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Faculty of Commerce, Law and Management

School of Accountancy

IMPLICATIONS OF ENVIRONMENTAL TAXES DUE TO CLIMATE CHANGE MANAGEMENT IN SOUTH AFRICA

Ntombizonke Nomfundo Kunene

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ABSTRACT

Climate change has become topical over the years, and refers to patterns of changes in general weather conditions that result in higher average temperatures for the earth and its surface, known as global warming. This is attributable to the increased concentration of gases known as greenhouse gases (Department of Environmental Affairs, 2011).

The causes of climate change emanates from natural and human activities (NASA, 2019), human causes are the major contributors to climate change attributable to high industrialisation (Department of Environmental Affairs, 2011). Industrialisation requires the burning of fossil fuels that emit carbon dioxide, which affects the atmosphere (NASA, 2019). The greenhouse gases emitted far exceed capacity of the natural eco-system to reabsorb them, and the clearing of land or forest areas also affects this process (Department of Environmental Affairs, 2011).

Policymakers recently gathered to put measures in place to address this predicament and to encourage ‘green energy’ or low-carbon technologies (Funke & Mattauch, 2018). This research study aims to assess the different measures implemented in order to reduce emissions.

Key Words: Environmental taxes, greenhouse gases, tax base, allowances, low-carbon technologies, climate change mitigations, Paris Agreement, carbon emissions.

DECLARATION

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

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Ntombizonke Kunene

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CHAPTER 1: INTRODUCTION

In an endeavour to mitigate the effects of climate change and protect the environment, government leaders have entered into global agreements in order to address climate change (World in Data, 2019). These agreements came with specific targets, such as to keep the carbon emissions at a minimum of the global temperature that they do not pass the level of 1.5 °C which ensures that the rise is kept under 2 °C (Wigley, 2021). These agreements have resulted in certain policies being developed, such as the imposition of environmental taxes.

The Paris Agreement was signed in 2016 in order to address the changes that are necessary to provide for mitigating the effects of greenhouse gas emissions, and to provide for financial impacts and for measures required to minimise the impacts, as well to plan for change accordingly (United Nations Climate Change, n.d.). The agreement was welcomed by the various global parties who opted to participate in the journey to halt the impacts of climate change. (United Nations Climate Change, n.d.).

South Africa joined forces with the global community by signing the Paris Agreement. The agreement was signed by the late Minister Molewa as a South African representative on the 22nd of April 2016 (Department of Environmental Affairs, 2016). The Paris Agreement is an official declaratory instrument that is aimed at providing extended guidance on the process regarding the action required for all partied involved in matters that pertain to climate change (Department of Environmental Affairs, 2016). It therefore requires countries that have the signed the agreement to have plans in place to meet the required targets (Department of Environmental Affairs, 2016).

The greater purpose for the Paris Agreement is to encourage countries to adopt green energy in order to avoid other types of energy that are negatively affecting the environment. This is the reason why the Carbon Tax Bill was approved by President Cyril Ramaphosa on 23 May 2019 (South African Government, 2019). The approval of the Carbon Tax Bill gave rise to a carbon tax coming into effect on 1 June 2019 (South African Government, 2019). A carbon tax had been under discussion since

2015. The carbon tax is one of the environmental taxes that have been introduced in South Africa (Brink, 2019).

A carbon tax can be a beneficial tool to use to fund the development of technologies that will be utilised to capture and store carbon emissions (National Treasury, 2013:7). The introduction of a carbon tax was intended to promote competition in different industries and to ensure that the greenhouse emissions mitigation plans are achieved, while preventing the impacts of non-mitigated greenhouse emissions on the poor (National Treasury, 2013:7).

Environmental taxes are defined differently, depending on how, where and by whom they are implemented. Some would refer to an environmental tax as a tax having an environmental policy objective, while others would define it in relation to what is being taxed, for example an energy tax (Mandy, n.d.) (Organisation for Economic Co-operation and Development, 2011). The accepted meaning under international best practice is that an environmental tax is a tax on anything negatively impacting the environment such as pollution, climate change as examples, regardless of policy objectives associated with the tax (Organisation for Economic Co-operation and Development, 2011) (Mandy, n.d.). Of course, this is not to say that the policy objectives of an environmental tax are not important, as they exist in order to comply with a policy that has been put in place to protect the environment (Mandy, n.d.).

1.1 Research Objective

1.1.1 Research Statement

This research will examine what the relevant legislation means to organisations and individuals who are in industries that are considered to be involved in activities that are environmentally unfriendly. Are these legislative changes promoting a change in behaviour to encourage the type of environmental consciousness that would be sufficient to recognise the desired results of contributing to green energy?

1.2 Sub-Problems

1.1 What are the environmental taxes, and who is liable to pay these environmental taxes?

1.2 How are environmental taxes collected and utilised to promote green energy or to promote low carbon emission?

1.3 Are environmental taxes effective in achieving the global target of reducing carbon emissions to an acceptable level?

1.4 Are environmental taxes accurately measured and calculated? Environmental taxes might be understated.

1.3 The Significance of the Study

This study provides the outcomes of the greenhouse gas emissions impact on to different spheres of life for individuals, companies and organisations. The study makes contributions in terms of the financial impacts of these environmental levies for both companies and the individuals. It contributes to the understanding of the considerations that have been taken into account in introducing the measures put in place to mitigate the effects of climate change through environmental levies or taxes on companies that are emitting greenhouse gases, as well as on their customers. The need for financial reporting and financial impact and requirements that been necessitated by climate change. This study describes the regulatory and administrative mechanisms and intended outcomes of the said environmental taxes.

1.4 Delimitations of the Research Report

This research study presents an analysis of the existing environmental taxes that currently exist in South Africa, with the focus being on assessing how they have impacted on organisations, whether in the public sector, the private sector, or individuals. This study is not able to present a fully quantitative study that would aim at reporting the actual quantitative impacts of interest because the companies in the area of this study protect the confidentiality of certain information. However, the consideration of interest in this study is to present an analysis of the existing

environmental levies, as well as of the newly added Carbon Tax, which is the latest regulatory addition to respond to climate change. This research study seeks to examine certain considerations that might pose certain challenges, considering the complexity of the subject matter surrounding carbon tax, as well as its applicability and implications in other areas. This is still a new subject area, especially as to the financial reporting considerations, and there is not much information in this regard. This research does not provide conclusive methods or mechanisms regarding how to ensure that greenhouse gas emissions are reduced. Rather, it examines other countries regarding the measures that they have used in their endeavours to reduce the emissions and to concomitantly reduce these environmental taxes.

1.5 Research Methods

A qualitative research method will be followed in this research. According to Bhandari (2022), a qualitative research method focuses on collecting and exploring non-numerical information in order to gain a proper understanding of key concepts, practices or relevant views. It is used to gather thorough perceptions of problems or to produce different views on researched matter. On the other hand, quantitative research involves collecting and analysing numeral and statistical data, while qualitative research is the opposite of quantitative research as it focuses on the non-numerical data.

As a qualitative research method was followed in this research, the information was gathered from sources on the internet, in journals and public documents, from government institutions and regulatory bodies, and in any academic books in relevant disciplines.

1.6 Chapter Outline

Chapter 2 considers the various environmental taxes that are applicable in South Africa, and their advantages and disadvantages in promoting environmental objectives.

Chapter 3 looks at the administrative requirements and the revenue collected from the environmental taxes. It will evaluate the effectiveness and the synergy between

the different regulatory bodies and any other relevant stakeholders that are part of the system.

Chapter 4 considers the impacts of the changes in legislation on the profits and tax obligations of organisations. This chapter will evaluate the accounting impacts of the changes, as well income tax implications of the changes. This chapter will also consider the social impacts and resources required to ensure compliance.

Chapter 5 will present an evaluation of the readiness of South Africa in relation to other countries, such as the USA, China, and India.

Chapter 6 concludes the study, discussing the findings that are identified in each chapter's discussions, together with the changes that are recommended for addressing the climate changes that are negatively affecting the environment.

CHAPTER 2:
THE DIFFERENT ENVIRONMENTAL TAXES AVAILABLE IN SOUTH AFRICA

Environmental taxes are referred to by different names (such as ecotaxes, green taxes, pollution taxes and Pigouvian taxes), and, for the purpose of this study, we will use the term ‘environmental taxes’, being those taxes that are aimed at discouraging organisations and individuals from engaging in harmful activities towards the environment (Environtech Online, 2015). These taxes are enforced by legal actions that are implemented to achieve the stated mandate, to punish those who are emitters, and also to reward those who comply with the legislation by not harming the environment. (Environtech Online, 2015).

The rise of environmental challenges, or climate change, has obliged different states in different spheres to seek solutions to these concerns, while at the same time not disturbing the economic growth of the implementing countries (Organisation for Economic Co-operation Development, 2011:1). These countries do consider the available options for addressing solutions to these challenges, one of which is to introduce policies, regulations, guidelines, and initiatives in the form of subsidies, as well as imposing taxes (Organisation for Economic Co-operation Development, 2011:1). As with most other policies, regulations and guidelines, environmental taxes have some benefits, such as increases in fiscal revenue and increases in environmental awareness, thus promoting effectiveness (Organisation for Economic Co-operation Development, 2011:1). Environmental taxes are generally introduced for a specific purpose to deal with a particular problem, such as a lack of waste management and a lack of consciousness of water and air pollution. However, they should not to be considered in isolation from the way in which they are designed and implemented; such isolation would probably indicate that they might not be successful (Organisation for Economic Co-operation Development, 2011:1).

The purpose of this chapter is to discuss the taxes that currently exist in South Africa, their purposes, and whether they have achieved what they were introduced for. The first levy was introduced at the beginning of June 2004 to deal with plastic bags. The second was introduced at the beginning of July 2009 regarding electricity

generation. The third was introduced at the beginning of November 2009 regarding electric filament lamps. Lastly, the regulation of CO2 emissions from vehicles was introduced at the beginning of September 2020 (Engineering News, 2015).

For the purpose of this research, the term ‘environmental taxes’ will be used. South Africa has a number of environmental taxes that are in force. The existing environmental taxes (Stiglingh, et al., 2019) (South African Revenue Services, 2019) are discussed in the following sub-sections.

2.1 Electric Filament Lamps

Electric filament lamps are non-energy-saving light bulbs, and the November 2009 levy is applicable to these, where they are manufactured or imported into South Africa (South African Revenue Services, 2019). The manufacturers and importers are the parties responsible to pay this levy (South African Revenue Services, 2019). Electric filament lamps subject to the levy comprise the tungsten halogen and incandescent types and are targeted because of their mercury content (Engineering News, 2015). The purpose of penalising these types of the bulbs with the levy is to encourage the use of fluorescent bulbs, which will be cheaper to use because they are not subject to the tax, while also being durable (Engineering News, 2015). Fluorescent bulbs are said to be better in all almost every respect – cost, durability, environmental impact and efficiency.

Another reason why electric filament lamps are discouraged is based on the assumption that they contain mercury, and that other types of bulbs do not contain mercury. The other contributing factor is that when they need to be disposed of, the mercury in these bulbs pollutes water and the air because it evaporates (Engineering News, 2015). This imposition of this environmental levy it is intended to discourage their use, with the aim of protecting the environment and promoting the use of environmentally friendly light bulbs.

2.2 Electricity Generation

The point of interest on electricity this study relates to electricity generated within the borders of South Africa. The levy introduced in July 2009 is applicable to electricity

generated by utilising fossil fuels and nuclear energy, which are considered harmful to the environment (South African Revenue Services, 2019). This is levy is borne by the electricity producers that are operating in the country (South African Revenue Services, 2019). The major supplier of electricity in South Africa is Eskom, which generates electricity in South Africa from coal and is therefore subject to the environmental levy (Ratshomo & Nembahe, 2019). The constraints on the supply of electricity, while at the same time needing to move away from using coal to generate electricity and to give consideration to using renewable energy to generate electricity, have constituted a huge area of concern in recent years (Engineering News, 2015).

South Africa's electricity is predominantly supplied by Eskom. Almost 90% of electricity generated used in the country is supplied by the utility (Ratshomo & Nembahe, 2019). Then the rest is provided by the other role players in the industry, such as private generators, resellers and municipalities. Eskom not only supplies South Africa, but also supplies about 40% of its electricity to neighbouring countries in Africa (Ratshomo & Nembahe, 2019).

2.3 Motor Vehicle (CO2) Emissions

The levy on CO2 emissions from vehicles that was introduced in September 2020 is applicable to motor vehicle, the emissions of which exceed a specified threshold that is considered to be harmful (South African Revenue Services, 2019). These motor vehicles are subject to the levy if they are utilised in South Africa. The objective of the levy is to encourage South African manufacturers to use components that are more energy efficient and environmentally friendly on their vehicle fleets. This levy is paid by the South African manufacturers of those vehicles that are above the CO2 emissions threshold (South African Revenue Services, 2019). The levy is applicable to new motor vehicles, and not old vehicles (Engineering News, 2015).

South Africa is the leader on the African continent in motor vehicle construction, with the major or largest new passenger vehicle feet, and it is also among the largest, globally. In 2015, South African manufacturers constructed and sold over 412 000 brand-new vehicles, overall. The exports of new vehicles amounted to more than 303 000 units in 2015. The largest producers were Volkswagen and Toyota (Posada, 2017).

There is global alignment between the South Africa market with the global markets when it comes to the market composition of vehicles. Globally, there is a contrasting mix of large scale and small vehicles and SUVs. South Africa traded mostly small cars, like the VW Polo and Toyota Corolla, in 2015 (Posada, 2017).

South Africa is the largest automotive manufacturer on the continent and it had a vehicle population of 9.6 million in 2014, as stated by the automotive industry representative, the Organisation of Motor Vehicle Manufacturers. South Africa leads in the automotive industry in terms of brand new vehicles sold and stock provided, and is the largest auto manufacturer in the region, while it is also ranked among the largest, globally. The automotive industry plays a major part in the economy, and it contributed 7.5% to the GDP in 2015, representing ZAR 399 billion. While the automotive industry does contribute economically, it is also part of the transportation industry, which is the second largest greenhouse gas emitter in the country because of its dependency on the utilisation of fossil fuels. Energy generation is the highest emitter, because of its reliance on coal, before the transportation industry. Growth in the transport sector is also an indicator of the growth in carbon emissions through the vehicle CO2 emissions (Posada, 2017).

A recent exercise in developing vehicle fuel economy standards has noted (Department of Transport , n.d.) that, as of February 2017, South Africa had a registered automobile fleet numbering 12 027 860, according to the National Administration Traffic Information System, and that the South African transport sector contributed 10.8% of greenhouse gas emissions. The Transport system consists of “rail, aviation, road, marine, heavy duty vehicles and light duty vehicles”. Of the 10.8% of greenhouse gas emissions derived from the transport sector, 91.2% of that emanated from road transport. Road transportation consists of using heavy-duty and light-duty vehicles.

The transport sector has a huge dependency on fossil fuels, and transport sectors over the world account for at least a quarter of global emissions. To achieve the global temperature goals set by the Paris Agreement, it will be imperative to target the transport sector to encourage it to avoid fossil fuels and to use other sources to fuel vehicles that are environmental friendly (United Nations Climate Change, 2021).

Accordingly, the introduction of this September 2020 environmental levy was intended to curb the growth in the carbon emissions that are generated from new passenger vehicles. Furthermore, the introduction of fuel consumption labelling displays the expected energy consumption of each new vehicle (Department of Transport , n.d.). However, there is no current policy that encourages or that provides incentives for the manufacturers to produce fuel-efficient vehicles (Posada, 2017). The government has set up certain policies to boost the use of electric vehicles ('e-mobility') through a vehicle taxation environmental levy, and it also has provided for battery charging infrastructure to be deployed on major highways at intervals of every 200 km to 300 km (United Nations Climate Change, 2021). Therefore, the solution to decarbonising is to move away from fossil fuels and to provide for electric vehicles with sufficient charging infrastructure, as well as to consider using compressed natural gas (Yasmin, et al., 2015) as an alternative to fossil fuels (United Nations Climate Change, 2021). Compressed natural gas not only provides clean energy, compared with diesel and petrol, but also reduces costs of maintenance (CNG Holdings, n.d.).

2.4 Plastic Bags

The plastic bag environmental levy was introduced in South Africa in June 2004 to encourage users to reuse their plastic bags, rather than creating waste by discarding the bags. There are certain types of plastic bags that cause polluting litter when discarded in the environment. These bags are thin-filmed bags (Dikgang, et al., 2010). The South African manufacturers of these bags are required to pay this levy (South African Revenue Services, 2019).

The levy was introduced as a result of the negative impacts of the build-up of discarded plastic material in the environment. The plastic bags create serious impacts in the environment. There is not much that can be done to limit the harm caused by plastic bags, because there is no method of disposal that would completely eliminate the harmfulness of plastic bags. Once the bags are dumped, they will end up in a landfill or be burnt. If they remain in the landfill, they are there forever, and if they are burnt, they emit toxic gases that harm the atmosphere by increasing the amounts of volatile organic compounds (Environment, n.d.). Plastic bags end up in landfills and waterways through littering by people, and this is

symptomatic of their laziness. Although human interaction might try to manage the disposal of these plastic bags, ultimately, they will end up as litter. Plastic bags are not decomposed by bacterial action or by other living organisms, thereby contributing to long-lasting pollution (The Plasttic Soup Foundation, n.d.). Typically, therefore, plastic bags remain where they land and will remain there for a very long time. If the wind shreds bags or rips them into small pieces, the small pieces will then spread and disperse throughout the area and often end up in waterways (Environment, n.d.).

It has been noted (Environment, n.d.) that much of these plastics end up in the oceans, and they have been estimated to amount to a bulk of around 300 million tonnes. This introduces dangers to the hunting animals of the sea because they can mistake a plastic bag for food. When they ingest a plastic bag, thinking it is food, there is a chance that the sea animal will die because its digestive system is unable to digest plastic, and it will eventually die from lung blockages, intestine blockages or plastic poisoning. The adverse impact is that once one of the animals dies from ingesting plastic, this has impacts on the other animals living in the waterways.

Furthermore, the littering of plastic bags on land is the main cause of woodland animals suffocating to death, as well as of the pollution of soil nutrients (Environment, n.d.). Every plastic bag that is littered and then ends up in the woodlands affects the natural progression of the wildlife in that area. Plastic has the potential to have a repetitive killing effect owing to its longevity. One plastic bag has the potential to kill one animal in a space of three months through its inhalation and ingestion. The increase in use of plastic bags has devastating effects, not only on nature, but also on human beings.

Plastics and paper are often separated from each other for the purposes of recycling. However, not all plastic bags are sent for recycling and instead they will be burnt or left in a refuse dumping site. This happens because recycling is expensive and because the type of plastic in plastic bags does not melt easily for recycling purposes. Therefore, the plastic bags are left in dumping areas to contribute to pollution. Alternatives to using plastic bags have been considered, such as paper bags. However, paper bags also have their own issues because they require more energy to produce and the utilisation of trees to make paper also has negative

effects on the environment. This led to the introduction of reusable plastics that can be utilised as many as five times. While the introduction of reusable plastics does not eliminate their problem, the better understanding of the environmental impacts gained will encourage society to introduce measures and ways to deal with plastic bags. Hence, the environmental levy imposed on plastic bags.

2.5 Tyres

A levy is paid on new, used or re-treaded pneumatic tyres because the disposal of these tyres contributes significantly to littering and causes harm to the environment. The South African tyre manufacturers are liable to pay the levy, provided the tyres are used in this country. The levy collected is said to be used for recycling projects (South African Revenue Services, 2019).

Tyres are among the greatest plastic polluting agents on earth, and they account for at least 10% of the microplastic waste that ends up in the oceans (National Geographic, 2019).

There is a low awareness of the contribution of microplastics by tyres to the environment because tyre wear and tear is gradual and imperceptible; hence, not much known about the problem (National Geographic, 2019). Tyre manufacturing has evolved over the years, with wheel rim coverings being initially made from stone and wood, and then in later years, wheels required covers, for which tyres made from leather and rubber were used. The utilisation of rubber meant that rubber trees were used in tyre manufacturing, and that resulted in huge deforestation, globally. As the demand for motor vehicles increased, tyre manufacturers needed to increase their output of tyres to meet the demand. That meant that the need for rubber increased, but there was as a shortage of natural rubber, and therefore synthetic rubber was introduced in tyre manufacturing. Tyres are now made from natural rubber, synthetic rubber, metal and other components. However, they still have a harmful effect on the environment through deforestation and the utilisation of fossil fuel components to create and make synthetic rubber. (National Geographic, 2019).

It has been noted (National Geographic, 2019) that tyres wear down through the normal driving and hard breaking of motor vehicles on the road because, in the process, small particles of the tyres break off. Once these small particles break off,

they create waste that can cause harm to the environment, and often end up in rivers and oceans. When this happens, the tyre particles are dangerous to water species that ingest the particles, and dangerous to the marine animals that then eat those species. Once tyres have reached their end of their life or of their useful life, they need to be disposed of. They can be disposed of or recycled for reuse as re-treaded tyres. They can also be recycled for non-automotive use in various places, such as play areas and sports fields.

There has been a huge increase in the recycling of tyres and the re-use of tyres, with the increase translating to 70% from 1990 (11%) to 2017 (81%). While this increase may be welcome in some respects, it comes with its own environmental threats because the re-use often entails burning the tyres to generate electrical energy, which is referred to as tyre-derived fuel energy. This type of energy can be derived in a clean way, if it is done correctly in a correct facility. However, if it is not done in a correct manner by putting proper measures in place, the tyres that are burned give off pollutants, such as zinc and chlorine, which cause huge damage to the environment. The non-recycled and non-re-used tyres end up in landfills (National Geographic, 2019).

Although tyre-manufacturing processes may not have improved much over the years, there is a drive to have tyres manufactured using sustainable production methods. Researchers in 2017 made groundbreaking headway by discovering a method to make isoprene, which is a crucial component for synthetic rubber, from green grass, trees and corn, instead of from fossil fuels. Therefore, there is a need for new technology to be developed that would assist in collecting tyre particles as they are worn off, or to build roads in a such way that they would reduce tyre material from wearing off as quickly (National Geographic, 2019).

The introduction of the tyre environmental levy was intended to encourage tyre manufacturers to ensure that the disposal of used tyres will not cause harm to the environment.

2.6 Fuel Taxes

There are other taxes in South Africa that are applicable to petrol, diesel and biodiesel. These are general fuel levy, the applicable customs and excise levy, and

lastly, the Road Accident Fund (RAF) levies. These are mainly intended to cover general government spending, to support the attainment of environmental objectives, and to finance the Road Accident Fund (Liedtke, 2019).

The prices for petrol on April 2021 reached the highest they had ever been, up to that point. The reason for the increase in the petrol prices was broadly attributed to the increase in the taxes and levies that were included in the determination of the petrol price. The increase was not only imposed on petrol, but also on diesel, as the Minister of Mineral Resources and Energy, Mr Gwede Mantashe, announced with effect from the 7th of April 2021. The reasons for the increase were attributed in more detail to the rand losing value against the US Dollar, which resulted in an increase in the basic fuel price, as well as to other events that affected the price increase, such as low crude oil stocks (Magubane, 2021). The increase not only affected the petrol prices, but also the taxes and levies charged on each litre sold. The actual petrol price was only 35% of the total price paid by customers (Daniels, 2021).

In order for South Africa to meet the majority of the local demand for petrol, it imports fuel and also depends on crude oil that is provided by other countries, such as Angola, Ghana, Nigeria and Saudi Arabia (Daniels, 2021). The Department of Energy is responsible for determining of fuel prices through the Central Energy Fund, and therefore the Central Energy Fund determines the basic fuel price (Daniels, 2021). In determining the price, a parity “pricing principle is used”, which includes all costs that are associated with bringing fuel to its end destination, while the basic fuel price is subject to volatility as it fluctuates in relation to the strength and weakness of the rand against the US dollar and the cost of crude oil (Daniels, 2021). The South African basic fuel price decreased for the year 2020/21 because of the decrease in demand that was attributable to the COVID-19 pandemic, which caused a global oil-price crash (Daniels, 2021). The impact of the decrease in the basic fuel price was not felt, however, because of the increase in taxes, with the General Fuel Levy increasing to R3.93 and Road Accident Fund Levy increasing to R2.18 (Daniels, 2021).

The basic fuel price once accounted for 60% of the total fuel price, but this proportion has since declined, as the taxes and levies have increased. The General Fuel Levy generates a substantial amount of money for the National Treasury, and the amount

collected is not ring-fenced for specific matters. The amount collected for the National Treasury through the General Fuel Levy has recently been estimated to be more than R85 billion, while the Road Accident Fund Levy has been estimated to be R43 billion. The above amounts are collected for road transportation matters and to compensate road accident victims, respectively (Daniels, 2021).

The levies referred to above have increased substantially over the years and they have almost doubled. These levies affect the transport sector, which contributes to carbon emissions by utilising vast amounts of fossil fuels. However, the recent motivation to create new technologies to mitigate carbon emissions has encouraged a move to develop vehicles with zero emissions. The introduction of electrically powered vehicles will, however, affect the amount of revenue collected for the National Treasury and also for the Road Accident Fund. This poses a risk of revenue reduction in future, which might threaten the viability of the Road Accident Fund as an entity, as it is currently struggling to keep up with the current claims made on it owing to insufficient funds. Therefore, in the foreseeable future, the government will need to review the taxing system for revenue generation based on fossil fuels. Climate change is impelling the implementation of new technologies that will reduce greenhouse gas emissions, which at the same time will adversely affect the revenue available for delivering government services. Therefore, better planning is required in order for the affected government institutions to continue to function in order to fulfil their designated mandates.

