THE USE OF TAX INCENTIVE MEASURES IN CONJUNCTION WITH CARBON TAXES TO REDUCE GREENHOUSE GAS EMISSIONS AND ACHIEVE ECONOMIC GROWTH: A COMPARATIVE STUDY WITH LESSONS FOR SOUTH AFRICA

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ABSTRACT

In 1997 industrialized nations, the Third Conference of the Parties to the United Nations Framework Convention on Climate Change, met in Kyoto, Japan to sign a treaty (the "Kyoto Protocol") in terms of which industrialized nations would be required to reduce their greenhouse gas emission by at least five percent below 1990 levels by the end of the "first commitment period" 2008-2012. South Africa is not regarded as an industrialized nation, but nonetheless acceded to the Kyoto Protocol in 2002. The literature reviewed in the present research reveals that, although idealistic, the Kyoto Protocol has been problematic. Fourteen meetings of the Conference of Parties to the Kyoto Protocol between 1997 and 2011 have achieved little more than to repeatedly defer and redefine Kyoto obligations.

This research was undertaken to document the existing environmental taxation policies employed in selected international jurisdictions with a view to providing a framework for environmental tax policy formation in South Africa to assist this country in meeting its "greenhouse gas" emission targets, while at the same time promoting economic growth. A doctrinal research methodology was adopted in this study as it mainly analysed and interpreted legislation and policy documents and therefore the approach was qualitative in nature.

An extensive literature survey was performed to document the various environmental policies that have been legislated in the selected jurisdictions. Comparisons were drawn with proposed tax policy measures for South Africa. The literature indicates that in the selected international jurisdictions carbon taxes achieved less-than-optimal results, largely due to political and industry-competitive agendas. With South Africa planning to introduce a carbon tax, it is submitted that the implementation of a carbon tax regime in isolation will be counter-productive, given South Africa's economic profile. On the basis of the literature reviewed, it was concluded that South Africa should consider "recycling" carbon tax revenues within the economy to fund a broad-based tax incentive regime that will stimulate the change to non-carbon energy whilst promoting growth through sustainable development.

Key words: carbon tax, tax incentives, greenhouse gas emissions, Kyoto Protocol, economic growth, substitution elasticity.

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CHAPTER 1: INTRODUCTION

1.1 CONTEXT OF THE RESEARCH

Global warming, the name given to climate change observations arising from increased concentrations of "greenhouse gases", has become a focal point of concern world-wide, being considered one of the greatest challenges facing human-kind environmentally, socially and economically. The first attempt by world nations to engage and consider the projected effects of global warming can be found in the 1972 United Nations Conference on the Human Environment where it was noted, *inter alia*, that:

> the natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate;
>
> the capacity of the earth to produce vital renewable resources must be maintained and, wherever practicable, restored or improved;
>
> the non-renewable resources of the Earth must be employed in such a way as to guard against the danger of their future exhaustion and to ensure that benefits from such employment are shared by all mankind;
>
> the discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems. The just struggle of the peoples of all countries against pollution should be supported;
>
> states shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea;
>
> (United Nations: 1972)

August 1965 saw the "Causes of Climate Change" conference in Boulder, Colorado. The scientific community at the time took little stock of this meeting, "but in retrospect it was a turning point" (Weart, 2003: 39). For post-depression America, "dirty skies meant jobs" (Weart, 2003: 40).

In July 1977, however, the New York Times (Sullivan, 1977: 45) carried the headline "Scientists Fear Heavy Use of Coal May Bring Adverse Shift in Climate". This did not go unnoticed by big business due to the negative impact it might have on the world's economies (Weart, 2003: 96).

1.1.1 The Causes and Effects of Global Warming

Debates about global warming have raged for over seventy years. It was stated in Time Magazine (1939: 27, in Weart (2003: 1)) that: "weather men have no doubt that the world at least for the time being is growing warmer". Stern (2007) alludes to many studies that identify the potential consequences of accelerated global warming as a result of greenhouse gas emissions. These include, but are not limited to:

- increased plant respiration leading to increased release of carbon dioxide (Friedlingstein, Cox, Betts, Bopp, von Bloh, Brovkin, Cadule, Doney, Eby, Fung, Bala, John, Jones, Joos, Kato, Kawamiya, Knorr, Lindsay, Matthews, Raddatz, Rayner, Reick, Roeckner, Schnitzler, Schnur, Strassman, Weaver, Yoshikawa & Zeng: 2006);
- weakening of the Earth's natural ocean-carbon sinks, leading to acidification of carbon dioxide-absorbing organisms (Orr, Fabry, Aumont, Bopp, Doney, Feely, Gnanadesikan, Gruber, Ishida, Fortunat, Key, Lindsay, Maier-Reimer, Matear, Monfray, Mouchet, Najjar, Plattner, Rogers, Sabine, Sarmiento, Schlitzer, Slater, Totterdell, Weirig, Yamanaka & Yool: 2005);
- loss of permafrost due to thawing (Lawrence & Slater: 2005);
- increased release of carbon dioxide and methane due to the drying of peat bogs and wetlands (Davidson & Janssens: 2006). Archer (2007: 1031) notes that hydrate reservoirs "[have] the potential to warm Earth's climate to . . . hothouse-type conditions, within a few years" ;
- should the water temperature increase at deep enough levels, the release of methane by the oceans would have an accelerating effect on global warming (Hadley Centre: 2005);
- warming will affect weather patterns, and could result in increased chances of excessive rainfall and/or drought (Stern: 2007);

Further studies predict the following:

- polar melting could cause sea levels to rise approximately five metres (Mercer: 1978, in Weart (2003));
- the chances of heat waves exceeding the European summer heat wave threshold of 2003 (considered perhaps the hottest European summer in 500 years) could double (Stott, Stone & Allen: 2004);
- increased friction across international borders could arise due to scarce resources and the increased incidence of disease (Bales & Duke: 2008);
- an increased incidence of kidney stone disease (American Urological Association: 2008);
- food shortages and lack of access to basic resources resulting from environmental changes may inhibit supplies of anti-retroviral and other medicines (Research Australia: 2008). This may accelerate the spread of the Human Immunodeficiency Virus (HIV), which causes Autoimmune Deficiency Syndrome (AIDS), and other diseases;
- an increase in the average global temperature may give rise to a "snowball effect" in that the Earth's natural reaction to an increase in temperature is increased water vapour (in itself a greenhouse gas), which will compound global warming (Intergovernmental Panel on Climate Change: 1990a).

1.1.2 First Attempts to Take Action

In 1992 the United Nations Conference on Environment and Development, or more commonly the "1992 Earth Summit" in Rio de Janeiro, revisited this issue with greater emphasis on the activities of Man and the concomitant effect on the environment. Amongst the foremost of issues discussed included rights to resources, safeguarding of the environment, development rights and sustainable development (Parson, Haas & Levy: 1992).

The Intergovernmental Panel on Climate Change was formed in 1988 as a scientific advisory body to "[assess] . . . climate science, impacts and response strategies" (Parson, *et. al.*, 1992: 12).

The mandate of the Intergovernmental Panel on Climate Change was to serve as a "pre-negotiation" platform for the Rio Convention, but it was the United Nations' Intergovernmental Negotiating Committee that ultimately tabled the recommendation that carbon dioxide emissions, considered the greatest contributor to global warming attributable to human activity, should be stabilized in a manner so as to "'prevent dangerous anthropogenic interference with the climate system . . . within a timeframe sufficient to allow ecosystems to adapt naturally'" (United Nations: 1992, in Parson, *et al.*: 1992: 13). This broad statement is embodied in Article 2 of the United Nations Framework Convention on Climate Change (United Nations: 1992).

Williams (2009) observes that the United Nations Framework Convention on Climate Change was established in order to implement the proposals of the First Assessment Report of the Intergovernmental Panel on Climate Change which, *inter alia*, calls for reduced greenhouse gas emissions and conversion to non-fossil fuel energy (Intergovernmental Panel on Climate Change: 1990b). The United Nations Framework Convention on Climate Change is a non-binding guide to address climate change and related issues, and has been agreed to by some 192 countries. In terms of the initial United Nations Framework Convention on Climate Change agreement, industrialized countries were required to reduce emissions of greenhouse gases to 1990 levels by the year 2000 (Williams: 2009).

It should be noted that, due to disagreements of the United States regarding scientific proof as to the connection between greenhouse gas emissions and climate change, no specific targets were set in terms of the Intergovernmental Negotiating Committee recommendation, but the resolution provided a proposal that could be signed and adopted at the Rio Convention (Parson, *et. al.*: 1992). Williams (2009) notes that it was only later in 1997 that the Third Conference of Parties to the United Nations Framework Convention on Climate Change established targets for greenhouse gas emission reductions in an agreement popularly termed "the Kyoto Protocol".

1.1.3 The Purposes of the Kyoto Protocol

The intended purposes of the Kyoto Protocol were to recall the original provisions of the United Nations Framework Convention on Climate Change and to set clear targets

for greenhouse gas emission reductions (United Nations, 1998a: 1). The specific objectives of the Kyoto Protocol are contained in Articles 2 and 3 of the Protocol.

The terms of Article 2 are fairly extensive, but generally require industrialised countries as listed in Annex I to the Kyoto Protocol ("Annex I countries") to institute, *inter alia*, policies for environmental reform, more specifically policies that will result in energy efficiency, create sustainable energy forms, improve waste management and reduce greenhouse gas emissions.

