this report. The contents of the formula are however set out in Appendix B of this report.

Chapter 4: The South African Carbon Tax Legislation in comparison to the legislation of other countries

This chapter examines the effects the introduction of carbon tax has had for Australia, Sweden, and China and compares these countries' Carbon Tax Legislation to South Africa's. These countries' carbon tax legislation was selected as comparisons to South Africa due to the successes as well as failures the implementation of carbon tax has had for the countries as a result of political, economic and social impacts. Analysing these countries' carbon tax legislation will also assist in determining whether they have any similarities to the South African Carbon Tax Act, which may also assist in determining the likely impact the introduction of a carbon tax might have for South Africa which will be discussed in the next chapter.

4.1. Australia

According to a 2011 report by the Australian Government (cited in Spash and Lo 2012:72) Australia at the time was reported as the highest per capita emitter of carbon dioxide (CO_2) globally. In 2011 the Australian government pledged to reduce unilaterally the Australian carbon dioxide equivalent emissions by 5 percent by the year 2020, the government also anticipated increasing this by an additional 15 percent or 25 percent with regards to global action. The carbon tax scheme was according to the Australian Government aimed to cover 'methane and nitrous oxide emissions from stationary energy, waste, rail, domestic aviation and shipping, industrial processes and fugitive emissions and perfluorocarbon emissions from the aluminum sector'. (Australian Government cited in Spash and Lo 2012:72).

This chapter discusses some of Australia's environmental taxes and compares them to the South African Carbon Tax Act. This will assist in examining the main research question on the likely effects of the carbon tax for South Africa.

The Australian Environmental taxes which have now been repealed due to a lack of political backing were as follows:

4.1.1. The Carbon Pollution Reduction Scheme

In May 2009 the Australian Government introduced the Australian Emissions Trading Scheme (AETS) known as the Carbon Pollution Reduction Scheme together with some enabling regulations. Under the Carbon Pollution Reduction Scheme, emissions reduction unit permits were set to be allocated without restrictions to main polluters and trade exposed sectors. (Spash and Lo 2012:72).

An emissions reduction unit is according to the Clean Energy Regulator a 'tradable unit representing one tonne of carbon dioxide-equivalent (tCO_2-e) of emissions abatement or sequestration'. Emissions reduction units are allocated to projects listed under the Joint Implementation (JI) mechanism. Developed country parties may use emissions reduction units to reach their obligations to reduce or limit emissions. (Clean Energy Regulator, 2015).

Section 4 of the Australian National Registry of Emissions Units Act 2011 states that emission reduction units were issued according to the applicable provisions of the Kyoto Protocol. The Kyoto Protocol emissions credit work as a certificate permitting someone to emit greenhouse gases. (Pears and Baxter,2019).

The Carbon Pollution Reduction Scheme was an emission trading scheme that was part of a framework intended to decrease carbon dioxide emissions and other greenhouse gases, 'measured in parts per million of carbon dioxide equivalent'. (Betz and Owen, 2010).

According to clause 3(1) of the Carbon Pollution Reduction Scheme Bill, the purpose of the bill is:

- ‘To give effect to commitments made by Australia under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol to that Convention;
- To sustain the creation of an efficient global climate change response, and;
- To take steps to allow Australia‘s greenhouse gas emissions reductions to meet emissions reduction goals’.

The objectives of clause 3(1) of the Carbon Pollution Reduction Scheme Bill is similar to the objectives of the South African Carbon Tax Act, which is amongst other things aimed at implementing a tax on the carbon dioxide (CO_2) equivalent of greenhouse gas emissions, as it was crucial to support the global efforts on reducing greenhouse gases to combat harmful anthropogenic tampering with the climate system within a timespan that allows the continuation of economic, social and environmental development in a feasible way (Carbon Tax Act 2019:2).

The introduction of the Carbon Pollution Reduction Scheme was also aimed at covering about 70 percent of Australia’s gas emissions which included many emitting sources, from electricity generation to the transport sector (Spash and Lo 2012:72).

4.1.2. Liability for the Carbon Pollution Reduction Scheme

According to Parliament of the Commonwealth of Australia (2012:27), under the Carbon Pollution Reduction Scheme, liable entities would have been required to submit eligible emissions units. In a financial year, a person may have been an eligible entity if that person:

- Was accountable for greenhouse gases released directly from a facility;
- Imported or produced or supplied specific fuels, or;
- Imported manufactured or supplied synthetic greenhouse gas.

Section 4(1) of the Act, similar to the Carbon Pollution Reduction Scheme liability states that 'a carbon tax shall be imposed on a taxpayer's amount of greenhouse gas emissions over a tax period as a carbon dioxide equivalent of greenhouse gas emissions'.

Section 54A of the Customs and Excise Act which works concurrently with the Carbon Tax Act similar to the Australian Carbon Pollution Reduction Scheme states that an environmental levy must be charged on imported goods and goods manufactured in South Africa as stipulated in Part 3 of Schedule 1 of the Act.

It can be concluded from the above that the method of liability to both the Australian Carbon Pollution Reduction Scheme and the South African Carbon Tax Act are similar even though the calculations of the liability may differ.

According to Jotzo, Betz, and Spash (cited in Spash and Lo, 2012:72) the Carbon Pollution Reduction Scheme allowed purchases of unrestricted quantities of credit permits (the Kyoto Protocol emissions credits). The Kyoto Protocol was introduced to the United Nations Framework Convention on Climate Change and was implemented in Kyoto, Japan and effective in February 2005, the main objective of the Kyoto protocol was to minimise the atmospheric concentrations of greenhouse gas emissions in a manner that avoids harmful intrusions with the climate system (Freeman, 2013).

4.1.3. The Kyoto Protocol credits

The Kyoto Protocol is an international agreement on climate change, which offers, inter alia, a basis for an international cap and trade scheme. (Parliament of the Commonwealth of Australia 2010: 86).The Kyoto Protocol emissions credit work as a certificate permitting someone to emit greenhouse gases. The credits represent emissions that could have been released into the atmosphere under international commitments but were not. Australia allowed organisations to use these credits as

offsets, this was part of the Australian emissions reduction strategy. (Pears and Baxter 2019).

Sections 7 to s 13 of the Act, similar to the Kyoto Protocol credits allows South African carbon taxpayers to deduct allowances specific to that carbon taxpayer's industry in the calculation of the carbon tax liability, this is aimed at reducing the amount of the carbon tax payable.

4.1.4. The Carbon Pollution Reduction Scheme repeal

The scheme was scheduled to commence on 1 July 2011. Despite the polarisation of public opinion, the Carbon Pollution Reduction Scheme was supported by the majority of Australians. However, in November 2009, the Carbon Pollution Reduction Scheme was withdrawn after being voted down in the Senate. This big policy failure tarnished the reputation of the Prime Minister of that time, who led the Carbon Pollution Reduction Scheme campaign. He was thereafter his political party demanded him to resign from his office. (Spash and Lo 2012:72).

4.1.5. The Energy Policy Package

In July 2011, the Multi-Party Climate Change Committee including Greens and Independents was requested to come up with a policy response to Australia's expanding greenhouse gas emissions. In November 2011 an introduction of the Energy Policy Package which passed through the Senate was announced. This was an Energy Policy Package with some components of carbon dioxide (CO_2) equivalent tax intended to meet nominal greenhouse gas emissions targets nationally. Under this plan, big polluting companies were required to submit to the government a permit for every tonne of carbon dioxide (CO_2) equivalent that the company produces for each financial year. (Spash and Lo 2012:73).