2.7 Carbon Tax

Sub-sections 2.1 to 2.6 above discussed various environmental taxes that apply to certain specific items. The general carbon tax needs to be added to these specific taxes for discussion (National Treasury, Deputy Minister of Finance Dr David Masondo, 2016:6) (Gilder, et al., 2020). The carbon tax was introduced because of climate change, which has been described as one of the greatest threats the human kind has ever faced (National Treasury, Deputy Minister of Finance Dr David Masondo, 2016:6). South Africa is among the top emitters of greenhouse gas emissions, globally, and as a global player that is concerned in lowering greenhouse gas emissions, it is a signatory to the Paris Agreement (South African Government, n.d.) (National Treasury, Deputy Minister of Finance Dr David Masondo, 2016:6). It

has taken some time to see the successful implementation of a carbon tax. Over a period of about a decade, a succession of Finance Ministers proposed the imposition of a carbon tax as a mechanism for placing a price on carbon emissions in order to give effect to the 'polluter pays' principle (South African Government, n.d.) (National Treasury, Deputy Minister of Finance Dr David Masondo, 2016:6).

The national Carbon Tax came into effect in June 2019 (South African Government, 2019). Although this tax is aimed at improving the market letdown through placing a price on carbon, its design and adaption needs be accepted in order to encourage supportable policymaking and conduct. Notwithstanding the fact that the Carbon Tax has been implemented, there are other tax incentives to promote energy efficiency that could be of assistance to enterprises while they are changing their processes to low-carbon technologies (National Treasury, Deputy Minister of Finance Dr David Masondo, 2016:6) (Brink, 2019). It is intended to encourage or provide incentives to all parties in order for them to consider the adoption of clean energy technology in their future investments (Gilder, et al., 2020).

2.7.1 Determination of taxpayers and activities that are taxable

The Carbon Tax is a tax that is imposed on a person (the taxpayer) whose activity is conducted in South Africa and results in greenhouse gas emissions that are higher than the determined threshold as set out in Schedule 2, with the aim of regulating those activities in a way that benefits the environment (Government Gazette, 2019:8&12) (Gilder, et al., 2020).

A. Person

The Carbon Tax Act, No 15 of 2019, (the "Carbon Tax Act") in Section 1 defines a person as including a "(i) Partnership, (ii)Trust, (iii) Municipal entity service utility or company established under law which operates under the control of a municipality, (iv) Public entity and (v) Municipality" (Gilder, et al., 2020).

The fact that the Carbon Tax Act uses "includes" in the definition indicates that the list is not final and can still be expanded on. The Interpretation Act (33 of 1957) applies to every law that requires interpretation. Therefore, the fact that the definition states that it "includes" means that consideration must also be given to the

Interpretation Act. In terms of the Interpretation Act, a person is defined in Section 2 as including (Gilder, et al., 2020) “(a) any divisional council, municipal council, village management board or like authority; (b) any company incorporated or registered as such any law; (c) any body of persons, corporate or unincorporate” (Gilder, et al., 2020).

Therefore, the definition of a “person” for the purposes of the Carbon Tax Act includes natural persons and any company incorporated or registered as such, in terms of the Interpretation Act, 33 of 1957. The Carbon Tax Act, in determining who is liable for the carbon tax, in its definition includes a person and defines a “person” as stated above.

In the National Gas Emission Reporting Regulations, the emphasis is placed on a “data provider”, “operational control” and “facility”. The definition of “data provider” is set out in Regulation 4 (Department of Environmental Affairs, 2017) as follows:

> “data provider - means any person as classified in regulation 4 and shall include ─
>
> (a) its holding company or corporation or legal entity, registered in South Africa in accordance with the legislation of the Republic of South Africa;
>
> (b) all its subsidiaries and legally held operations, including joint ventures and partnerships where it has a controlling interest, or is nominated as the responsible entity for the purpose of reporting under these Regulations;
>
> (c) all facilities generally over which it has operational control, which are not part of another data provider as provided for in these Regulations” (Department of Environmental Affairs, 2017)

Regulation 4 states:

> “For purposes of these Regulations, a data provider is classified as follows:
>
> (a) Category A: any person in control of or conducting an activity marked in the Category A column above the capacity given in the threshold column of the table in Annexure 1 to these Regulations; and
>
> (b) Category B: any organ of state, research institution or academic institution, which holds greenhouse gas emission data or activity data relevant for calculating

> greenhouse gas emissions relating to a category identified in table in Annexure 1 to these Regulations" (Department of Environmental Affairs, 2017)

Considering the above definition of a person, there is no alignment between the Carbon Tax Act and the National Greenhouse Gas Emissions Reporting Regulations. These two critical legislative instruments need to be harmonised in order to avoid confusion, and to ensure that the tax liability is calculated correctly and that taxpayers are properly defined in order to ensure that all "persons" who are supposed to pay carbon tax are covered (Gilder, et al., 2020).

In order to ensure congruency of the two documents, the Carbon Tax Act needs to be updated with the definitions contained in the National Greenhouse Gas Emissions (Gilder, et al., 2020).

B. Conducts an activity in South Africa

The Carbon Tax Act outlines taxable activities under Schedule 2. These prescribed activities are liable to attract carbon tax and they are sourced from the 2006 Intergovernmental Panel on Climate Change. Therefore, a taxpayer needs to refer to Schedule 2 in order to assess whether their operation falls under any listed taxable activity. Schedule 2 has five sectors/activities, which it describes as "(i) Energy, (ii) Industrial processes and product use, (iii) Agricultural forestry and other land use, (iv) Waste, and (v) Other" (Gilder, et al., 2020).

All the above sectors can be further broken down for their subsector details. These activities must take place in South Africa in order for them to be subjected to carbon tax. Having considered the listed activities, it is worth noting that the phrase "conducting an activity" is not well defined in the Carbon Tax Act. It is therefore safe to say that conducting an activity means or refers to organising and carrying out of that activity if take in a true meaning of word conduct. That would mean that the person operating a facility that generates greenhouse gas emissions is conducting an activity that is taxable under the Carbon Tax Act. Therefore, the assessment of the person conducting an activity in South Africa will be a subjected to a consideration of the circumstances and facts, as well as law, because of the differences between the Carbon Tax Act and the National Gas Emissions Reporting

Regulations. The Regulations refer to the “data provider”, which is defined as a holding company and all its subsidiaries, joint ventures and other facilities that the holding company has operational control over. The Carbon Tax Act refers to partnerships, trusts and municipality and municipal entities and public entities that fall under Schedule “2, 3A, 3B, 3C and 3D” of the “Public Finance Management Act, 1999 (Act No.1 of 1999)” (Gilder, et al., 2020).

C. The activity is equal to or above the threshold

In order for the Carbon Tax Act to be applicable, the greenhouse gas emissions of a particular taxpayer must be above the stipulated threshold. If the greenhouse gas emissions are below the threshold, the taxpayer is not subjected to the carbon tax and is therefore not obliged to submit the environmental levy returns. Schedule 2 stipulates the various thresholds for different activities. The prescribed thresholds indicate that any greenhouse gas emissions that are above the stipulated thresholds are subject to carbon tax (Department of Environmental Affairs, 2017).

Table 2.1: Threshold for Category A

Code	Name	Category A shall report when their total installed capacity for this activity is over the threshold	Category A Threshold	Transitional Arrangement Applicability (Regulation 15)
1A3a	Civil Aviation	Tier 2 or 3	100 000 litres/year	Yes
1A3b	Road Transportation	NA	NA	NO
1A3c	Railways	Tier 2 or 3	100 000 litres/year	Yes
1A3d	Water-borne Navigation	Tier 2 or 3	100 000 litres/year	Yes
1A3e	Other Transportation	NA	NA	NA
1A4	Other Sectors			
1A4a	Commercial/Institutional	Tier 2 or 3	10 MW(th)	Yes
1A4b	Residential	Tier 2 or 3	10 MW(th)	Yes
1A4c	Agriculture/Forestry/Fishing/Fish Farms	Tier 2 or 3	10 MW(th)	Yes
1A5	Non-Specified			
1A5a	Stationary	Tier 2 or 3	10 MW(th)	YES
1A5b	Mobile	NA	NA	NA
1A5c	Multilateral Operations	NA	NA	NA
1B	Fugitive Emissions from Fuels			
1B1	Solid Fuels			
1B1a	Coal Mining and Handling	Tier 2 or 3	[3]none	YES
1B1b	Uncontrolled Combustion, and Burning Coal Dumps	NA	NA	NA
1B1c	Solid Fuel Transformation	Tier 2 or 3	none	YES

The stipulated thresholds operate in the way that any amount that is above a threshold is subject to the carbon tax. Table 2.1 above displays the thresholds for category A data providers. There are two categories of data providers – Category A and Category B. In Category A, a “data provider is any person that is in control of an activity” that produces emissions above the stipulated threshold. Category B covers any state institution, academic or research body that holds information or activity data that pertains to greenhouse gas emissions, and which are relevant in calculating the emissions for a particular category, as identified in Annexure 1 of the Regulations. However, in the annexure, there are notations of “N/A” and “none” stated in the threshold column. “N/A” means that such a line item is currently not subject to carbon tax and “none” means there is no tax-free threshold that the stated activity, which is subject to carbon tax, regardless of the capacity (Gilder, et al., 2020) (Department of Environmental Affairs, 2017). Therefore, a taxpayer falling under the category of “N/A” does not need to report greenhouse gas emissions

relating to the activity classed as “N/A” (Department of Environmental Affairs, 2017). For the transitional arrangements, the indication of a “YES” this means “that a data provider has to apply a tier 3 or tier 3 methodology after five years from the date of the promulgation of the regulations” (Department of Environmental Affairs, 2017).

2.7.2 Determination of the total greenhouse gas emissions in order to calculate carbon tax liability

The carbon tax will be levied on the “total 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 and 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” (Government Gazette, 2019:8&12). This is described as the tax base.

The aspect of fuel combustion relates to the emissions that arise from fuel activity, such as the combustion of coal to produce heat or energy. These uses are for energy generation from fuel or for gasification. Emissions from industrial processes are emissions resulting from non-energy related industrial processes. They arise from the use of fuel and consumption of carbonates as feedstock and also from the combustion of synthetic gases. ‘Fugitive emissions’ are emissions that arise from leaks emanating, for example, from industrial plants, pipelines, and mine ventilations (Gilder, et al., 2020).

There are six types of greenhouse gas emissions that are governed by the Kyoto Protocol. Those are carbon “dioxide (C02), methane (CH4), nitrous oxide (N20), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6)” (United Nations, 1997). These greenhouse gas emissions are aligned with those stipulated in the Carbon Tax Act. These greenhouse gas emissions need to be expressed in carbon dioxide equivalents. To convert an emission, the global warming potential is used as a multiplying factor. The conversion is necessitated by the different rate at which these emissions trap heat. Hence, the global warming

potential of gasses stipulates the multiplying factors of different gasses (Gilder, et al., 2020).

Table 2.2: Global warming potential of greenhouse gases

No	Greenhouse Gas	Global Warming Potential
1	“Carbon dioxide(C02)”	1
2	“Methane(CH4)”	23
3	“Nitrous oxide(N20)”	296
4	“Hydrofluorocarbons (HFCs)”	22 200
5	“Perfluorocarbons (PFCs)”	11 900
6	“Sulphur hexafluoride (SF6)”	5 700

Source: (Gilder, et al., 2020)

Table 2.2 above indicates the multiplying factor used to convert each gas emission into a carbon dioxide equivalent in order to determine how much carbon dioxide is emitted to the atmosphere on an equal basis. The above emissions are aligned with the “technical guidelines for monitoring, reporting and verification of greenhouse gas emissions per industry” (Department of Environmental Affairs, 2017).

The total greenhouse gas emissions are determined according to the applicable category (fuel combustions, industrial processes, and fugitive emissions). Each category is calculated by using its own formula in terms of Section 4 of the Carbon Tax Act. In determining the emissions, the Department of Environmental Fisheries and Forestry have issued the Technical Guidelines for Monitoring, Reporting and Verification, which are used as a guide. These technical guidelines are in line with the principles determined by the Intergovernmental Panel on Climate Change (Department of Environmental Affairs, 2017).

The Carbon Tax Act, as well as the Intergovernmental Panel on Climate Change, adopted a default emission factor approach to quantify the emissions. These default factors are used for each activity under consideration. They are, however, considered to be not as accurate as the company-specific factors and country-specific factors. In the event that it is difficult to determine a company- and country-

specific emission factor, the default factors are utilised (Department of Environmental Affairs, 2017). “Section 4(1) of the Carbon Tax Act and the 2019 Explanatory Memorandum on the Draft Taxation Laws Amendment Bill state that a tax payer determining their carbon emissions must use company specific emissions methodology or the tier 3 methodology that is approved by Department of Environment Fisheries and Forestry” (National Treasury, 2019). “The 2019 Explanatory Memorandum on the Draft Taxation Laws Amendment Bill and section 4(2) of the Carbon Tax Act states that the taxpayer must use the default emissions as defined by the 2006 Intergovernmental Panel on Climate Change if the company specific emissions have not been developed and approved by the Department of Environmental fisheries and Forestry” (National Treasury, 2019).

The Greenhouse Gas Protocol is a Corporate Accounting and Reporting Standard that gives guidance on how to quantify and report greenhouse gas emissions. The Greenhouse Gas protocol provides guidance on how to properly classify or allocate the relevant greenhouse gas emissions and to ensure transparency and accuracy in reporting the emissions. In order to have the emissions properly allocated and classified, the emissions are categorised as either direct emissions or indirect emissions. Next, they are categorised as scope 1, 2 or 3, depending on how the company’s organisational boundaries are set. Companies will need to set their operational boundaries after setting their organisational boundaries. According to the Greenhouse Gas Protocol (World Resource Institute, 2004), an organisational boundary is the company structure of the organisation that determines if the interest of the company is either as a subsidiary, joint arrangement or a joint venture. The organisational boundary also determines whether a company’s interests in these structures will have to be consolidated or equity accounted; therefore, the reporting of these emissions will follow the same reporting and accounting when it comes to the emissions reporting.

In setting the organisational boundary, the approaches to follow are either an equity share approach or a control approach. The control approach can either be operational control (which is control over the operation of the company) or financial control (which is control over the financial and operational policies to gain economic benefit). Operational boundaries are defined on the basis of the company’s operations, which involve its goals and climate change policies. These are then used

to identify and categorise the company's emissions as either direct or indirect emissions. Once they are categorised as either direct or indirect, they then be categorised as scope 1, 2 or 3 (World Resource Institute, 2004).

The South African Technical Guidelines for Monitoring, Verification, Reporting and Measuring and the National Greenhouse Gas Emissions Reporting Regulations define the organisational boundaries and reporting boundaries. The organisational boundary is based on the nature of the operational control that the data provider has over the facilities that they control. A data provider is considered to have operational control if it has the full authority to influence the policies of the operation and the company. Therefore, such a data provider must consolidate one hundred percent of the greenhouse gas emissions for those facilities that they have operational control over. An operational boundary is defined such that the greenhouse gas emissions reported must include all direct emissions, including abnormal events, together with details of the down times or shut down times, and all emergencies of that particular facility (Department of Environmental Affairs, 2017).

The definitions of organisational control and operational control have also been generally detailed in the Greenhouse Gas Protocol. These are separate from the provisions set out in the South African Technical Guidelines for Monitoring, Verification, Reporting and Measuring for South African purposes. Improving the latter would definitely enhance the identification of the relevant boundaries for South Africa, with an aim of ensuring completeness, accuracy, transparency and reporting of emissions.

In terms of the South African Technical Guidelines for Monitoring, Verification, Reporting and Measuring (Department of Environmental Affairs, 2017), once the boundaries are set, the data provider needs to select a methodology for estimating or determining the data provider's greenhouse emissions. There are three types of methodology that a data provider can choose from being Tier 1, Tier 2 and Tier 3. Tier 1 is the method used to determine the greenhouse gas emissions according to the 2006 Intergovernmental Panel on Climate Change. The Tier 1 method utilises the readily available data on the activity and the default factors, and so it is the simplest method of the three to use. Tier 2 follows the method as defined in Tier 1, but uses the country-specific emissions rather than the default emissions. Tier 3 is a

more detailed methodology that considers more specific information, such as site information, the equipment used and the maintenance of such equipment, in determining the emissions. The level of accuracy is different per tier. The tier with the highest uncertainty in terms of accuracy is Tier 1, followed by Tier 2, which has a reduced level of uncertainty when compared with Tier 1. Lastly, Tier 3 has the lowest level of uncertainty and is considered to be the most accurate, in comparison with Tier 1 and Tier 2.

These tiers are then utilised to determine the level of accuracy that is stipulated for the listed activities. The higher the tier is, the higher the accuracy is that is required for that activity. If the listed activity is stated as Tier 1, a moderate degree of accuracy is expected to be provided in terms of that particular activity. The higher the emissions are, the higher the carbon tax is that the taxpayer will have to pay. The lower the emissions are, the lower the carbon tax is that the taxpayer will have to pay. Therefore, the onus for reporting accuracy should be upon the taxpayer to ensure that the emissions are reported as accurately as possible, and also to maximise the tax savings as much as possible to reduce the liability (Department of Environmental Affairs, 2017).

Once the level of the applicable tier is determined, the data provider needs to calculate the emissions for all the three categories – “fuel combustion, industrial combustion and fugitive combustions”. The Carbon Tax Act stipulates the formulas to use for the calculations of the emissions for the three categories. These formulas are outlined in section 4(2)(a) –(c). It must be noted that the Carbon Tax Act contains an error that has resulted in a duplication of sections 4(2)(a) and 4(2)(b). The first mention of section 4(2)(a) and 4(2)(b) deals with the methodology used by the taxpayer. The second mention of section 4(2)(a) and 4(2)(b) deals with the “greenhouse gas emissions that result from the fuel combustion and fugitive emissions that are expressed in a carbon dioxide equivalent greenhouse gas emissions” (Gilder, et al., 2020).

Fuel Combustion Emissions

The Carbon Tax Act in section 4(2)(a) stipulates the formula to use for determining the greenhouse gas emissions for fuel combustion of all the fuel types for the tax period under review. The formula is (Gilder, et al., 2020):

“E = (A × B)”

The elements of the formula stand for (Gilder , et al., 2020):

a) “ **‘E’** = means the emissions to be determined

b) **‘A’** = represents the mass of fuel expressed in tone excluding fuel used in for purpose of international aviation and maritime transport

c) **‘B’** = represents the greenhouse gas emission factor in carbon dioxide equivalent that must be determined by utilizing the formula (Gilder, et al., 2020)”:

“X = {[(C × 1) + (M × 23) + (N × 296)] × D}/Y”

The elements in the formula stand for:

i. “ **‘X’** = represents number to be determined

ii. **‘C’** = represents the carbon dioxide emissions of fuel type

iii. **‘M’** = represents methane emissions for fuel type

iv. **‘N’** = represents nitrous oxide emissions for fuel type

v. **‘D’** = represents the net default calorific value for fuel type

vi. **‘Y’** = represent the number 1000.”

Fugitive emissions

The Carbon Tax Act in section 4(2)(b) stipulates the formula to use for determining the greenhouse gas emissions for fugitive emissions for the period under review. The formula is (Gilder, et al., 2020):

“F=(N×Q)”

The elements in the formula stand for:

a) “ **‘F’ =** represents number to be determined

b) **‘N’ =** represents mass expressed in tone in case of solid fuels or volume of each type expressed in cubic metres of fuels other than solid fuels

c) **‘Q’ =** represents the greenhouse gas emission factor in carbon dioxide equivalent in cubic metres or tones” (Gilder, et al., 2020):

i. In the case of oil and natural gas, **‘Q’** must be determined according to the formula:

“X = [(C × 1) + (M × 23) + (N × 296) × Y”

The elements in the formula stand for (Gilder , et al., 2020):

a) “ **‘X’** = represents number to be determined

b) **‘C’** = represents carbon dioxide emissions of fuel type

c) **‘M’** = represents methane emissions of fuel type

d) **‘N’** = represents nitrous oxide emissions of fuel type

e) **‘Y’** = represents the number 1000”; and

ii. “In the case of coal mining and handling, **‘Q’** must be determined according to the formula”:

“X = (M × D × 23) × Y”

The elements in the formula stand for:

a) “ **‘X’** = represents number to be determined

b) **‘M’** = represents methane emissions of type

c) **‘D’** = represents the net default calorific value for coal mining and handling methane emissions

d) **‘Y’** = represents the number 1000”.

Industrial process

The Carbon Tax Act in section 4(2)(c) stipulates the formula to use in determining the greenhouse gas emissions for an industrial process for the period under review. The formula is (Gilder, et al., 2020):

"P = (G × H)"

The elements in the formula stand for (Gilder, et al., 2020):

a) **"'P'** = represents amount to be determined; it must not be less than zero

b) **'G'** = represents the mass of each raw material used or to be produced expressed in tone

c) **'H'=** represents the greenhouse gas emission factor in carbon dioxide equivalent per tone for each raw material used or product produced. It must be determined using the formula" (Gilder, et al., 2020)**:**

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

The elements in the formula stand for (Gilder , et al., 2020):

i. " **'X'** = represents number to be determined

ii. **'C'** = represents the carbon dioxide emissions of raw materials or product

iii. 'M' = represents methane emissions for materials or product

iv. 'N' = represents nitrous oxide emissions of raw materials or product

v. **'H'** = represents the hexafluoroethane emissions of raw material or product

vi. **'T'** = represents the carbon tetrafluoride emissions of raw material or product

vii. **'S' =** represents sulphur hexafluoride emissions of raw material or product".

Carbon Tax liability

After calculating the total greenhouse gas emissions for fuel combustions, industrial process and fugitive emissions, the tax payable is calculated on the aggregate amount, after deductions and allowances (Gilder, et al., 2020).

The carbon tax liability is calculated in terms of the following formula (Gilder, et al., 2020):

"X= < {[(E - S) × (1 - C)] × [D × (1 – M)]} + {P × (1 - J)} + {F × (1-K)}> × R"

The elements in the formula stand for (Gilder , et al., 2020):

a) " **'X'** = represents the amount to be determined

b) **'E'** = represents the total fuel combustion related greenhouse gas emissions of the tax period under review represented in carbon dioxide equivalent

c) **'S'** = represents the number in respect of greenhouse gas emissions expressed in carbon dioxide equivalent that were sequestrated for the period under review as verified and certified by Department of Environmental Affairs

d) **'C'** = represents the number equal to the sum of percentages of allowances determined under sections 7 (basic tax-free allowance); 10 (trade exposure allowance); 11 (performance allowance); 12 (carbon budget allowance); and 13 (offset allowance) for the period under review subject to section 14 (limitation allowance)

e) **'D'** = represents the number in terms of petrol diesel related greenhouse gas emissions for the period under review expressed equivalent of carbon dioxide

f) **'M'** = represents the number equal to the sum of the percentage allowances determined under section 7 (basic tax-free allowance); 12 (carbon budget allowance); and 13 (offset allowance) subject to section 14 (limitation allowance).

g) **'P'** = represents the number in respect of the total industrial process related greenhouse gas emissions for the period under review expressed in carbon dioxide equivalent

h) **‘J’** = represents the number equal to the sum of percentages allowances determined under section 7 (basic tax-free allowance); 8 (industrial process emissions allowance); 10 (trade exposure allowance); 11 (performance allowance); 12 (carbon budget allowance); and 13 (offset allowance)

i) **‘F’ =** represents the number in respect of total fugitive greenhouse gas emissions for the period under review expressed in carbon dioxide equivalent

j) **‘K’ =** represents the sum of total of the percentages of the allowances determined in terms of section 7 (basic tax-free allowance); 9 (fugitive emission allowance); 10 (trade exposure allowance); 11 (performance allowance); 12 (carbon budget allowance); and 13 (offset allowance) subject to section 14 (limitation allowance).

k) **‘R’ =** represents the tax rate as prescribed in section 5”.

Once the total carbon tax is calculated, it is adjusted for the tax payable from the electricity generated from fossil fuels, as well as the tax payable by a refinery for petroleum products. The following formulas are detailed below.

Generation of electricity from fossil fuels

The formula is as follows:

“X = A- B-C”

The elements in the formula stand for:

a) “ **‘X’** = the amount to be determined

b) **‘A’** = the amount of tax payable for the period under review

c) **‘B’ =** represents the energy premium in respect of the period commencement of the period until 31 December 2022 as determined by Minister

d) **“C” =** represents the environmental levy (imposed by section B of Part 3 of Schedule 1 of the Customs and Excise Act) for the period until 31 December 2022”.

The above formula is used to ensure that there is no double counting of the carbon taxation when it comes to the electricity generated levy that is collected by the South

African Revenue Services on electricity generated in South Africa by using fossil fuels.

Tax payable by petroleum refineries

In terms of tax amendments that were gazetted on 20 January 2020, section 6(1) of the Carbon Tax Act was amended in order to include a new subsection 3 (National Treasury, 2020), which incorporates a tax payable by a petroleum refinery. This amendment extends section 6(1), which indicates that, subject to subsection 2, the tax on oil refineries is included, subject to subsections 2 and 3. Section 2 applies to electricity generated from fossil fuels, and section 3 relates to petroleum products. The amendment is introducing the formula to calculate tax payables by petroleum refinery.