In terms of Article 3.1 of the Kyoto Protocol (United Nations: 1998a), industrialized countries committed to reduce their greenhouse gas emissions "by at least five percent below 1990 levels in the commitment period 2008 to 2012" (the "first commitment period") (Grubb, Vrolijk & Brack, 1999: 283). These targets are also noted in Packard and Reinhardt (2000) and Williams (2009). Article 3.2 requires Annex I parties to be able to show progress in meeting their Kyoto targets (Grubb, *et. al.*: 1999: 283). Article 3.14 specifically requires that the objectives of the Protocol must be achieved without detriment to the "social, environmental *and economic* welfare of developing country Parties" (own emphasis added) (Grubb, *et al.*: 1999: 285).

One notable exception to the list of Annex I countries that agreed to the terms of the Kyoto Protocol is the United States of America (Crabtree: 2009). Crabtree (2009) reports the United States as the world's biggest polluter, accounting for twenty four percent of the world's carbon dioxide emissions, and thirty six percent of global greenhouse gas emissions. The George W Bush Administration stated that it would not accept any protocol that might harm the economy of the United States. This may be viewed as inconsistent with previous policy where in the 1970s and 1980s the United States was considered a world-leader in environmental matters.

Crabtree (2009: 1) notes that the Kyoto Protocol is "not perfect", but adds that "it is at least a first step". However, the terms of the Kyoto Protocol have been universally problematic, as seen by the numerous meetings of the Conference of Parties (seventeen meetings of the United Nations Framework Convention on Climate Change Conference of Parties to the Convention on Biodiversity, held between 1997 and 2011) and its seeming inability to reach any material agreement on greenhouse gas emissions and Kyoto Protocol targets.

1.1.4 Weaknesses in the Kyoto Protocol

Although the purpose of the Kyoto Protocol was well-intended, Victor (2001: xi) suggests that the Kyoto agreement is "flawed". The implementation of the Protocol has been problematic, as has adherence by subscribing parties to its terms. One of the major disadvantages of the Kyoto Protocol is that it prescribes "arbitrary allocation(s)" (Nordhaus, 2007: 34) for greenhouse gas abatement, with abatement targets set as a fraction of base year emissions (Victor: 2001). The year 1990 was selected as the base year for setting emissions reductions targets, with the requirement that industrialized nations would be required to reduce their greenhouse gas emissions by at least five percent below 1990 levels (Grubb, *et al.*, 1999: 283). Consequently countries with comparatively higher emissions in 1990 are far better positioned in terms of Kyoto Protocol abatement targets compared to countries whose 1990 emissions were comparatively lower, but have increased since that date (Nordhaus: 2007).

The Kyoto Protocol's "first commitment period" (2008-2012) for achieving emissions reduction targets was set some twenty years ahead of the base year on which emissions reduction targets were allocated (Nordhaus: 2007). Victor (2001) notes the reticence on the part of developing countries to participate in global efforts to combat global warming due to the perceived future costs of regulating greenhouse gas emissions. South Africa, together with other developing countries that accepted the terms of the Kyoto Protocol voluntarily, is affected in as much as emissions have increased over time as its economy has expanded. This places South Africa and other subscribing developing countries in an awkward position *vis á vis* their Kyoto commitments, not only because of the pressure placed on those countries with regard to 1990 base year emissions, but also because of the retrospective nature of the Kyoto agreement.

It is interesting to note that the Kyoto agreement made provision for an "escape" clause. Victor (2001) notes that the Kyoto Protocol made provision for countries in the process of adopting market-based economies to select years other than 1990 as the base year for setting emissions abatement targets; Bulgaria, Poland, Hungary and Romania all selected years prior to 1990 when their emissions were higher, so as to guarantee themselves smaller abatement targets.

The Kyoto Protocol was signed at the Third Conference of the Parties to the United Nations Framework Convention on Climate Change in 1997 (United Nations: 1998a; United Nations: 1998b). Amended emissions abatement targets have been debated at fourteen subsequent conferences, with few material agreements being reached. Parties to the conferences have deadlocked repeatedly over the terms of the Kyoto Protocol, and consequently each subsequent conference has seen a focus on peripheral issues rather than giving consideration to adherence to Kyoto targets. The Conferences of the Parties (CoP) fourth to eleventh meetings between 1997 and 2005 debated common issues. By way of example, the first three meetings after the adoption of the Kyoto Protocol focused on, *inter alia*:

- CoP 4 – development and transfer of technologies, encouraging adherence to the Kyoto Protocol;
- CoP 5 – capacity building, transfer of technologies, flexible mechanisms;
- CoP 6 – capacity building for developing and undeveloped countries;
- CoP 7 – capacity building, transfer of technologies, establishment of guidelines for adherence to various Articles of the Kyoto Protocol;
- CoP 8 – establishment of guidelines on various issues, and review of already existing mechanisms and existing guidelines;
- CoP 9 – establishment of funds to facilitate technology transfer, adoption of new guidelines for emissions reporting;
- CoP 10 – transfer of technologies, change in land use, capacity building and reassessment of current and future climate change policy;
- CoP 11 – transfer of technologies, capacity building, and consideration of the effect of climate change on developing and less-developed countries.

It is submitted that the common thread of discussion points in the above-mentioned meetings were partly necessary as the Kyoto Protocol could not be of any force or effect until a minimum of fifty five countries responsible for fifty five percent of

global greenhouse gas emissions had ratified and accepted its terms (Grunewald & Martinez–Zarzoso: 2009). Agreement was achieved in 2005 after Russia ratified the Kyoto Protocol, eight years after the Kyoto Protocol was originally agreed upon at the third Conference of Parties in 1997 (United Nations Framework Convention on Climate Change: 2006; Grunewald & Martinez–Zarzoso: 2009). Russia's delayed acceptance emphasises the limited enforceability of the Kyoto Protocol. It also points to the inherent problem in immediately enforcing the terms of the Treaty which Victor (2001: 13) refers to as (a) "cold start problem". It would appear that by the eleventh meeting of the Conference of the Parties in Montreal in 2005, the Parties to the United Nations Framework Convention on Climate Change were already looking forward in terms of future policy formation, notwithstanding the desire throughout that developed and developing countries should be looking to implement environmental policies in line with what the Kyoto Protocol had originally intended. Many of the decisions taken at the above mentioned conferences focused specifically on "recalling" previous decisions, "reaffirming" commitments to the Kyoto Protocol (United Nations Framework Convention on Climate Change: undated), and then making decisions and resolutions to try and promote support for a Protocol that was now into its eighth year, but still not legally binding on any of its signatories.

The second commitment period of the Kyoto Protocol, due to commence in 2013 (Naidoo: 2011) has been rejected by Russia, Japan and Canada, all of which are industrialized ("Annex I") countries, and signatories to the Kyoto Protocol (Xinhua English News: 2011). Canada has subsequently withdrawn from the Kyoto Protocol, stating that "Kyoto, for Canada, is in the past" (Kent, 2011: 1). Canada holds the view that the terms of the Kyoto Protocol are anachronistic and need to be reviewed, preferring the revised targets agreed upon at the sixteenth conference of parties (commonly referred to as the "Cancun Agreements") in 2010.

Parties to the Cancun Agreements are responsible for in excess of seventy five percent of global emissions (Kent, 2011: 1). The Cancun Agreements of the sixteenth conference of parties is binding on more States than was required by the Kyoto Protocol, as Grunewald and Martinez-Zarzoso (2009) note that the Kyoto Protocol required only fifty five signatories responsible for at least fifty five percent of the world's 1990 emissions.

Canada's stance is that "the Cancun Agreements are more realistic . . . comprehensive . . . [and] effective than Kyoto" (Kent, 2011: 1). It is submitted that more stringent emissions reduction targets would be necessary given the temporal delays in bringing the Kyoto Protocol into force, and Canada's withdrawal of support for the Kyoto Protocol after 2012 is justified. Whether or not the Cancun Agreements are the best alternative to the Kyoto Protocol is not within the scope of this text and is not considered further.

1.1.5 Developing Countries and the Kyoto Protocol

In spite of its difficulties, certain developing countries have also agreed to the terms of the Kyoto Protocol. Developing countries are not bound to reduce greenhouse gas emissions in terms of the original Kyoto Protocol (Victor, 2001: x). South Africa is also classified as a developing country (Van Heerden, Gerlagh, Blignaut, Horridge, Hess, Mabugu & Mabugu, 2006: 113). Regardless of its status as a developing country, South Africa has nonetheless agreed to cap greenhouse gas emissions (Underwood: 2008), having acceded to the terms of the Kyoto Protocol on 31 July 2002 (United Nations Framework Convention on Climate Change: 2006).

That fact that developing countries like South Africa have ratified the terms of the Kyoto Protocol may be praiseworthy, but the fact that they are not bound by its terms is not. Victor (2001: x) notes that "emissions from the developing world are rising rapidly and, within the next three decades, are likely to exceed those of developed nations". Increased emissions may be anticipated in India and China which are both considered the leading developing countries in terms of economic growth (Mladek: 2010). To comply with the terms of the Kyoto Protocol to which they have given their assent, developing countries, like the "Annex I countries", should be investing in environmentally friendly technologies now that will compensate for their future anticipated increased greenhouse gas emissions. Murlis (in Specter, 2008: 4) states: "we have to remember our goal: reduce emissions of greenhouse gases . . . that should be the world's biggest priority".

1.1.6 The Seventeenth Conference of Parties

The seventeenth Conference of Parties in Durban, South Africa ended on Sunday 11 December 2011. It would appear that the only material decisions made at the seventeenth conference were the establishment of a "Green Fund" to assist developing countries in adapting to "greener" technologies and adapting to climate change (United Nations Framework Convention on Climate Change: undated). This is not the first fund to be established by the Parties to the United Nations Framework Convention on Climate Change; a "special climate change fund" and a "least developed countries fund" were established at the seventh Conference of Parties in Marrakesh in 2001 (United Nations Framework Convention on Climate Change: undated). The Parties at the seventeenth Conference also agreed to a "second commitment period" to the Kyoto Protocol (Naidoo: 2011), although not unanimously, as indicated above.