The goal of this carbon reduction scheme was to price carbon emissions in Australia. This was implemented through the 2011 Clean Energy Act and related laws and extended to the largest carbon emitters in Australia, referred to as liable entities. Under the scheme, those that were liable had to pay for the generated emissions during the financial years 2012-2013 and 2013-2014. This represented nearly 60 percent of carbon emissions from electricity generation, stationary energy, landfills, wastewater, industrial processes, and fugitive emissions, stationary energy, landfills, wastewater, industrial processes, and fugitive emissions. This carbon mitigation scheme included big business and industrial facilities, but it did not explicitly affect the balk of the smaller companies and households in Australia. (Clean Energy Regulator, 2015).

4.1.6. How the Energy Policy Package worked

Liable entities had to submit one qualifying emissions unit for each tonne equivalent of carbon dioxide (CO_2-e), that they emitted. Carbon units were acquired from the Renewable Energy Regulator in 2012-2013 at $23 per unit, in 2013-2014 they were at $24.15 per unit. Liable entities that did not submit any or sufficient units were liable for a 'unit shortfall charge'. This fee was fixed at 130 percent of the unit price multiplied by the number of units in that financial year. This encouraged companies to submit units under the mechanism than paying more through the unit shortfall charge. (Clean Energy Regulator, 2015).

4.1.7. Liability in terms of the Act

Entities releasing covered scope 1 emissions equivalent to 25 000 tonnes of carbon dioxide equivalent (CO2-e) or more in a facility during a specific financial year were liable. Entities were also liable if they supplied 'natural gas, imported, manufactured or produced liquefied petroleum gas or liquefied natural gas for non-transport use in a financial year, or if it was an Obligation Transfer Number (OTN) holder that quoted its

Obligation Transfer Number in a [manner] that gave rise to a liability'. (Clean Energy Regulator, 2015).

An Obligation Transfer Number (OTN) shifted the carbon liability of the potential greenhouse gas emissions incorporated in an amount of natural gas liquefied petroleum gas (LPG) or liquefied natural gas (LNG) obtained from a gaseous fuel supplier to the recipient of that gas. If natural gas was supplied by an entity to another entity who is a recipient or if an entity 'imported, manufactured or produced liquefied petroleum gas (LPG) or liquefied natural gas (LNG) for non-transport purposes', that entity was liable for the probable greenhouse gas emissions contained in the gas, except for instances where liability was shifted from the selling entity to the recipient by quoting an Obligation Transfer Number. (Clean Energy Regulator, 2015).

According to the Clean Energy Regulator (2015), the Obligation Transfer Number was used to monitor liability to avoid it being charged twice on the same volume of natural gas, liquefied petroleum gas or liquefied natural gas.

Section 4 of the Clean Energy Act 2011, states that if an entity was accountable for the emission of greenhouse gasses covered from operating a facility, and the yearly emissions of a facility exceeded the threshold, and that entity does not transfer one qualifying emissions unit per tonne of carbon dioxide equivalent of the gas, that entity was liable for the unit shortfall.

under s 4 of the Clean Energy Act, 'if a supplier of natural gas did not supply eligible emissions unit for each tonne of carbon dioxide equivalent of the potential greenhouse gas emissions contained in natural gas, that supplier became liable for the unit shortfall charge'.

The unit shortfall charge motivated entities to submit units instead of paying the higher unit shortfall charge. Carbon pricing mechanisms comprised of techniques for

measuring liability for emissions, assigning free units to sectors that are energy intensive trade exposed, settling liabilities for emissions by payment and submission methods for permitted emissions units, and surrendering units. In some instances units were given back to the Commonwealth without being submitted to the government. (Parliament of the Commonwealth of Australia 2012:107).

4.1.8. Greenhouse gas (Import Levy) Act

The Clean Energy Package also introduced a carbon price for importing or processing of bulk synthetic greenhouse gas and imports of products containing these gases. The carbon tax value and global warming potential were applied to calculate the carbon price for every gas relative to carbon dioxide at the point of import or manufacture. This was called the 'applicable charge rate' in the Ozone (Import Levy) Act. The applicable charge rate formed part of the levy imposed on the import or manufacture of synthetic greenhouse gas or products that have these gasses. (Parliament of the Commonwealth of Australia the Senate, 2012:81).

According to the Parliament of the Commonwealth of Australia, 'the Ozone Manufacture Amendment Bill and the Ozone Import Amendment Bill removed the applicable charge rate from the Ozone (Manufacture Levy) Act from 1 July 2014'. This ensured that importers and manufacturers of synthetic greenhouse gas and products comprising of such gases were not liable for the carbon price of gas manufactured and imported and equipment from 1 July 2014. (Parliament of the Commonwealth of Australia 2012: 82).

In comparison to the South African Carbon Tax Act, Section 10 of the Act 'provides for a tax-free allowance to entities that are trade exposed and sensitive to potential international competitiveness', the allowances per schedule 2 of the Act are not only based on Synthetic Greenhouse gas like the Australian Ozone manufacture and Synthetic Greenhouse gas (Import Levy) Act but rather applies to all industries that are trade exposed by way of imports and exports.

4.1.9. Withdrawal of the Australian carbon prices mechanisms

The Australian carbon pricing mechanisms lacked broad political support and were repealed in 2014 (Springmann, Sacks, Ananthapavan, Scarborough 2018: 523). The Australian political parties were broadly in agreement from 2007 to 2009 with regards to enforcing a carbon tax, but the liberal opposition party changed their leader. This resulted in the opposition party rejecting carbon pricing, and their new leader promised to call off the legislation if and when in power. (Burnette 2015:25).

The rationale behind the withdrawal of the carbon tax was to cut costs for businesses and households. In 2012 the Australian Treasury advised that withdrawing the carbon tax in 2014 to 2015 would result in the average cost of living for all households around $550 lower than expected between 2014 and 2015. (Parliament of the Commonwealth of Australia 2012:104).

In conclusion, according to s 4 the Australian Clean Energy Act, if a natural gas supplier, did not surrender eligible units for the potential greenhouse gas emissions, they were liable for the unit shortfall, whereas the carbon tax liability according to section 4(1) of the South African Carbon Tax Act arises for every taxpayer who conducts an activity in South Africa resulting in greenhouse gas emissions above the threshold as determined in Schedule 2 of the Carbon Tax Act.

The Australian carbon reduction emission schemes used emission credit units to reduce the carbon tax liability. The South Africa Carbon Tax Act, on the other hand, provides specific allowances for the reduction of the carbon tax liability.

The basis for the determination of companies subject to the carbon tax in Australia was based on the amount of emissions that they emitted instead of the industry they belonged to (Burnette 2015:28). This is different from the South African Carbon Tax Act as every person who conducts carbon emitting activities above the 'Threshold' per the 'Activity/Setor' in schedule 2 of the Act is liable for the carbon tax.

4.2. Sweden

Sweden is a small, open country with a population of 9.5 million and a nominal gross domestic product per capita that was classified as one of the richest countries in the world in 2015. In 1991 Sweden was amongst the first countries in the world to introduce climate change policies such as the carbon tax. (Word Bank cited in Andersson, 2019:7).

The Swedish carbon tax has been the countries leading climate policy instrument from 1991, taxing energy emissions in transport, buildings (heating), industry, and agriculture. Sweden is one of the first and best carbon price signals with the world's highest sector coverage of about EUR 120/ tons of carbon dioxide (CO_2) equivalent. (Ackva and Hoppe, 2018:1).

Sweden has been a pioneer of global environmental policy and was among the first signatories and ratifies of the Kyoto Protocol at the turn of the millennium (Ackva and Hoppe, 2018:2). The Kyoto protocol works as a certificate permitting someone to emit greenhouse gases, the credits represent emissions that could have been released into the atmosphere under international commitments but were not (Pears and Baxter, 2019).

The current red-green government of Sweden under Prime Minister Stefan Löfven has pledged to being greenhouse gas neutral by the year 2045. The country currently has the least pollution rate (per unit of gross domestic product) (GDP) and the second lowest greenhouse gas emissions per capita in the European Union (EU). (Ackva and Hoppe 2018:2).