The formula is as follows (National Treasury, 2020):

"X = A – (B x P)"

a) " **'X'** = represents the amount to be determined that must not be less than zero (National Treasury, 2020);

b) **'A'** represents the amount of tax payable in respect of a tax period determined in terms of subsection (1) (National Treasury, 2020);

c) **'B'** represents an amount of 0.56 cents per litre (National Treasury, 2020); and

d) **'P'** represents the total amount of petrol produced expressed in litres" (National Treasury, 2020).

After calculating the total tax liability in terms of section 6(1), the taxpayer must take account of the effect of the tax payable from electricity generation using fossil fuels and the tax payable in respect of the petroleum refinery. This is to avoid double counting.

The tax rate is levied at "R120 per ton carbon dioxide equivalent of the greenhouse gas emissions of a taxpayer, however this rate is subject to change at consumer price inflation plus two percent for the period 31 December 2022 and increase by consumer price inflation thereafter" (Government Gazette, 2019:8&12). This levy will be collected by the Commissioner of South African Revenue Services and the

Commissioner must report to the Minister of Finance within “six months from the date of submission of the environmental levy and payments” with regard to the greenhouse emissions that the taxpayer is liable to pay for carbon tax and the amount of carbon tax collected (Government Gazette, 2019: 5,10,15,25).

2.7.3 Allowances and deductions that apply in order to reduce the carbon tax liability in terms the Carbon Tax Act

This sub-section deals with the allowances and the requirements to qualify for the various allowances.

The tax rate is applied after considering the allowances that are made available. The allowances constitute a measure to encourage taxpayers by reducing the financial pressure of the tax, and to encourage them to transition to finding alternative technologies and energy-efficient investments. These allowances are allocated per sector (Legg, 2019). They (Government Gazette, 2019:14,16,18) are discussed in the paragraphs below. Schedule 2 of the Carbon Tax Act stipulates the allowances per activity. The order of discussion will follow the layout given in Schedule 2: “(a) Basic tax free allowance, (b) Industrial process allowance, (c) Fugitive emissions allowance, (d) Trade exposure allowance, (e) Performance allowance, (f) Carbon budget allowance and (g) Carbon offset allowance” (Gilder, et al., 2020).

The above-mentioned allowances are subject to limitations set out in section 14 of the Carbon Tax Act, whereby the limitation is stipulated to be 95% and 100% on other taxpayers stipulated in Schedule 2, such as in the agricultural sector (Gilder, et al., 2020).

Basic tax free allowance

The basic tax allowance is applicable to the “taxpayer that conducts an activity that is listed in schedule” “as the activity”, according to the activity sector, and it is matched with the line for the basic tax free allowance. That is how the basic tax free is determined. The percentage is allocated in the schedule, as set out in the Carbon Tax Act (Gilder , et al., 2020).

The value of the basic tax free allowance ranges from 60% to 100%, depending on the activity that is conducted, as detailed in schedule to the Carbon Tax Act (Government Gazette Republic of South Africa, 2020). To claim this allowance, there

is no requirement for the taxpayer to have any supporting documents. The taxpayer can simply refer to the schedule that is the guide on how to determine the allowance (Gilder , et al., 2020).

Industrial process emission allowance

This is an allowance that is applicable to the industrial processes that are listed in the activity sector, according to Schedule 2 of the Carbon Tax Act. The 10% allowance is applicable to the activities that pertain to industrial process emissions (Government Gazette Republic of South Africa, 2020). To claim the allowance of 10% as stated in the schedule, the taxpayer must keep the supporting documents (Gilder , et al., 2020).

Fugitive-emission allowance

This is an allowance that is applicable to fugitive emissions that are listed in the activity sector according to Schedule 2 of the Carbon Tax Act. The 10% allowance is applicable to the activities that pertain to industrial fugitive emissions (Government Gazette Republic of South Africa, 2020). To claim this allowance, the taxpayer needs to keep supporting documents (Gilder , et al., 2020).

Trade exposure allowance

This is an allowance that is applicable to a taxpayer that is exposed in terms of its trade experiences. The allowance is calculated “by the value of exports plus the imports divided by total production by sector or subsector that must be” determined as prescribed by Minister of Finance by regulation. The maximum deduction allowable is 10%, and the regulations are applicable to determine the precise amount of the allowance (Government Gazette Republic of South Africa, 2020). To claim the allowance, the taxpayer needs to keep supporting documents to indicate how the claim is determined in terms of the relevant methodology, as prescribed in the regulations on the trade exposure allowance (Gilder , et al., 2020).

There is one determination of trade exposure that is applicable to a single sector taxpayer, and another determination of trade exposure for a multiple sector taxpayer. The determination of a trade allowance for a single sector is made by matching the line in terms of activity in Annexure A in terms of the exposure allowance with the

SIC Code and the sector name (Government Gazette Republic of South Africa, 2020).

The trade exposure allowance for multiple sectors is typically determined by using the applicable formula prescribed by the regulations, which is achieved by matching the activity and the SIC code, as prescribed in Regulation "2 determining allowance in respect of trade exposure for purposes of determining carbon tax liability". However, if a taxpayer is of the opinion that the determination of the allowance does not provide an accurate picture of the taxpayer's trade exposure, the taxpayer can opt to use an alternative method, as prescribed in regulation 4(1), (2) and (3), which describes the methodology to use to measure the exposure (Government Gazette Republic of South Africa, 2020).

The multiple sectors allowance is determined by using the following formula (Government Gazette Republic of South Africa, 2020):

"X = S × N"

The elements in the formula stand for (Government Gazette Republic of South Africa, 2020):

- "X = represents the percentage to be determined
- S = represents the sector allowance determined by matching the SIC code and the activity as prescribed in regulation 2
- N = represents the value that needs to be determined according to the formula
    - N = (P ÷ S) × Y".

  The elements in this formula stand for:

    - "P = represents the total average production of the individual sector for the prior three tax periods
    - S = sum of total average of production of all relevant sectors for the prior three tax periods as published by Stats SA and
    - Y = 100".

The alternative method of calculating the allowance is to permit taxpayers themselves to actually determine the amount of allowance that would be an accurate reflection of their trade exposure. The formula to use to determine the calculation of this allowance (Government Gazette Republic of South Africa, 2020) is as follows:

"X = (E+I)/S × Y"

The elements in the formula stand for (Government Gazette Republic of South Africa, 2020):

- "**X** = represents the percentage to be determined
- **E** = represents monetary value expressed in rand of products that were exported after taking all the costs that are necessary for the product to be put in its useable form. These costs include those of creating, extraction, production, major or minor assembly, improvements, repair, packaging and labelling for the tax period under review and these must be audited by an independent auditor
- **I** = represents monetary value expressed in rand of products after taking all the costs that are necessary for the product to be put in its useable form. These costs include those of creating, extraction, production, major or minor assembly, improvements, repair, packaging and labelling for the products that were imported by the taxpayer for the tax period under review and these must be audited by an independent auditor
- **S** = represents the amounts of total sales expressed in rand during the tax period under review and must be audited by an independent auditor
- **Y** = represents number 100".

There is a proviso that provides limitations on the amount determined in terms of the alternative method: if the percentage determined is less than 10%, there is no allowance to be granted. If the percentage is equal to or greater than 10%, but less than 30%, the allowance will be determined by using the formula; however, it will be multiplied by 0.33 fraction. If the percentage calculated is equal to or greater than 30%, an allowance of 10% will be allowed (Government Gazette Republic of South Africa, 2020).

Performance Allowance

The performance allowance is applicable to taxpayers that have put measures in place that were aimed at reducing their greenhouse gas emissions for the tax period under review. The allowance must not exceed 5% of the total greenhouse emissions for the tax period under review (Government Gazette Republic of South Africa, 2020). The following formula is used to determine the allowance (Gilder , et al., 2020):

"Z = (A/B - C) × D"

The elements in the formula stand for (Gilder , et al., 2020):

- "**Z** = represents the percentage to be determined and it must not be less than zero
- **A** = represents
    a) Sector or subsector greenhouse gas emissions intensity as prescribed by the Minister
    b) Where there is no value prescribed the number is zero
- **B** = represents verified and measured greenhouse gas emissions intensity of the taxpayer for the tax period under review
- **C** = represents number one and
- **D** = represents number 100"

In order to claim the performance allowance, the taxpayer must use the provisions of section 11(1), which sets out the formula as stated above, and prescribed documentation must be submitted to claim the allowance. To determine the value of the allowance, the provisions are used that are stipulated in the regulations for the "greenhouse gas emissions intensity bench mark prescribed for the purpose of section 11 of the Carbon Tax Act" (Gilder , et al., 2020). The verified emissions data details of the taxpayer are received by SARS automatically from the Department of Environmental Affairs Fisheries and Forestry (Gilder , et al., 2020).

Carbon Budget allowance

The carbon budget allowance is applicable to taxpayers that are participating in the carbon budget system, as determined by the Department of Environmental Fisheries and Forestry, during or before the tax period under review. The activity must be “listed in the column activity/sector under schedule 2, that taxpayer qualify to receive an additional budget allowance of 5% of the total greenhouse gas emissions in respect of the applicable tax period”. The Department of Environment Fisheries and Forestry needs to confirm that the “taxpayer is participating in the carbon budget system” through a confirmation letter (Gilder, et al., 2020).

Carbon offset allowance

The carbon tax offset allowance is available to qualifying taxpayers to use to reduce their tax liability. This allowance was put into effect and published by the Minister of Finance. For a taxpayer to claim this allowance, they must possess a carbon offset retirement certificate issued by the administrator of the allowance (the Department of Minerals Resources and Energy). The purpose of the offsetting programme under the regulations is to give industry participants the flexibility to provide their own mitigation measures at low costs, while reducing their tax liability. This allowance covers the activities or sectors that are not directly catered for by the carbon tax or by any other incentive under the “renewable energy independent power producer procurement and programme or any energy efficiency incentive” (Gilder, et al., 2020).

The offset allowance is administered through regulations that define an approved project as an eligible project, and the carbon offset regulations defines an eligible project as encompassing the Clean Development Mechanism Project, the Verified Carbon Standard Project, the Gold Standard Project, or any other project verified to be using any applicable standard approved by the Minister of Energy (Gilder, et al., 2020).

A prescribed procedure needs to be followed to claim this allowance, which is managed through an online system that is used to execute the mandate of all parties involved in the process. This process involves the registration by a taxpayer and the process of assessing the taxpayer as to whether it can be issued with an extended letter of approval to allow the taxpayer to claim the allowance (Gilder, et al., 2020).

The administrator is required to give access to registration details to the Minister of Finance and the SARS Commissioner, with access to the registry, as well as other observers to the specific reports. There are other participants in the system, as the credit owners who can own, retire, or sell or buy their credits (Gilder, et al., 2020).

The introduction of the above allowances has resulted in section 12I of the Income Tax Act, 58 of 1962, being repealed in order to avoid double deductions (National Treasury, 2019).

There are certain other deductions that are considered in calculating the tax payable, and these deductions are as follows:

a) Sequestrated emissions

Sequestration means a long-term project to remove and capture greenhouse gas emissions from the atmosphere. Sequestration is often done by capturing the carbon from the source where is emitted, and it is then stored underground. The sequestration process can also be achieved though biological and chemical processes. The biological process is achieved by increasing the appropriate changes in land utilisation and forestry use, and the chemical approach includes the use of certain engineering activities, such as those for carbon capture and storage (Selin, 2019). The Carbon Tax Act in section 6(3) defines “sequestration as the process of storing a greenhouse gas or increasing the carbon content of carbon reservoir other than the atmosphere”.

b) Petrol- and diesel-related emissions

It has been noted (Gilder, et al., 2020) that the calculation of the petrol- and diesel-related emissions are included in the formula for the alignment of the Department of Environmental Forestry and Fisheries requirements for carbon calculation of combustion sources, but are later removed for the carbon tax calculation. For this deduction to be obtained, supporting documents are required. This exclusion is done at the stage of the carbon tax liability determination.

c) Renewable-energy premium

It has been observed (Gilder, et al., 2020) that there is a renewable energy premium that is available for renewable energy, for which a taxpayer needs to provide proof to obtain the deduction. This deduction is applicable to the renewable energy generated for the period under review. However, the guidelines that prescribe the capacity for which this is applicable are unclear.

d) Total environmental levy on electricity

A comment has been made (Gilder, et al., 2020) that there is an environmental levy that is provided for when calculating the tax payable on the generation of electricity that uses fossil fuels. A qualifying taxpayer is required to provide proof of the amount determined as the environmental levy for the period under review.

All these allowances and deductions are regulated by the Carbon Tax Act. However, there are other deductions and allowances that are regulated by the Income Tax Act that also aim to address the promotion of green energy as well energy efficiency investments.

2.8 Income Tax Act Deductions and Allowances

The Income Tax Act provides the following deductions that are allowed in calculating taxable income, as defined under that Act. The motivation is to mitigate the increase in the harm to the environment, and to reduce greenhouse emissions. In response to the threats of climate change, the deductions described in the sub-sections below are available in terms of the Income Tax Act.

2.8.1 Allowances pertaining to movable assets

2.8.1.1 Section 12B allowance on renewable energy assets

This allowance is an attractive or encouraging tax allowance “for taxpayers owning renewable energy assets and provides for an allowance (Golegal, 2019) for any plant, machinery, implements, utensils and articles used in farming or production of renewable energy in the course of one’s trade” (Cliffe Dekker Hofmeyr, 2019; Golegal, 2019). This section applies to “renewable energy sources wind power, solar

energy", but only 3 categories are allowed: "photovoltaic solar energy more than one megawatt, photovoltaic solar energy not exceeding one megawatt or concentrated solar, hydropower to produce electricity of not more than 30 megawatts and biomass comprising organic wastes, landfill gas or plant material" (Cliffe Dekker Hofmeyr, 2019; Golegal, 2019).

"Section 12B allows for a deduction in relation to improvements" (Golegal, 2019), but it does not allow for repairs or improvements on these assets over the course of their useful life. It does not consider the useful life of the applicable assets, although "some renewable energy plants have an expected useful life of twenty years" (Golegal, 2019) and even more. "S12B allows one to claim an accelerated capital allowance of between one to three years" (Cliffe Dekker Hofmeyr, 2019; Golegal, 2019). The allowance on photovoltaic solar energy not exceeding one megawatt is granted at 100%, while for the other assets, the allowance is granted at 50% in year one, 30% in year two, and 20% in year three. This allowance does not make an apportionment to account for when an asset was brought into use, and the entire allowance is deductible (Stiglingh, et al., 2019). This makes it the most attractive allowance for the renewables industry (Cliffe Dekker Hofmeyr, 2019; Golegal, 2019).

2.8.2 Allowances pertaining to immovable assets

2.8.2.1 Section 12D deductions in respect of pipelines, transmission lines and railway lines

As has been noted (Cliffe Dekker Hofmeyr, 2019), this allowance is applicable to "any new or unused" "affected asset" that is owned by the taxpayer and is brought into use for the first time by the taxpayer for use directly by such taxpayer for the purposes contemplated in the definition of "affected asset" (Golegal, 2019). An "affected asset" specifically comprises any pipeline that is used to transport oil or water; any line or cable that is used to transmit electricity or electronic communications; and any railway line used to transport goods; as well as improvements to these assets (Stiglingh, et al., 2019). All expenditure incurred on these assets is allowed a deduction, at 10% for the pipelines, 10% for the electronic communication lines, and 5% for the remainder of the other assets which are

electricity transmission lines and railway lines, as well as improvements thereto (Stiglingh, et al., 2019). The deductions on the affected assets are allowed on the basis that these assets are used to generate income for the taxpayer.

If costs incurred pertain to improvements to leased assets, leased by a lessee in terms of public-private partnerships, the costs incurred will not be allowed under this section, but rather under section 12N, which allows an amount to be deducted as the lessee is taken to be the owner of the improvements.

2.8.3 Allowances pertaining to other expenses

2.8.3.1 Section 12L energy efficiency savings allowance

To claim the deduction for energy efficiency savings allowance on activities conducted for trade purposes, the taxpayer must be registered with the South African National Energy Development Institute (SANEDI) and must comply with the relevant regulations (Cliffe Dekker Hofmeyr, 2019; Golegal, 2019).

The reason for the allowance is to promote a decrease in the demand for energy by encouraging energy efficiency, because, if energy is used efficiently, that would reduce carbon emissions, considering that “South Africa is dependent on coal and diesel for electricity generation” (Golegal, 2019). This deduction is designed to promote the development of new technologies that will address the issues of climate change, and at the same time assist with an efficient energy use (Stiglingh, et al., 2019). The move from relying on coal and diesel by energy industries for energy generation would drive the energy industries to invent other technologies that would give benefits that will reduce pressure on the national grid and automatically result in the reduction of load shedding (Cliffe Dekker Hofmeyr, 2019). This allowance is based upon the receipt of a certificate that indicates necessary information, such as the efficiency saving expressed in kilowatt hours or equivalent, and any other important information. The allowance 95c per saved kilowatt was made available for taxpayers for the year of assessment before 1 January 2020 (Stiglingh, et al., 2019).

This deduction, however, was extended up to 1 January 2023 (South African Institute of Professional Accountants, 2021). This is an allowance that prompts taxpayers to use energy efficiently to curb the effects or impacts of climate change.

2.8.3.2 Section 12U additional deduction for roads and fences used in respect of production of renewable energy

This section relates to expenditure on certain type of assets. This allowance is applicable to renewable projects that are undertaken on a large scale, which require substantial capital outlays. The introduction of this additional allowance is to take into consideration the capital expenditure on assets that took place during the period under review pertaining to any construction (including fences and roads) for purposes of the production of renewable energy (Cliffe Dekker Hofmeyr, 2019).

This is an additional allowance that operates in support of section 12B, which allows a deduction for the actual assets that generate the renewable energy. The s. 12B allowance does not cover the other infrastructure required to fully support the project developments, such as fences and roads. Hence, this s. 12U deduction was introduced to allow deductions of the expenditure of the additional developments. These expenses would not qualify to be deducted under the “general deduction formula” in s. 11(a) of the Income Tax Act because they are capital in nature (Cliffe Dekker Hofmeyr, 2019). The entire cost incurred for the development of the additional roads and fences is deductible in full, which makes this allowance attractive for the promotion of the construction of renewable energy developments (Stiglingh, et al., 2019).

2.8.3.3 Section 37B - Environmental Expenditure

This is a deduction allowed for the expenses incurred on environmental expenditure, as well as the post-environmental expenses, such as decommissioning and restoration. These are expenses that are incurred as required by law and are unavoidable (Stiglingh, et al., 2019).

This deduction is applicable to the assets that are used for environmental treatment or environmental waste and disposal assets, and improvements on such assets, as well as any expenditure incurred in decommissioning as a result of trade. However,

these assets do not qualify for any deductions under sections 11, 12C and 13. The allowance for environmental treatment and recycling assets is allowed on both used and unused assets over four years, starting in the year of assessment that the asset was first used, at 40% and at 20% thereafter for the remainder of the period. The allowance for environmental waste disposal assets is also allowed on both used and unused assets, at 5% each year, starting “in the year of assessment the asset” was first used, and the decommissioning costs are deductible in full (Stiglingh, et al., 2019).

2.8.4 Allowances pertaining to leased immovable assets

2.8.4.1 Section 12N – improvements to property not owned by taxpayers

Section 12N allows deductions to a lessee that makes improvements (Golegal, 2019) to infrastructure that they do not own, including land or buildings, where the owner is the government or a state entity. The taxpayer is treated for purposes of the section as the owner of such land and building, and will be entitled to claim the allowance as long the taxpayer has incurred the cost and they use the property to generate income and they have the right to use the land. The allowance is then processed as if the lessee is the owner, and the lessee will enjoy the same allowance as the owner of the assets on the improvements made would (Stiglingh, et al., 2019). Depending on the type of asset that the improvements have been made to, a “research and development allowance applicable to research and development” allowance (Gouveia, 2013) will be granted in terms of the relevant section, or if infrastructure relates to renewable energy, the allowance according to the relevant section will be granted (Cliffe Dekker Hofmeyr, 2019).

The introduction of the carbon tax has resulted in a change or new law, which has different implications for different people or taxpayers (Government Gazette, 2019:8&12). This can have a positive effect for SARS because will serve to increase revenue collection, and a negative effect on taxpayers because they will have an increased tax bill to pay (South African Government, 2019). Changes in legislation come with administration issues and resource issues, as well as issues regarding

readiness for dealing with the changed legislation (South African Government, 2019).

The above-mentioned environmental levies have contributed to an increase in revenue collection, according Dr Hendrich Volmink from OUTA (Organisation Undoing Tax Abuse, 2019): the levies contributed a total of R90,795,000,000 from inception until the 2019 financial year, and including the projection for the 2020 financial year, the projection amounts to R103,451,704,000. These levies have contributed an amount of R11,881,704,000 for the 2021 financial year (South Afican Revenue Services, 2022), this bring up this amount to R115,452,000,000 (R115 billion). This results in an increase of 11%. The breakdown of the R11,881,704,000 contribution, from the highest to the lowest respectively, is Electricity R7,739,340,000; Motor Vehicle CO2 Emissions R1,469,259,000; Carbon Tax R1,469,948,000; Tyres R601,524,000; Plastic Bags R579,754,000; and incandescent light bulbs R24,879,000 (South Afican Revenue Services, 2022).

According to Volmink (Organisation Undoing Tax Abuse, 2019), these must be ring-fenced for some of these funds to be utilised for the purpose of combating or alleviating poverty because the impacts of climate change affect mostly the poor. Volmink adds that the funds should also be used to drive job creation in the green economy and also to assist poor communities to gain access to renewable energy, as some experts have argued for. At the minimum, government should be transparent on the amount of revenue that has been collected from all the environmental levies, as well as on the expenditure that has been incurred in order to address climate change. Even if a part of that revenue collected is placed in the general fiscus, there should be accountability from government on how these funds are used to at least address climate change. This information must notified be in an easily understandable manner. Lastly, government should ensure that these taxes result in effecting real changes in negative behaviours, and that they are used to fast track the mitigation of climate change threats, instead of merely adding to revenue collection.

CHAPTER 3:
THE ADMINISTRATION REQUIREMENTS OR REGULATORY REQUIREMENTS

In South Africa, there are regulatory bodies that regulate certain industries. There are administrative departments and entities that deal with policymaking, and there are bodies that deal with the implementation of policies.

When it comes to the development of environmental taxes or levies, the following government departments are involved: the National Treasury, the Department of Mineral Resources and Energy, and the Department of Environmental Fisheries and Forestry (South African Government Information , 2021). Various governmental agencies are also involved: the South African Revenue Services, the National Energy Regulator, the National Economic Development and Labour Council, the Central Energy Fund, the Road Accident Fund and the South African National Energy Development Institute (SANEDI, n.d.). The above government departments and entities play different roles in terms of regulating and determining the environmental levies. It must be noted that these levies constitute initiatives that are intended to curb the emissions that are negatively affecting the environment. Climate Change is global challenge. It has taken global efforts to tackle it, because it is not only one country that contributes to the global warming that the world is currently facing. It is a treat to global sustainability.

Therefore, the above-mentioned organisations play different roles in terms of ensuring that the climate change initiatives are adhered to. However, there must be proper synergies in existence to achieve that purpose. Considering that these departments and entities do not have the same reporting lines, there might be challenges in terms of the synergies required for administrating the various environmental levies. This chapter discusses the different roles of each official body to assess the efficiency of all of them.

3.1 National Treasury

It has been stated (National Treasury, n.d.) that the National Treasury has a legislative mandate, and that its mandate is prescribed by the Public Finance

Management Act. That mandate is to “promote government’s fiscal policy framework; coordinate macroeconomic policy and intergovernmental financial relations; manage the budget preparation process; facilitate the Division of Revenue Act, which provides for an equitable distribution of nationally raised revenue between national, provincial, and local government; and monitor the implementation of provincial budgets. As mandated by the executive and Parliament, the National Treasury will continue to support the optimal allocation and utilisation of financial resources in all spheres of government to reduce poverty and vulnerability among South Africa’s most marginalised” (South African Government Information, 2021).

The “National Treasury’s priorities include: increasing investment in infrastructure and industrial capital; improving education and skills development to raise productivity; improving the regulation of markets and public entities; and fighting poverty and inequality through efficient public service delivery, expanded employment levels, income support and empowerment” (National Treasury, n.d.).

The National Treasury is also the fiscal policy developer for the country, together with the relevant departments. The environmental levies or taxes are developed under the umbrella of the National Treasury. The guidelines on how to implement the policies have been developed by the National Treasury, in the event there might be uncertainties, to give necessary guidance. These policies are developed for the main purpose of increasing the fiscal revenue to provide for increased service delivery. Another reason is to raise funds necessary to execute work that is required to support certain industries, although this does not always prove to be the case. The National Treasury works with all the departments that are responsible for collecting revenue, and once the entities have collected the money, the National Treasury then distributes the money accordingly to enhance service delivery (National Treasury, n.d.).

Once the money is collected and handed over to the National Treasury, the money is placed into one ‘pot’, and there is no ring-fencing of the money to indicate that the money comes from the environmental levies or taxes. There is no indication that such money needs to be utilised for the purposes of promoting green energy or environmentally friendly processes. Accordingly, processes need to be put in place to ensure that the revenue collected from environmental levies and taxes is ring-

fenced to assist in funding green energy and energy-friendly transformation initiatives. To meet the challenges of climate change that are threatening the world, the required investments required huge capital outlays to change the current infrastructure to a system that would be less harmful to the environment.