The seventeenth conference of parties has been lauded by the United Nations as "'an important advance in the work of climate change'" (Ki-moon: 2011, in Naidoo (2011: 1)). As with previous conferences of parties, the claim of the success of the conference has had its detractors. The proposed $100-billion per annum "green fund", agreed to at the seventeenth conference of the parties, has been regarded fairly sceptically, and has been described as being "'woefully short'" (Welch: 2011, in West (2011: 1)). It is open to speculation as to whether the "second commitment period" will yield any positive results in terms of reduced greenhouse gas emissions, making the advisability of such a commitment questionable.

The seventeenth conference of parties has provided for a much broader, long-term strategy to which the parties have agreed. In terms of the broader agreement, almost 200 countries will extend their original Kyoto emissions commitments beyond the expiry of the first commitment period in 2012, pledging themselves to cut emissions by 2015, which agreement will only be enforceable in 2020 (McGroarty: 2011). Canada, Japan and Russia, all of which refused to accept a further commitment period for the Kyoto Protocol, have agreed to this broader plan, as have the United States of America, India and China, currently the world's largest greenhouse gas emitters (McGroarty: 2011).

The acceptance of the long-term strategy achieved by the seventeenth conference of parties may be sound in principle, but it is submitted that the latest agreement only serves to defer any meaningful action to mitigate the effects of climate change. It appears that, given the short-comings of the Kyoto Protocol as detailed above, a "second commitment period" may not be as successful in implementation as it is perhaps intended to be and that repeated delays in taking decisive action will only make matters worse in the long term. Therefore alternative policy interventions are likely to be necessary.

1.1.7 Programmes for Reducing Emissions

Nordhaus (2007: 35) notes that excluding developing countries from mandatory compliance with the Kyoto Protocol was "probably a fundamental mistake". There is therefore a perceived need for the introduction of other policy instruments designed to achieve emissions reductions that are not based on meeting "arbitrary allocation(s)" as provided for in the Kyoto Protocol. Three programmes were initiated in terms of the Kyoto Protocol to enable countries to meet their reduced emissions targets. These are the Clean Development Mechanism, Joint Implementation and Emissions Trading. As this thesis concentrates on carbon tax regimes and the use of environmental tax incentives to achieve reductions in greenhouse gases, it is not within the scope of this work to explore these programmes in detail.

Alternatives to these programmes include market-based instruments such as punitive environmental taxes (otherwise referred to as "environmental" or "carbon" taxes). Nordhaus (2007: 35) contemplates the use of "harmonized carbon taxes", where the carbon price is set at levels "that balance the . . . social marginal costs and marginal benefits of additional emissions". This would negate the need for quotas or emissions trading at domestic or international level. Carbon taxes have been implemented with varying success rates *inter alia* in Scandinavia in realising reduced greenhouse gases emissions (see Johannson: 2000; Osborn: 2001; Bruvoll & Larsen: 2004). South Africa favours the carbon tax approach and intends to implement a carbon tax regime (National Treasury: 2012a).

In the United States the Obama Administration has since called for large-scale environmental reform, with the stated intention "to reduce carbon emissions by eighty

percent by 2050" (Jones Lang LaSalle, 2009: 1). The Obama Administration is also in favour of cap-and-trade systems *and* federal, state and local environmental tax incentives (Jones Lang LaSalle: 2009). This represents a major policy turn-around from the previous Republican stance, even though the United States never ratified or accepted the Kyoto Protocol (United Nations Framework Convention on Climate Change: 2006).

It should be noted that China has now superseded the United States as the world's largest emitter of greenhouse gases (Watts: 2011). Much of China's greenhouse gas emissions are ascribed to faster-than-anticipated economic growth (Höhne, Hare, Schaeffer, Chen, Rocha, Vieweg & Moltmann: 2011). It is submitted that as a developing country South Africa faces the same challenges as China, Brazil and India with regard to increasing greenhouse gas emissions and economic expansion.

1.1.8 The South African Context

Increased greenhouse gas emissions are concomitant with economic growth. It is not surprising therefore that South Africa's economic growth has not occurred without negative environmental impacts. For example, nine of South Africa's largest listed industrial companies, including Mondi, Sappi, DRDGold, Goldfields and Sasol have recently been targeted for environmental non-compliance (Business Report (on-line): 2010). This is problematic in a country that is heavily reliant economically on fossil fuels, especially coal.

Section 24 of the South African Constitution guarantees the right to a clean environment. South Africa can ill-afford to sacrifice its commitment to the Kyoto Protocol and emissions targets purely for the sake of economic expansion. Although Clean Development Mechanism projects exist in the country, it is submitted that South Africa does not have the financial capacity to implement them at a level that would make the country internationally competitive. The introduction of emissions trading systems may result in high administrative burdens (Goldblatt: 2010, in National Treasury (2010)). One potentially acceptable alternative to the Kyoto Protocol programmes is the introduction of market-based instruments in the form of environmental or carbon taxes similar to those already adopted in international jurisdictions.

It is accepted that the main purpose of environmental taxes is to change producer and consumer behaviour in order to realise reduced greenhouse gas emissions (Winkler: 2007; Government of the Republic of South Africa: 2010; National Treasury: 2010). Whether implemented "upstream" (where the tax is levied on the producer at entry-point into the economy) or "downstream" (where the tax is levied on the end consumer) (National Treasury: 2010), environmental taxes would place upward pressure on the price of both public and private goods. This is not feasible in a country that has a high rate of unemployment and a large proportion of the population that supports large families on a minimal income. At the time of writing the latest available statistics indicate that 24.9 percent of South Africans are unemployed (Statistics South Africa: 2012). Without taking the effect of the Human Immuno-Deficiency Virus (HIV) and Auto-Immune Deficiency Syndrome (AIDS) into consideration, approximately one quarter of the South African population either has no income or is reliant on another breadwinner to support them. Levying a carbon tax would only place greater financial strain on households, especially poorer households.

Where a greenhouse gas emitter cannot introduce price adjustments to compensate for the carbon tax for which they might be liable due to trading and other regulations, it is submitted that the financial burden of a carbon tax would have to be absorbed internally by the emitter and would impact negatively on the emitter's profitability, and hence economic growth potential.

1.1.8.1 The Copenhagen Accord

During the 2009 climate change negotiations in Copenhagen (the "Copenhagen Accord") South Africa volunteered to reduce its greenhouse gas emissions by thirty four percent by 2020 and by forty two percent by 2025 (National Treasury: 2010). This will be an enormous undertaking and investing in environmentally cleaner technology will in all likelihood be a very costly exercise, placing further pressure on South Africa's economic growth potential.

It is thought that for South Africa to meet its revised emissions reductions targets in terms of the Copenhagen Accord, large-scale investment in cleaner technology will be required.

South Africa's economy is heavily reliant on fossil fuels and it is submitted that it will not be easy for South Africa to substitute existing fuel sources with cleaner fuels and technologies due to investment costs and substitution elasticity issues. Gerlagh and Van der Zwaan (2004) observe that the investment costs of converting to non-carbon energy sources will be high. Gebreselasie (2008) and Serletis, Timilsina and Vasetsky (2010) observed inelasticity of substitution between coal and alternative energy sources in South Africa, inferring that alternative energy sources cannot be easily substituted for fossil-fuel energies. Inability to substitute alternative energies will increase the financial burden on the polluter should a carbon tax be imposed on emissions. In the face of increased costs of investment, the prognosis for polluters is bleak. Therefore, to encourage the level of capital expenditure that will be required to invest in cleaner technologies, there is a case for South Africa to contemplate the introduction of environmental tax incentives to subsidize the costs of conversion. These might be implemented in the form of broad-based tax incentives, similar to those available in the United States, as detailed by Garrison (2009). The argument for the introduction of such incentives is strengthened by the anticipated effect that the proposed introduction of a carbon tax may have on the spending power of individuals.

1.1.8.2 Tax incentive measures in the South African Taxing Statutes

In South Africa the Income Tax Act No. 58 of 1962 (the Income Tax Act) contains very few income tax incentives to encourage compliance on any level, let alone environmental compliance, and what incentives are available are in many cases restrictive (Paterson: 2005). Corrective measures are invariably punitive in nature, designed to punish the taxpayer for non-compliance. However, the Act does provide for the following measures which have a potential direct or indirect impact on "greening" the environment:

- section 10(1)(cA): income tax exemption for any institution, board or body, those sole purpose of which is to engage in scientific, technical or industrial research, providing necessary or useful commodities to the State or the general public, or carries on activities designed to promote commerce, industry or agriculture;

- section 10(1)(cN): income tax exemption for public benefit organizations engaged in public benefit activities;
- section 11D: income tax relief for taxpayers engaged in research and development;
- sections 11(gB) and (gC) provide for deduction of the cost of extending rights to existing intellectual property and acquiring intellectual property, respectively;
- section 12B provides for a three-year accelerated write-off of the capital cost of assets owned by the taxpayer and used to provide electricity from wind power, solar energy, hydropower (limited to 30 Megawatts), and certain biomass wastes and plant material;
- section 12K exempts from income tax any amount received in consequence of the disposal of any "certified emissions reduction" derived from a qualifying clean development mechanism project;
- section 12L provides for an allowance in respect of certifiable energy savings achieved by a person, calculated at 45 cents per kilowatt hour of energy saved;
- section 37B provides for the deduction of the capital cost of the following assets that are owned by the taxpayer or acquired by the taxpayer in terms of an instalment credit agreement:
  - new and unused environmental treatment and recycling assets – over four years, with a double deduction in the first year, and
  - new and unused environmental waste disposal assets – over twenty years;
- section 37C provides for the deduction of expenditure actually incurred in land conservation if in terms of a Biodiversity Management Agreement that will endure for at least 5 years;
- paragraph 12(1) of the First Schedule to the Act provides that a farmer may claim tax deductions in respect of various forms of farming-related expenditure, *inter* alia, the eradication of noxious plants and alien vegetation (paragraph 12(1)(a)) and soil erosion (paragraph 12(1)(b));

- paragraph 12(1A) deems certain expenditures provided for in paragraph 12(1) to be incurred in respect of farming operations if incurred in consequence of a biodiversity agreement that will last at least five years.