The following represents Sweden’s Environmental taxes:

4.2.1. The Energy tax

The Energy tax was implemented in the 1930s and initially only applied to petrol and diesel. Currently, the tax applies to 'oil products (diesel and petrol), coal, coke and natural gas'. The rate of Energy Tax per product differs in relation to its energy element but is also based on its use. Sectors that are economically affected by the Energy Tax in Sweden include road transport, industry, agriculture and fishing as well as the residential and commercial sector. The road sector bears the highest rate of tax in comparison to other sectors, this may be due to the sectors heavy reliance on diesel and petrol. (OECD, 2019:2).

The Nordic Council of Ministers (2009:83), summarises the Swedish Energy tax into two components; (1) Selective sales tax on fuels and (2) Tax on electric power. The components of the Energy Tax were put in place to take into account the energy, environmental policy and fiscal considerations. (Nordic Council of Ministers 2009:83).

Sales tax on fuel is imposed on volume. There are however exclusions for liquid petroleum gas (LPG), coal-based fuels and petroleum coke, as they are taxed based on weight. To distinguish the fuel tax rate, products are divided into environmental classes and by considering the use of the fuel. (Nordic Council of Ministers 2009:83).

The energy tax was redesigned in 1991 this resulted in the tax being lowered primarily as a result of the implementation of the Carbon Dioxide Tax (CO_2). The energy tax has continuously increased since then due to the increasing attention on the negative impact of fossil fuel consumption on the environment. (Nordic Council of Ministers, 2009:83).

The tax on electric power consumption includes electricity consumed in Sweden, whether generated locally or imported. The energy which is exported and used outside the country is not taxable.

4.2.2. Carbon dioxide tax

The Swedish carbon dioxide tax was implemented in January 1991 (de Mooij, 2000). The tax is imposed on all fossil fuels according to their carbon content percentage. (Government office of Sweden, 2020).

Carbon dioxide emissions through burning fossil fuels are proportionate to the carbon content of the fuel. There is no requirement to calculate actual emissions, which significantly simplifies the system. The combustion of renewable biofuels does not amount to a net increase of carbon in the environment, as a result, it is not subject to carbon dioxide tax. (Government office of Sweden, 2020).

Fossil Fuels combusted for electricity generation in Sweden is not taken into account in the calculation of the carbon dioxide tax, these are however very limited in Sweden as most electricity generation is decarbonised. The carbon dioxide tax is charged with the energy tax which is imposed based on energy instead of the carbon content. The proceeds generated through the carbon dioxide tax contributes to the government's general budget, contributing approximately 0.5 and 1 percent of the Swedish gross domestic product between 2000 and 2015. (Ackva and Hoppe, 2018:5).

4.2.3. Sulphur dioxide tax

The Environmental Inorganic Chemistry for Engineers (2017), state that 'sulphur dioxide (SO_2) is a pungent corrosive gas mainly produced from the burning of coal or crude oil in power plants and from factories that produce chemicals, paper, or fuel.

The Swedish sulphur dioxide tax was implemented on mineral products in 1991. The purpose of the sulphur dioxide tax was to alter the consumption of oil to low-sulphur oil. The sulphur dioxide tax only applies to the fuel classes with the uppermost sulphur content, heavy fuel oil, coal and peat. Oil with sulphur content of less than 0,05 percent is excluded from the tax and, while the tax is limited to a maximum tax rate

equal to 0.2 percent of the sulphur content. The weight of the sulphur in the fuel is the basis for the taxation of the sulphur content on coal. The sulphur tax rate still remains at 30 SEK/kg for sulphur on solid fuels and 27 SEK/kg for each thousandth of sulphur content by weight in oils since introduction in 1991. (Skatteverket cited in Nordic Council of Ministers 2009:82).

Fuels used in the production of lime, stone and cement, and soda boilers in the pulp and paper industry are not liable for the sulphur dioxide tax. Diesel and heating oils used for shipping, trams, railways, and aviation fuel are also excluded. (Nordic Council of Ministers 2009:82).

4.2.4. Nitrogen oxide Charge

Sulphur emissions from nitrogen oxides combined with Sulphur deposits result in acidification of water and soil. Nitrogen oxides (NO_x) are created through combustion and the actual quantity produced depends on the temperature at which combustion takes place. (Nyman, 1998).

According to the Nitrogen Oxide Act (cited in Nature Vards Verket, 2006), the charge is levied on emissions of nitrogen oxides from boilers, stationary combustion engines and gas turbines of at least 25-gigawatt hours (GWh) of usable energy per year. The Nitrogen Oxide Act mostly targets boilers. The Nitrogen Oxide charge focuses on actual recorded emissions. It is levied regardless of the fuel used. (Nature Vards Verket, 2006).

The nitrogen oxide charge is levied on measured emissions or probable emissions levels of '250 milligrams per megajoule (mg per MJ) for boilers and 600 mg per MJ for gas turbines'. Operators of plants may elect to pay the charge based on projected emissions levels or through the installation of measuring equipment. The projected emissions rates are in most cases significantly higher than the real emission, therefore, measurement is mostly preferred. The projected levels are also used when the

measuring equipment is not in good working condition or does not meet the requirements of the Swedish Environmental Protection Agency (Swedish EPA). In order to allow time for repair and calibrate the measuring equipment, operators can estimate emissions up to 37 hours per month, based on emissions under similar operating conditions. (Nature Vards Verket, 2006).

The Swedish Carbon Dioxide Tax according to Ackva and Hoppe (2018:5), does not include fossil fuels combusted for electricity generation, but these are scarce in the Swedish context as most electricity generation is decarbonized. In South Africa, fossil fuel electricity generators are subject to an environmental levy and they are permitted to offset some of their carbon tax liability from the revenue generated from the environmental levy (ELR) (National Treasury 2018:23).

South Africa also excludes the fossil fuel combustion emissions of petrol and diesel from the calculation of the carbon tax liability, this is under the assumption that these emissions will be taxed under the current fuel tax regime and to prevent double taxation (South African Revenue Service, 201:9), while the Swedish Energy Tax rate for each product e.g. diesel and patrol varies in proportion to its energy content as well as its use (OECD 2019:2).

In conclusion, South Africa is a developing country with a population of about 58,78 million (Statistics South Africa, 2019). Sweden has a population of 9.5 million and a nominal gross domestic product per capita that is rated as the eleventh richest country in the world in 2015 (Word Bank cited in Andersson 2019:7).

The basis for the introduction of environmental taxes for both Sweden and South Africa are similar, for South Africa they are to limit greenhouse gas emissions by facilitating a feasible and reasonable shift to a low-carbon economy (National Treasury 2018:3). Environmental taxes in Sweden ensure that emissions are decreased cost-

effectively while promoting the production and implementation of modern, renewable technologies (Government office of Sweden, 2020).

The calculation of environmental taxes between the two countries is different, this may be due to multiple factors including South Africa's heavy reliance on coal. The oil and coal dependent sectors in South Africa are responsible for about 80 percent of South Africa's greenhouse gas emissions profile. The export of carbon-intensive goods contributes to about 40 percent of South Africa's emissions rather than domestic consumption. The country obtains 97 percent of its primary energy from fossil fuels, and 76 percent of that energy is coal. (Mbadlanyana 2013:79).

The fact that South Africa is still a developing country may also be a factor. Sweden has had environmental taxes since the 1930[s] (Nordic Council of Ministers 2009:82), as such the South African Carbon Tax Act is still fairly new compared to Sweden and may still be subject to some developments.

Sweden has very little coal power left in the Swedish Vattenfall, a majority state-owned energy company. In recent years, the company has limited its funding for coal-fired power plants. The company sold its coal-fired plants and coal mines in Germany in 2017 and its share of coal-fired electricity decreased by more than 50 percent between 2014 and 2016. (Gençsü and Zerzawy 2017:2).