3.2 Department of Mineral Resources and Energy

The goal of the Department of Mineral Resources and Energy is to encourage the transformation of South Africa through economic growth and sustainable development in the mining and energy sectors (Department of Mineral Resources and Energy, n.d.). Its mission is to “regulate, transform and promote the minerals and energy sectors, providing sustainable and affordable energy for growth and development, and ensuring that all South Africans derive sustainable benefit from the country’s mineral wealth” (Department of Mineral Resources and Energy, n.d.).

The Department of Mineral Resources and Energy is responsible for policy development regarding minerals and energy, as well as to ensure the effective regulation of mines and the energy generating entities. The mining sector and the energy sector have substantial impacts that affect the environment. Therefore, they contribute considerably to the country’s greenhouse gas emissions. The mining sector indirectly causes greenhouse gas emissions by utilising considerable amounts of electricity or fossil fuels to run their operations (Department of Mineral Resources and Energy, n.d.).

Therefore, the role of the Department of Mineral Resources and Energy is crucial in a sense that it has the power to hold the responsible parties accountable through its regulation and monitoring processes to ensure compliance with the commitment that South Africa undertook when is ratified the Paris Agreement.

The Department of Mineral Resources has the mandate to ensure that there is effective monitoring of the projects in the sectors that it oversees, which are intended to reduce greenhouse gas emissions. To ensure sustainability, the Department of Mineral Resources also needs to ensure synergy between the public entities that report to it, being the Central Energy Fund, the South African National Energy Development Institute, and the National Energy Regulator of South Africa (Department of Minerals Resources and Energy , n.d.).

3.3 Central Energy Fund

The Central Energy Fund is a public entity that reports to the Department of Mineral Resources and Energy. It has a mandate to provide a diversified energy mix to ensure the supply of energy to meet the demand, which is done through partnerships, exploration, and marketing. The Central Energy Fund has a mandate to also promote “economic growth and energy poverty alleviation through security of supply; and give access to affordable energy in Southern Africa” (Central Energy Fund, n.d.).

The Central Energy Fund has subsidiaries that it operates through, and these make up the Central Energy Group. These subsidiaries focus on different energy supplies. These subsidiaries are (Central Energy Fund, n.d.):

- “PetroSA which is responsible for exploration of oil and gas and synthetic fuel production from gas. It has operations in Ghana, South Africa, and the Netherlands.

- South African Gas Development Company (iGas) develops gas and gas infrastructure through active investment in the provision of gas molecules and gas infrastructure. It is a key investor in Rompco, the commercial operator of the 865 km high-pressure gas pipeline connecting the onshore gas fields in Mozambique to South Africa (Central Energy Fund, n.d.).

- African Exploration Mining and Financing Corporation (AEMFC) is responsible for the mining and supply of coal for the generation of electricity. It focuses on key minerals that will provide energy for the future. It supplies more than 1.5 million tons of coal per year (Central Energy Fund, n.d.).

- Strategic Fuel Fund (SFF) is responsible for acquiring, maintaining, and trading strategic fuel stocks to ensure the country’s supply of hydrocarbons. Its core assets include steel storage facilities in Mpumalanga and the Western Cape capable of storing more than 50 million barrels of fuel (Central Energy Fund, n.d.).

- Energy Projects Division (EPD) is responsible for the commercialization of new energy technologies, as a demand for cleaner, more sustainable energy supplies increases. It has a range of projects in development including the Redstone Solar

> Thermal Power plant, the first of such projects with molten salt energy storage in Africa" (Central Energy Fund, n.d.).

The subsidiaries mentioned above are assisting the Central Energy fund to fulfil its mandate to ensure a sustainable supply of energy to South Africa. However, in view of the plan to ensure that there are zero carbon emissions and that there is compliance with the climate change plan, some of the subsidiaries need to review their activities to ensure that they are not seen to be promoting greenhouse gas emissions. The regulators and policymakers need to review their policies to promote alternative sources of energy, or to develop plans that will mitigate the risk of harming the environment. The need to put measures in place that will address the risk of emissions harm to the environment. The Energy Projects Division is venturing into the cleaner energy space, while the remaining subsidiaries are still involved in the supply of harmful sources of energy. While it is known that fossil fuels are harmful, and that coal and gas have been seen as the less harmful, these are nevertheless contributors to environment harm.

3.4 South African National Energy Development Institute

The South African National Energy Development Institute (SANEDI) is a public entity that reports to the Department of Mineral Resources and Energy. The mandate of the South African National Energy Development Institute is "to direct, monitor and conduct energy research and development, promote energy research and technology innovation as well as undertake measures to promote energy efficiency throughout the economy" (SANEDI, n.d.).

The "portfolio of initiatives is closely attuned to technology advancements, declining technology costs and continued innovation in the energy sector. These can enable South Africa to take full advantage of our energy resources and the associated infrastructure development as a vehicle for economic growth, industrialization, employment creation and sustainable development" (SANEDI, n.d.).

SANEDI is responsible for the administration, regulation and approval of certain allowances made in terms of certificates (Theron, 2020). The Institution has administered a number of certificates over the years, which is an indication of how well the energy efficiency allowance has been received (Theron, 2020). The leading

industries to benefit from the allowance are those in mining, manufacturing and wholesale. The mining sector and manufacturing sectors have 69 certified projects for each, while there are 17 certified certificates in the wholesale industry (Theron, 2020).

This allowance has shown a reduction of CO2 by 24.479 megatonnes, which shows effectiveness of the allowance, and it has also resulted in a huge growth in terawatt-hours (TWh) of energy savings, from 5.217 TWh to 24.727 TWh from 2015 to 2020, and this has resulted in over R19.9 billion in rebates from 2013 November (Theron, 2020). The implementation of the carbon tax has encouraged the participating industries to use the savings to prioritise and investigate their energy operations, and this will be reflected in their profitability, because the tax liability involves paying over substantial amounts of money (Van Zyl, 2021). According to SANEDI, there has been an increase in the applications for the incentive allowance, which is a result that can be attributed to the introduction of the carbon tax because energy users have received a ‘wakeup call’. The applicants have realised that the carbon tax has a financial ‘sting’ and it needs to be paid, and so they are impelled to consider using clean energy (Van Zyl, 2021). Therefore, they are obliged to seek alternative energy supplies, while at the same time endeavouring to minimise their tax liability (Van Zyl, 2021).

This allowance has a double effect in that it promotes clean energy at low cost, while protecting the environmental, which is a sign of effectiveness of the allowance (Van Zyl, 2021).

3.5 National Energy Regulator of South Africa

The energy sphere is a regulated industry, in that there is a regulator, being the “National Energy Regulator of South Africa (NERSA) which is a regulatory body. It was established as a juristic person in terms of Section 3 of the National Energy Regulator Act, 2004 (Act No. 40 of 2004)” (National Energy Regulator of South Africa, n.d.). “NERSA’s mandate is to regulate the following three industries electricity, piped gas and petroleum pipelines industries in terms of the Electricity Regulation Act, 2006 (Act No. 4 of 2006), Gas Act, 2001 (Act No. 48 of 2001) and

Petroleum Pipelines Act, 2003 (Act No. 60 of 2003)" (National Energy Regulator of South Africa, n.d.). The National Energy Regulator of South Africa regulates the three industries that are playing a critical role in the energy sector. In terms of the industry-specific requirements, the National Regulator of South Africa is required to apply the relevant guidelines, rules and Acts to execute its mandate (National Energy Regulator of South Africa, n.d.).

The guidelines and the rules are prescripts regarding how the National Regulator of South Africa must determine the applicable tariffs. Each industry is regulated in terms of its own specific rules, according to the industry. The current move, globally, is to encourage a move to clean or green energy, which requires all stakeholders and those charged with regulatory powers to implement the promotion of clean energy in their rules and regulations.

The National Energy Regulator of South Africa is mandated to regulate three industries, namely those dealing with piped gas, piped petroleum and electricity, with each industry having its own methodology, regulations, and guidelines (National Energy Regulator of South Africa, n.d.). The National Energy Regulator of South Africa determines the maximum prices and tariffs for the piped-gas industry. This is done according to regulations that provide that the price determined must be a price that allows the licensees to recover both operational and investment costs, while at the same time making profits that would adequately cover their risk (Department of Minerals and Energy, 2007). There is a tariff and there is a maximum price determination, with the tariff relating to access to the pipeline, basically being a tariff covering the service rendered to transport gas through the pipeline, which is what the owners of the pipeline will charge to the user beneficiaries of the pipeline. The National Energy Regulator of South Africa is also mandated to monitor, approve and, when required, regulate the transmission and storage tariffs (National Energy Regulator of South Africa, 2017).

Piped Gas

In determining the maximum prices and the tariffs for piped-gas, the National Energy Regulator uses an allowable revenue approach as the base to determine the price or the tariff.

The difference is that the assets for purposes of the tariff are adjusted for inflation every year, while the trading assets are not adjusted for inflation every year (National Energy Regulator of South Africa, 2017). There is a specific methodology that is used to determine the maximum price, with the methodology differentiating between the importers of gas and the traders of gas, as well as the importers of liquefied natural gas. These have different formulas for determining the maximum prices. However, for the purposes of this Dissertation, the traders (including the importers of liquefied natural gas) will be considered, instead of the importers of gas (National Energy Regulator of South Africa, 2020). The traders use a pass-through approach that takes into consideration the cost of gas and the trading business costs, which are determined by using the following formula:

The formula for allowable revenue is as follows (National Energy Regulator of South Africa, 2017):

"Allowable Revenue = (Trading Assets + Working Capital) * WACC + OPEX + TAX ± C"

where:

"Trading Assets = regulated assets

Working Capital = inventory + receivables + operating cash (this is determined using operating expenses as per the methodology) – payables

WACC = Weighted Average Cost of Capital determined using Capital Asset Pricing Model and is adjusted using the allowed adjustments as per the guidelines, e.g. country risk and small stock; however, liquidity is not allowed

OPEX = operational expenses that are necessary to run a business, including depreciation, are allowed; however, penalties and interest on defaults are disallowed. These are considered, case by case

TAX = Tax expense that is determined by using the guidelines or income tax principles

Clawback = this is an adjusting mechanism that is done on each application to reconcile the forecasts used during application versus the actual results. This can either be over or under recovery in comparison to the amounts used during application process."

In terms of the methodology (National Energy Regulator of South Africa, 2020), the above equation is used in the determination of the allowable revenue that is then used to determine the trading costs of the trading business. The focus is will be on the tax determination of the trading business. The tax determination is determined by using the prescribed guidelines, which set out a formula that considers the allowable revenue as the revenue where the tax rate will be applicable, and basically the tax rate of 28% is charged on allowable revenue to determine the tax expense for regulation purposes (National Energy Regulator of South Africa, 2017). Therefore, this means that the higher the tax is, the higher the possibility will be that it will increase the maximum price. However, the question is whether any environmental levy or any carbon tax is included in the tax determination for the piped-gas maximum price determination. Is there a possibility that the tax might be included in the future, or is it already included and it is just allocated differently? The reason that there was not inclusion is that piped gas is considered to be less harmful, and therefore the aim was to encourage investment in piped gas.

The current methodology, together with the guidelines, do not consider the environmental levy and the carbon tax because there are specific guidelines that need to be followed in determining the taxation expense, which guidelines use the following formula (National Energy Regulator of South Africa, 2017):

"Tax = {(NRBTA)/(1-t) *t}"

where:

"NRBTA = Net Revenue Before Tax Allowance

={(RAB*WACC) + E + D (historic + write up) +/-C} – {E + D(historic) + Kd (nominal)}

T=Prevailing Corporate Tax Rate".

When the National Energy Regulator of South Africa assesses the applications of different licensees, the applications at the start are seen as forecasts, and not as

actual. A reconciliation is then done when the audited regulatory financial statements are received. The reconciliation is done between the actual taxation paid versus the forecast taxation that was calculated through using the guidelines. The determinations of the forecast and the actual tax use different principles, and therefore will always yield different results. The actual tax determination uses income tax principles, which determine the taxable income as done under the Income Tax Act (National Energy Regulator of South Africa, 2017). The income tax determination follows the allowable revenue approach, and the two approaches are not necessarily the same.

Piped Petroleum

The piped-petroleum sector has tariff prices, but it does not attract a maximum price determination. There is a tariff for pipeline petroleum products (National Energy Regulator of South Africa, 2015) and there is a tariff for loading facilities and storage facilities (National Energy Regulator of South Africa, 2017). Both these tariffs are approved through using the allowable revenue approach, according to the following formula:

Petroleum Pipeline Tariff

"AR = (RAB x WACC) + D + E+F ± C+T"

where:

"AR = Allowable Revenue

RAB = Regulatory Asset Base – accumulated depreciation and inflation write-up + net working capital

D= Depreciation and amortization of inflation write up

E= Expenses accrued and maintenance, including provisions for land rehabilitation costs

F= additional revenue to meet obligation

C= Is the correction mechanism between application and actual

T= Estimated Tax".

Tariff for loading facilities and storage facilities

A specific formula is used to approve the tariff for loading facilities and storage facilities. The approach is the same, and the determination is of allowable revenue (National Energy Regulator of South Africa, 2017). The formula is:

"AR = (RAB x WACC) + E + D ± C+ T"

"AR = Allowable Revenue

RAB = (Regulatory Asset Base – accumulated depreciation and inflation write-up) + net working capital ± deferred tax asset or liability

D= Depreciation and amortization of inflation write up

E= Expenses accrued and maintenance

C= Is the correction mechanism between application and actual

T= Estimated Tax".

For the purpose of this Dissertation, the focus will be placed on tax expense determination, although the differences in the formulas are noted. The petroleum pipeline tariffs have a component for the allowable additional revenue needed to meet obligations, and also have provisions for decommissioning costs. However, the loading (National Energy Regulator of South Africa, 2015) and storage facilities tariffs do not have these components (National Energy Regulator of South Africa, 2017). The rest of the components are similar.

The taxation expense is determined by a prescribed methodology, which is similar to that used for petroleum pipelines and loading and storage facilities. Tax expense can be determined by using notional or actual figures, with the difference between notional and actual being that notional figures do not included wear and tear (National Energy Regulator of South Africa, 2015). For the purpose of this Dissertation, the actual figures will be utilised.

The taxation formula is as follows:

"Tax = {(NRBTA) / (1-t)}*t

NRBTA = Net revenue before tax allowance

= {(RAB*WACC) + E + D (historic & write up) + F ± C}-{E +wear and tear(historic) + Kd(nominal)}.

T = Prevailing corporate tax rate of the licensee".

The assessment of tax in the determination of the maximum prices and tariff are the same for both the Piped-Gas and Petroleum Pipelines and it does not consider the environmental levies or carbon tax at face value.

A comparison is reflected below, giving examples of how the two calculations result in different amounts of tax expense when the calculation is performed using the guidelines versus the income tax method.

Example1: The Guidelines Method calculation

Details	**Amounts R**
Regulatory Asset Base	33,407
Working Capital	9,725
TRAB	**43,132**
WACC	13.40%
ROA (TRAB*13.40%)	5,782
OPEX	14,881
Depreciation	3,795
Total Revenue	**24,458**
Less: Deductible Expenses	**-18,794**
OPEX	-14,881
Depreciation/Wear and Tear	-3,795
Interest (Kd)	-118
Taxable income after tax	**43,252**
Corporate Tax Rate	0.28
Gross-up Factor	0.72
Grossed-up taxable income	60,072
Corporate Tax Rate	**28%**
Tax	**16,820**

Example 2: The income tax method starting with accounting profit

Details	Amount R
Accounting Profit/Loss before taxation	**36,974**
Add: Non - Deductible Expenses	**3,795**
Amortisation	3,491
Depreciation	304
Deduct: Deductible Expenses	**-3,795**
Wear & Tear - Amortisation	-3,491
Wear & Tear - Depreciation	-304
Tax loss carried forward	0
Tax loss brought forward	**0**
Taxable income	**36,974**
Tax Rate	**28%**
Tax (36 974*28%)	10,353

The two methods have different starting points, and they result in two different amounts of tax expense being calculated. These amounts use the forecast amounts that are used in the application for the tariff of the maximum price. It must be noted that the amount calculated according to the guidelines methodology results in a higher taxation expense than the taxation amount determined by using the income tax principles. The guidelines base the tax expense on the performance of the assets, while the income tax method is based on the actual revenue generated, after deducting all deductible expenses. Using the guidelines method means there will never be a situation where these assets will result in a tax loss, unless they have been fully depreciated. For the tariff application where the assets are trended, meaning they increase using inflation adjustment mean it means their tax expense will continue to increase, even if they are not generating revenue owing to various reasons, such as bad economic conditions. The reconciliations between the actual and the application are not made on the same basis, which situation is therefore bound to give huge differences.

The environmental levies might be part of operating expenses; however, the carbon tax, which is a separate tax, is not considered as part of the tax expense calculation. Considering that the carbon tax is implemented to discourage carbon emissions, but if it is considered as part of the tax expense calculation, it will not encourage the

taxpayers to reduce their carbon emissions. It is an expense that is incurred by licensees as a requirement to do so; basically, it is an obligation more like a legal obligation that is incurred as a result of the regulation for the emitters to incur a carbon tax liability. If it is simply passed on to customers, it suggests that the taxpayers will continue to emit because they do not feel a financial loss.

Electricity Department in NERSA

Electricity matters are attended to by the largest department in NERSA and its function is to approve prices and tariffs for electricity for use by Eskom and municipalities (National Energy Regulator of South Africa, n.d.). There is a methodology that is used for approving the prices allowed for Eskom to charge, and the methodology follows the allowable revenue approach (National Energy Regulator of South Africa, n.d.).

The formula for the allowable revenue is as follows:

"AR = (RAB x WACC) + E +PE + D + R&D + IDM ± SQI + L&T ± RCA"

where:

"AR=Allowable Revenue

RAB = Regulatory Asset Base

WACC= Weighted Average Cost of Capital

E= Expenses

PE= Primary Energy Cost

D = Depreciation

R&D = Cost related to research and development programmes or projects

IDM = Integrated Demand Management costs

SQI = Service Quality Incentives related costs

L&T = Government imposed levies or taxes; these do not include income tax

RCA = The balance in Regulatory Clearing Account"

This is the formula that is used for assessing Eskom's applications for price adjustments. The focus on the above formula will be placed on the component of L&T, which comprises government-imposed levies and taxes, but is exclusive of income tax (National Energy Regulator of South Africa, n.d.). The environmental levies and carbon taxes are considered for the determination of the allowable revenue, although they are treated as pass-through costs to the customers; in other words, they increase the price (National Energy Regulator of South Africa, n.d.).

The fact that these costs are passed through to the customer it taxpayer, they are basically recoverable (National Energy Regulator of South Africa, n.d.); however, if they are recoverable, these costs do not encourage the emitter to reduce their carbon emissions because, in effect, they are not prohibitively expensive.

The total amount of the environmental levy and carbon tax used in the calculation of the electricity price determination forms part of total primary costs. According to Eskom's application for a multi-year price determination for the period 2023 to 2025, the contribution of the environmental levy and carbon tax to the price had increased (Eskom , 2021). The increase is contributed to by the implementation of carbon tax from the period starting in January 2023 (Eskom , 2021). These costs are considered to be basically unavoidable because Eskom cannot do anything about them (Eskom , 2021). The Carbon Tax is one of the significant increases in the primary costs for independent power producers (Eskom , 2021).

Since the introduction of Carbon Tax Phase 1, Eskom has been allowed to reduce its carbon tax liability by a further two allowances for the renewable energy and the environmental levy deductions (Eskom , 2021). Since Phase 1 was set to end on 31 December 2022, Eskom will be liable for carbon tax liability from January 2023. Although Eskom has not carried any carbon tax liability in the previous years, it is expected to bear a carbon tax liability by January 2023 of over R11 billion, which amount will have to be paid over to the South African Revenue Services (Eskom, 2021). The increase in the price determination asked for in the Eskom application, which arises as a result the introduction of carbon tax, amounts to R10 billion for the 2023 to 2025 period, which will be passed on to Eskom customers (Eskom , 2021). As it stands, Eskom is not profitable, and the additional burden of paying carbon tax will continue to place financial strain on an already financially distressed company

(Eskom, 2021). Although it recovers some of the carbon tax payable by passing through the costs to customers, this will not be enough, since many of Eskom's customers do not pay their debts, with the major culprits being municipalities that are unable to pay their debts owed to Eskom. Therefore, passing this burden on to the already struggling customers will not solve the financial issue that is currently facing the state-owned entity, Eskom (Eskom, 2021).

3.6 Road Accident Fund

The Road Accident Fund is established on the basis of the Road Accident Fund Act, 1996 (Act No. 56 of 1996). The Act was amended as required when the Road Accident Fund took over all the assets and liabilities of the Multilateral Motor Vehicle Accident Fund (Road Accident Fund, n.d.).

Section 3 of the Road Accident Fund Act stipulates that "the object of the Fund shall be the payment of compensation in accordance with this Act for loss or damage wrongfully caused by the driving of a motor vehicle". Therefore, this covers everyone who is within the borders of the country. It covers everyone who has been injured in South Africa as a result of a vehicle accident by providing compensation as well as rehabilitation to the affected parties (Road Accident Fund, n.d.).

The main source of revenue for the RAF (Road Accident Fund, 2019/20) is a levy that is generated from sale of fuel, known as the fuel levy. The levy is collected by SARS and is paid over to the Road Accident Fund. The fuel levy is driven by the volumes of sales of petrol and diesel. To increase the source of revenue for the Road Accident Fund, the volumes of petrol and diesel sales need to increase, or the fuel levy needs to be increased (Road Accident Fund, n.d.). The dependency of the Road Accident Fund on the fuel levy threatens the ability of the Road Accident Fund to continue to fulfil its mandate. The COVID-19 pandemic has given an indication of how this dependency on the fuel levy threatens the Fund's ability to continue as a going concern. During the pandemic, fuel levy collections decreased in step with decreases in the sales of petrol and diesel caused by the pandemic lockdown restrictions; in effect, the levy collections were much lower than they would have

been, had there been no lockdown (Road Accident Fund, 2019/20). A decrease in the volumes of sales of petrol and diesel affects the revenue collection of the Road Accident Fund, and even if the levy were to be increased, it might not be sufficient (Road Accident Fund, n.d.).

The 2019/20 Annual Report of the Road Accident Fund indicates that its main source of revenue is derived from fuel levies, while an insignificant portion is generated from investment revenue (Road Accident Fund, 2019/20). The Fund's heavy reliance on fuel levies poses a threat to its sustainability; hence, there is a need for a new source of revenues, considering that that the Fund has recently been operating at a loss (Road Accident Fund, 2019/20).

The Road Accident Fund has reported losses in its financial statements for four consecutive years (National Government of South Africa, 2021). The introduction of fuel-control measures to respond to climate change would worsen the situation of the Fund. As it stands, the Road Accident Fund is in financial distress, and the impact of the COVID-19 pandemic gave a glimpse of what might happen when the transition to electric vehicles and gas-powered vehicles occurs. This transition away from using petrol- and diesel-powered vehicles will have extremely negative impacts on the collection of Road Accident Fund Levy, which is financially linked to hydrocarbon fuel consumption (Orgnisation Outdoing Tax Abuse, 2021).

3.7 Department of Forestry, Fisheries and the Environment

The Department of Forestry, Fisheries and the Environment (DFFE) was previously known as the Department of Environment, Forestry and Fisheries (DEFF), and was renamed on the 1st of April 2021 (National Government of South Africa, n.d.). "In June 2019, the DFFE had been established by incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries into the Department of Environmental Affairs" (Department of Fisheries, Forestry and Environment , n.d.) (National Government of South Africa, n.d.).

The mandate of the Department of Forestry, Fisheries and the Environment is to ensure that the environment is preserved and protected for the current and the generations to come, and also to protect the right of everyone to a safe environment that is not harmful. The Department takes the “leadership role in environmental management, conservation and protection towards sustainability for the benefit of South Africans and the global community” (Department of Fisheries, Forestry and Environment , n.d.) (Regenesys Business School, n.d.).

The strategic objectives of the Department (Department of Fisheries, Forestry and Environment , n.d.) are to:

- centralise administration, strategic leadership and executive support as well as corporate services on oceans and coastal conservation in order to promote improved air quality
- promote environmental awareness and education to encourage international relations
- enforce compliance with environmental laws by developing and implementing an enabling legal and licensing authority
- monitor and report on the effectiveness and efficiency of the responses on climate change locally, nationally and internationally
- ensure that all biodiversity, heritage and conservation matters are managed and regulated in a manner that enables economic growth and development
- expand green economy projects and public works in the environmental sector
- ensure that chemicals and waste management policies and legislation are implemented and enforced in compliance with chemicals and waste management authorisations, directives and agreements (Regenesys Business School, n.d.).

For the purpose of this research study, the objective of the Department of Forestry, Fisheries and the Environment that will be looked into is the role of the Department in the response to climate change. One of its objectives is to monitor and report on the response of climate change, at large. In response to climate change, South

Africa has become a party to the initiatives of the United Nation Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement.

The Paris Agreement has a long-term goal to limit the increase in global temperature, attributable to increasing greenhouse gas emissions, to below an increase of 2 °C and ultimately limit the increase to 1,5 °C. The target is to reach a zero emissions situation through a balancing of the environmental pollution emitted by human actions with the removal of emissions by carbon sinks by 2050 (Gcuka, 2021). The Kyoto Protocol requires that there must be reduction in greenhouse gas emissions, and the Paris Agreement is latest agreement on climate change, stating that all countries share in climate issues, and therefore signatory countries are required to submit their respective Nationally Determined Contributions. The Nationally Determined Contributions are the targets and goals set by governments in order to reduce the increase in global temperature to below an increase of 2 °C. The Nationally Determined Contributions are reviewed every 5 years for progress on the achievement of these targets even though countries are required to report there is no imposed obligation to meet the targets (Maizland, 2021).