(It should be noted that the wording of sections 12B, 12L and 37B is the amended wording as proposed in the 2012 Taxation Laws Amendment Bill (National Treasury: 2012b)).

Unfortunately, the wording of sections 10(1)(cA) and 10(1)(cN) is such that those sections are limited in their applicability. All of the remaining incentives require that that the expenditure be incurred in the production of income and/or that the taxpayer carries on a trade. This immediately excludes private individuals from availing themselves of any of these tax incentives. The only notable exception may be found in the provisions of section 18A of the Income Tax Act, in terms of which an individual may claim an income tax deduction in respect of donations made to "public benefit organisations" carrying on "public benefit activities", as defined in section 30. However, such deduction is limited to a maximum of ten percent of the taxpayer's taxable income before claiming the deduction. Section 56(1)(h) of the Income Tax Act provides for a donations tax exemption for donations to public benefit organisations, and a similar concession is afforded in terms of section 4(h) of the Estate Duty Act No. 45 of 1955. Section 9(1)(c) of the Transfer Duty Act No. 40 of 1949 exempts from transfer duty any property acquired by a "public benefit organization" as contemplated in terms of section 30 of the Income Tax Act or other body exempt from income tax in terms of section 10(1)(cA) of the Income Tax Act that carries on a public benefit activities as contemplated in section 30 of that Act. The Value-Added Tax Act No. 89 of 1991 contains no incentives that are directed at environmental preservation.

1.1.9 Tax Incentives in the United States of America

Although the United States of America has not ratified the Kyoto Protocol this has not deterred that country from legislating income tax incentives to encourage its citizens to engage in "pro-environmental" activities and behaviour that is less environmentally destructive. It is apparent that the use of tax incentives is considered favourably in the United States, and is not restricted to income tax incentives only.

Garrison (2009) provides a state-by-state breakdown of all tax incentives that have been enacted in the United States of America, stating that as fuel prices rise, there is an increased need for incentives to invest in alternative forms of energy. In some American states, environmental tax incentives have been enacted since the 1970s, and are not restricted to taxpayers carrying on a trade but extend to include personal tax incentives, property tax incentives, tax "holidays" and certain sales tax incentives (Garrison: 2009).

Bourgeois, Breaux, Chaisson and Mauldin (2010) support the use of tax incentives in the United States of America to assist both businesses and individuals to reduce their greenhouse gas emissions, stating that "the incentive to pursue renewable energy projects has never been greater" (Bourgeois, *et al.*, 2010: 20). Edwards, Russo, Merrill and Wagner (1998) document the various environmental tax incentives that were enacted in the United States during the late seventies and eighties and analyse the Clinton Administration's fiscal incentives to tackle global warming.

South Africa would do well to implement tax incentives for green compliance as this appears to be an appropriate mechanism for a developing country to meet its environmental commitments at the lowest cost, whilst promoting economic growth. It is submitted that tax incentives should be broad-based, including all forms of taxation and should be available to all taxpayers, including private individuals and those carrying on trades. These might include, but would not be limited to, income tax concessions in respect of expenditure in installing environmentally friendly heating systems (solar or wind-powered systems, for example), similar property tax and value-added tax concessions in respect of such expenditure, value-added tax exemptions for the sale of wood and other fuels made from recycled materials and value-added tax "holidays" effective for limited periods at a time. Similar incentives have been specifically enacted in the United States of America (Garrison: 2009).

South Africa appears to promote the use of market-based instruments as the most appropriate mechanism to combat greenhouse gas emissions and climate change, as advocated in the Draft Environmental Fiscal Reform Policy Document issued by the National Treasury in April 2006. The National Treasury (2010: 3) notes that the use of market-based instruments is supported in both Winkler (2007) and the National Climate Change Response Green Paper (2010). These taxes are promoted as an

appropriate mechanism to bring about changes in consumer behaviour with regard to energy use. The Draft Paper on Environmental Reform Policy (National Treasury: 2006) contemplates the role that market-based instruments, including environmental taxes, might play in achieving sustainable development , and realising the so-called "double-dividend" (National Treasury, 2006: 7), being:

- a cleaner environment; and
- economically efficient labour.

The National Treasury (National Treasury, 2010: 4) supports the proposed fiscal reform contemplated in the 2006 Draft Paper (*supra*). Although this document focuses mainly on how environmental taxes may be used to bring about behavioural changes that will contribute towards greenhouse gas emissions abatement (National Treasury, 2010: 3), a few incentives are considered. These include, *inter alia*, the introduction of incentives for producers and consumers to adopt a carbon tax whereby partial or full exemptions may apply for limited periods of time (National Treasury, 2010: 7). The National Treasury Discussion Document also contemplates tax credits equal to the carbon tax that might be levied on carbon that is emitted if the emitter invests in technology that is able to store the emitted carbon (National Treasury, 2010: 33). It is submitted that the tax credit would be a tax incentive in itself, even in the presence of environmental taxes.

It is acknowledged that the implementation of tax incentives for "green" compliance will not be a costless exercise to the country and careful consideration will have to be given to which tax incentives might be best implemented without placing an undue burden on the fiscus, which it will not be able to afford.

1.2 RESEARCH QUESTIONS

Keeping in mind that meeting its commitments to the Kyoto Protocol should not occur at the expense of economic growth, the questions to be addressed in this thesis are therefore the following:

- What is the current South African environmental tax policy?
- To what extent have environmental taxes and environmental tax incentives been promulgated in selected jurisdictions outside South Africa?
- Are carbon taxes the best mechanism to enable South Africa to reduce its greenhouse gas emissions?
- Should South Africa not consider the use of broad-based environmental tax incentives?
- Are carbon taxes preferable to environmental tax incentives in the South African context, or is a combination of both carbon taxes and incentives the most cost-effective and economical way for South Africa to achieve its greenhouse gas abatement targets?

1.3 GOALS OF THE RESEARCH

The first goal of this research is to document the existing environmental taxes and environmental tax incentives that have been enacted in the South African taxing statutes, which are aimed at environmental protection, achieving the conversion to cleaner non-carbon energy, and reducing greenhouse gas emissions. The second goal is to discuss the theoretical, legal, practical and socio-economic implications of the proposed introduction of a carbon tax in South Africa as part of the environmental policy. A review of the environmental tax policies of selected international jurisdictions comprises the third goal. Particularly, the policies of the United States of America, Scandinavia, Germany and England, are analysed, with attention to the success of the environmental policies adopted in the international jurisdictions in terms of reducing greenhouse gas emissions.

These investigations are performed with a view to determining whether a "stand-alone" carbon tax regime is appropriate for South Africa, or whether alternative measures might be adopted, whether in conjunction with, or instead of carbon taxes, in the formulation of an appropriate environmental protection policy aimed at reducing greenhouse gas emissions and the conversion to non-carbon energy.

1.4 METHODS, PROCEDURES AND TECHNIQUES

The approach adopted in this research is interpretative, and is based on a doctrinal research methodology. Interpretative research seeks to understand and describe (Babbie & Mouton: 2009) and this approach was considered to be appropriate, given the intended goals of the research.

The doctrinal methodology informed the systematic exposition of legal rules applicable to the environmental taxation legislation which this research sought to analyse. This methodology was adopted as the research was based almost entirely on documentary data (McKerchar: 2008).

To achieve the goals of the research a literature survey was conducted, which literature is largely described in this chapter and chapters two, three and four. The survey informs the discussion in chapters four and conclusions in chapter five.

The literature on greenhouse gas emissions, global warming, punitive environmental taxes and tax incentives was drawn from South African and international tax legislation, published books, articles published in journals, as well as a wealth of popular articles and opinions accessed on-line or in the printed press. Comparisons of international measures are drawn against the taxing statutes in South Africa, most notably the Income Tax Act and the various Environmental and Fiscal Reform Policy Documents issued by the South African Government and the South African National Treasury (hereafter National Treasury), including the 2010 National Treasury Discussion Document on carbon taxes. An in-depth analysis of the rationale for the implementation of environmental taxes is given.

1.4.1 Scope of the Research

The literature survey conducted in this research was by no means exhaustive (refer to the comments in sections 1.1.4, 1.1.7, 2.2.11 and 4.3.2 of this text). The National Environmental Management Act No. 107 of 1998 is not considered in this text as the study intends to focus on the fiscal and economic impacts of carbon tax regimes as opposed to the management of the environment *per se*. The study does focus on environmental legislation enacted at federal and state levels in the United States of America, and environmental tax legislation in selected international jurisdictions,

including Norway, Sweden, Denmark, Germany and England. In light of the scope of investigation, it is submitted that the literature reviewed is adequate for the intended purpose.

The international jurisdictions selected for benchmarking in this study are good examples of best practice from a taxation perspective in relation to environmental preservation and reducing greenhouse gas emissions. The broad-based nature of the state-level incentives available in the United States of America is regarded as being valuable when analysing the options open to South Africa in terms of appropriate environmental tax legislation. The Scandinavian countries selected were chosen specifically because the literature indicates the positive results achieved in those countries in terms of reducing greenhouse gas emissions.