Sweden relies on imported oil and natural gas as it has no local production of oil, natural gas or coal. attempt to reduce emissions Sweden has additionally committed to stop coal for energy by the year 2020 (Gençsü and Zerzawy 2017:2).

4.3. China

The Chinese government pledged in 2009 to reduce the country's carbon intensity by up to 45 percent by 2020. In 2014 China formally issued its 'National climate change

plan (2014 to 2020)' clearly putting forward a 2020 non-fossil emissions target of at least 15 percent, and many other energy saving emission reduction targets (Wu, Li, Zhang, Tian 2019:1).

According to Zou L, Xue J, Fox A, Meng B (2016: 341), China does not have a specific energy tax category, but a value added tax for energy selling, a consumption tax for energy use, and a resource tax for energy exploration, the country has implemented many policy instruments, but most of them are not efficient. At the beginning of 2018, China implemented the Environmental Protection Law serving as China's first tax targeting environmental protection (Hu, Sun, Liu, Meng, Wang, Yang, Xu, Yi, Xiang, Li, Yun, Ma, and Ta 2019:1).

4.3.1. The Environmental Protection Law

Under the Environmental Protection Law, a taxpayer is defined as an enterprise and public institutions that release air pollutants, water pollutants, solid waste and noise directly into the environment within the territory of China (Wu and Tal 2017:6). Enterprises and public institutions that release air pollution, water pollution, solid waste and noise pollution directly into the environment within the territory of China are subject to Environmental Tax (Hu *et al.* 2019:1).

According to PWC (2019), the environmental protection tax liability is determined based on the capacity of pollutants discharged, multiplied by the specific Environmental Protection Tax amount. A minimum tax rate is provided by the legislation for each class of pollutants. The legislation also permits provincial governments to adjust the relevant tax rate by up to 10 times the national standard level. Provincial governments may make adjustments based on their specific environmental capacity, economic growth goal, and other development indicators. (Hu, 2017).

The adjustments rates are only approved by the Standing Committee of the National People's Congress. Not all discharged air and water emissions are taxable. The bureau taxes the top three air pollutants for each discharge outlet, the top five class water pollutant and the top three items in other classes (Hu, 2017).

The Environmental Protection Law provides exemptions for industries not subject to green taxes for pollution behaviour, which include 'the agricultural sources excluding large-scale livestock farming, mobile pollution sources including motor vehicles, railroad vehicles, off-road-vehicles, mobile machinery shipping vessels, air crafts, sewage treatment plants and domestic waste treatment plants if their discharges are proven to meet national and local discharge standards'. (Environmental Tax Law, 2018, Chapter 3, Article 12 cited in Wu and Tal 2017:6).

The Environmental Protection Law is heavily reliant a lot on self-reporting by emitters. The necessary information is submitted to tax authorities who then determine the tax collection levels among emitters, emissions monitoring is administered by the Environmental Protection Bureau. Detailed discharge inventories are shared amongst tax environment authorities if one tax authority is suspicious of fraud it can request confirmation of pollution data from relevant environmental authorities. (Environmental Tax Law, 2018, Chapter 3, Article 14,15,17,18,20, cited in Wu and Tal 2017:6).

In conclusion, China like South Africa is faced with significant climate change challenges (Wu, Li, Zhang, Tian 2019:2450). The Environmental Protection Law imposes greater accountability and transparency on Chinese local governments and law-enforcement agencies and sets higher standards for businesses, and is thus anticipated to successfully protect the environment, particularly air quality (Hu *et al.* 2019:2).

Similar to China, South Africa is a carbon intensive developing country (Price Waterhouse Coopers 2013). China is according to He, Zhang, Yuan, Qiao, Xin, Zou (2019:409) also a carbon intensive developing country although China's population is much greater than South Africa, the two countries have a lot of similarities including the fact that both countries emissions reduction schemes (Environmental Protection Law and the Carbon Tax Act) are still fairly new.

China's Environmental Protection Law also allows Chinese provinces to increase tax rates and add more tax pollutants (Wu and Tal 2017:7), this makes China's Environmental Protection Law different to the South African Carbon Tax Act which according to s 5(1) of the Act, applies a fixed rate of R120 per ton of carbon dioxide equivalent of greenhouse gas emissions of a taxpayer in the first phase of implementation (1 June 2019 to 31 December 2022). This rate according to s 5 of the Act, 'will be increased by the amount of the consumer price inflation plus two percent for the preceding tax period as determined by Statistics South Africa per year until 31 December 2022, thereafter the rate of tax must be increased by the amount of the price inflation for the preceding tax year as determined by Statistics South Africa'.

Chapter 5: The likely effects of Carbon Tax for South Africa

The alarming prospect of the increasing impacts of climate change will hit across a broad spectrum, including heatwaves, wildfires, sea level rise, hurricanes, flooding, drought and shortages of clean water (South African Revenue Service 2019:2). This section of the research analyses the likely impacts the carbon tax might have for South Africa.

According to a report by Tyler, Du Toit and Dunn (cited in Mbadlanyana 2013:79), both on a per capita basis and from an emission intensity perspective, South Africa was one of the world's biggest carbon emitters. As a result of South Africa's carbon intensive economic sectors, the country emits more greenhouse gasses than all other Sub-Saharan African countries combined. (Mbadlanyana 2013:79).

As an active participant in the Kyoto Protocol, South Africa is determined to mitigate climate change. This is evinced by the fact that in the recent past, the country has drafted several policy frameworks and has implemented various environmental taxes, including the electricity levy, a plastic bag levy, duties on filament lamps and car emission tax. (Mbadlanyana 2013:80).

The South African Intended Nationally Determined Contribution (INDC) (cited in Steenkamp and Naude 2018:78), targets a reduction in greenhouse gas emission of between 398 and 614 metric tons of carbon dioxide equivalent (MtCO2e) over the period 2025 to 2030. The country's Nationally Determined Contribution is in line with its commitments under the Copenhagen Accord, which pledges emissions reductions below business-as-usual (BAU) levels of 34 percent by 2020 and 42 percent by 2025. The Nationally Determined Contribution also highlights that economic and social development, as well as poverty eradication, is South Africa's top priorities. (Steenkamp and Naude 2018:78).

The Intended Nationally Determined Contribution (INDC) is a submission by South Africa to the Parties of the United Nations Framework on Climate Change. This submission was on 'adaptation, mitigation as well as finance and investment requirements which were established on the understanding that the Paris Agreement will be binding, fair, effective' and incorporate a progressive approach to enhance climate change mitigation plans. (Chambers, 2015:1).

The likely effects of the implementation of a carbon tax for South Africa are as follows:

5.1. Health and environmental benefits

According to Cuevas and Haines (2016:8), there is evidence that carbon pricing will offer significant health and co-benefits. Co-benefits are benefits that are not linked to mitigation itself. Health and co-benefits are in most cases easy to measure, more localised, and more instant than the long- term benefits of climate change mitigation. Studies in China have documented the health and co-benefits from concentrated fine particulate air pollution. These studies note that monetisation of health and co-benefits will cover the costs of policies to lessen carbon pollution to varying degrees. (Cuevas and Haines 2016:8).

According to Cuevas and Haines (2016:8), there is also evidence that mitigation strategies may through other mechanisms also improve health, those mechanisms include improved active travel, healthy dietary adoptions that have low greenhouse gas emissions, and housing initiatives. Clear knowledge of health and other co-benefits on crop yield, for example, will improve the political and economic backing of carbon taxes, among other climate change policies. (Cuevas and Haines 2016:8).

Carbon taxes and emissions reduction instruments are economy-wide contributions, yet affecting a broad range of socio-economic factors that are significant parts of health. Therefore, the ultimate impact of these policies on human health and

wellbeing would rest on the precise nature and condition of the intervention. (Cuevas and Haines 2016:8).