South Africa, to comply with the Paris Agreement and for it to be able to meet the Nationally Determined Contributions, has developed policies and technical guide lines that fall under the responsibility of the Department of Forestry, Fisheries and the Environment. The current important policy and guidelines for South Africa are set out in the National Climate Change Response Policy, which describes the range in the Peak, Plateau and Decline of greenhouse gas emissions that are intended to provide for South Africa's emissions to peak between 2020 and 2025, for about a decade, and to decline thereafter. The Nationally Determined Contribution then describes the Peak, Plateau and Decline international mitigation commitment, and this was further catered for in the Climate Change Bill, 2018 (Gilder, et al., 2020).

It has been noted (Gilder, et al., 2020) that the Department of Forestry, Fisheries and the Environment has used the Peak, Plateau and Decline mechanism to develop a Post-2020 Mitigation System, which has six components:

- National Greenhouse Gas Emissions Trajectory, which applies to National Greenhouse Gas Emissions provisions that are founded on the Future

Climate Change Act, established and administered by the Department of Forestry, Fisheries and the Environment;

- Sectoral Emissions Targets, which apply to government (sectoral) departments. These are founded on the Future Climate Change Act, established and administered by the Department of Forestry, Fisheries and the Environment;
- Monitoring and Evaluation provisions, which apply to emitting installations that conduct listed, reportable activities. These provisions are founded on the National Environmental Management: Air Quality Act, 39 of 2004, and the National Greenhouse Emissions Reporting Regulations, established and administered by the Department of Forestry, Fisheries and the Environment;
- Carbon Budgets, which apply to the emitting installations to which carbon budgets have been allocated, and are founded on the Future Climate Change Act, established and administered by the Department of Forestry, Fisheries and the Environment;
- Pollution Prevention Plans, which apply to emitting installations that are subject to the Pollution Prevention Plan Regulations, and which are founded on the National Environmental Management: Air Quality Act, 39 of 2004, and the Pollution Prevention Plans Regulations, established and administered by the Department of Forestry, Fisheries and the Environment; and
- the Carbon Tax, insofar as it applies to emitting installations that conduct listed taxable activities, as provided for in the Carbon Tax Act (Act No. 15 of 2019) and in the Regulations established by the National Treasury, which are administered by South African Revenue Services.

The above-mentioned components are intertwined, and are aimed at accomplishing the mitigation plan that is defined by the Department of Forestry, Fisheries and the Environment. Considering that the carbon tax forms a part of the six components, it is therefore important to understand the whole process regarding the carbon tax, in line with the other components. These components are critical for determining the total of the greenhouse gas emissions that will be used to determine the liability for

carbon tax. The Department of Forestry, Fisheries and the Environment is responsible for governance relating to climate change and the mitigation system, while the National Treasury is responsible for, or a custodian for, the implementation of the carbon tax, and the South African Revenue Services are responsible for administering the carbon tax.

3.8 The South African Revenue Services

The South African Revenue Service (SARS) is a collecting tax authority and it collects all revenues due, and also ensures “optimal compliance with tax and customs legislation, and provide a customs and excise service that will facilitate legitimate trade as well as protect the economy and society” (South African Revenue Services, 2021) (ISSUU, n.d.). SARS was established in terms of the South African Revenue Service Act, 34 of 1997. The objectives of SARS are to increase compliance with all tax regulations, as well as customs and excise regulations, and also to foster fairness in doing business with SARS, as well public trust and credibility in SARS, and to improve cost effectiveness and internal efficiencies (South African Revenue Services, 2021).

SARS’ mission is to optimise revenue collection from all the types of tax they collect. SARS collects at least 21 types of taxes (South African Revenue Services, 2021). For the purpose of this chapter, the tax type considered is the category of Excise and Levies, and under this type, we will be looking strictly into environmental levies (South African Revenue Services, 2021). Currently, there are 6 environmental levies that are charged, “tax, electric filament lamps, electricity generation, motor vehicle CO2 emission, plastic bags and tyres” (South African Revenue Services, 2021).

According to the South African Revenue Services report for the financial year end 2020/21, it collected revenue in the amount of R1,550,3 billion (South African Revenue Services, 2021). The fuel levy and the customs and excise charges constitute 12.4% of the total revenue collected (South African Revenue Services, 2021). The focus for this section will be placed on the carbon tax, taking consideration of the point that the determination of the tax liability is not solely dependent on SARS alone. The determination involves the data provider, the

Department of Forestry, Fisheries and the Environment, and then SARS. Carbon Tax liability is based on the number of the greenhouse gas emissions reported, and the amount owing is collected using provisions of the Customs and Excise Act and of the rules that regulate an environmental levy. The legal regime concerning the collection of the carbon tax is based on section 54AA of the Customs and Excise Act (Gilder, et al., 2020). Rules 54FD.01 to 54FD.05 are applicable to the administration of the carbon tax, and these rules need to be read with the schedules in the Customs and Excise Act. This process is not always clear and this creates further confusion, as the Customs and Excise Act is already confusing. The effect of these rules is as follows (Gilder, et al., 2020):

- Rule 54FD.01(a)(i) makes the rules applicable to the “greenhouse gas emissions generated in South Africa” and the liability for an environmental levy is determined in terms of section 157.00 in Section F of Part 3 of Schedule No.1 to the Customs and Excise Act. This section has been amended by the inclusion of a tariff sub-heading that specifies the environmental levy item and the rate of the environmental levy for the carbon resulting from fuel combustion, fugitive emissions and industrial processes.
- Rule 54FD.01(a)(ii) is applicable to the consolidated licensing of the emission facilities of a taxpayer.
- Rule 54FD.01(a)(iii) is applicable to the calculation of the environmental levy payable by the taxpayer for the licenced manufacturing warehouse.
- Rule 54FD.01(a)(iv) is applicable to the payment and the submission of the environmental levy.
- Rule 54FD.01(a)(v) is applicable to other matters relating to the administration of the environmental levy.

Therefore, the rules described above give the details of how the Customs and Excise Act determines, calculates and collects carbon tax. In order to apply the rules, there are definitions that need to be considered and applied. To apply these rules, SARS is required to license an emissions facility or facilities. These facilities are licensed under a single customs and excise license as a customs and excise manufacturing

warehouse that is conducting a taxable activity. If there is more than one facility that is producing greenhouse gas emissions, those facilities need to be licensed under a consolidated licence. Those licensees that are producing greenhouse gas emissions above the threshold will be subject to carbon tax, and those licensees that are individually below the threshold will not be subject to carbon tax. However, if in the aggregate they are above the threshold, the taxable activity will be subject to carbon tax (Gilder, et al., 2020).

SARS operates at the end of the process, while the Department of Forestry, Fisheries and the Environment is responsible for registrations for purposes of reporting greenhouse gas emissions and also for the verification of the greenhouse gas emissions through the utilisation of verifying agents. Therefore, there should be an integration of the systems between SARS and the Department of Forestry, Fisheries and the Environment so that a reduction of the administrative burden on data providers might be achieved.

3.9 National Economic Development and Labour Council

The “National Economic Development and Labour Council (Nedlac) is a representative and consensus-seeking statutory body established in law through the National Economic Development and Labour Council Act of 1994. It aims to facilitate sustainable economic growth, greater social equity at the workplace and in the communities, and to increase participation by all major stakeholders in economic decision-making at national, company and shop floor level” (OECD, 2016). Nedlac is “the vehicle by which Government, labour, business and community organisations seek to cooperate, through problem-solving and negotiation, on economic, labour and development issues and related challenges facing the country” (National Economic Development and Labour Council , 2021).

Nedlac is the link between the various above-mentioned entities that are working together to ensure economic growth for all parties involved in the value chain that is aimed at propelling the country forward. It is for that reason that Nedlac was involved in the climate change discussion and in the views on climate change matters. The

effects of climate change are affecting government, labour, businesses and the community at large; therefore, Nedlac has been involved in an endeavour to strike a balance between all these parties. In an attempt to promote the transition, it is important to ensure that the community's concerns pertaining to energy security, job losses and retrenchments that might be as a result of the climate change are taken into consideration. Therefore, it is necessary for the transition to be achieved in an orderly manner and in such a way that it creates jobs, while it is driven to fulfil the aim to attain zero emissions by 2050 (South African News Agency, 2019).

CHAPTER 4:
THE IMPACTS OF CLIMATE CHANGE ATTRIBUTABLE TO CHANGES IN REGULATIONS/LAWS

In order for South Africa to affirm that it would comply with the climate change plan to reduce carbon emissions, it introduced certain laws and regulations. These new regulatory measures have different impacts, at different levels. This chapter examines the implications of these changes in law. Generally, a change in law is imposed by government to achieve a certain objective; in this case, the objective is to reduce carbon emissions. For the purposes of this research study, the important change in law to be reviewed is the introduction of the carbon tax. The President of South Africa signed the Carbon Tax Act (Act No. 15 of 2019) (Carbon Tax Act) into law in May 2019, to become effective in June 2019 (South African Government , 2019).

The reason for the introduction of the carbon tax is to reduce carbon emissions. In order for carbon emissions to be reduced, companies need to review their current technologies to determine if they are able to reduce carbon emissions. Such a review could find that new technologies are required, or that current technologies need to be modified, or that current technologies should be disposed of. These options will be guided by the outcomes of the reviews or assessments that will need to be conducted in order to comply with the legal requirement to reduce carbon emissions.

The impacts of the change in law will be considered in terms of the International Financial Reporting Standard (IFRS) and the International Accounting Standards (IAS). These requirements are prescribed for the reporting and accounting standards that must be followed.

However, the IFRS does not have requirements or prescripts that specifically deal with climate change reporting (Halmos, 2019); therefore, the applicable standards will be considered according to the IAS (Anderson, 2019).

4.1 International Accounting Standard 1 (IAS1)

The objective of IAS1 is to provide prescriptive guidance for the presentation of financial statements to ensure that they are comparable with the reporting entity's financial statements of previous periods, and that they are also comparable with the financial statements of other relevant entities (IFRS Foundation, 2021: A939). Basically, the standard sets out an overall requirement for all entities regarding the presentation of financial statements, rules, and minimum requirements for preparing and presenting financial statements (IFRS Foundation, 2021: A939). "General purpose financial statements (referred to as 'financial statements') are those intended to meet the needs of users who are not in a position to require an entity to prepare reports tailored to their particular information needs" (IFRS Foundation, 2021: A939).

4.1.1 Going Concern

The assessment of a company as being a 'going concern' means that the company has the ability to continue to operate in the short term and the long term (AccountingTools Accounting CPE Courses & Books, 2022). This assessment is made by a company's management during the preparation of the company's financial statements. In the event that management intends not to continue with the business, these intentions need to be disclosed as such in terms paragraph 25 of IAS1. The reasons for a company being in a condition other than a going concern need to be provided accordingly during the preparation of financial statements in order to justify why the company is not a going concern. If there are any material doubts that give management a cause to believe that the business or company will not be functioning at its optimum level, these also need to be disclosed (IFRS Foundation, 2021:A947).

The management of an entity needs to assess the going concern status of the entity and to disclose any uncertainties in this regard. In making the assessment, consideration is given to the basis of any material uncertainties, or events or conditions that create substantial doubt whether the entity would be able to continue to operate as a going concern. There are factors that might indicate that the organisation might not be able to continue to operate in the present and in the near

future, such as a change in the asset values of the organisation attributable to impairment or changes in certain economic conditions (AccountingTools Accounting CPE Courses & Books, 2022). Rules relating to climate change might have a negative impact on entities that are fossil-fuel intensive and emit high emissions because they will be required to adapt or change their current operations in order to be in compliance with the climate change initiatives.

In terms of IAS 1, paragraph 7, ‘material’ is defined as applying to deficiencies in information that would influence a decision maker differently, if it was not omitted, or if it was not clearly defined as confusing, or if it was not reported in a distorted manner (IFRS Foundation, 2021:A940). Materiality is subjective and relative. Information can be qualitatively material or quantitatively material, and also, when assessing materiality, information can be individually material, or when aggregated, it becomes material..

Information can be categorised as distorted or disguised, if its communication would result in a user of the information reaching a different conclusion if that information had been communicated in an appropriate manner, and if the user would not have reached the same initial conclusion, if the information had been omitted (IFRS Foundation, 2021:A940). In assessing the influence that reported information might have on the user of the financial statements containing that information, a reporting entity must consider the needs of the users of the financial statements, as well as the its position as a reporting entity. Some users do not get information direct from the entity, and instead rely on the information recorded in the financial statements for making investment decisions (IFRS Foundation, 2021:A940). However, sometimes not all users of the entity’s information are fully equipped to understand and interpret the financial statements because some of the activities of the business are so complex and complicated that they need experts to interpret the information (IFRS Foundation , 2021: A941).

In terms of IAS 1, paragraph 26, the assessment of an entity entails the consideration of all the information that pertains to the business activities of the entity, such as it historic performance, its current profitability, its ability to meet its debt obligations and its ability to obtain financial assistance. If all of these parameters of an entity are still acceptable, it is an indication that the entity is a going

concern. Although the past performance is considered, the future prospects are equally important, and anything that might negatively affect the earnings of the entity has a potential for preventing management from concluding that the financial statements can be prepared on the basis of a going concern (IFRS Foundation, 2021:A947).

4.1.2 Sources of estimation uncertainty

Paragraph 125 of IAS 1 states that there are assumptions that need to be made in respect of assets and liabilities, and these generally involve estimations that have risks attached to them at each reporting date. Therefore, these estimations require the disclosure of the nature and the carrying amount or assets and liabilities in accounting notes in the reporting for each financial year (IFRS Foundation, 2021: A969).

Paragraph 126 of IAS 1 states that the determinations regarding the assets and liabilities involve making certain assumptions and estimates, depending on the type of assets concerned and whether the operations of future events might affect the measurement of these assets and liabilities. The effects of these assumptions affect the determination of the book values of assets and liabilities (IFRS Foundation, 2021: A969).

Paragraph 126 of IAS 1 further notes that the assumptions, and the basis of the estimations used, which are disclosed pertain to estimates that require management to often apply problematic, biased or compound judgements. The more complex the assumptions and judgements are, the more material the figures used are in determining the book value of assets and liabilities (IFRS Foundation, 2021: A970).

Paragraphs 127 and 128 of IAS 1 go on to state that the disclosures that are required, and those that are not required, are typically those that are complex to formulate, and which require management to make compound judgments. However, there is no need for disclosures to be made of those assets and liabilities that are measured at fair value, even though they might carry major risks (IFRS Foundation, 2021: A970).

Paragraph 129 of IAS 1 notes that those disclosure requirements that are required by Paragraph 125 are the disclosures that are necessary to assist users of the

financial statement by giving them an understanding of the sources of information used to for making certain estimations. Companies are required to disclose the nature of the assumptions, the basis of the estimations of amounts, the rationale for estimations, and the sensitivity of the information, should there be any changes, as well as giving explanations therefore (IFRS Foundation, 2021: A970).

The effects of climate change need to be considered for presentation in financial statements, because these effects might have an impact on the company's ability to continue as a going concern, and these effects might also affect the sources of estimation uncertainty and the making of significant judgements (Halmos, 2019).

4.2 IAS 2 – Inventories

The objective of IAS 2 is to recommend the accounting treatment for inventories (IFRS Foundation, 2021:A984). The main concern with inventory accounting relates to the amount that needs to be recognised as cost to be recognised as an asset, until such a time that revenue is recognised (IFRS Foundation, 2021:A984). This standard therefore provides guidance on cost determinations when it comes to cost allocation, and the recognition as an expense, including the write-down to net realisable value, whenever applicable (IFRS Foundation, 2021:A984).

Inventory is recognised at cost or net realisable value, whichever is the lower (IFRS Foundation, 2021). Net realisable value is the net estimated selling price in the ordinary course of business, which is assessed after taking into consideration all costs that are required to conclude the sale (IFRS Foundation, 2021).

The standards set out the definition of the cost of inventory in Paragraph 8 of IAS 2 as being all charges (including all costs of acquisition, conversion and any other relevant costs) that are attributable to bringing inventory into a usable or saleable state (IFRS Foundation, 2021).

Paragraphs 11, 12 and 15 of IAS 2 define the acquisition costs as being all costs that are necessary, such as buying value, manufacturing costs, and delivery costs, although certain costs are excluded, such as rebates (IFRS Foundation , 2021: A986). The other relevant costs that are considered are the costs that are incurred in meeting customer specifications (IFRS Foundation, 2021:A987).

Regarding other relevant costs, there are costs that are disallowed, such as irregular costs, storing costs, and selling costs, as well as irrelevant administrative costs (IFRS Foundation, 2021:A987).

The accepted acquisition costs include import costs, and, considering the various climate change initiatives, the European Union Commission has suggested an implementation of carbon charge adjustments at borders. These are a charged on imports of certain goods, which means that this ‘carbon border’ has the potential to increase the costs of good acquired. Moreover, all costs that are associated with the affected products (fertilisers, cement, aluminium, steel and electricity) will have to be included in the costs of acquiring such goods (Deloitte , 2022). However, in South Africa, the determination of the price for electricity includes all the environmental levies as well as the carbon tax, as these are costs that Eskom needs to incur in order to provide power for the country (National Energy Regulator of South Africa, n.d.) (National Energy Regulator of South Africa, n.d.). These costs are then passed on to a customer, and any high costs will then result in a high price for the customer.

Paragraph 6 of IAS 2 defines net realisable value as an estimated selling price, excluding the estimated all costs that are necessary to conclude the sale (IFRS Foundation , 2021:A985).

The net realisable value may decrease owing to the changes in regulations. The effects of climate change might affect the net realisable value because of a decline in the price of particular inventory (Halmos, 2019). The decrease might be influenced by the decrease in demand attributable to compliance requirements that require buyers to opt for alternative products that are environment friendly (Halmos, 2019). The changes in the market conditions contribute to the decrease in the net realisable value (Halmos, 2019) (IFRS Foundation , 2021:A989).

Therefore, as a result of climate change, the cost of inventory cannot be higher than the net realisable value; hence, inventory will have to be written down as a result of obsolete stock (Halmos, 2019) (IFRS Foundation , 2021:A988).

4.3 IAS 12 – Income Taxes

The objective of IAS 12 is to recommend the appropriate accounting treatment for income taxes (IFRS Foundation, 2021:A1088). The main concern when it comes to income taxes is the treatment of the current and the future tax consequences pertaining to assets and liabilities, the recovery of which would occur in the future, as well as the current transactions for the current period recorded in the financial statements (IFRS Foundation, 2021:A1088).

An entity is expected recover or settle the recognised assets or liabilities if it is probable that a company would do so in the near future, if the recovery or settlement would result in more or less payments if there had been no tax payments (IFRS Foundation, 2021:A1088). The standard allows the recognition of the deferred tax assets or liabilities, with certain exceptions (IFRS Foundation, 2021:A1088).

Paragraphs 24 and 34 of IAS 12 respectively state that a deferred tax asset is only recognised to the extent that it will constitute part of taxable profits (IFRS Foundation, 2021: A1097), and that the deferred tax asset of the unused tax losses and unused tax credits can only be recognised to extent that there will be sufficient taxable profits to utilise on the losses (IFRS Foundation, 2021:A1101).

Paragraph 56 of IAS 12 states that a deferred tax asset needs to be reviewed at each reporting date in order to ascertain if it there are sufficient profits to set off the deferred tax asset in the event that it is no longer probable that the asset would be reduced, until such a time that there are sufficient profits (IFRS Foundation, 2021:A1109).

The above paragraphs indicate the necessity for the availability and sufficiency of future profits in order for a deferred tax asset to be recognised. The climate change-related matters may affect a company’s ability to estimate adequate future taxable profits in order to recognise deferred tax assets, and this may result in the company being unable to recognise deferred tax assets, or maybe being required to derecognise previously recognised deferred tax assets (Nick , 2020).

4.4 IAS 16 – Property, Plant and Equipment

The objective of IAS 16 is to recommend the appropriate accounting treatment for moveable and immovable assets that are described under the grouping of property, plant and equipment in order for the users to be able to interpret and analyse the situation regarding those assess to ensure that investment in those assets is appropriately accounted for, including the changes relating to such assets (IFRS Foundation , 2021: A1128). The main concerns in accounting for property, plant and equipment relate to determining the costs, the depreciation amount, and the impairment write-offs against those assets (IFRS Foundation , 2021: A1128).

The standard requires that certain cost be recognised as an asset, provided they pass the recognition requirements. Paragraph 7 states that the cost of an asset is recognised only when there are future economic benefits and they are apparent and they are measured accurately (IFRS Foundation, 2021: A1130).

Upon recognition of the above costs, they need to be depreciated by using a systematic method or approach over their useful lives. In order to calculate depreciation, a depreciable amount needs to be determined (IFRS Foundation, 2021:A1138).

A depreciable amount is the cost (all relevant costs) of an asset, after taking into consideration the residual value (IFRS Foundation , 2021:A1129). The residual value is an expected return if the asset were to be disposed of, after taking into consideration all costs incurred into selling the asset at the end of the asset's life (IFRS Foundation , 2021:A1129).

Depreciation is defined as "the systematic allocation of the depreciable amount of an asset over its useful life" (IFRS Foundation , 2021:A1129).

The useful life is a "period [during] which an asset is expected to be available for use or number of units or production expected to be obtained from the assets by an entity" (IFRS Foundation , 2021:A1129).

The residual value and the useful life are required to be reviewed annually at each reporting period, and any changes compared with the preceding year. Those changes will be accounted for as a change in the estimate, in accordance with IAS 8,

which is a designated standard set to deal with changes in estimates (IFRS Foundation, 2021:A1138).

The useful life and residual value can change as a result of a change in market conditions. The changes may arise as a result of internal and external factors (PK A/C Take a Lead, n.d.). Therefore, changes in market conditions may result in increases or decreases in a residual value. The movement in the residual value may result in the residual value being equal or higher than the carrying amount (IFRS Foundation, 2021:A1138).

Market conditions may change as a result of the effects of climate change, which then requires companies to comply with the requirements relating to changes in the residual values and useful life, and as a consequence, changes may be required to adopt technologies that utilise assets that emit less carbon (PK A/C Take a Lead, n.d.).

Climate change also has an impact on the conditions of physical assets because most of them were designed with consideration of historic weather conditions, which have changed over the years (M Moyo, 2015). The deterioration of assets that is attributable to climate change results in impairment of physical assets. The deterioration of assets is influenced by changes in weather conditions that impact on sea levels, cause drought, augment storm intensity, and give rise to more intense winds and extreme hot weather (M Moyo, 2015). These risk factors are likely to lead to flooding of facilities, shutdowns of plant owing to water constraints (droughts reduce water availability), and production outages (shutdowns affect outputs), as well as the impairment of plant operations owing to plants not being designed to cope with the current climate changes.

4.5 IAS 38 – Intangible Assets

The objective of IAS 38 is to recommend an appropriate accounting treatment for intangible assets that are not fall outside of other standards; therefore, this standard is applicable for the recognition of intangible assets, provided that the prescribed criteria are met. It also stipulates the measurements and disclosures that are required (IFRS Foundation, 2021:A1491).

Paragraph 8 of IAS 38 defines an intangible asset as an identifiable non-monetary asset, without physical substance (IFRS Foundation , 2021:A1493).

Each organisation is required to review the useful lives of its intangible assets to assess whether they have finite or indefinite useful lives. If an asset has a time allocated to it, to which it is limited for generating income, it is said to have a finite useful life, but if an asset has no limit in terms of its generation of income, it is said to have infinite useful life (IFRS Foundation, 2021:A1508).

An intangible asset with a finite useful life is subject to amortisation, while an infinite-life asset is not, and is instead reviewed for impairment (IFRS Foundation, 2021:A1508).

The depreciable amount is the cost (all relevant costs) of an asset, after taking into consideration the residual value, which is what the asset can be sold for, net of selling costs, at the end (IFRS Foundation , 2021; A1493).

The useful life is defined as the time that the asset is expected to be in use, or as the period during which the asset produces the number of units that is expected of it (IFRS Foundation , 2021:A1493). There are considerations that need to be considered when determining a useful life. These considerations relate to the particular industry that the assets are used in, the possibility that the assets might become obsolete through new technology, how the competition is faring, comparisons with similar assets, how an entity plans to utilise the assets, the maintenance of such assets in order to achieve what they are supposed to produce, whether the assets are held under a lease, what the contract period is, and whether the assets are dependent on other assets or not (IFRS Foundation , 2021: A1508 - A1509).

The intangible assets with a finite useful life are amortised, over the useful life. They are only amortised when they are ready for use. When an asset is no longer in use and it is derecognised, or it is in the process of being sold and classified as asset for sale, it will cease to be amortised on the occurrence of the earlier of the two. The amortisation should be a reflection of how the asset’s benefits are expected to be recovered in a reliable manner, otherwise a straight-line method can be used if there is an issue of reliability. That amortisation is expensed (IFRS Foundation , 2021:A1510).

The residual value of an intangible asset with a finite useful life is assumed to be zero, unless a third party commits to acquiring the asset, or there is an willing buyer and a willing seller for the particular asset that can be sold through an active market and it is certain that the market will exist at the end (IFRS Foundation, 2021: A1512).