The documentary data was analysed and interpreted to establish a framework for a fiscal policy that can be used to assist South Africa in achieving reduced greenhouse gas emissions. Due to the volume of literature on the Clean Development Mechanism, Joint Implementation and Emissions Trading, these topics are beyond the scope of this half-thesis.

As all the documentary data to be used for this research are in the public domain, no ethical considerations arise.

1.5 ARRANGEMENT OF CHAPTERS

Chapter two considers the South African taxing statutes and the provisions that have currently been enacted to facilitate and encourage a change to cleaner energy and environmental protection. The existing environmental tax incentives already legislated in the Income Tax Act No.58 of 1962, the Value-Added Tax Act No. 89 of 1991 (the VAT Act), the Estate Duty Act No. 45 of 1955 (the Estate Duty Act) and the Transfer Duty Act No 40 of 1949 (the Transfer Duty Act) are analysed, with a view to illustrating the lack of existing broad-based environmental tax incentives currently available and, in most cases, the limited scope of application of such incentives.

Chapter three examines the implementation of market-based instruments such as carbon, fuel and other energy taxes in selected international jurisdictions. The extent

to which punitive environmental taxes have been successfully implemented in the United States of America, Norway, Sweden and Denmark, Germany and the United Kingdom is analysed with particular reference to the problems encountered with the adoption of such taxes. The implementation of broad-based environmental tax incentives in the United States is also discussed.

Chapter four considers the rationale for the introduction of carbon taxes in South Africa from both theoretical and practical perspectives. Particular attention is devoted to the National Treasury Discussion Document entitled "The Carbon Tax Option" (National Treasury: 2010), and the works of other writers on the topic are discussed in an attempt to provide a broad perspective on the introduction of a carbon tax in South Africa. Punitive and incentive measures are compared and contrasted in order to establish a framework of measures that would be specifically appropriate in the South African context. Given South Africa's heavy reliance on fossil fuels, especially coal, consideration is given to perceived substitution and price elasticity problems in the South African energy sector and the effect that this might have on the decision to invest in cleaner infrastructure.

It is acknowledged that it will be impossible for South Africa to summarily change from fossil fuels to other technologies. It is further accepted that the cost of converting to cleaner technologies will be onerous, particularly in the light of the proposed carbon tax, and the research suggests that if carbon taxes are to be introduced, broad-based incentives should be considered to encourage more rapid conversion to less carbon-intensive forms of energy. Certain policy recommendations are made as to the nature and scope of environmental tax incentives that could be legislated in South Africa in order to assist it to meet its environmental obligations, while at the same time not limiting economic growth.

Chapter Five summarises the findings of the research in addressing the goals of the research, at the same time reflecting on problems encountered in carrying out the research. Finally certain recommendations are made for areas of possible future research.

CHAPTER 2: THE SOUTH AFRICAN TAXING STATUTES AND ENVIRONMENTAL PROTECTION AND REFORM

2.1 INTRODUCTION

This research seeks to explore the existing and proposed environmental policies in South Africa, as well as those implemented in selected international jurisdictions, with a view to determining whether carbon taxes, environmental tax incentives, or a combination of both taxes and incentives is suitable in the development of an environmental protection policy that will assist South Africa meet its greenhouse gas emission reduction targets and the conversion to non-carbon energy.

This chapter will address the first goal of the research in exploring the South African taxing statutes, including the Income Tax Act No. 58 of 1962 (the Income Tax Act), the Value-Added Tax Act No. 89 of 1991 (the VAT Act), the Estate Duty Act No. 45 of 1955 (the Estate Duty Act) and the Transfer Duty Act No. 40 of 1949 (the Transfer Duty Act) in order to identify all the existing environmentally-focused tax concessions available in the existing legislation.

2.2 TAX INCENTIVES IN SOUTH AFRICA

Environmental tax incentives are used to facilitate a positive change in consumer behaviour, especially with regard to behaviour towards the environment (Arendse: 2007). Paterson (2005) notes the use of tax incentive measures to encourage voluntary participation in conservation of biodiversity. Although Patterson's work focuses on biodiversity conservation, it has relevance in that it explores the use of broad-based tax incentives in terms in terms of the Income Tax, Estate Duty and Transfer Duty Acts and property rates, and seeks to determine not only the existing government interventions for conservation, but also possible further interventions that might be put in place to encourage conservation. It is submitted that a logical extension of tax incentives for conservation of biodiversity would be to introduce tax incentives for investing in cleaner infrastructure so as to reduce greenhouse gas emissions.

Paterson (2005:186) analyses the existing South African policies and notes that the White Paper on Biodiversity (1997) identified, *inter alia*:

- the need to "[introduce] incentives (such as tax relief) to strengthen the involvement of the private sector . . ."; and
- the Katz Commission's observation that "'it is plainly unrealistic to think in terms of a tax system devoid of incentives'" (Katz, Davis, Graaff, du Toit, Mohr, Mokgatle & Njeke, 1994: 88).

It is submitted, therefore, that any taxing statute that does not make provision for tax incentives for "green" compliance, especially in the private sector, will achieve little in terms of reductions of greenhouse gas emissions and promoting investments in environmentally friendly infrastructure.

Developed countries are adopting tax incentives as a mechanism to encourage greener practices with regard to the environment, including the use of renewable natural energy sources such as wind, water and solar energy as opposed to the (conventional) burning of fossil fuels (Edwards, *et al.*: 1998; Butcher, Kreiser, Sprohge & Sirisom: 2006; Garrison: 2009; Bourgeois, *et al.*: 2010). Paterson (2005) notes that many countries throughout Europe, the United States of America, Canada and Kenya in Africa adopted legislation for environmental "servitudes".

Whereas developed countries (especially the United States of America) view the use of environmental tax incentives favourably, the adoption of tax incentives in South Africa appears to have limited scope. More specifically, the Income Tax Act and the VAT Act offer very little in the way of incentives that are aimed primarily at environmental rehabilitation and protection. The existing incentive allowances and exemptions currently afforded in the Income Tax Act may be summarized as follows:

2.2.1 Income Tax: Section 11D

Sections 11D(1) and 11D(2) read together provide for the deduction from the income of a taxpayer in the carrying on of any trade an amount equal to the expenditure incurred in the Republic directly for the discovery of non-obvious, scientific or technological knowledge, or the creation of any intellectual property (an invention in

terms of the Patents Act 1978, the Designs Act 1993, computer program as defined in the Copyright Act 1978), where that knowledge is to be used by the taxpayer in the carrying on of any trade and for the purposes of producing income.

Section 11D(3) provides for a deduction of a further fifty percent of the expenditure contemplated in subsection (1) if the research and development activity has been approved by the Minister of Science and Technology (in terms of section 11D(9)).

Section 11D(4) provides for a further deduction of fifty percent of the expenditure incurred in subsection (1) if the research is being funded by the taxpayer but is carried out by another person on behalf of that taxpayer. The research must be approved by the Minister of Science and Technology (in terms of section 11D(9)).

From an environmental perspective, this incentive would assist taxpayers who develop or devise any form of intellectual property that is environmentally friendly in nature or is "greener" in its technological design, including technology that is not reliant (partially or wholly) on fossil fuels. However, in relation to section 11D(4), section 11D(5) places a limit on the amount that may be deducted if the company funding the research and the company carrying out the research belong to the same group of companies. In such a case the deduction available to the funding company is equal to fifty percent of the actual expenditure incurred by that company solely in relation to the research that is conducted by the company being funded.

Furthermore, it should be noted that section 11D(8) does not extend to expenditure on exploration or prospecting, management or internal business processes, trademarks or goodwill, social sciences, the humanities, prospecting activities, financial instruments, market research activities, or expenditure in respect of which an income tax deduction is afforded in terms of sections 11(gB) and 11(gC).

No tax relief will be gained in terms of section 11D from undertaking these activities. It should be noted further that the incentives granted in terms of section 11D are restrictive in that they are only granted in respect of expenditure actually incurred in the production of income by persons carrying on a trade.

Furthermore, the research and development must be carried on *in the Republic* (own

emphasis).

2.2.2 Income Tax: Section 11(gB)

Section 11(gB) provides for a deduction of any expenditure incurred during the year of assessment in obtaining the grant or restoration of any patent, the registration or extension of registration of any design, and the registration or renewal of registration of any trademark, provided such expenditure is not deductible in terms of any other provision in section 11. The deduction will only apply in respect of such intellectual property contemplated in the section that is to be used in the production of the taxpayer's income.

2.2.3 Income Tax: Section 11(gC)

In terms of section 11(gC), a taxpayer may claim an allowance in respect of any expenditure incurred by him during any year of assessment commencing on or after 1 January 2004, to *acquire* (own emphasis) any invention (as defined in the Patents Act 1978), design (as defined in the Designs Act 1993), copyright (as defined in the Copyright Act 1978), other information (excluding trademarks) or other information pertinent to the use of such intellectual property, if such intellectual property is to be used for the first time in the taxpayer's trade and for the production of the taxpayer's income. The deduction is unlimited if the cost of such intellectual property is less than or equal to R5 000, but where the cost of acquisition is greater than R5 000, proviso (aa)(A) provides that the allowance shall be limited to five percent per annum of the acquisition cost in the case of all forms of intellectual property contemplated in the section, excluding designs. Proviso (aa)(B) provides for an allowance of ten percent per annum in the case of designs, the acquisition cost of which exceeds R5 000.

Section 11(gC) does not provide for any income tax deduction in respect of any intellectual property that is acquired by way of devising, creating or developing; it is submitted that any such deduction would be afforded in terms of section 11D, provided that the requirements of that section are met.