5.2. Employment Opportunities

Winkler and Marquard (cited in Fakoya 2014:95), state that substantial employment opportunities can be created through energy efficiency measures, with energy cost savings allowing higher spending on non-energy goods, and services that are typically more labour-intensive may result in employment opportunities directly from energy-efficient industries, contributing to employment opportunities throughout the economy.

5.3. Additional revenue

According to Cuevas and Haines (2016:8), a carbon tax is likely to create additional Government revenues. According to Cuevas and Haines (2016:8), a tax representing the costs of carbon dioxide emissions, local air pollution, and additional transport-related externalities such as congestion and accidental injuries may produce more revenue, equal to approximately 2.6 percent of global gross domestic product, while at the same time decreasing carbon dioxide emissions by 23 percent and pollution-related mortality by 63 percent. Such mutual co-benefit initiatives have a critical means of shaping policy and questioning the central debate about the costs of climate change. (Cuevas and Haines 2016:8).

5.4. Technical innovation

The Swedish Carbon Dioxide Tax does not cover fossil fuels combusted for electricity generation. This is however very low in the country since most electricity generation is decarbonised. (Ackva and Hoppe 2018:5).

This could also be a case for South Africa if the implementation of carbon tax encourages producers like ESKOM, a major greenhouse gas emitter, (Mbadlanyana 2013:84), to decrease their carbon intensity and shift to cleaner technologies.

Carbon prices could also encourage consumers to purchase less carbon-intensive goods. The tax may also promote a move to less carbon-intensive alternatives such as public transportation and increase the effective use of current systems, for example, carpooling and eco-driving. The tax may also encourage the acceptance and diffusion of current abatement technologies and encourage investment towards cleaner alternatives like more efficient cars. (Duan, Edenhofer and Heal, 2017).

By providing incentives to improve productivity or reduce costs by reducing greenhouse gas emissions, carbon pricing may foster creativity and inspire new ideas and solutions to be implemented. Carbon pricing could drive innovation in technologies and business models that can lessen carbon emissions and improve resource efficiency, and thus improve productivity. As the development of green technology frequently entails constant investments, some economists view carbon pricing as having the potential to move energy industries towards cleaner technologies. (Veugelers and Hemous, 2009:5).

5.5. General and progressive price increases

According to Mbadlanyana (2013:84), studies both in developed and developing countries tend to show that environmental taxes, especially energy taxes can have a direct negative impact on the income distribution of households, for instance, in most cases, a less well-off household spends a larger amount of its income on heating than its better-off neighbors. A carbon tax that increases costs for the national electricity generator and distributor (ESKOM – a major greenhouse gas emitter) could result in price increases. (Mbadlanyana 2013:84).

A carbon tax according to Winkler and Marquard (2011:63), will possibly have two effects on the poor. The first is a direct effect on the price of energy carriers used by poor households, 'directly on electricity, paraffin, liquefied petroleum gas and coal, and indirectly through higher fuel prices in transporting bulk solid fuels like coal and fuelwood, where applicable. The second would be indirect economic effects, either through higher input costs for services used by the poor (for instance, public transport)', or through economy-wide influences. (Winkler and Marquard 2011:63).

Clause 3(1) of the Australian Carbon Pollution Reduction Scheme Bill had objectives similar to the South African Carbon Tax Act, they were mainly to take action to enable the reduction of Australia's greenhouse gas emissions to achieve the countries emissions reduction targets. Even with such robust objectives, the Australian environmental taxes were repealed.

According to the Parliament of the Commonwealth of Australia (2014:10), withdrawing the carbon tax was to lessen wholesale electricity and gas prices. These rate reductions were expected to flow to businesses in the form of lower production costs, and to households in the form of lower energy bills and lower retail prices. (Parliament of the Commonwealth of Australia (2014:10).

A study by the University of South Africa's Bureau of Market Research on household income and expenditure for 2010 and 2011 revealed that the dominant contributor to household spending was the 'housing, water, electricity, gas and other fuels' group, which amounted to 32 percent of household consumption spending. Cape Town's 2011 State of Energy Report further revealed that Cape Town's energy was a big cost for many cities at the time of the report, with poorer households, often using as much as 15 to 25 percent of a household's income. (Mbadlanyana 2013:84).

Balmer pointed out that the average expenditure for lighting, cooking, space heating and water heating purposes in Gugulethu outside Capetown amounted to R 619,50 per month. Balmer also reported that poor households spend 15 to 25 percent of their income towards their energy needs, while their wealthier counterparts only used about 2 to 3 percent of their households' income for energy consumption. (Balmer cited in Mbadlanyana 2013:84).

The adverse effects of fuels like paraffin, coal, and wood on the wellbeing of poor households are well known. Electricity and liquefied petroleum gas are the most ideal energy carriers for households that do not have this impact. The usage of electricity by poor households has been intensely extended through the accelerated electrification program which aims to achieve universal access of electricity to all households, schools, and clinics in South Africa, but more opportunities to motivate broader use of electricity in households were needed since affordability was a major problem. (Winkler and Marquard, 2011:63).

Organised labour is condensed in energy-intensive industries and labour unions are concerned about employment losses. Civil society groups are worried about the results of higher energy prices for poor households. Such fears support the current widespread opposition to a carbon tax. The South African government's challenge is not solely designing an efficient carbon tax but also to strike a careful balance between energy development and environmental objectives. (Alton *et al.* 2014:344).

The South African Carbon Tax Act is still fairly new and at the time of writing this report, those that are liable to pay the carbon tax are only due to make payment in July 2020 per s 54FD (4) of the Customs and Excise Act. As a result, it is hard to evaluate whether the government has met the challenge of striking a careful balance between energy development and environmental objectives.

Imposing a carbon tax could render electricity prices more expensive. Considering the undesirable effects of paraffin and other inferior fossil fuels, paying a carbon tax on these fuels may have welfare benefits if their use were further discouraged. (Winkler and Marquard, 2011).

According to Winkler and Marquard (2011:64), due to the regulatory environment in which energy industries operate, they can not shift the carbon tax costs to consumers, for example, without a change in the regulatory framework, Sasol would not be able to shift the carbon tax costs to consumers, this would reduce the effects of the tax but still provide a good incentive for producers in certain cases.

5.6. Impact for businesses

According to Van Heerden, Bohlmann, Blignaut, Mander (2016:724), the carbon tax may increase costs in most sectors and thereafter increase prices in South African compared to the rest of the world. As a result, South African businesses may become less competitive and lose international markets for their exports as they get more expensive. (van Heerden *et al.* 2016:724). Alton *et al.* (2014:344), state that companies are also concerned about losing competitiveness, specifically in the minerals and metals export markets.

According to a study by van Heerden *et al.* (2016:723), CoalGen, the company generating electricity from coal, has the biggest effect on production. This is expected as coal accounts for approximately 70 percent intermediate input costs in the industry's and coal is taxed as one of the four fuel inputs. Other industries that may be affected negatively by the carbon tax include petroleum refineries, coke oven, other manufacturing, and iron and steel. (van Heerden *et al.* 2016:723).

The likely increase to the price of coal, natural gas, and petroleum products due to a carbon tax could result in a ripple effect on an already slow economy leading to higher

production costs and lower spending on energy-intensive products. Subsequently, a carbon tax is likely to result in lower real wage rates due to increased costs for businesses. (Fakoya 2014:96).

Steep rises in South African energy prices could render carbon-intensive firms globally uncompetitive. This vulnerability is further exacerbated by the fact that because of the prevalence of very low long-term energy prices and often long-term contracts, particularly for electricity, assuring future low energy charges, businesses investing in energy intensive industries invested in rather energy-inefficient equipment, as such, South Africa's economy is not just energy-intensive but the energy intensive sectors are mostly inefficient. (Den Elzen *et al.* cited in Winkler and Marquard 2011:64).