The depreciable amount of an asset with a finite useful life is determined after deducting its residual value (IFRS Foundation, 2021: A1512). A residual value estimation is based on the amount recoverable from disposal of an asset, using the selling prices at that particular moment, as compared with similar assets that have operated in a similar industry, have operated under the same conditions, and have reached the ends of their useful life. The residual value, amortisation method, amortisation method and useful life of an indefinite intangible asset are reviewed each financial year, and any changes are accounted for by using the specific standard that deals with the changes in accounting estimates (IFRS Foundation, 2021: A1512).

These assets require a review of their useful lives and recoverable amounts. The climate change requirements have a direct impact on the assessments of the useful lives, as well as on the residual values (Nick , 2020). The details of these impacts will be discussed under impairment, as determined in terms of IAS 36.

The above details need to be disclosed according to the requirements of the standard.

4.6 IAS 36 – Impairment of Assets

The objective of IAS 36 is to outline the procedures that entities need to apply so as to ensure that the assets are not over valued in comparison with their recoverable amounts (highest amount between fair value less cost to sell or value in use) (IFRS Foundation, 2021:1421). The assets are either recovered through sale or use. In the event that there are indicators of impairment, the assets have to be assessed as to whether their carrying amount is not higher than recoverable amount. This has to be done on annual basis because the asset might be impaired successively during each reporting period. If the carrying amount is higher, this is an indication that it is impaired (IFRS Foundation, 2021:A1419).

However, an entity is required to test for impairment of all assets, including intangible assets, even if there are no indicators for intangible assets, assets with an indefinite useful life, and assets that are not available for use, as well as goodwill acquired through business mergers (Delotte IAS Plus, n.d.). This test is conducted on an annual basis, at any point in time, provided the test is conducted at the same time during each period (IFRS Foundation, 2021; 1422).

In order to assess whether assets are impaired, an organisation needs to consider the factors that might indicate that the assets might be impaired. These factors are external and internal, and include investments in subsidiary, joint venture and associate entities (IFRS Organisation , 2021: 1422-1423). External factors are represented by significant declines in the market, changes in environmental law for the industry in question, increases in the rate of return and interest rates, and net assets that are higher than market capitalisation. All these changes result in adverse outcomes for the industry; hence, they are indicators of impairment (IFRS Organisation , 2021: 1422-1423). Internal factors are indications that there might be an economic downturn, which would cause an asset to underperform, or would render assets obsolete, or would make a sudden change to the useful life of assets, force the sales of assets or shutdowns, or result in assets becoming physically damaged. The appropriate internal reporting should indicate whether the assets are not going to perform at their expected capacity, and whether the carrying amount of investments (associates, joint venture and subsidiary) will become higher than assets of the investee, or that dividends will be higher than total comprehensive income (IFRS Foundation, 2021:1423).

The above indicators will need to be considered, if they arise as a result of climate change.

The effects of climate change may give rise to indications that assets, such as goodwill, investments, property, plant and equipment, right-of-use assets and intangible assets (or a group of assets), will become impaired. For example, the introduction of the Carbon Tax Act is a change in legislation that seeks to reduce carbon emissions. This is an indication that assets or a group of assets might be impaired as a result of such a change in legislation or law, and this is an external factor. This might operate to decrease the demand for products that emit

greenhouse gases, thus indicating that the existing assets might become idle or obsolete. Once assets are idle or obsolete, they no longer generate the returns as expected, and therefore there is no economic benefit being generated by those assets. Such assets need to be tested for impairment or they need to be impaired (Nick , 2020).

A decrease in the demand for products that involve or cause the emission of greenhouse gases has a negative effect in a company involved in such products, from an industry perspective. The introduction of the goal of zero emissions for the companies that operate in an industry that emits greenhouse gases is an indication that the assets or group of assets held by such a company might be impaired, and as a result, the value of the company will decline (McKinsey & Company, 2022). This would be an adverse effect on the company, which might require the company to re-invest or look for alternative solutions in order to remain in business.

Determination of recoverable amount

A recoverable amount is a critical amount for determining an impairment loss. A recoverable amount is the higher of the value of an asset in use or the fair value of the asset, less the cost of disposal (IFRS Foundation, 2021: A1425). There are two amounts that need to be calculated in order to determine the recoverable amount, the fair value and the value in use (Delotte IAS Plus, n.d.). However, it is not always necessary to calculate both amounts. If either of the amounts is higher than the carrying amount, then the asset is not impaired or might not be impaired; therefore, there is no need to estimate the other amount (IFRS Foundation, 2021: A1425).

In terms of IAS 36, the fair value is the price that would be received at the point of sale of an asset among the relevant market participants, and the value in use is the present value of the future cash flow of an asset or a cash-generating unit (IFRS Foundation, 2021:1421).

The fair value amount is determined by using a specific standard, and the costs to sell are all costs (legal costs, taxes, removal cots and all other costs) that are relevant and are directly linked to the sale of an asset (Delotte IAS Plus, n.d.). However, it is not always possible to determine the fair value because of a lack of reliable estimates at the point sale. In that event, a recoverable amount is taken as the value in use (IFRS Foundation , 2021:A1426).

The amount of the value in use is the present value of future cash flows, and it must reflect the timing of the future cash flows, the estimated future cash flows, the estimated future cash flows expected to be derived from the asset, the time value for money, and other inherent uncertainties. All these estimates must be made by management, taking into account the best future economic conditions, and must be supportable. The future cash flow estimates must be based on the current condition of the assets, excluding the future enhancements of the asset's performance or restructuring (Delotte IAS Plus, n.d.). Therefore, entities need to consider whether climate matters would affect the assumptions made in determining the cash flows (Nick , 2020).

Once it is concluded that the carrying amount is greater than the recoverable amount, then the "carrying amount is reduced to recoverable amount". "The reduction of the carrying amount is called impairment loss". Impairment loss is an expense that will reduce profits for the year, unless the asset is a revalued asset, in which case the impairment will be taken through other comprehensive income as a revaluation decrease (Delotte IAS Plus, n.d.).

The standard also requires the disclosure of impairment loss recognised in profits, reversed to profits, impairment losses recognised or reversed to revalued assets into comprehensive income. The introduction of legislation that will result in a reduction in emissions is an occurrence that might render assets obsolete or idle, or it might increase costs required to pivot the existing assets. This is a material change with material impacts. Therefore, this aspect requires to be disclosed in the financial statements, because this event might cause assets to become impaired (Nick , 2020).

The effects of climate change might result in possible increases in impairment losses, which would reduce the profitability of the affected entities, and might present a continuing concern for some entities that might not be able to pivot their business to adapt to the required changes in the industry concerned.

4.7 IAS 37 – Provisions, Contingent Liabilities and Contingent Assets

The objective of IAS 37 is to make sure that “appropriate recognition criteria and measurement bases are applied to provisions, contingent liabilities and contingent assets and that sufficient information is disclosed in the notes to enable users to understand their nature, timing and amount” (IFRS Foundation, 2021:A1468).

In terms of the standard, a “provision is a liability of uncertain timing or amount and a liability is a present obligation of the entity arising from past events, the settlement of which is expected to result in a payment”. An obligating event is that which gives rise to a constructive or legal obligation that requires an entity to settle the obligation without an alternative. A legal obligation arises through contract, legislation or other operational law (IFRS Foundation , 2021: A1469).

The drive to achieve zero carbon emissions arising from climate changes will have an impact on how the provision is recognised, measured and disclosed in the financial statements applying IAS 37 (Nick , 2020).

The following are examples (Nick , 2020) that relate to provisions that are related to the climate change:

- Government-imposed levies introduced to reduce greenhouse gas emissions;
- Restoration of the environment;
- Inability to me contract obligations due reduction in revenue increase costs as a result of climate-related changes in legislation, additional investment may be required in order to meet the carbon zero emission requirements (McKinsey & Company, 2022); or
- restructuring, new skills and re-skilling are required, as well as dispensing with skills that have become redundant, in order to redesign products or services to achieve climate-related targets (McKinsey & Company, 2022).

The Department of Forestry, Fisheries and the Environment (Department of Forestry, Fisheries and the Environment, 2021) is the regulatory government Department that

is responsible for ensuring that: the environment is protected; there is improvement in the quality and safety of the environment; and vigorous environmental management is taken regarding authorisations and regulatory systems and services for protecting marine, coastal and terrestrial resources, for pollution and waste prevention and reduction, and for improving atmospheric and air quality. This Department is responsible for conducting inspections to ensure or to enforce compliance with the applicable environmental laws (Green Building Africa, 2021). The entities falling within the oversight of the Department might need to provide for any contraventions of the regulations in order to be able to rehabilitate any land affected by their operations, and to provide for dealing with contracts that become onerous as a result of the changes in regulations to combat the threats of climate change.

For the provisions or contingent liabilities, the standard requires the disclosure of all indications of doubts pertaining to the amount or timing of any related outflows of economic benefits. The major assumptions relating to future events that are reflected in the amount require disclosure (IFRS Foundation, 2021).

4.8 IFRS 7 and IFRS 9 – Financial Instruments and Disclosures

These standards specifically require disclosures to be made in financial statements that would enable users of the information in the statements to assess the extent and nature of risks attaching to financial instruments during the period under review, to assess how these risks are to be mitigated (Nick , 2020), and to evaluate the significance of the financial instruments to the financial position and performance of the company.

Climate-related matters may affect both lenders and investors. Entities that are lenders may face increased risks of exposure in relation to financial instruments, to an extent that, as lenders, they might be required to present information on climate-related consequences, as far as the measurement of the expected credit losses and/or the concentrations of credit risk are concerned. Similarly, equity participants may also be expected to present information per industry and to identify sectors exposed to climate-related risks (Nick , 2020).

4.9 IFRS 9 – Financial Instruments

The aim of IFRS 9 is to provide a framework for reporting financial assets and liabilities, as well as pertinent financial information, to stakeholders, thereby assisting them in their decision making (IFRS Foundation , 2021: A370).

Climate-related matters potentially impact on how financial assets and liabilities are accounted for, e.g. contractual obligations and the settlement thereof may be negatively influenced by the need to attain climate-related milestones (IFRS Foundation , 2022) (Nick , 2020).

This standard determines how financial instruments are to be classified as financial assets, and how liabilities should be measured, at amortised costs or fair value, being a fair value attained through profit and loss or through other comprehensive income. Climate-change milestones impact on classifications and measurement (IFRS Foundation , 2021: A382 - 383). Lenders therefore need to take cognisance of climate-change milestones in their determinations of cash flow amounts and the related finance costs (Nick , 2020) (IFRS Foundation , 2022).

Furthermore, climate-change milestones have an impact on whether contractual obligations would have certain value, where the value varies in relation to the movement of one or other instruments. In this instance, the value of the underlying contract needs to be set apart from the value of any other asset identified as a derivative. Climate-related matters may also affect a lender’s exposure to credit losses. For instance, a change in policy or the regulatory environment might have an adverse effect on a borrower’s repayment plan. The effective control over assets might be lost or insurance cover lost, which would otherwise serve as security for lending institutions (Nick , 2020) (IFRS Foundation , 2022).

In accordance with IFRS 9, the recognition and measurement of loss provisions must be based on information that is available in a practical manner. Climate-related matters have much relevance in that they potentially affect a variety of future outcomes with financial implications, including lenders’ perceptions of heightened risk of default in repayments and whether financial assets are correctly valued, as well as the accuracy of loss provisions (Nick , 2020) (IFRS Foundation , 2022).

4.10 IFRS 13 – Fair Value Measurement

This IFRS deals with defining fair value and the setting of a fair value measurement framework and the required disclosures (IFRS Foundation , 2021: A688).

Climate-related matters might also potentially impact on the amount at which financial instruments are to be disclosed for financial reporting purposes. For instance, users of financial statements may assign different values to financial instruments as a consequence of certain perceptions arising from legislation associated with the climate (IFRS Foundation , 2021: A688) (IFRS Foundation , 2022).

A requirement of IFRS 13 is for market participants to bring to the fore key data not otherwise in the public domain that would have influenced pricing and climate-related risk (IFRS Foundation , 2021: A688) (IFRS Foundation , 2022).

IFRS 13 further requires transparency in the underlying data used in a fair value determination, including a description of fair value elasticity relating to such data, and whether such data reduces or increases fair values (IFRS Foundation , 2022). Contemporary accounting standards deal with disclosure risk, but neglect to deal with risk susceptibility and the means to adapt. There is a clear absence of a potent and combined methodology for assessing financial risk and climate change (West and Brereton, 2013). Users of financial statements, however, need to be given information on relevant climate change impacts, the manner in which they might impact on the organisation, and the ability of the organisation to adapt, which information would allow users to establish how exposure could be managed or brought to a minimum (Linnenluecke, et al., 2015) (Research Gate, n.d.).

4.11 IFRS 17 – Insurance Contracts

The scope of IFRS 17 covers the recognition, measurement, presentation, and disclosure of insurance-related contracts, as well as ensuring that an entity presents appropriate data that gives a fair representation of those contracts. Such presentations assist users to examine the impact that insurance contracts have on an entity’s balance sheet and financial performance, whether they relate to cash flow or otherwise.

There is potentially a direct correlation between climate-related matters and the number of insured events, including the timing of their occurrence (Halmos, 2019). Insured events that may be impacted on by climate-related matters include the following: interruptions to businesses, damage to property, sickness and mortality (Halmos, 2019). Climate-related matters consequently have a bearing on the underlying assumptions that are used in the measurement of insurance-related obligations in terms of IFRS 17 (Halmos, 2019). Climate-related matters, in addition, impact on the necessary presentation requirements on material inputs and variations in application of the standard, as well the risk-related disclosures required (Halmos, 2019).

CHAPTER 5:
COMPARISON WITH OTHER COUNTRIES

It has been stated (McKinsey & Company, 2022) that climate change is a global issue and that all the countries, worldwide, contribute to the global emissions, which contributions do differ in terms of the population and gross domestic product of each country. The top ten major contributors to greenhouse gas emissions account for 60% of global emissions.

These highest contributors to greenhouse gas emissions can be differentiated by their economic structures. China has, over the years, become the global supplier of various commodities, and as a result, their manufacturing industries have grown drastically, making China a ‘go to’ country. However, this growth in manufacturing has resulted in increases in emissions by the industrial and power-generating sectors, which account for 12% and 11%, respectively (McKinsey & Company, 2022).

This chapter examines the high emitters (BBC News, 2021) and how they have dealt with their carbon emissions to address the impacts of climate change (World Population Review, n.d.). This examination will look at what has caused these countries to become the highest emitters and at what measures they have put in place to curb the increases in their carbon emissions. This chapter will also look at what their achievements are and also at what the challenges are that they have faced in the process of curbing their greenhouse gas emissions. The following countries are going to be looked at in a comparison with South Africa: China, the United States of America, India and Turkey (The Conversation, 2021). They have been selected because they are the part of the group of the largest emitters and they are highly dependent of coal, which is a source of high amount of carbon dioxide (The Conversation, 2021).

5.1 China

It has been reported (BBC News, 2021) that China is the largest carbon emitter, and that if China could reduce their carbon emissions, it would make a huge difference,

globally. It is therefore important that China should undertake substantial measures to curb its carbon emissions (BBC News, 2021).

China is highly dependent on coal; therefore, in order to make an impact on the reduction of its greenhouse emissions, experts agree that China needs to increase its mitigation actions (BBC News, 2021). China has become the highest contributor of carbon dioxide, which has resulted in it contributing above a quarter of the greenhouse gases in the world (World Population Review, n.d.). China has since experienced much condemnation and pressure from the global community because of its highest contribution of the greenhouse gas emissions, and as a result, there are major expectations that China would work on reducing its greenhouse gas emissions (World Population Review, n.d.). China has depended on coal as the source of its power generation for a substantial time, and therefore a drastic move away from coal as the source of its energy would have substantial implications for the country (BBC News, 2021). China utilises coal in its industrial processes, and the industrial processes include those related to agriculture, construction, manufacturing and mining, and these utilise an amount of 62.5% of the coal-generated power (World Population Review, n.d.).

China has planned to phase out coal utilisation; however, experts are of the view that it will not be possible for the country to phase out the use of coal from 2026. Currently, China is constructing new coal plants in more than sixty locations, and in some areas, there is more than one coal plant (BBC News, 2021). The useful life of these coal plants range between 30 years and 40 years, and these new coal plants are in addition to existing assets that are contributing to the emissions. Reducing its emissions means that China would have to underutilise the new assets and possibly stop utilising the old assets (BBC News, 2021). The need to reduce their carbon emissions because of climate change might result in the under-utilisation of assets in China through shortening the life spans of new assets, and possibly the write-off of old assets (McKinsey & Company, 2022).

China has been experiencing exponential economic growth, which implies a greater need to utilise power or energy to support its economic growth. However, the energy required will have to be a clean energy that will not affect the environment or the atmosphere (BBC News, 2021). In order to achieve such a position, China has

strengthened its commitments in the CORP 26 to reach a peak in emissions before 2030, and to achieve carbon neutrality by 2060. There are targets that have been set for reducing global warming, but for China, it seems its emissions are increasing instead of decreasing. Accordingly, achieving a reduction in emissions would require drastic changes to be made by China with regard to coal use, and it would require stringent plans to be put in place (BBC News, 2021).

In order to achieve reductions, China has pursued different approaches, such as developing green energy and green technologies. It is the leader in the production of solar panels and batteries. In terms of solar-generated megawatts produced, China dominated as the global leader in the solar power generation in 2020, producing 254 355 megawatts, followed by the USA at 75 772 megawatts, Japan at 66 999 megawatts, Germany at 53 5783 megawatts, India at 39 211 megawatts, Italy at 21 600 megawatts, and Australia at 17 627 megawatts (BBC News, 2021). China produces more solar power than any other country in the world does, and it has installed three times more wind-powered electricity generating installations than any other country has. Furthermore, it is aiming to increase its non-fossil-fuels energy-generation capability to 25% by 2030.

China is ranked seventh in the world in the use of electric-powered vehicles, and although China is ranked at number seven, it is still a major contributor of the electric-powered vehicle industry because of its huge population. The following are the global leaders in the sales of electric vehicles: Norway 55.9%, Iceland 22.6%, the Netherlands 15.1%, Sweden 11.4%, Finland 6.9%, Portugal 5.7%, and then China at 4.9%. China has also enlarged its green programmes to contribute to the reduction of emissions, with reforesting being part of the measures that countries are embarking on in order to reduce the impacts of climate change (NASA, 2019). China is overtaking all other countries when it comes to ‘going green’, and it is doing so at a rapid pace (BBC News, 2021; International Energy Agency, 2020).

As has been reported (International Energy Agency, 2020), China introduced a national emissions trading system in 2017, which is part of China’s plan to reduce emissions in order to meet its carbon targets in a cost-effective manner. The current emissions trading system is the largest, by far. The success of China’s reduction of carbon emissions will be a notable achievement for the global community. The

traded emissions will cover the gas-powered and coal-powered plants. Emissions trading is based on allowances that are calculated according to the output of each plant, and allowances are allocated, based on using different yardsticks or benchmarks for each type of technology and fuel used to generate power (International Energy Agency, 2020). The output-based allocation allowance is based on benchmarks, which should be tCO2/MWh for power generation and tCO2/gigajoules (GJ) for heating generation. There are two options that are currently proposed, which are differentiated by the number of benchmarks for conventional coal-fired power plants. There is one benchmark for Option 1 for conventional coal, while there are two benchmarks for Option 2 for conventional coal, but which are separated into two sub-categories according to unit size. One category is for over 300 MW capacity, and the second category is for below the 300 MW capacity benchmark. There is no differentiation between unconventional coal-fired plants for both options of allocation. The above 300 MW capacity of conventional coal category consist of ultra-supercritical, large supercritical and subcritical. Where the capacity is at or below 300 MW, the category consists of small supercritical, subcritical and high pressure (International Energy Agency, 2020). Although there are 2 options for the emission trading system, only one option will be adopted (International Energy Agency, 2020).

The entities will be allocated allowances on an annual basis according to their electricity and heating outputs, multiplied by the relevant emission benchmark. In the event that an entity produces combined heating and power, it will be allocated an allowance on both the electricity and heat out-put, multiplied by the relevant emission benchmarks (International Energy Agency, 2020).

China is planning to expand its national emissions trading to other industries, such as “petrochemicals, chemicals, building materials, iron and steel, non-ferrous metals, paper and domestic aviation” (International Energy Agency, 2020). The allowances are given on an output basis, rather than the cap and trade system that is adopted by the European Union and by the North American countries (International Energy Agency, 2020). China has tested the process and it has been specifically designed for China in such a way that it meets their development needs. On the other hand, the cap and trade system has limitations, in that it requires adjustments to be made, should there be any changes in the entities according to their demand and

operations (International Energy Agency, 2020). The cap and trade system is another mechanism that is a cost-effective method for reducing carbon emissions (Center for Climate and Energy Solutions , n.d.).

China had tested an emissions trading system at a regional level, starting in 2013, which was supervised by local government. The subsequent migration to a national trading scheme resulted in an increased challenge for monitoring and enforcement by the relevant entities (International Energy Agency, 2020). The key to the allowance allocation is actually the accuracy of the emission which than tests the entities reporting, measurement and the requirement for the verification system (International Energy Agency, 2020). The entities are required on annual basis to report their allowances, which should correspond to their annually reported CO2 emissions. The fuel factor of CO2, which is used for monitoring coal-powered plant output, and especially the strict monitoring that assists regarding the accuracy and reliability of the emissions data reported, will help in achieving increases in efficiency (International Energy Agency, 2020).

The qualifying entities, upon accumulating an excess of allowances, are allowed to sell the allowances and generate revenue, and if there is deficit, an entity may buy excess allowances from other entities in the similar industry, or otherwise acquire these from the market (International Energy Agency, 2020).

China has a Refined Oil Excise Tax, charged at a uniform rate of CNY1.52 per litre, and there is diesel and oil tax charged at a rate of CNY1.2 per litre. Revenue generated from these streams is ring-fenced for funding transport, as well as for green purposes (OECD, 2021). China does not tax greenhouse gas emissions directly, although it does have a national emissions trading system. It does not charge an electricity tax or charge any carbon tax on fuel. However, it does have environmental protection tax, which pertains to the generation of pollution and waste (OECD, 2021).

5.2 The United States of America

The United States of America is the second highest carbon emitter, globally (BBC News, 2021). Although the United States experienced a decrease in its net emissions by 12% between 2005 and 207, it is still the second largest emitter of

greenhouse gasses (World Population Review, n.d.). The above reduction emanates from an increase in the utilisation of renewable energy, as well as the move away from the use of coal by changing to natural gas, and by a flattening in the demand for electricity (World Population Review, n.d.). The major contributor to the emissions, which accounts for 29%, followed by electricity generation, which accounts for 28%, and lastly, industry which accounts for 22% (World Population Review, n.d.).

It has been stated (Center for Climate and Energy Solutions , n.d.) that the United States uses a cap and trade system of allowances, which is a cost effective way of reducing greenhouse emissions. It is an approach that is seen as being an effective way to reduce greenhouse emissions because it gives allowances that are directed to meeting the specified targets, in a way that encourages the entities involved to ensure that they do reduce the emissions in order to acquire surplus allowances that they can then sell and thereby generate revenue.

The cap and trade system has attained a proven record that has seen the elimination of sulphur dioxide pollution, which was achieved at a low cost, in California (Environmental Defense Fund, n.d.). There is confidence that the cap and trade system has a large impact on the reduction of emissions, as it has contributed to the decrease of emissions by 10% in California in the period from 2013 to 2018 (Environmental Defense Fund, n.d.). Although cap and trade has worked for the elimination of sulphur dioxide, the scale might be lower in comparison with the other greenhouse emissions, which are way higher, and therefore the efficiency cannot be compared (Carbon Tax Centre, n.d.). It must be noted that the capping is mainly applicable to the emissions that contribute greatly to global warming, such as carbon dioxide and other equally harmful emissions (Environmental Defense Fund, n.d.).

The United States has different taxes on energy and greenhouse emissions. The United States levies taxes on greenhouse gas emissions directly, but it does not charge taxes on electricity generation, and it does not have a carbon tax on fuel (OECD, 2021). Although the United States does not charge taxes on greenhouse gas emissions, it has various emissions trading systems that are in place to curb the emissions, which include the cap and trade system in California and the Regional Greenhouse Gas Initiatives (OECD, 2021). The energy taxes include the Highway Motor Fuel tax, which is charged at USD 0.183 per gallon of gasoline and bio-

gasoline, and the Compressed Natural Gas and Liquefied Petroleum Gas tax, which is charged at USD 0.243 per gallon on undyed products, such as diesel, biodiesel, kerosene, and Liquefied Natural Gas. Taxes on aviation fuels for commercial and non-commercial flights (OECD, 2021) include the General Aviation Fuel Tax and the Commercial Fuel Tax, which are levied at USD 0.193 per gallon and USD 0.218 per gallon for gasoline and kerosene, and the commercial aviation tax, which is charged at USD 0.043 per gallon (OECD, 2021). There are also trust fund taxes, which include the Inland Water Trust Fund Tax, levied at USD 0.29 per gallon, the Leaking Underground Storage Tank Tax, levied at USD 0.001 per gallon, and lastly, the Oil Spill Liability Tax, which is levied at USD 0.002 per gallon (OECD, 2021). The Inland Water Trust Fund, the Leading Underground Storage, and the Oil Spill Liability taxes all fall under a category of fuel excise tax in terms of the Taxing Energy Use methodology (OECD, 2021). These are the energy taxes applicable in the United States of America.