It is interesting to note that section 11(gB) provides for the deductions in respect of

the registration or extension of existing trademarks, but section 11(gC) does not provide for an allowance in respect of the acquisition cost of any trademark.

The import of this is that there would be little or no income tax benefit to be gained under the provisions of section 11(gC) in acquiring ownership of a trademarked technology that would assist a taxpayer in reducing greenhouse gas emissions or covert to environmentally friendly infrastructure. It is submitted that a taxpayer could only achieve a tax benefit either by extending the ownership rights under section 11(gB), or by devising or developing the intellectual property himself, in which case the provisions of section 11D might apply.

2.2.4 Income Tax: Section 12B

Section 12B provides for deductions in respect of machinery, pant, implements, utensils and articles used in farming or for the production of renewable energy.

The relevant deductions may be summarised as follows:

- section 12B(1)(f) allows for the deduction of the capital cost of any of the above-mentioned assets (not including livestock, personal use motor vehicles and office furniture and equipment) that are used by the taxpayer in carrying on farming operations;
- section 12B(1)(g) allows for the deduction of the capital cost of any of the above-mentioned assets to be used in the taxpayer's trade for the production of biodiesel or bio-ethanol;
- section 12B(1)(h) allows for the deduction of the capital cost of any of the above-mentioned assets that are used by the taxpayer in his trade for the generation of electricity from (suggested working as per the Taxation Laws Amendment Bill 2012 (National Treasury: 2012b)):

    1. wind power;
    2. solar energy;
    3. hydropower . . . not exceeding 30MW of power;
    4. biomass consisting of organic wastes, landfill gas and plant material.

- section 12B(1)(i) allows a deduction of the capital cost of any improvements (not being repairs) to any assets listed above that are used during the year of assessment in the processes described in subparagraphs (f),(g) and (h).

Section 12B(2) provides that the capital cost of assets contemplated in subsection (1) is claimable over a three-year period on the basis of fifty percent in the first year, thirty percent in the second year and twenty percent in the third year.

The deduction is granted in the year that the asset is first brought into use by the taxpayer, and is not pro-rated for a partial year of use.

2.2.5 Income Tax: Section 12K

Section 12K is a more recently promulgated addition to the Act, being effective from 11 February 2009 and effective in respect of any date from that date or thereafter.

Section 12K provides for an exemption from income tax of certified emissions reductions. More specifically, section 12K(2) exempts from income tax any amount received by a person in respect of the disposal of any certified emissions reductions derived by that person in carrying on any qualifying Clean Development Mechanism (CDM) project. (The Clean Development Mechanism is defined in Article 12 of the Kyoto Protocol as a means for non-Annex I countries (developing countries) to achieve sustainable growth and reduce greenhouse gas emissions, and to enable Annex I countries (industrialized countries) to meet their greenhouse gas emission reduction targets under the Kyoto Protocol, as required in terms of Article 3 of that Protocol) (United Nations: 1998a).

2.2.6 Income Tax: Section 12L

Section 12L in its amended form (National Treasury: 2012b) is to be inserted into the Income Tax Act with effect from a date to be decided by the Minister of Finance in the *Government Gazette*. At the time of writing this section has yet to be promulgated, meaning that this incentive is not yet available. The purpose of section 12L is to provide income tax relief in respect of energy efficiency savings.

It is intended that, in its substituted form, section 12L(1) will provide for a deduction in respect of any energy savings achieved by a person in the carrying on of any trade during any year of assessment ending before 1 January 2020.

The deduction is granted against taxable income. In terms of section 12L(2), the deduction shall be calculated at the rate of 45 cents per kilowatt hour of energy savings achieved. Section 12L(3) provides that the energy savings in respect of which a deduction is being claimed must be certifiable in a manner prescribed by the Ministers of Energy and Trade and Industry, as detailed in section 12L(5). Section 12L(4) shall prevent a taxpayer claiming a deduction under section 12(L)(1) if a "concurrent benefit in respect of energy savings is received". The fact that the provisions of section 12L will only apply in respect of any year of assessment ending before 1 January 2020 implies that this concession will have a limited window of applicability, limited even more so by further delays in the promulgation of the section by the Minister of Finance.

2.2.7 Income Tax: Section 37B

Section 37B provides for deductions in respect of environmental expenditure. It should be noted that provision has been made in the Taxation Laws Amendment Bill 2012 (National Treasury: 2012b). This explanation refers to section 37B in its proposed amended form.

Section 37B(1) distinguishes between an "environmental treatment and recycling asset" and an "environmental waste disposal asset", and different tax concessions are granted in respect of these assets. The first deduction is contained in section 37B(2), in terms of which a taxpayer may deduct for income tax purposes the capital cost of any new and unused environmental treatment and recycling asset over a four year period, with a double deduction (i.e. forty percent) of the cost in the first year, commencing in the year in which such asset is brought into use by the taxpayer for the first time. The second deduction applies to the capital cost of new and unused environmental waste disposal assets. The deduction may be claimed evenly over a twenty year period (at five percent per annum) commencing in the year that the asset is brought into use by the taxpayer for the first time. The definitions of "environmental treatment and recycling asset" and any "environmental waste disposal

asset" in section 37B(1) make it clear that for the purposes of the section such assets must be used in the taxpayer's trade.

Therefore such assets will not qualify for any tax relief if they are not used in the taxpayer's trade, regardless of whether or not they satisfy the other criteria of the section.

2.2.8 Income Tax: Section 37C

Section 37C provides for deductions in respect of environmental conservation and maintenance. In terms of sections 37C(1)(a) and (b) any taxpayer who incurs expenditure in respect of environmental conservation and maintenance may deem such expenditure to be incurred in the production of income and for the purposes of trade if both of the following requirements are satisfied:

a) the expenditure is being incurred in respect of a biodiversity and management agreement programme that will last at least five years, concluded in terms of the Biodiversity Act, 2004; and
b) the land on which the taxpayer trades or utilises for the production of income forms part of, includes, or is in immediate proximity to the land being so conserved or maintained.

Where a taxpayer incurs expenditure in respect of land that either is, forms part of, or is in immediate proximity to the land which he uses to produce income or on which he trades, section 37C(2)(a) provides that the expenditure incurred may not be deducted to the extent that it exceeds the taxpayer's trade income in that year. However, section 37C(2)(b) provides that any such excess may be deemed to be expenditure actually incurred in the following year of assessment. The taxpayer therefore does not lose the benefit of the deduction under this section purely because the quantum of the expenditure actually incurred in that tax year is greater than his trade income in that year of assessment.

Section 37C(3) provides that such expenditure may, in certain circumstances, be deemed to be a donation to the Government for the purposes of section 18A(2) (see below).

2.2.9 Income Tax: Paragraph 12(1) – First Schedule

Paragraph 12(1) of the First Schedule allows for the deduction of expenditure incurred by farmers in any year of assessment, in respect of:

a) the eradication of noxious plants and alien invasive vegetation;
b) the prevention of soil erosion;
c) dipping tanks;
d) dams, irrigation schemes, boreholes and pumping plants;
e) fences;
f) the erection of, or extensions, additions or improvements (other than repairs) to, buildings used in connection with farming operations, other than those used for domestic purposes;
g) the planting of trees, shrubs or perennial plants . . . and the establishment of any area used for the planting of such trees, shrubs or plants;
h) the building of roads and bridges in connection with any farming operations;
i) the carrying of electric power from the main transmission lines to the farm apparatus . . . in terms of which the farmer has undertaken to bear a portion of the cost . . . in connection with the supply of electric power consumed by the farmer wholly or mainly for farming purposes;

2.2.10 Income Tax: Paragraph 12(1A) – First Schedule

This paragraph provides for a concession similar to the provisions of section 37C(1) in relation to sub-paragraphs (1)(a), (b), (d) and (e) of paragraph 12 of the First Schedule. A taxpayer incurring such expenditure to conserve or maintain land owned by the taxpayer may consider such expenditure to be incurred in the carrying on of pastoral, agricultural or other farming activities if such expenditure is incurred in accordance with the same pre-requisites as contained in section 37C(1)(a) and (b).

It is interesting to note that Paterson (2005: 193) postulated a tax incentive for certain land uses, especially in undertaking conservation. These proposed incentives would appear to be similar to the incentives now promulgated in section 37C, and paragraphs 12(1) and (1A) of the First Schedule to the Act.

The Income Tax Act requires that a taxpayer must, with the exception of section 12K, be carrying on a trade before they can claim any tax relief in terms of the sections described below. The term "trade" is defined in section 1 of the Income Tax Act as:

> . . . every profession, trade, business, employment, calling, occupation or venture, including the letting of property and the use of or grant of permission to use any patent . . . design . . . trademark . . . or copyright . . . or any other property which is of a similar nature;

In Burgess v Commissioner for Inland Revenue (1993) 55 SATC 185(A) it was held that the term should "be given a wide interpretation". Therefore, any private individual who is not carrying on any activity listed in the definition of trade would be unable to avail himself of any income tax relief in respect of his private property and/or assets. This narrows the potential tax base for these concessions.

Private persons would be limited to the provisions of sections 18A and 56 of the Income Tax Act and section 4 of the Estate Duty Act No. 45 of 1955 for tax relief as envisaged in these provisions.