A Carbon tax could lead carbon-intensive companies to slow growth. This could benefit companies that use other cleaner energies as their carbon tax liabilities would be much less than carbon-intensive companies. But the slow pace of renewable energy investment among South African companies may erode the probable benefit of carbon tax savings. (Fakoya 2014:96).

The undesirable impact of a carbon tax on total manufacturing production in South Africa may be extensive, with production from energy-intensive manufacturing sectors decreasing. Investors could withdraw the funds from energy-intensive businesses to less regulated businesses, thereby refuting the much-needed funds for energy-intensive companies to generate power more effectively. This would result in higher energy costs, lower-profits and fewer job opportunities. (Fakoya 2014:96).

A study from the Organisation for Economic Co-operation and Development (cited in World Wide Fund for Nature 2018:2), states that 41 OECD countries are pricing carbon in their domestic products. These countries are beginning to create trade barriers against products from countries that do not have these measures in place. The European Union declared that they will not conclude trade agreements with countries

that are not taking steps to tackle global warming. (World Wide Fund for Nature 2018:2).

5.7. Employment losses

Fakoya (2014:95), states that a carbon tax may result in a decrease to the national rate of employment as there might be a low demand for workers in carbon-intensive industries, companies may see the need to reduce salaries to meet the burden of the new carbon tax, and workers, on the other hand, might be forced to demand higher salaries due to higher consumer prices and a lower purchasing power in an economy like South Africa that relies heavily on government grants. Consequently, worker's demand for higher wages to meet the increasing costs of consumer goods is likely to result in layoffs to meet up with increasing wage demands. (Fakoya 2014:95).

The impact of a carbon tax on employment according to Fakoya (2014:96), is also dependent on aspects like the carbon intensity of manufacturers, the extent to which they can pass the rising costs to consumers, the power of import competitors, the willingness of producer's to switch to less carbon-intensive energy sources, and the willingness of consumers to switch to low carbon-intensive products.

5.8. Conclusion

In an analysis of the long-term mitigation by Winkler *et al.* (cited in Winkler and Marquard 2011:57), a carbon tax was revealed to be very effective in decreasing greenhouse gas emissions. According to the analysis, a carbon tax is a means of implementation rather than a mitigation option, as it will promote a variety of mitigation options such as renewable energy and energy efficiency (Winkler, Hughes, *et al*. cited in Winkler and Marquard 2011:57).

In summary, the biggest concern with the carbon tax is whether the true cost of the carbon tax will be born by the liable companies or whether the companies will transfer the cost of the carbon tax to the consumers through prices.

AfriSam (2019) states that given the current market conditions and the increase of input costs, the company will not be able to absorb the additional cost of the carbon tax since the carbon tax is an environmental levy. AfriSam will be charging VAT on the carbon tax amount that customers will be charged. (AfriSam (2019)

The aim of introducing a carbon tax is to allow both producers and consumers to decrease the intensity of carbon (Winkler and Marquard 2011:64). The costs of climate change impacts will be much more than the cost of reducing emissions through policies like the carbon tax, for example, the effects of changing rainfall and crop disease patterns, droughts and extreme storms, and higher temperatures are demanding the agricultural industry to change, and this results in higher food prices whether South Africa taxes emissions or not. (World Wide Fund for Nature 2018:2).

The World Wide Fund for Nature (2018:2) states that through the effects of climate change to water, food prices, health, infrastructure, disasters and conflicts, the public purse and the public is already paying the price of carbon tax.

According to the OECD (2019:2), the Swedish environmental taxes were introduced in the 1930s and originally only applying to petrol and diesel. Since then additional taxes have been implemented by the Swedish Government to combat environmental damage, as discussed in the previous chapter. Sweden has the lowest emission intensity and the second lowest greenhouse gas emissions per capita in the European Union (EU). Under Prime Minister Stefan Löfven Sweden has committed to becoming greenhouse gas neutral by 2045. (Ackva and Hoppe 2018:2).

Although the carbon tax is new for South Africa, it can be concluded from the Swedish experience that the implementation of carbon tax may assist South Africa in reducing greenhouse gas emissions in the near future.

As the global economy changes towards a less-carbon economy if South Africa does not keep pace, the country risks losing export markets or being left behind with business practices that no one wants. In addition, the need for high carbon exports for example, thermal coal, locally produced iron and steel and combustion engines will decrease. (World Wide Fund for Nature 2018:2).

Indirectly, carbon tax will impact everyone within the economy as electricity prices and fuel-related products prices may rise. Carbon tax revenue may be used to encourage growth by encouraging efficient government spending, funding basic research, funding essential infrastructure, and investments in human capital. Failure of utilising realised carbon tax revenue accurately could render the objectives of the policy and its output contradictory and detriment to the economy as a whole. (Zhu *et al*. cited in Fakoya 2014:96).

Chapter 6: Conclusion

In this concluding chapter, the analysis made in the preceding chapters will be used to answer the research question. Areas into which further research may be conducted that were not addressed in this research report will be identified in this chapter.

Ethical questions related to climate change are primarily concerned with issues of distributive and restorative justice. Thus, how should the burden of mitigating climate change be equitably distributed and who is ethically responsible for the past damages caused by climate change? According to Steenkamp and Naude (2018:72), while the carbon tax intends to motivate companies to invest in low carbon energy sources, the cost of alternative energy sources is usually high for individual companies to bear. (Fakoya 2014:97).

In analysing the provisions of the Carbon Tax Act, allowances are per schedule 2 of the Act, provided to most liable entities. It can be concluded that this is done to put relief on carbon-intensive industries and also not to financially burden carbon-intensive businesses, although there is still an additional cost for liable companies of paying for carbon emissions. The question in this regard is whether it is likely that individual companies will absorb the carbon tax cost? Or whether companies will simply increase the price of carbon-intensive goods and services and the consumer indirectly pays the cost of the carbon tax.

In summary, there is no provision in the Carbon Tax Act, that companies may not pass the cost of the carbon tax to consumers through pricing, even if there was, costs to ensure that the carbon tax expense is not transferred to consumers may be too expensive along with the administrative burden. This would require the Competition Act and the Consumer Protection Act to put some measures in place to avoid such practices, this may lead to the cost of administering the carbon tax exceeding its intended benefits.

According to the World Bank (cited in Steenkamp and Naude 2018:78), carbon dioxide (CO_2) emissions for 2014, measured in metric tons per capita, for South Africa were higher than China. China has a much larger population in comparison to South Africa thus, resulting in a lower per capita ranking. However, South Africa's ranking is a cause for concern and the country's climate change pledges under the Paris Agreement as adopted in the country's National Determined Capacity has to be viewed through a critical lens. (Steenkamp and Naude 2018:78).

6.1. Economic obstacles

According to a study by Fakoya (cited in Fakoya 2014:96), findings suggest that the carbon tax revenue has substantial negative impacts that exceeded its contribution to the economy as a whole. This might also be a case for South Africa, especially if the prices in general increased due to the carbon tax.

Australia experienced similar negative effects and all their environmental taxes were repealed. The reason for repealing the Australian environmental taxes was to reduce the cost of living, the Australian Treasury estimated that eliminating the carbon tax would result to an average cost of living for all households approximately $550 lower than they would otherwise be, to decrease the cost of retail electricity by 9 percent and the costs of retail gas by 7 percent than what they would have been with a carbon tax, to improve Australia's economic growth, increase jobs and improve Australia's international competitiveness by getting rid of a pointless tax, which costs businesses and families, to eliminate constant annual compliance costs for approximately 370 liable entities by almost $90 million per annum. (Australian Government n.d.).

The carbon budget is a global one, because of one shared atmosphere. However, economic activity which causes emissions is located within countries and sectors, which results in many ways of dividing the budget up amongst countries. The overall budget, though, cannot change substantially. Therefore, if one country increases its

emissions, another country will have to reduce its emissions to compensate. (Steenkamp and Naude, 2018:76).