The fact that California in the United States has been able to reduce its greenhouse gas emissions through the cap and trade system is an indication that these steps are taken in the right direction for reducing emissions, since United States is one of the highest emitters. The reason that the cap and trade system has resulted in the reductions is attributable to the policy that was adopted ten years ago, which has yielded results (Enivironmental Defense Fund, n.d.).

In conclusion, the United States' cap and trade system has contributed to the reduction of emissions.

5.3 India

India is one of the largest carbon emitters in the world in terms of national carbon emissions from global carbon sources (BBC News, 2021) (Shruti , 2021). India follows after China and the United State of America in terms of global ranking (Shruti , 2021). India is also the highest energy consumer, globally, and its consumption has increased tremendously over recent years, with the increased energy needs being supported by the use of coal, biomass and oil (IEA, 2021).

India’s main contribution towards emissions emanates from its high dependency on the utilisation of coal and oil. This is also influenced by its substantial increase in population, which emphasises the need to have a reliable energy supply (IEA, 2021).

India does not tax carbon emissions directly (OECD, 2021); however, it currently has measures in place that are aimed at reducing carbon emissions, as well as a plan to implement a cap and trade system in order to generate revenue, with the aim of using funds derived from the system for other projects (The Economic Times , 2022). India is considering making a change from its current Perform, Achieve and Trade system to the carbon emission trading system that is used by the EU, which assigns target to emitters (The Economic Times , 2022).

The Perform, Achieve and Trade scheme was founded on the National Mission for Enhanced Energy Efficiency, and it is applicable to energy-intensive industries. The scheme describes these industries as ‘Designated Consumers’. The Designated Consumers are given targets for reduce their specific energy consumption, and according to their performance, they are described as ‘achievers’ or ‘non-achievers’, or ‘compliant’ or ‘non-compliant’ (Bureau of Energy Effeciency , n.d.). The Designated Consumers that are achievers obtain Energy Saving Certificates, while those that are non-achievers are eligible to buy Energy Saving Certificates from the achievers, with the buying and selling of savings certificates being traded on the Power Exchanges platform (Bureau of Energy Effeciency , n.d.). There are also Renewable Energy Certificates that are traded in order to allow companies to achieve their obligations by purchasing Renewable Energy Certificates. The Renewable Energy Certificates are traded every month, and they attract a favourable price, with solar renewable energy trading at Rs 2,250, and non-solar trading at Rs 1,000 each (The Economic Times , 2022).

However, the Energy Saving Certificates have recently been put on hold owing to a lack of demand, with the certificates trading at Rs 1,200 and Rs 250 per Energy Saving Certificate for the first and the second trading cycles, respectively (The Economic Times , 2022). The different prices are an indication of a significant drop in demand. Furthermore, consideration is also being given to opening the scheme to other industries, with the possibility of penalties, in order to increase coverage because, as it stands, the scheme only covers eleven industries, which equates to

only about fifty percent of the energy consumption (The Economic Times , 2022). The scheme does not include other industries such as logistics and transport, and it is proposed that these businesses should be included to broaden the scope of the scheme (The Economic Times , 2022).

According to the Deloitte Economics Institute, India is in a position to hugely benefit from acting on climate change and by leading in that space to exploit the benefit of realising at least USD 11 trillion, instead of USD 35 trillion as a result of inaction (Deloitte, 2021). In order to unlock the value that could be realised, there is a need for drastic and bold decisions to be taken, by both business and by government in terms of policies as of now and 2030. Proper harmonisation needs to be made between the change in terms of energy consumption and generation and the decarbonising required between 2030 and 2040. The expectation is that, between 2040 and 2055, the process of eliminating high-emitting industries would be almost over, and that the green economy would be operating at reasonable costs. Alternatively, emissions would have begun to decline at this point onwards, and the benefits would begin to show beyond 2055, when the work that has been invested in decarbonisation would yield results (Deloitte, 2021).

The measures that are in place constitute an endeavour to help India to meet its pledge of achieving net zero carbon emissions by 2070, which is a furthest deadline in comparison with the rest of the world. India’s reliance on coal is one of the reasons why it has opted a phase-down approach on using coal, instead of a phase-out approach, in its commitments in Glasgow COP26 (BBC News , 2021). The day-to-day activities of communities India are dependent on coal, and these range from ordinary individuals right through to businesses, with the entire value chain being coal orientated in the endeavours to provide livelihoods for families. Therefore, the phase-down to using coal needs to be properly planned and addressed, taking into consideration the fact that coal makes a huge contribution towards employment (BBC South Asia Correspondent , 2021).

There are other taxes in place that also address the issues of climate change in order to reduce the emissions, and these are taxes on energy (OECD, 2021). They are all classified as fuel excise taxes, and comprise the “Basic Excise Duty, Special Additional Excise Duty and Road and Infrastructure Cess and Agriculture

Infrastructure and Development Cess" (OECD, 2021). These are applicable to petroleum products and gas products (OECD, 2021).

Considering the fact that India's major greenhouse gas emission is carbon dioxide, which primarily comes from coal, India introduced a Clean Energy tax, which was levied on coal in the attempt to promote clean energy, and to generate revenue that would be utilised for research and development (Vidhi:Centre for Legal Policy Centre , 2021). This Clean Energy tax was replaced when the Central Goods Services Act was implemented, which replaced the Clean Energy tax with the Compensation Cess, which maintained the same charge as the previous regime of Rs.400 per tonne (Vidhi:Centre for Legal Policy Centre , 2021). The Compensation Cess is applicable across all sectors (OECD, 2021) and at any point of supply (Vidhi:Centre for Legal Policy Centre , 2021).

India has put in place measures comprising the Compensation Cess, Excise Fuel Taxes, and additional levies. However, these have not yielded the required results for increasing revenue and reducing emissions, because not all of these measures are aligned to the emissions emitted by the respective taxpayer, and as such, a taxpayer pays the same tax, whether high or low carbon emissions are emitted by it. Basically, the respective tax charges and penalties do not encourage a taxpayer to switch to using 'clean' coal (Vidhi:Centre for Legal Policy Centre , 2021).

Over and above these national measures, some states in India have introduced other taxes, such as Green Cess and Eco Tax, which are charged on pollutant products and vehicles, respectively. However, these do not seem to be efficient because they still have not reduced the emissions, as India is still ranked the highest emitter (Vidhi:Centre for Legal Policy Centre , 2021). Therefore, it might be necessary for India to consider implementing a direct mechanism, such as a carbon tax, that would be levied on emitted emissions in such a way that it discourages the utilisation of coal and any other pollutants that have a significant impact on the environment. Such a tax would also raise funds for green projects, while discouraging the use of high carbon emission processes (Vidhi:Centre for Legal Policy Centre , 2021). An aggressive approach is required to ensure that India is operating on a competitive footing with its major trading partners in the European Union (Vidhi:Centre for Legal Policy Centre , 2021). India conducts a considerable

amount of trade with the European Union, and it exports goods to the European Union at lower prices than other exporting countries do. However, the introduction of the EU Carbon Border Adjustment Mechanism means that imports involving high emissions will be taxed upon entry to the European Union. That might affect the pricing for goods exported by India, and this might result in a decrease in the demand for Indian goods exported to the European Union (Vidhi:Centre for Legal Policy Centre , 2021). If other countries adopt the EU Carbon Border Adjustment Mechanism, India will lose a substantial amount of revenue; hence, the need for India put substantial measures in place to ensure that manufacturing is conducted by using technologies that do not contribute emissions, and which would produce goods that attract little or no penalties under the EU Carbon Border Adjustment Mechanism. In such a way, India would continue to be a major exporter to the EU (Vidhi:Centre for Legal Policy Centre , 2021).

In conclusion, the current measures that India has put in place have not resulted in reduction in emissions, and accordingly, consideration is being given to the direct taxing of emissions through a carbon tax.

5.4 South Africa

South Africa is one the major emitters of greenhouse gas emissions, globally, and it is ranked as the highest emitter in Africa. It is ranked among the top twenty highest emitters, being ranked number twelve in the world and number one in Africa (Africa Check, 2021). South Africa is heavily reliant on coal, and South African major emitters have been found to be Eskom, which is the national electricity-generating entity, and Sasol, which is an oil and gas company (Africa Check, 2021).

Since South Africa is among the highest emitters, the government has introduced different environmental taxes for dealing with the reduction of emissions (OECD, 2021). These environmental taxes and levies are administered by the South African Revenue Services, which include the Carbon Tax, and environmental levies on “Electric filament lamps, Electricity generation, Motor vehicle CO2 emissions, Plastic bags, and Tyres” (SARS, 2021). These are discussed in detail above, under Chapter CHAPTER 2: .

South Africa has amended its emissions targets to “350 to 420 metric tonnes of carbon dioxide equivalent” (Daily Maverick, 2021). The lower limit is applauded by the industry experts, although the upper limits are of concern to the experts because they allow room for the highest emitters to actually postpone their actions in dealing with reduction of greenhouse gas emissions. Although the range allowed gives the highest emitters room to defer their actions, it is still a step in the right direction (Daily Maverick, 2021).

The climate change is a fight that needs global co-operation, and working together at all levels, ranging from individuals to communities, to government (The Nature Conservancy , 2022).

CHAPTER 6:
CONCLUSION, FINDINGS AND RECOMMENDATIONS

The research reported above adds to existing research on environmental taxes and levies. The aim is to supplement the existing knowledge about the impacts and implications of such environmental taxes and levies.

The conclusion of this research study is that climate change is a serious issue that has been with us for decades, and that it is only a matter of time before it takes on a serious dimension. This progression calls for the measures that are put in place to combat harmful emissions to be fully implemented in order to save the environment for future generations to come.

The current measures that have been put into effect in the endeavour to preserve nature need to have enforcement measures in order for them to yield fruitful outcomes. The other issue that affects the proper implementation of clean energy technologies that are less harmful to the environment is the lack of capital or funds to fund the new technologies. Although there are allowances in place to encourage new technologies, these allowances have come in effect after the fact of expenditure that is required have already been incurred.

The revenue generated from all the environmental taxes needs to be ring-fenced and be utilised to fund specific projects that would promote the proper disposal of tyres and the proper management of plastic waste, as well as funding the expansion of the use of clean energy to generate electricity, and thus achieve the optimal utilisation of renewables in order to generate revenues.

The impacts of climate changes have the capacity to negatively affect a company's profitability, and as a result, the company's assets would be rendered obsolete because of climate change. This requires the development of new assets that will not affect the environment. This also means that the assets affected by climate change will no longer be able to provide the returns for which they were acquired to generate. The will be a need for companies to pivot their businesses away from carbon-emitting assets as a result of the impacts of climate change. That pivoting

would also affect the ability of other companies to continue to do business as going concerns, which will negatively affect the revenue that is collected through those companies that are in the businesses that are negatively affecting the environment.

The industries that will be affected greatly by environmental levies are those that are in the energy sector because their products mainly utilise fossil fuels, gas and coal. These energy sources are seen to be harmful to the environment.

The is a need for the development of initiatives that would, in the interim, assist businesses to reduce the harm caused by their greenhouse gas emissions through capturing and storing these emissions in such a way that they will no longer be harmful. The carbon capture and storage solution, however, will need resources for the proper development of the necessary technology. Another option is to consider the trading of credits for savings in the amounts of carbon emitted. However, for such trading to take place, there must be proper carbon capture and storage systems in place, which require funds for development.

Job losses will occur as a result of the new approach to promote environmentally friendly technologies. These losses will affect the economy, but at the same time, the clean energy approach will require new sets of skills to be developed, which might take time to accomplish because of the technical expertise required to ensure that there is compliance with applicable laws and regulations.

There are various bodies that are affected by climate change in terms of the operations required to even to the extent of existence. There are different government institutions that are in effect operating in separate silos of information; therefore, synergy should be developed between these entities in order to ensure that they make collaborative efforts to curb harm to the environment. Furthermore, the environmental levies that are put in place need to be centralised in order to promote efficiency and reduce the administrative burden required for giving effect to these levies. Automation and integration between these entities would assist to ease the regulation and administration of the levies.

Consideration should be given to the changes made in other countries for the reduction of carbon emissions.

This study has reviewed and given consideration to the accounting treatment and the basis of accounting that might be affected by environmental levies. There is a need for emphasis to be given to the disclosure and the risk management aspects that are affected as a result of climate change. The accounting and auditing professions must be involved in order to ensure that all organisations play their roles in promoting the protection of the environment.

The new South African carbon tax is an extremely technical tax, as it involves different disciplines at the different levels of determination. It involves legal expertise, finance expertise, engineering expertise and environmental expertise, which means that these disciplines need to work closely together in order to ensure that the carbon tax paid is correct, accurate and is paid on time. Considering its technicality, the carbon tax should to be a subject of interest at schools, and it should form part of the curriculum at all levels, especially for finance at under-graduate and post-graduate levels in order to sharpen the skill as well as the ensure out put on the skill sets for the carbon tax. Less emphasis has been placed on Customs and Excise as a component in the syllabus, although emphasis is placed on the other aspects of taxes. This omission should be reconsidered, since the new carbon tax is administered under the Customs and Excise Act.

REFERENCES

Ratshomo, K. & Nembahe, N., 2019. *THE SOUTH AFRICAN ENERGY SECTOR REPORT: DIRECTORATE: ENERGY DATA COLLECTION, MANAGEMENT AND ANALYSIS,* Pretoria: Department of Energy.

Selin, N. E., 2019. *Carbon Sequestration Encyclopedia Britannica.* [Online] Available at: https://www.britannica.com/technology/carbon-sequestration [Accessed 08 November 2021].

Shruti , M., 2021. *Climate change: What emission cuts has India promised?.* [Online] Available at: https://www.bbc.com/news/world-asia-india-58922398#:~:text=India%20has%20also%20abstained%20from,India%20is%20a%20major%20emitter. [Accessed 17 April 2022].

AccountingTools Accounting CPE Courses & Books, 2022. *The going concern principle.* [Online] Available at: https://www.accountingtools.com/articles/the-going-concern-principle [Accessed 18 May 2022].

Africa Check, 2021. *South Africa the 12th biggest source of greenhouse gases? Yes, but that's not the only measure that matters.* [Online] Available at: https://polity.org.za/article/south-africa-the-12th-biggest-source-of-greenhouse-gases-yes-but-thats-not-the-only-measure-that-matters-2021-04-19 [Accessed 14 May 2022].

Anderson, N., 2019. *IFRS® Standards and climate-related disclosures.* [Online] Available at: https://cdn.ifrs.org/-/media/feature/news/2019/november/in-brief-climate-change-nick-anderson.pdf?la=en%0D [Accessed 28 February 2021].

Anon., n.d. [Online]
Available at: https://worldpopulationreview.com/country-rankings/greenhouse-gas-emissions-by-country

BBC News , 2021. *Climate change: What emission cuts has India promised?.* [Online]
Available at: https://www.bbc.com/news/world-asia-india-58922398#:~:text=India%20has%20also%20abstained%20from,India%20is%20a%20major%20emitter
[Accessed 12 May 2022].

BBC News, 2021. *Why China's climate policy matters to us all.* [Online]
Available at: https://www.bbc.com/news/world-asia-china-57483492
[Accessed 23 April 2022].

BBC South Asia Correspondent , 2021. *Climate change: Why India can't live without coa.* [Online]
Available at: https://www.bbc.com/news/world-asia-india-58706229
[Accessed 12 May 2022].

Bhandari, P., 2022. *Scribbr.* [Online]
Available at: https://www.scribbr.com/methodology/qualitative-research/
[Accessed 20 March 2022].

Brink, J., 2019. *Increasing focus on environmental taxes in South Africa.* [Online]
Available at: https://www.golegal.co.za/environmentally-related-taxes/
[Accessed 29 August 2019].

Bureau of Energy Effeciency , n.d. *ESCerts Trading.* [Online]
Available at: https://beeindia.gov.in/content/escerts-trading#:~:text=Perform%2C%20Achieve%20and%20Trade%20is,sectors%20across%20the%20PAN%20India.
[Accessed 11 May 2022].

Carbon Tax Centre, n.d. *Cap and Trade.* [Online]
Available at: https://www.carbontax.org/carbon-tax-vs-the-alternatives/cap-

and-trade/
[Accessed 07 May 2022].

Center for Climate and Energy Solutions , n.d. *Cap and Trade Basics.* [Online]
Available at: https://www.c2es.org/content/cap-and-trade-basics/#:~:text=In%20a%20cap-and-trade%20system%2C%20the%20government%20sets%20an,allowances%2C%20and%20this%20market%20establishes%20an%20emissions%20price.?msclkid=924783bcc85811ec9f149a3547e0f9db
[Accessed 2 May 2022].

Central Energy Fund, n.d. *Central Energy Fund.* [Online]
Available at: https://nationalgovernment.co.za/units/view/81/central-energy-fund-soc-ltd-cef
[Accessed 27 November 2021].

Cliffe Dekker Hofmeyr, 2019. *TAX & EXCHANGE CONTROL ALERT.* [Online]
Available at: https://www.cliffedekkerhofmeyr.com/export/sites/cdh/en/news/publications/2019/Tax/downloads/Tax-Exchange-Control-Alert-17-May-2019.pdf
[Accessed 30 November 2021].

CNG Holings , n.d. *Public Transport: Buses running on CNG.* [Online]
Available at: https://cngholdings.co.za/elementor-671/
[Accessed 08 October 2021].

Daily Maverick, 2021. *South Africa takes bolder steps to reduce emissions — but are they enough?.* [Online]
Available at: https://www.dailymaverick.co.za/article/2021-09-29-south-africa-takes-bolder-steps-to-reduce-emissions-but-are-they-enough/
[Accessed 16 May 2022].

Daniels, L., 2021. *Business Insider SA : Petrol prices in South Africa are at an all-time high – and taxes siphon 65% from every litre sold.* [Online]
Available at: https://www.businessinsider.co.za/petrol-prices-in-south-africa-

are-at-an-all-time-high-and-taxes-siphon-65-from-every-litre-sold-2021-4
[Accessed 17 October 2021].

Deloitte, 2021. *India's turning point.* [Online]
Available at: https://www2.deloitte.com/in/en/pages/about-deloitte/articles/turning-point-press-release.html
[Accessed 12 May 2022].

Delotte IAS Plus, n.d. *Deloitte IAS Plus.* [Online]
Available at: https://www.iasplus.com/en/standards/ias/ias36
[Accessed 20 September 2021].

Department of Environmental Affairs, 2011. *National climate change response white paper,* Pretoria: Department of Environmental Affairs.

Department of Environmental Affairs, 2016. *South Africa joins Nations of the World in ratifying the Paris Agreement on Climate Change.* [Online]
Available at: https://www.environment.gov.za/mediarelease/southafrica_ratifies_parisagreement
[Accessed 30 August 2019].

Department of Environmental Affairs, 2017. *Department of Environmental Affairs.* [Online]
Available at: https://www.environment.gov.za/sites/default/files/legislations/technicalguidelinesformrvofemissionsbyindustry_0.pdf
[Accessed 30 October 2021:9].

Department of Environmental Affairs, 2017. *NATIONAL GREENHOUSE GAS EMISSION REPORTING REGULATIONS.* [Online]
Available at: https://www.environment.gov.za/sites/default/files/legislations/nemaqa39of2004_nationalgreenhousegasemissionreporting_gn40762_0.pdf
[Accessed 23 October 2021].

Department of Environmental Affairs, 2017. *Technical Guidelines for Monitoring Reporting and Verifiacation of Greenhouse Gas Emissions by Industry.* [Online]
Available at: https://www.environment.gov.za/sites/default/files/legislations/technicalguidelinesformrvofemissionsbyindustry_0.pdf
[Accessed 06 November 2021: 13].

Department of Environmental Affairs, 2017. *Technical Guidelines for Monitoring, Reporting and Verification.* [Online]
Available at: https://www.environment.gov.za/sites/default/files/legislations/technicalguidelinesformrvofemissionsbyindustry_0.pdf
[Accessed 06 November 2021:26].

Department of Fisheries, Forestry and Environment , n.d. *Department of Fisheries, Forestry and Environment : Overview.* [Online]
Available at: https://nationalgovernment.co.za/units/view/15/department-of-forestry-fisheries-and-the-environment-dffe
[Accessed 27 November 2021].

Department of Forestry, Fisheries and the Environment, 2021. *Department of Forestry, Fisheries and the Environment.* [Online]
Available at: https://www.environment.gov.za/services/public
[Accessed 26 September 2021].

Department of Mineral Resources and Energy, n.d. *Department of Mineral Resources and Energy.* [Online]
Available at: https://www.dmr.gov.za/about-dmr/overview
[Accessed 27 November 2021].

Department of Minerals and Energy, 2007. *Piped Gas Regulations ,* s.l.: Staatskoerant.

Department of Transport , n.d. *DEVELOPING VEHICLE FUEL ECONOMY STANDARDS FOR SOUTH AFRICAN PASSENGER VEHICLES.* [Online]

Available at:
https://wedocs.unep.org/bitstream/handle/20.500.11822/25187/DevelopingVehicleFuelEconomyStandards_SouthAfrican.pdf?sequence=6&isA
[Accessed 2 October 2021].

Depatment of Environmental Affairs, 2017. *Technical Guidelines for Monitoring, Verification, Reporting and Measuring.* [Online]
Available at:
https://www.environment.gov.za/sites/default/files/legislations/technicalguidelinesformrvofemissionsbyindustry_0.pdf
[Accessed 06 November 2021:26].

Diffen, n.d. *Fluorescent (CFL) vs. Incandescent Bulbs.* [Online]
Available at:
https://www.diffen.com/difference/Fluorescent_Bulbs_vs_Incandescent_Bulbs
[Accessed 11 June 2022].

Dikgang, J., Leiman, A. & Visser, M., 2010. *ANALYSIS OF THE PLASTIC-BAG LEVY IN SOUTH AFRICA.* [Online]
Available at:
https://www.econrsa.org/system/files/publications/policy_papers/pp18.pdf
[Accessed 30 September 2021].

Engineering News, 2015. *Engineering News: Environmental levies – fiscal or behavioural intent?.* [Online]
Available at: https://www.engineeringnews.co.za/article/environmental-levies-fiscal-or-behavioural-intent-2015-05-22
[Accessed 17 August 2020].

Enivironmental Defense Fund, n.d. *California leads fight to curb climate change.* [Online]
Available at: California leads fight to curb climate change
[Accessed 10 May 2022].

Environmental Defense Fund, n.d. *How cap and trade works.* [Online]
Available at: https://www.edf.org/climate/how-cap-and-trade-works
[Accessed 07 May 2022].

Environmental Technology , 2020. *Environmental Technology.* [Online]
Available at: https://www.envirotech-online.com/news/air-monitoring/6/breaking-news/what-are-environmental-taxes/34066
[Accessed 08 May 2020].

Environment, n.d. *The Effects of Plastic Bags on The Environment.* [Online]
Available at: https://www.environment.co.za/pollution/the-effects-of-plastic-bags-on-environment.html
[Accessed 08 October 2021].

Environtech Online, 2015. *What are Environmental Taxes?.* [Online]
Available at: https://www.envirotech-online.com/news/air-monitoring/6/breaking-news/what-are-environmental-taxes/34066#:~:text=Environmental%20taxes%2C%20also%20known%20as,cause%20damage%20to%20the%20environment.
[Accessed 11 June 2022].

Eskom , 2021. *Multi-Year Price Determination 5 Revenue Application for FY2023 to 2025,* Pretoria: NERSA.

Eskom, 2021. *Eskom Integrated Report 2021,* Johannesburg: Eskom.

Funke, F. & Mattauch, L., 2018. *Why is carbon pricing in some countries more successful than in others?,* Oxford: World in Data.

Gcuka, O., 2021. *SA will not sign COP26 parallel pledge to move away from coal, says Environment Minister Creecy.* [Online]
Available at: https://www.dailymaverick.co.za/article/2021-11-09-sa-will-not-sign-cop26-parallel-pledge-to-move-away-from-coal-says-environment-minister-creecy/
[Accessed 27 November 2021].

Gilder , A., Rumble, O. & Parker, M., 2020. Allowances and deductions. In: L. Nexis, ed. *Concise Guide to Carbon Tax.* Johamesburg: Lexis Nexis, pp. 47 - 64.

Gilder, A., Rumble , O. & Parker, M., 2020. Identifying the person conducting the activity. In: LexisNexis, ed. *Concise Guide to Carbon Tax.* Johannesburg: LexisNexis, p. 27.

Gilder, A., Rumble , O. & Parker, M., 2020. Tax Base. In: *Concise Guide to Carbon Tax .* s.l.:s.n., pp. 106 -107.

Gilder, A., Rumble, O. & Parker, M., 2020. Administration of Carbon Tax. In: L. Nexis, ed. *Consice Guide to Carbon Tax.* Johanneburg: Lexis Nexis, p. 71 to 81.

Gilder, A., Rumble, O. & Parker, M., 2020. Administration of the carbon tax. In: L. Nexis, ed. *Concisce Guide to Carbon Tax.* Johannesburg : Lexis Nexis , p. 65 to 71.

Gilder, A., Rumble, O. & Parker, M., 2020. Allowances and Deductions . In: LexisNexis, ed. *Consice Guide to Carbon Tax.* s.l.:LexisNexis, pp. 52 - 53.

Gilder, A., Rumble, O. & Parker, M., 2020. Carbon Tax Resgime. In: LexisNexis, ed. *Concise Guide to CARBON TAX.* Johannesburg: LexisNexis, p. 1.

Gilder, A., Rumble, O. & Parker, M., 2020. Identifying the activity. In: LexisNexis, ed. *Concise Guide to Carbon Tax.* Johannesburg: LexisNexis, p. 24.