2.2.11 Income Tax: Section 18A

Section 18A provides for the deduction of donations to certain organisations. In terms of section 18A(1)(a) a taxpayer may deduct from his income the sum of any *bona fide* donations that have been made to:

(a) any

(i) public benefit organisation . . . approved by the Commissioner under section 30; or

(ii) institution, board or body contemplated in section 10(1)(cA)(i) (being an institution, board or body defined in section 10(1)(cA) as an institution, board or body whose principal object is to carry out scientific, technical or industrial research, provide necessary or useful commodities, amenities or services to the State . . . or to the general public, or carry on activities . . . to promote commerce, industry or agriculture . . .),

which -

(aa) carries on in the Republic any public benefit activity contemplated in Part II of the Ninth Schedule, . . .

Section 18A(1)(b) provides that the same deduction shall be available to public benefit organisations as contemplated in section 30(1) that provide funds or assets to any public benefit organisation.

A public benefit organisation as defined in section 30(1)(a) includes a non-profit company as defined in section 1 of the Companies Act No. 71 of 2008, or a trust or association incorporated in the Republic, or any branch situated within the Republic of any company, association or trust incorporated outside the Republic that enjoys income tax exemption status in that other country.

Subsection 30(1)(b)(i) provides that any public benefit organisation as described must be carrying on one or more public benefit activities that are conducted in a non-profit manner, or are altruistic or philanthropic in nature. The term "public benefit activity" is defined in section 30(1) as being any activity listed in Part I of the Ninth Schedule to the Act, or any activity listed by the Minister of Finance in the *Government Gazette* as being of a benevolent nature, having regard to the general needs, interests and well-being of society.

Part I of the Ninth Schedule to the Act is fairly extensive, but classifies public benefit activities into the following major areas:

- welfare and humanitarian;
- health care;
- land and housing;
- education and development;
- religion, belief or philosophy;
- cultural;
- conservation, environment and animal welfare;
- research and consumer rights;
- sport;
- providing of funds, assets and other resources;
- general.

Of the above, the areas of conservation and the environment are of particular relevance. Paragraph 7 of Part I of the Ninth Schedule lists such activities as including (only those activities that are of direct relevance are listed here):

(a) engaging in the conservation, rehabilitation or protection of the natural environment, including flora, fauna and the biosphere.
(b) . . .
(c) The promotion of, and education and training programmes relating to environmental awareness, greening, clean up or sustainable development projects.

Private taxpayers, who may or may not be carrying on a trade, could donate property, whether in the form of cash or assets, to a public benefit organisation that is involved in rehabilitation of the environment or education and environmental protection, and obtain some income tax relief. Such a person would not necessarily be reducing their own greenhouse gas emissions directly, but would be assisting the country to reduce its greenhouse gas emissions, and would be doing so in a tax efficient manner.

How the reduction in greenhouse gas emissions relative to a single donation to a public benefit organisation carrying on these activities would be measured is not discussed here, but it is submitted that this would not be an impossible task if an audit is undertaken of the manner in which any such public benefit organisation invests the donations received by it and linking the returns on such investments to greenhouse gas emission reductions. The manner in which such an audit might be performed is submitted to be technical and scientific in nature and is also beyond the scope of this document.

Paterson (2005) supports a tax incentive for donations in the form of a tax deduction. It should be noted, however, that the income tax deduction afforded under section 18A(1) is limited to ten percent of the taxpayer's taxable income (excluding retirement, withdrawal and severance benefits) and before allowing for any deduction in respect of medical aid contributions and medical expenses that might be available in terms of section 18 of the Act. Section 18A(2)(a) requires certain documentary evidence (a "section 18A certificate") to be issued in respect of any qualifying donation.

A perceived weakness in the concession granted by the section is that it implies that any income tax benefit would only be available if the taxpayer *depletes* his or her assets in a benevolent manner, as opposed to granting income tax relief for *investing* in personal infrastructure that is environmentally friendly.

2.2.12 Income Tax: Section 10(1)(cA)

Section 10(1)(cA) exempts from income tax:

the receipts and accruals of –

(i) any institution, board or body . . . which . . . –
(aa) conducts scientific, technical or industrial research;
(bb) provides necessary or useful commodities, amenities or services to the State . . . or members of the general public; or
(cc) carries on activities . . . designed to promote commerce, industry or agriculture . . .

Paterson (2005: 209) notes that the exemption may be somewhat limiting in that entities carrying on conservation activities would not be able to avail themselves of this exemption unless they are involved in the activities described in (aa) and (bb) above. This is based on the premise that conservation entities do not promote commerce, industry or agriculture. The limited scope of this exemption may act as a disincentive to engage in environmental conservation and/or rehabilitation. Paterson (2005) notes further that section 10(1)(cB)(cc) of the Income Tax Act used to afford an exemption for entities involved in conservation, but that this sub-section was repealed in 2000.

2.2.13 Income Tax: Section 10(1)(cN)

Section 10(1)(cN) exempts the receipts and accruals of any public benefit organization approved by the Commissioner in terms of section 30(3), to the extent to which such receipts and accruals are derived –

(i) otherwise than from any business undertaking or trading activity; or
(ii) from any business undertaking or trading activity –

(aa) if the undertaking or activity –

(A) is integral and directly related to the sole or principal object of the public benefit organization . . . ;
(B) is carries out or conducted on a basis . . . which is directed to the recovery of cost; and
(C) does not result in unfair competition in relation to taxable entities . . .

Section 10(1)(cN) may be read with section 18A in that whereas section 18A provides for a (limited) income tax deduction to the donor in respect of donations to public benefit organizations, section 10(1)(cN) provides an income tax exemption to the donee public benefit organization.

Paterson (2005: 210) notes that section 10(1)(cN) contains many restrictions that may have the effect of "undermin[ing] the viability of many current conservation organizations and discourages the formation of others".

Specific attention is drawn to the limits placed on the amounts that may be raised by such entities with the suggestion that these either be "relaxed or removed".

It is acknowledged that Paterson (2005) focuses on conservation entities, but it is submitted that the concerns raised in relation to the above-mentioned sections as they apply to conservation entities would apply equally to all entities concerned with environmental rehabilitation and reducing their carbon footprints.

2.2.14 Donations Tax: Section 56 of the Income Tax Act

Donations tax is levied in terms of sections 54 to 64 of the Income Tax Act. Section 54 specifically provides for the levy of donations tax on the disposal of any property by way of a donation. However, section 56 provides for certain exemptions from donations tax. Section 56(1)(h) exempts from donations tax donations to various persons, most notably public benefit organisations (which are exempt from income tax by virtue of section 10(1)(cN) of the Income Tax Act). Therefore this concession would apply together with the income tax deduction granted in terms of section 18A in that an income tax deduction (up to ten percent of income before the deduction and

allowing for medical deductions in terms of section 18) would be granted in respect of donations made to public benefit organisations as described above, and any such donation will not be subject to donations tax by virtue of section 56(1)(h).

2.2.15 The Value-Added Tax Act No. 89 of 1991

Currently there are no tax incentives offered in the Value Added Tax Act to encourage "green" compliance or investment in more environmentally friendly technology.

2.2.16 The Estate Duty Act No. 45 of 1955

Section 4(h)(i) of the Estate Duty Act provides for a deduction for estate duty purposes of any assets that are bequeathed to a public benefit organisation upon death, and section 4(h)(iA) provides for a similar deduction in respect of assets bequeathed to entities exempt from income tax in terms of section 10(1)(cA) that carry on public benefit activities. However, such concessions are not immediately available as the assets would only be transferred to the public benefit organisation after death, and the deceased person would not get the tax benefit of the deduction. This would be passed down to the heirs and legatees of the deceased to be enjoyed by them by way of pro-rata reductions in any estate duty liability for which they may be liable. Even in cases where no estate duty is payable, the benefit would still not be enjoyed by the deceased who originally intended that such assets should be left to the public benefit organisation.

2.2.17 The Transfer Duty Act No. 40 of 1949

In terms of section 9(c)(i) and (ii) of the Transfer Duty Act, public benefit organizations approved as such in terms of section 30 of the Income Tax Act and any institution, board or body falling within the provisions of section 10(1)(cA)(i) of the Income Tax Act engaged in public benefit activities are exempted from paying transfer duty on the acquisition of property. This concession may be seen as a concession similar to section 18A of the Income Tax Act, read with sections 10(1)(cA), (cN) and section 30 of the Income Tax Act. The scope of the transfer duty exemption is clearly very restrictive as entities must qualify as public benefit organizations before the exemption will apply. Paterson (2005) concurs that the

provision in relation to public benefit organizations is restrictive, suggesting that the exemption be opened up to include organizations that have not been registered as public benefit organizations to make the exemption more accessible.

In the 2012 National Budget Speech (National Treasury: 2012a) it was announced that South Africa intends to introduce a carbon tax. This tax will be punitive in nature. The proposed carbon tax is discussed in detail in chapter four.

2.3 CONCLUSION

In this chapter the relevant provisions of the Income Tax Act, the Value Added Tax Act, the Estate Duty Act and the Transfer Duty Act that provide incentives for environmental protection have been summarized.

However, all the Acts discussed provide few broad-based tax incentives for "green" compliance, and of those that have been promulgated, many are restrictive in their applicability. Most are only available to persons carrying on a trade, thus leaving private individuals without the opportunity of tax relief. Exceptions to this rule may be found in the provisions of section 18A of the Income Tax Act, section 56(1)(h) of the Income Tax Act and sections 4(h)(i) and 4(h)(iA) of the Estate Duty Act.

The limiting and restrictive nature of the exemptions afforded in terms of sections 10(1)(cA) and (cN) of the Income Tax Act and section 9(c)(ii) of the Transfer Duty Act as noted by Paterson (2005) are discussed. Although Paterson's (2005) work focuses on conservation for biodiversity, it is submitted that the concerns raised have universal applicability.

In contrast to introducing further tax incentives, South Africa intends to introduce a carbon tax, which will be punitive in nature.