In conclusion, with a global carbon budget, all countries should come together in an effort to mitigate the issues of climate change but also considering that some countries are not as carbon-intensive as others which also explains why some countries will choose not to impose strict carbon emission schemes as others. Sweden for example currently has the least emission intensity (emissions per unit of gross domestic product) (GDP) and the second lowest per capita emissions of greenhouse gas in the European Union (EU). (Ackva and Hoppe, 2018:2), this may be because Sweden started introducing Environmental taxes in the 1930[s].

China is a major emitter of carbon dioxide (CO_2) globally according to a report by Al-Mubarak, Efird, Lester, Xia (2017:4). The Chinese government's attempts to limit carbon dioxide (CO_2) emissions are of significant importance to both the population of the People's Republic of China and the rest of the world (Al-mubarak, Efird, Lester, Xia 2017:4). It is therefore evident that the efforts to combat climate change is a global one, regardless of the carbon intensity of each particular country.

According to South African Revenue Service (2019:3), South Africa's annual greenhouse gas emissions have increased at a faster rate than the world average of 2.3 percent per year compared to the world average of 1.8 percent per year. As the World Wide Fund for Nature (2018) puts it:

> The global economy is shifting to be lower-carbon and if South Africa does not keep pace, the country risks losing the export markets or being left stranded with business models that no other country wants.

According to a 2016 OECD study, there are 41 OECD countries are already putting a price on carbon in their domestic products (World Wide Fund for Nature 2018:2). It is therefore likely that the carbon tax would affect the South African prices of carbon-intensive goods and services.

6.2. The need for environmental intervention

As much as the carbon tax may give rise to inflation the increasing impacts of climate change will hit across an extensive spectrum, with heatwaves, wildfires, sea level rise, hurricanes, flooding, drought and clean water scarcities (South African Revenue Service 2019:2).

According to Environmental Affairs (n.d.) Climate change is already a quantifiable reality giving rise to significant social, economic and environmental threats and challenges globally. South Africa like many other developing countries is highly vulnerable to the impacts of climate change (Kreft, Eckstein and Melchior cited in Environmental Affairs n.d.). This may be because South Africa is a developing country which is highly carbon intensive(PWC, 2013). The country's challenge is to balance the pace of the rapid economic growth and transition with the sustainable use of environmental resources and responding to climate change. (Environmental Affairs n.d.).

As much as the cost of the carbon tax may give rise to an increase in the costs of goods and services, the carbon tax is likely to decrease carbon emissions by facilitating the adoption and diffusion of existing abatement technologies and redirecting investments toward cleaner alternatives (Duan, Edenhofer and Heal 2017:9).

As South Africa shifts to cleaner technologies, the likely effects of such a shift is less air and water pollution, especially for communities that reside close to carbon-emitting industrial parks like the Secunda industrial complex and associated coal mines comprising of industrial carbon-intensive industrial activities like coal mines. (Rogers et al., 2008 and Ras et al., 2010 cited in Ras and von Blottnitz, 2012).

Ethically, who is responsible for the past damages caused by climate change? Steenkamp and Naude (2018:72), state that the carbon tax is a means to combat

environmental damage. It can be concluded that the world is already paying the price of the past damages to the environment through heatwaves, wildfires, sea-level rise, hurricanes, flooding, drought and clean water scarcities.

Without substantial cuts in carbon dioxide emissions and other greenhouse gases, climate change will have even more destructive and permanent impacts on life on Earth. (South African Revenue Service (2019:2).

6.3. Conclusion

This study explored the question posed at the outset: How will the implementation of carbon tax affect the people of South Africa and businesses operating in South Africa? and what likely effects will carbon tax have for South Africa based on a comparison to other countries which have already implemented the tax? The Environmental Legislation of Australia, Sweden and China was analysed in chapter 4 of this report and compared to the South African Carbon Tax Act. Details of the likely impacts of the implementation of carbon tax for South Africa were analysed in chapter 5 and chapter 6 of this report.

The overall findings discussed in chapter 5 and chapter 6, were that the implementation of carbon tax may result in carbon-intensive companies increasing the prices of carbon-intensive goods and services to cover the cost of the carbon tax. It was also found in chapter 5 that South African businesses may become less competitive and lose foreign markets for their outputs as they get more expensive.

Nonetheless, although carbon tax may affect the South African society negatively through price increases, the report argued in chapter 5 and chapter 6 of this report, that the implementation of a carbon tax may lead to better health and technological innovation and is the best measure for the country to combat climate change challenges.

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Appendix A

Schedule 2 of the Carbon Tax Act extract

Activity/Sector	Threshold	Basic free allowance for fossil fuel combustion emission %	Basic free allowance for process emissions %	Fugitive emissions allowance %	Trade exposure allowance %	Performance allowance %	Carbon budget allowance %	Offsets allowance %	Maximum total allowance %
Brick manufacturing	4 million	60	0	0	10	5	5	10	90
Pipelines	10 000 tons	60	0	10	10	5	5	5	95
Managed Waste Disposal Sites	Receiving 5 tonnes per day or a total capacity of 25000 tonnes	100	0	0	0	0	0	0	100

Appendix B

Tax base formulae

Section 4(2) of the Act, states that 'if a reporting methodology approved by the Department of Environmental Affairs for the purposes of determining emission factors does not exist in respect of the calculation of greenhouse gas emissions resulting from fuel combustion, and industrial processes and fugitive emissions the carbon tax must be levied in respect of the sum of the greenhouse gas emissions of a taxpayer in respect of a tax period expressed as the carbon dioxide equivalent of those greenhouse gas emissions resulting from:

(a) fuel combustion in respect of that tax period that is a number constituted by the sum of the respective numbers determined for each type of fuel in respect of which a greenhouse gas is emitted in respect of that tax period which respective numbers must be determined in accordance with the formula:

E = (A x B)

in which formula—

(i) **''E''** represents the number to be determined;

(ii) **''A''** represents the mass of any one type of the fuel expressed in tonne that is the source of the greenhouse gas emission, other than any fuel utilised for the purposes of international aviation and maritime transport;

(iii) **''B''** represents the greenhouse gas emission factor in carbon dioxide equivalent per tonne that must be determined in accordance with the formula:

X = {(C x 1) + (M x 23) + (N x 296)} x D

in which formula—

(aa) **''X''** represents the number to be determined;

(bb)**''C''** represents the carbon dioxide emissions of a fuel type determined by matching the fuel type listed in the column ''fuel type' 'in Table 1 of Schedule 1 with the number in the corresponding line of the column ''CO2 (KGCO2/TJ)'' of that table;

(cc) **''M''** represents the methane emissions of a fuel type determined by matching the fuel type listed in the column ''fuel type'' in Table 1 of Schedule 1 with the number in the corresponding line of the column ''CH4 (KGCH4/TJ)'' of that table';

(dd) **''N''** represents the Nitrous Oxide emissions of a fuel type determined by matching the fuel type listed in the column ''fuel type'' in Table 1 of Schedule 1 with the number in the corresponding line of the column ''N2O (KGN2O/TJ)'' of that table; and

(ee) **''D''** represents the default calorific value (terajoule per tonne) of a fuel type determined by matching the fuel type listed in the column ''fuel type'' in Table1 of Schedule 1 with the number in the corresponding line of the column ''DEFAULT CALORIFIC VALUE (TJ/TONNE)'' of that table;

(b) fugitive emissions that is a number constituted by the sum of the respective numbers determined for each type of commodity, fuel or technology in respect of which the greenhouse gas is emitted in respect of a tax period which respective numbers must be determined in accordance with the formula:

F= (N x Q)

in which formula—

(i) **''F''** represents the number to be determined;

(ii) **''N''** represents the mass expressed in tonne in the case of solid fuels or the volume of each type of fuel expressed in cubic metres in the case of fuels other than solid fuels, in respect of the greenhouse gas emission; and