Gilder, A., Rumble, O. & Parker, M., 2020. Identifying the person conducting the activity. In: NexisNexis, ed. *Consice Guide to Carbon Tax.* Johannerburg: LexisNexis, p. 27.

Gilder, A., Rumble, O. & Parker, M., 2020. Is the activity above or equal to the above applicable taxf-free threshold?. In: LexisNexis, ed. *Concise Guide to Carbon Tax.* Johannesburg: LexisNexis, p. 25.

Gilder, A., Rumble, O. & Parker, M., 2020. South Africas Post - 2020 Mitigation System. In: L. Nexis, ed. *Concise Guide to Carbon Tax .* Johhanesburg : Lexis Nexis , p. 9 to 11.

Gilder, A., Rumble, O. & Parker, M., 2020. Tax Base. In: LexisNexis, ed. *Concise Guide to Carbon Tax.* Johannesburg: LexisNexis, p. 28 and 29.

Government Gazette Republic of South Africa, 2020. *National Treasury.* [Online] Available at: http://www.treasury.gov.za/legislation/tax%20acts%20and%20bills/CarbonTaxRegulations/Annex%20B%20Trade%20Exposure%20Allowance%20Regulations%2019%20June%202020.pdf [Accessed 04 December 2021].

Government Gazette Republic of South Africa, 2020. *South African Government : Taxation Law Amendment.* [Online] Available at: https://www.gov.za/sites/default/files/gcis_document/202001/42951gon21taxationlawsamendmentact34of2019.pdf [Accessed 04 December 2021: 96-111].

Government Gazette, 2019: 5,10,15,25. *Carbon Tax Act 2019.* Cape Town: Government Printing Works.

Government Gazette, 2019:14,16,18. *Carbon Tax Act 2019.* Cape Town: Government Printing Works.

Government Gazette, 2019:8&12. *Carbon Tax Act 2019.* 2019: Government Printing Works.

Green Building Africa, 2021. *Sasol ups its carbon emissions reduction targets in SA to 30% by 2030.* [Online] Available at: https://www.greenbuildingafrica.co.za/sasol-ups-its-carbon-emissions-reduction-targets-in-sa-to-30/ [Accessed 26 September 2021].

Halmos, G., 2019. *The financial impact of climate change on the IFRS financial statements.* [Online] Available at: https://www.linkedin.com/pulse/financial-impact-climate-change-

ifrs-statements-gabor-halmosi
[Accessed 28 February 2021].

IEA, 2021. *India Energy Outlook 2021.* [Online]
Available at: https://www.iea.org/reports/india-energy-outlook-2021?msclkid=456d7d28d11211ec99315e0ed4840154
[Accessed 11 May 2022].

IFRS Foundation , 2021: A1128. *IAS 16 Property Plant and Equipment.* [Online]
Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-16-property-plant-and-equipment.html/content/dam/ifrs/publications/html-standards/english/2021/issued/ias16/
[Accessed 05 May 2021].

IFRS Foundation , 2021: A1469. *IAS 37 Provisions, Contingent Liabilities and Contingent Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-37-provisions-contingent-liabilities-and-contingent-assets.pdf
[Accessed 26 September 2021].

IFRS Foundation , 2021: A1508 - A1509. *IAS 38 Intangible Asset.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf
[Accessed 05 September 2021].

IFRS Foundation , 2021: A1512. *IAS 38 Intangible Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf
[Accessed 05 September 2021].

IFRS Foundation , 2021: A1513. *IAS 38 Intangible Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf
[Accessed 05 September 2021].

IFRS Foundation , 2021: A284. *International Financial Reporting Standard 7 Financial Instruments: Disclosures.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ifrs-7-financial-instruments-disclosures.pdf
[Accessed 26 September 2021].

IFRS Foundation , 2021: A370. *IFRS 9 Financial Instruments.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ifrs-9-financial-instruments.pdf
[Accessed 2021 September 2021].

IFRS Foundation , 2021: A382 - 383. *IFRS 9 Financial Instruments.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ifrs-9-financial-instruments.pdf
[Accessed 26 September 2021].

IFRS Foundation , 2021: A688. *International Financial Reporting Standard 13 Fair Value Measurement.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ifrs-13-fair-value-measurement.pdf
[Accessed 28 September 2021].

IFRS Foundation , 2021: A941. *IFRS Org:.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS1.pdf
[Accessed 21 March 2021].

IFRS Foundation , 2021: A986. *IAS 2 Inventories.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS2.pdf
[Accessed 03 April 2021].

IFRS Foundation , 2021:1421. *IAS 36 Impairment of assetss.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 06 September 2021].

IFRS Foundation , 2021:1423. *IAS 36 Impairment of assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 08 September 2021].

IFRS Foundation , 2021:A1129. *IAS 16 Property Plant and Equipment.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-16-property-plant-and-equipment.pdf
[Accessed 5 May 2021].

IFRS Foundation , 2021:A1426. *IAS 36 Impairment of assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 20 September 2021].

IFRS Foundation , 2021:A1483. *IAS 37 Provisions, Contingent Liabilities and Continget Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-37-provisions-contingent-liabilities-and-contingent-assets.pdf
[Accessed 26 September 2021].

IFRS Foundation , 2021:A1493. *IAS 38 Intangible Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf
[Accessed 4 September 2021].

IFRS Foundation , 2021:A1510. *IAS 38 Intangible Asset.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf
[Accessed 05 September 2021].

IFRS Foundation , 2021:A985. *IAS 2 Inventories.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS2.pdf
[Accessed 03 April 2021].

IFRS Foundation , 2021:A988. *IAS 2 Inventories.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS2.pdf
[Accessed 03 April 2021].

IFRS Foundation , 2021:A989. *IAS 2 Inventories.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS2.pdf
[Accessed 03 April 2021].

IFRS Foundation , 2021; A1493. *IAS 38 Intangible Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf
[Accessed 04 September 2021].

IFRS Foundation, 2021: A1097. *IAS 12 Income Taxes.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-12-income-taxes.pdf
[Accessed 4 May 2021].

IFRS Foundation, 2021: A1130. *IAS 16 Property Plant and Equipment.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-16-property-plant-and-equipment.pdf
[Accessed 5 May 2021].

IFRS Foundation, 2021: A1425. *IAS 36 Impairment of assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 20 September 2021].

IFRS Foundation, 2021: A939. *IFRS Org : IAS 1 Presentation of Financial Statements.* [Online]
Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-1-presentation-of-financial-statements/
[Accessed 05 March 2021].

IFRS Foundation, 2021: A939. *IFRS Org: IAS 1 Presentation of Financial Statements.* [Online]

Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-1-presentation-of-financial-statements/
[Accessed 20 March 2021].

IFRS Foundation, 2021: A939. *IFRS Org: IAS 1 Presentation of Financial Statements.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS1.pdf
[Accessed 21 March 2021].

IFRS Foundation, 2021: A969. *IFRS Org: IAS1 Presentation of Financial Statements.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS1.pdf
[Accessed 21 March 2021].

IFRS Foundation, 2021: A970. *IFRS Org: IAS1 Presentation of Financial Statements.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS1.pdf
[Accessed 21 March 2021].

IFRS Foundation, 2021:1422-1423. *IAS 36 Impairment of assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 08 September 2021].

IFRS Foundation, 2021:1423. *IAS 36 Impairment of assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 07 September 2021].

IFRS Foundation, 2021:A1088. *IAS 12 Income Taxes.* [Online]
Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-12-income-taxes.html/content/dam/ifrs/publications/html-standards/english/2021/issued/ias12/
[Accessed 04 May 2021].

IFRS Foundation, 2021:A1101. *IAS 12 Income Taxes.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-12-income-taxes.pdf
[Accessed 5 May 2021].

IFRS Foundation, 2021:A1109. *IAS 12 Income Taxes.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-12-income-taxes.pdf
[Accessed 5 May 2021].

IFRS Foundation, 2021:A1138. *IAS 16 Property Plant and Equipment.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-16-property-plant-and-equipment.pdf
[Accessed 5 May 2021].

IFRS Foundation, 2021:A1419. *IAS 36 Impairment of Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 05 September 2021].

IFRS Foundation, 2021:A1468. *IAS 37 Provisions, Contingent Liabilities and Contingent Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-37-provisions-contingent-liabilities-and-contingent-assets.pdf
[Accessed 26 September 2021].

IFRS Foundation, 2021:A1491. *IAS 38 Intangible Assets.* [Online]
Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-38-intangible-assets.html/content/dam/ifrs/publications/html-standards/english/2021/issued/ias38/
[Accessed 14 May 2021].

IFRS Foundation, 2021:A1508. *IAS 38 Intangible Assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-

standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf
[Accessed 04 September 2021].

IFRS Foundation, 2021:A940. *IFRS Org: IAS 1 Presentation of Financial Statements.* [Online]
Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-1-presentation-of-financial-statements/
http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS1.pdf
[Accessed 21 March 2021].

IFRS Foundation, 2021:A947. *IFRS Org: IAS 1 Presentation of Financial Statements.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS1.pdf
[Accessed 21 March 2021].

IFRS Foundation, 2021:A984. *IAS 2 Inventories.* [Online]
Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-2-inventories/
[Accessed 03 April 2021].

IFRS Foundation, 2021:A987. *IAS 2 Inventories.* [Online]
Available at: http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS2.pdf
[Accessed 03 April 2021].

IFRS Foundation, 2021; 1422. *IAS 36 Impairment of assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 06 September 2021].

IFRS Foundation, 2021. *IAS 2 Inventories.* [Online]
Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-2-inventories/
[Accessed 03 April 2021].

IFRS Organisation , 2021: 1422-1423. *IAS 36 Impairment of assets.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-

standards/english/2021/issued/part-a/ias-36-impairment-of-assets.pdf
[Accessed 06 September 2021].

IFRS organisation , 2021. *IAS 16 Property Plant and Equipment.* [Online]
Available at: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-16-property-plant-and-equipment.pdf
[Accessed 5 May 2021].

International Energy Agency, 2020. *China's Emissions Trading,* France: International Energy Agency.

International Energy Agency, 2020. *China's Emissions Trading Scheme.* [Online]
Available at: https://www.iea.org/reports/chinas-emissions-trading-scheme?msclkid=96fb731dc64a11ec903b6902ecc5e573
[Accessed 4 May 2022].

Legg, T., 2019. *The Carbon Report.* [Online]
Available at: https://www.thecarbonreport.co.za/the-proposed-south-african-carbon-tax/
[Accessed 20 August 2019].

Linnenluecke, M. K., Birt, J. & Griffiths, A., 2015. *The role of accounting in supporting adaptation to,* Australia: s.n.

M Moyo, H. W., 2015. AN ASSESSMENT OF THE IMPACT OF CLIMATE CHANGE ON THE FINANCIAL PERFORMANCE OF SOUTH AFRICAN COMPANIES. *Journal of Governance and Regulation ,* 4(2), p. 52.

Magubane, K., 2021. *Fin 24.* [Online]
Available at: https://www.news24.com/fin24/economy/record-fuel-price-increase-announced-ahead-of-long-weekend-20210401
[Accessed 17 October 2021].

Maizland, L., 2021. *Global Climate Agreements: Successes and Failures.* [Online]
Available at: https://www.cfr.org/backgrounder/paris-global-climate-change-agreements
[Accessed 27 November 2021].

Mandy, K., n.d. *Eco- Taxes.* [Online]
Available at: http://enviropaedia.com/topic/default.php?topic_id=76
[Accessed 30 August 2019].

Mckinsey & Company, 2022. *Mckinsey Sustainability.* [Online]
Available at: https://www.mckinsey.com/business-functions/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring#
[Accessed 25 March 2022].

NASA, 2019. *Human Activity in China and India Dominates the Greening of Earth, NASA Study Shows.* [Online]
Available at: https://www.nasa.gov/feature/ames/human-activity-in-china-and-india-dominates-the-greening-of-earth-nasa-study-shows
[Accessed 27 April 2022].

NASA, 2019. *NASA Global Climate Change: Vital Signs of the Planet.* [Online]
Available at: https://climate.nasa.gov/causes/
[Accessed 30 August 2019 2019].

National Economic Development and Labour Council , 2021. *National Economic Development and Labour Council.* [Online]
Available at: https://nedlac.org.za/#
[Accessed 30 November 2021].

National Energy Regulator of South Africa, 2015. *Tariff Methodology for Setting of Pipeline Tariffs in Petroleum Pipelines Industry,* Pretoria: NERSA.

National Energy Regulator of South Africa, 2017. *Guildelines for Monitoring and Approving Pipe-Gas Transmission and Storage in South Africa ,* Pretoria: National Energy Regulator of South Africa .

National Energy Regulator of South Africa, 2017. *TARIFF METHODOLOGY FOR THE APPROVAL OF TARIFFS FOR PETROLEUM LOADING AND PETROLEUM STORAGE,* Pretoria: NERSA.

National Energy Regulator of South Africa, 2020. *Methodology to Approve Maximum Prices of Piped-Gas in South Africa,* Pretoria: National Energy Regulator of South Africa.

National Energy Regulator of South Africa, n.d. *Multi-year Price Determination (MYPD) Methodology,* Pretoria: NERSA.

National Energy Regulator of South Africa, n.d. *National Energy Regulator of South Africa.* [Online]
Available at: https://www.nersa.org.za/our-profile/
[Accessed 27 November 2021].

National Geographic, 2019. *Tires: The plastic polluter you never thought about.* [Online]
Available at: https://www.nationalgeographic.com/environment/article/tires-unseen-plastic-polluter
[Accessed 08 October 2021].

National Government of South Africa, 2021. *Rooad Accident Fund.* [Online]
Available at: https://nationalgovernment.co.za/units/financial/152/road-accident-fund-raf
[Accessed 28 May 2022].

National Treasury, Deputy Minister of Finance Dr David Masondo, 2016:6. *Speech by Deputy Minister Of Finance Dr David Masondo 2019 Tax Indaba.* [Online]
Available at:
http://www.treasury.gov.za/comm_media/speeches/2019/Deputy%20Minister's%20speech%20at%20the%20Tax%20Indaba.pdf
[Accessed 30 August 2019].

National Treasury, 2013:7. *National Treasury Carbon Tax.* [Online]
Available at:
http://www.treasury.gov.za/public%20comments/carbon%20tax%20policy%20paper%202013.pdf
[Accessed 30 August 2019].

National Treasury, 2019. *Budget Reveiw 2019, Chapter 4, Revenue Trends and Tax Proposals,* Pretoria: National Treasury.

National Treasury, 2019. *National Treasury.* [Online]
Available at:
http://www.treasury.gov.za/public%20comments/2019BTDraftBills/2019%20Draft%20Explanatory%20Memorandum%20to%20the%202019%20Draft%20TLAB%20-%2021%20July%202019.pdf
[Accessed 06 November 2020].

National Treasury, 2020. *National Treausury: Tax Amendments.* [Online]
Available at:
https://www.gov.za/sites/default/files/gcis_document/202101/4408320-1taxationlawsamendmentact23of2020.pdf
[Accessed 08 November 2021].

National Treasury, n.d. *National Treasury: Mandate.* [Online]
Available at: http://www.treasury.gov.za/ministry/info.aspx
[Accessed 27 November 2021].

Nick , A., 2020. *Effects of climate-related matters on financial statements.* [Online]
Available at: https://www.ifrs.org/-/media/feature/supporting-implementation/documents/effects-of-climate-related-matters-on-financial-statements
[Accessed 28 February 2021].

OECD, 2021. *Carbon pricing in times of COVID-19: What has changed in G20 economies? Background Notes.* [Online]
Available at: https://www.oecd.org/tax/tax-policy/carbon-pricing-background-notes.pdf
[Accessed 29 April 2022].

Organisaion for Economic Co-operation and Development, 2011. *Environmental Taxation: A Guide for Policy Makers.* [Online]
Available at: http://www.oecd.org/env/tools-evaluation/48164926.pdf
[Accessed 30 August 2019].

Organisation for Economic Co-operation and Development, 2011. *Environmental Taxation.* [Online]
Available at: http://www.oecd.org/env/tools-evaluation/48164926.pdf
[Accessed 08 May 2020].

Organisation for Economic Co-operation Development, 2011:1. *Environmental Taxation.* [Online]
Available at: http://www.oecd.org/env/tools-evaluation/48164926.pdf
[Accessed 14 May 2020].

Organisation Undoing Tax Abuse, 2019. *Enviro taxes must bring real change.* [Online]
Available at: https://outa.co.za/blog/newsroom-1/post/enviro-taxes-must-bring-real-change-165#blog_content
[Accessed 24 March 2022].

Orgnisation Outdoing Tax Abuse, 2021. *Government's unsustainable fuel related levies and taxes.* [Online]
Available at: https://outa.co.za/blog/newsroom-1/post/enviro-taxes-must-bring-real-change-165#blog_conten
[Accessed 28 May 2022].

PK A/C Take a Lead, n.d. *PK A/C Take a lead.* [Online]
Available at: https://pakaccountants.com/courses/non-current-assets/revision-of-depreciation-estimates/
[Accessed 06 May 2021].

Posada, F., 2017. *SOUTH AFRICA'S NEW PASSENGER VEHICLE CO2 EMISSIONS BASELINE ANALYSIS.* [Online]
Available at: https://www.globalfueleconomy.org/media/461030/africa_icct-sa-fe-baseline-report_final.pdf
[Accessed 30 September 2021].

Road Accident Fund, 2019/20. *Road Accident Fund Annual Report,* Pretoria: Road Accident Fund.

Road Accident Fund, n.d. *Road Accident Fund: Fuel Levy.* [Online]
Available at: https://www.raf.co.za/About-Us/Pages/Fuel-Levy.aspx
[Accessed 21 November 2021].

Road Accident Fund, n.d. *Road Accident Fund: Profile.* [Online]
Available at: https://www.raf.co.za/Pages/Default.aspx
[Accessed 21 November 2021].

SARS, 2019. *Electric Filament lamps.* [Online]
Available at: https://www.sars.gov.za/customs-and-excise/excise/environmental-levy-products/electric-filament-lamps/
[Accessed 30 August 2019].

SARS, 2019. *Electricity Generation.* [Online]
Available at: https://www.sars.gov.za/customs-and-excise/excise/environmental-levy-products/electricity-generation/
[Accessed 30 August 2019].

SARS, 2019. *Motor vehicle CO2 emission.* [Online]
Available at: https://www.sars.gov.za/customs-and-excise/excise/environmental-levy-products/motor-vehicle-co2-emission/
[Accessed 30 August 2019].

SARS, 2019. *Plastic Bags.* [Online]
Available at: https://www.sars.gov.za/customs-and-excise/excise/environmental-levy-products/plastic-bags/
[Accessed 30 August 2019].

SARS, 2019. *Tyres.* [Online]
Available at: https://www.sars.gov.za/customs-and-excise/excise/environmental-levy-products/tyres/
[Accessed 30 August 2019].

South Afican Revenue Services, 2022. *Environmental Levy Products & Sugar Beverage Levy.* [Online]
Available at: https://www.sars.gov.za/wp-

content/uploads/Docs/Excise/Environmental-Levy-products-SBL.pptx
[Accessed 22 March 2022].

South African Government , 2019. *Treasury on Gazetting of Carbon Offsets Regulations in terms of the Carbon Tax Act and related draft regulations for public comment.* [Online]
Available at: https://www.gov.za/speeches/treasury-gazetting-carbon-offsets-regulations-terms-carbon-tax-act-and-related-draft#
[Accessed 28 February 2021].

South African Government, 2019. *www.gov.za.* [Online]
Available at: https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000
[Accessed 30 August 2019].

South African Government, 2019. *www.gov.za.* [Online]
Available at: https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000
[Accessed 30 August 2019].

South African Institute of Professional Accountants, 2021. *South African Institute of Professional Accountant - Tax Guide.* [Online]
Available at: https://www.saipa.co.za/wp-content/uploads/2021/03/SAIPA-2021-Tax-Guide.pdf
[Accessed 26 May 2022].

South African News Agency, 2019. *Climate change bill being debated at Nedlac.* [Online]
Available at: https://www.sanews.gov.za/south-africa/climate-change-bill-being-debated-nedlac
[Accessed 30 November 2021].

South African Revenue Services, 2021. *Environmental Levy Products.* [Online]
Available at: https://www.sars.gov.za/customs-and-excise/excise/environmental-levy-products/
[Accessed 28 November 2021].

South African Revenue Services, 2021. *South African Revenue Services: About SARS.* [Online]
Available at: https://www.sars.gov.za/about/
[Accessed 28 November 2021].

South African Revenue Services, 2021. *South African Revenue Services: Annual Report,* Pretoria: South African Revenue Services.

South African Revenue Services, 2021. *South African Revenue Services: Customs and Excis.* [Online]
Available at: https://www.sars.gov.za/customs-and-excise/excise/
[Accessed 28 November 2021].

South African Revenue Services, 2021. *Types of Tax.* [Online]
Available at: https://www.sars.gov.za/types-of-tax/
[Accessed 28 November 2021].

Stiglingh, M. et al., 2019. Additional deduction for roads and fences used in respect of the production of renewable energy. In: M. Jonck, ed. *Silke: South African Income Tax.* s.l.:LexisNexis, p. 417 to418.

Stiglingh, M. et al., 2019. Enironmental Expenditure S 37 B. In: M. Jonck, ed. *Silke: South African Income Tax.* s.l.:LexisNexis, pp. 418 - 419.

Stiglingh, M. et al., 2019. Movable assets used in farming or production of renewable energy(s12B). In: M. Jonck, ed. *Silke:South African Income Tax.* s.l.:LexisNexis, p. 353 to 354.

Stiglingh, M. et al., 2019. Pipelines, transmission lines and railway lines s12D. In: M. Jonck, ed. *Silke: South African Income Tax.* s.l.:LexisNexis, pp. 377 - 379.

Stiglingh, M., Koekemoer, A., Wilcocks, J. S. & van der Zwan, P., 2019. Deductions in respect of improvments not owned by the tax payer s12N. In: M. Jonck, ed. *Silke: South African Income Tax.* s.l.:LexisNexis, pp. 395 - 397.

Stiglingh, M., van Heerden, L., Wilcocks, J. S. & van der Zwan, P., 2019. Energy effeciency savings deductions s12L. In: M. Jonck, ed. *Silke: South African Income Tax.* s.l.:LexisNexis, pp. 416 - 417.

Stiglingh, P. M. et al., 2019. *Silke: South African Income Tax.* 2019 ed. s.l.:Lexis Nexis.

The Conversation, 2021. *COP26: Strong carbon-trading rules could help the world avoid dangerous levels of global warming.* [Online]
Available at: https://theconversation.com/cop26-strong-carbon-trading-rules-could-help-the-world-avoid-dangerous-levels-of-global-warming-151172
[Accessed 23 April 2022].

The Economic Times , 2022. *India plans own uniform carbon trading market.* [Online]
Available at: https://economictimes.indiatimes.com/industry/renewables/india-plans-own-uniform-carbon-trading-market/articleshow/91082527.cms
[Accessed 11 May 2022].

The Nature Conservancy , 2022. *The Latest IPCC Report: What is it and why does it matter?.* [Online]
Available at: https://www.nature.org/en-us/what-we-do/our-insights/perspectives/ipcc-report-climate-change/
[Accessed 17 April 2022].

The Plasttic Soup Foundation, n.d. *Plastic production and decomposition.* [Online]
Available at: https://www.plasticsoupfoundation.org/en/plastic-problem/plastic-environment/plastic-production-decomposition/
[Accessed 11 June 2022].

Thomas, R., Graven, D. H., Hoskins , P. S. B. & Prentice , P. I. C., 2016. *Imperial London College.* [Online]
Available at: https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/Balancing-sources-and-sinks-of-greenhouse-gases-Grantham-BN3_web.pdf
[Accessed 11 April 2022].

United Nation Climate Change, 2021. *Advancing Electric Mobility in Africa.* [Online]
Available at: https://unfccc.int/news/advancing-electric-mobility-in-africa
[Accessed 08 October 2021].

United Nations Climate Change, n.d. *The Paris Agreement.* [Online]
Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement
[Accessed 30 August 2019].

United Nations, 1997. *Kyoto Protocol To The United Nations Framework Convention On Climate Change.* [Online]
Available at:
https://unfccc.int/sites/default/files/resource/docs/cop3/l07a01.pdf#page=24
[Accessed 30 October 2021].

Vidhi:Centre for Legal Policy Centre , 2021. *Carbon Tax – An Indian Perspective.* [Online]
Available at: https://vidhilegalpolicy.in/blog/carbon-tax-an-indian-perspective/
[Accessed 14 May 2022].

Wigley, T. M. L., 2021. *The relationship between net GHG emissions and radiative forcing with an application to Article 4.1 of the Paris Agreement..* [Online]
Available at: https://assets.researchsquare.com/files/rs-1022455/v1/e89c8db4-32ac-4f6f-a8f7-c29bc66aa8cd.pdf?c=1637131876
[Accessed 11 June 2022].

World in Data, 2019. *Climate Action - SDG Tracker.* [Online]
Available at: https://sdg-tracker.org/climate-change#targets
[Accessed 6 August 2019].

World Population Review, n.d. *Greenhouse Gas Emissions by Country 2022.* [Online]
Available at: https://worldpopulationreview.com/country-rankings/greenhouse-gas-emissions-by-country
[Accessed 23 April 2022].

World Rescource Institute, 2004. *World Resource Institute.* [Online]
Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf
[Accessed 05 November 2021].