(iii) **''Q''** represents the greenhouse gas emission factor in carbon dioxide equivalent per tonne or cubic metres that must be determined in accordance with the formula:

X = (C x 1) + (M x 23) + (N x 296)

in which formula—

(aa) **''X''** represents the number to be determined;

(bb)**''C''** represents the carbon dioxide emissions of a fuel type determined by matching the fuel type listed in the column ''fuel type'' in Table 2 of Schedule 1 with the number in the corresponding line of the column ''CO2'' of that table;

(cc) **''M''** represents the methane emissions of a fuel type determined by matching the fuel type listed in the column ''fuel type'' in Table 2 of Schedule 1 with the number in the corresponding line of the column ''CH4''of that table;

(dd)**''N''** represents the Nitrous Oxide emissions of a fuel type determined by matching the fuel type listed in the column ''fuel type'' in Table 2 of Schedule 1 with the number in the corresponding line of the column ''N2O''of that table; and

Industrial process in respect of a tax period that is a number constituted by the sum of the respective numbers determined for each type of commodity, fuel or technology in respect of which the greenhouse gas is emitted in respect of that tax period which respective numbers must be determined in accordance with the formula:

P= (G x H)

in which formula—

(i) **''P''** represents the amount to be determined that must not be less than zero;

(ii) **''G''** represents the mass of each raw material used or product produced expressed in tonne in respect of which the greenhouse gas is emitted in respect of that tax period; and

(iii) **''H''** represents the greenhouse gas emission factor in carbon dioxide emissions equivalent per tonne for each raw material used or product produced that must be determined in accordance with the formula:

X = (C x 1) + (M x 23) + (N x 296) + (H x 11 900) + (T x 5 700) +(S x 22 200)

in which formula—

(aa) **''X''** represents the number to be determined;

(bb) **‘‘C’’** represents the carbon dioxide emissions of a raw material or product determined by matching the fuel type listed in the column‘‘ SOURCE CATEGORY ACTIVITY / RAW MATERIAL / PRODUCT’’in Table 3 of Schedule 1 with the number in the corresponding
line of the column ‘‘CO2/tonne product’’ of that table;

(cc) **‘‘M’’** represents the methane emissions of a raw material or product determined by matching the fuel type listed in the column ‘‘SOURCE CATEGORYACTIVITY / RAW MATERIAL / PRODUCT’’ in Table 3 of Schedule 1 with the number in the corresponding line of the column‘‘**CH4/tonne product**’’ of that table;

(dd) **‘‘N’’** represents the Nitrous Oxide emissions of a raw material or product determined by matching the fuel type listed in the column ‘‘SOURCE CATEGORYACTIVITY / RAW MATERIAL / PRODUCT’’ in Table 3 of Schedule 1 with the number in the corresponding line of the column‘‘**N2O/ tonne product**’’ of that table;

(ee) **‘‘H’’** represents the Hexafluoroethane (C2F6) emissions of a raw material or product determined by matching the fuel type listed in the column ‘‘SOURCE CATEGORY ACTIVITY / RAW MATERIAL /PRODUCT’’ in Table 3 of Schedule 1 with the number in the corresponding line of the column ‘‘**C2F6/tonne product**’’ of that table;

(ff) **‘‘T’’** represents the carbon tetrafluoride (CF4) emissions of a raw material or product determined by matching the fuel type listed in the column ‘‘SOURCE CATEGORY ACTIVITY / RAW MATERIAL /PRODUCT’’ in Table 3 of Schedule 1 with the number in the corresponding line of the column ‘‘**CF4/tonne product**’’ of that table; and

(gg) **‘‘S’’** represents the Sulphur hexafluoride (SF6) emissions of a raw material or product determined by matching the fuel type listed in the column ‘‘SOURCE CATEGORY ACTIVITY / RAW MATERIAL / PRODUCT’’ in Table 3 of Schedule 1 with the number in the corresponding line of the column ‘‘**SF6/tonne product**’’ of that table’.

Rate of tax

According to s 5(1) of the Act, 'the rate of the carbon tax on greenhouse gas emissions must, subject to subsections (2) and (3), be imposed at an amount of R120 per ton carbon dioxide equivalent of the greenhouse gas emissions of a taxpayer.
(2) The rate of tax specified in subsection (1) must be increased by the amount of the consumer price inflation plus two percent for the preceding tax period as determined by Statistics South Africa per year until 31 December 2022.
(3) The rate of tax must be increased after 31 December 2022 by the amount of the price inflation for the preceding tax year as determined by Statistics South Africa'.

Calculation of the amount of tax payable

Section **6**(1) of the Act, states that 'subject to subsection (2), the amount of tax payable by a taxpayer in respect of
a tax period must be calculated in accordance with the formula:

$$X = <\{[(E - S) \times (1 - C)] - [D \times (1 - M)]\} + \{P \times (1 - J)\} + \{F \times (1 - K)\}> \times R$$

in which formula—

(a) **''X''** represents the amount to be determined that must not be less than zero;

(b) **''E''** represents the number in respect of the total fuel combustion related greenhouse gas emissions of the taxpayer in respect of that tax period expressed as a carbon dioxide equivalent determined in terms of section 4(1) or (2)*(a)*;

(c) **''S''** represents the number in respect of greenhouse gas emissions, expressed in terms of carbon dioxide equivalent that were sequestrated in respect of that tax period as verified and certified by the Department of Environmental Affairs;

(d) **"C"** represents a number equal to the sum of the percentages of allowances determined under sections 7, 10, 11, 12, and 13 in respect of that tax period, subject to section 14;

(e) **"D"** represents the number in respect of the petrol and diesel related greenhouse gas emissions of that taxpayer in respect of that tax period expressed as a carbon dioxide equivalent, determined in terms of section 4(1)or (2)*(a)*;

(f) **"M"** represents a number equal to the sum of the percentages of the allowances determined under sections 7, 12 and 13 in respect of that tax period, subject to section 14;

(g) **"P"** represents the number in respect of the total industrial process related greenhouse gas emissions of the taxpayer in respect of that tax period expressed as a carbon dioxide equivalent determined in terms of section 4(1) or (2)*(c)*;

(h) **"J"** represents a number equal to the sum of the percentages of the allowances determined under sections 8, 10, 11, 12 and 13 in respect of that tax period, subject to section 14;

(i) **"F"** represents the number in respect of the total fugitive greenhouse gas emissions of the taxpayer in respect of that tax period expressed as a carbon dioxide equivalent determined in terms of section 4(1) or (2)*(b)*;

(j) **"K"** represents the sum of the percentages of the allowances determined in terms of sections 7, 9, 10, 11, 12 and 13 in respect of that tax period, subject to section 14; and

(k) **"R"** represents the rate of tax prescribed under section 5: Provided that where the number in respect of the determination of the expression ''**(E-S)**'' in the formula is less than zero, that number must be deemed to be zero.

(2) The amount of tax payable by a taxpayer in respect of the generation of electricity from fossil fuels in respect of a tax period must be calculated in accordance with the formula:

X =A- B- C

in which formula—

(a) **"X"** represents the amount to be determined that must not be less than zero;

(b) **"A"** represents the amount of tax payable in respect of a tax period determined in terms of subsection (1);

(c) **"B"** represents the renewable energy premium in respect of a tax period, from the commencement of the tax period until 31 December 2022, constituted by an amount expressed in Rand determined by the Minister by notice in the *Gazette*; and

(d) "**C"** represents an amount equal to the environmental levy contemplated in respect of electricity generated in the Republic in Section B of Part 3 of Schedule 1 to the Customs and Excise Act, 1964 (Act No. 91 of 1964), paid in respect of a tax year, until 31 December 2022.

(3) For the purposes of this section **"sequestrate"** means the process of storing a greenhouse gas or increasing the carbon content of a carbon reservoir other than the atmosphere'.