Chapter three will focus on the various environmental policies instituted in selected international jurisdictions, and the success with which such policies have been implemented. This analysis will inform the discussion in chapter four on the development of an appropriate environmental policy for South Africa.

CHAPTER 3: ENVIRONMENTAL FISCAL POLICY IN SELECTED INTERNATIONAL JURISDICTIONS

3.1 INTRODUCTION

Chapter two described the environmental tax incentive measures currently provided for in the South African Income Tax, Value-Added Tax, Estate Duty and Transfer Duty Acts. It is noted that these Acts contain few broad-based tax incentive measures that would encourage investment in environmentally cleaner technologies. The incentive measures that are available are restricted in their applicability and are, in most cases, only available to particular classes of taxpayers. There is little in these statutes that would be to the benefit of individuals, and thus they have little fiscal incentive to invest in technologies that would enable them to contribute effectively to achieving reductions in greenhouse gases.

In addressing the third stated goal of this research, this chapter will focus on the implementation of environmental fiscal policies in selected international jurisdictions, particularly the United States of America, and certain Scandinavian and European countries in order to highlight the similarities and differences in the environmental fiscal reform policies implemented in those jurisdictions. It will be evident that certain of the selected international jurisdictions favour market-based instruments in the form of environmental taxes as the preferred mechanism to bring about reductions in greenhouse gas emissions. Environmental taxes are preferred because such taxes reflect the social (external) cost of environmental damage by way of price adjustments, and also act as an incentive to encourage and achieve behavioural change. Environmental taxes are also thought to be far more effective as a means to reduce greenhouse gas emissions than the quota system advocated by the Kyoto Protocol, which sets “arbitrary” targets with no guarantee that those targets are achievable.

The selected European and Scandinavian jurisdictions have adopted similar (punitive) environmental tax policies. It should be noted that in all the jurisdictions reviewed, the effectiveness of such environmental taxes has been compromised to a greater or lesser degree by political and other economic pressures.

By comparison, extensive use is made of broad-based environmental tax incentives in the United States of America, at both federal and State levels. In the Scandinavian and European countries tax incentive measures are almost non-existent, and there are only a few concessions that might be considered to be indirect tax incentives.

3.2 ENVIRONMENTAL TAX POLICY IN THE UNITED STATES OF AMERICA

In terms of the Kyoto Protocol (United Nations: 1998a) read with the United Nations Framework on Climate Change Status of Ratification (United Nations: 2006), the United States of America is an industrialized ("Annex I") country and is therefore bound to reduce its greenhouse gas emissions in accordance with targets set in terms of the Kyoto Protocol. Although bound by the terms of the Kyoto Protocol due to its status as an industrialized country, Nordhaus (2007) notes that that country subsequently withdrew from the Protocol in 2002.

Aside from environmental taxes (discussed below) the two mechanisms favoured to achieve reductions in greenhouse gas emissions in the United States are carbon taxes and "cap-and-trade" systems. "Cap-and-trade" systems permit carbon dioxide emissions up to a certain limit. Emitters who exceed their "cap" will be penalized by way of a tax (Jones Lang LaSalle: 2009). Conversely, unutilized emissions quotas could be sold to emitters who would otherwise exceed their own "caps". "Cap-and-trade" systems are not universally supported in the United States of America with some environmentalists and leaders favouring taxes on carbon dioxide emissions. For example, Lawrence Summers, former United States of America Treasury Secretary (2007, in Aldy, Ley and Parry (2008: 493)) notes: "'I prefer carbon and/or gasoline tax measures to permit systems … because the latter are likely to be more economically inefficient and to be regressive'". Zedillo (2008, in Aldy, *et al.* (2008: 493-494)) also favours the introduction of carbon taxes over quota systems, stating that carbon taxes would result in "an internationally harmonized carbon price", and that carbon taxes would provide the easiest mechanism for compliance, as well as "'let[ting] poor countries move toward the agreed trajectory of carbon prices more slowly than rich countries'".

3.2.1 Environmental Taxes in America

The Nixon Administration first proposed the introduction of taxes on fuels in 1970 and on sulphur dioxide in 1972. Taxes on automobiles were introduced in 1978 and taxes on chemicals in 1980 (Milne: 2008). A primary motivating factor in the decision to promote the implementation of such taxes is that the polluter should be accountable for the environmental damage caused by its emissions. President Richard Nixon (1970, in Milne (2011: 418)) stated:

> The fight against pollution . . . [results] . . . from a failure to take into account the full consequences of our actions. . . . by ignoring environmental costs we have given an economic advantage to the careless polluter over his more conscientious rival.

Milne (2011) explains that various Acts were passed including the National Environmental Policy Act and the Clean Air Act, and that the tax policies introduced were informed by issues relating to economic competitiveness, with border tax adjustments for imported goods, and exemptions on certain goods. She states further (2011:431) that the introduction of the automobile tax was also fundamentally problematic in that "non-passenger" vehicles and sport utility vehicles were exempted from the tax. The rate of the automobile tax has remained static since 1990 and fuel efficiency standards have not been reviewed since the tax was implemented. It is submitted that in these respects, the automobile tax is outdated. Milne (2011) supports this view.

In 1993 the Clinton Administration proposed a broad-based energy tax determined in British Thermal Units (BTUs). However, the introduction of the tax was primarily motivated by the desire to reduce America's budget deficit (Milne: 2011). The associated benefits for the environment in terms of combating pollution and the incentive to change to the use of renewable energy sources were acknowledged as secondary considerations (Milne: 2008). Being broad-based in its design, it was intended to cover all forms of fuel, including nuclear and hydropower, and was intended to supply a deficit-reducing revenue stream of approximately $22 billion per annum. However, the tax was not universally accepted by the American Senate.

The failure of the Clinton Administration's broad-based BTU tax may largely be attributed to political and economic concerns (Milne: 2008). Whereas the Clinton Administration suggested that a broad-based energy tax would "treat all states relatively equally" (Milne, 2008: 11), counter-arguments were advanced, including:

- people required to travel long distances (and especially where no public transport is available) would be "disproportionately affected" (Milne, 2008: 10); and
- States that are coal intensive in terms of production and dependence for energy would be affected more than states that could rely on other forms of energy.

Furthermore, Milne (2008) notes that President Clinton had prior to his election opposed large fuel tax increases and the introduction of a broad-based energy policy would have presented some serious challenges to his policy stance. In addition, a carbon tax (levied only on carbon dioxide emissions) would not have found favour with coal-intensive states. The Clinton Administration's proposed BTU tax was subjected to further political manipulation, with proposals to extend the exemption from the tax granted to renewable energy to certain energy sources that were in high domestic demand.

The Clinton Administration intended to levy the tax on industries at the point of entry into the system, but allowed itself to be persuaded to levy the tax at the point of consumption. Environmentalists objected on the basis that "imposing the tax on electric utilities would give them a greater incentive to invest in cleaner energy" (Milne, 2008: 13-14). Ultimately the proposed tax was scrapped and replaced with, *inter alia*, an increase in the fuel tax.

3.2.2 Tax Incentive Measures

Since the failure of the proposed Clinton BTU tax, Milne (2011: 440) notes "the Federal government has not enacted any new or significantly increased environmental taxes". Environmental policy has shifted from "revenue side" taxes to "expenditure side" mechanisms incorporating the use of broad based tax incentives.

America's decision to refuse to ratify the Kyoto Protocol was ascribed to a perceived threat to the United States' economy (West: 2008; Crabtree: 2009). However, it is submitted that lack of American support for the Kyoto Protocol should not be viewed as a lack of interest in environmental reform. When the United States withdrew from the Kyoto Protocol the then Republican Administration tabled alternatives to the Kyoto Protocol to encourage *voluntary* reductions of greenhouse gases by means of incentive measures.

West (2008) notes the voluntary reductions policy would actually have realized a thirty percent increase in carbon dioxide emissions on 1990 levels, since the baseline emissions level used in the Bush administration's projections was based on 2001 levels, and not the 1990 level set by the Kyoto Protocol.

Although the voluntary reductions incentive would have realized the opposite consequences in terms of reductions in emissions, the Republican Administration favoured the use of incentive measures in preference to taxation measures, enacting tax incentives for investment in alternative fuel sources and energy-efficient buildings (Milne: 2011).

In 2009 the Obama Administration instituted plans to intensify American environmental policy efforts by committing the United States of America to an eighty percent reduction in greenhouse gas emissions by 2050 (Jones Lang LaSalle: 2009). To this end broad-based federal incentives have been enacted. Milne (2011: 440-441) notes that such incentives are aimed at energy efficiency, conservation and the use of cleaner energy sources, including *inter alia*:

- tax deductions for environmental rehabilitation and conservation; and
- a range of tax credits for investment in energy efficient buildings (commercial and residential), energy generated from non-fossil fuel sources, use of bio-fuels, investment in clean energy manufacturing, and carbon capture.

Jones Lang LaSalle (2009) supports tax such tax incentives at both Federal and State levels.

Aldy, *et al.* (2008) notes that much emphasis is being placed on the development of technology for carbon capture and storage in the United States. If such research is successful, this might provide scope for further tax incentives for firms that invest in such technology. Notwithstanding the cost considerations, the availability of tax incentives provides consumers with a greater impetus to change to cleaner technologies, than taxation systems that are purely punitive in nature.

Furthermore, Bourgeois, Breaux, Chiasson and Maldin (2010) note that the availability of tax incentives for green compliance may be the primary factor in deciding whether firms will "go green", given the extremely high capital expenditure considerations associated with "green" technology, and the financial constraints associated with converting to cleaner technologies.

The United States has promulgated tax incentives at State as well as Federal level, although it is submitted that at State level, tax incentives are far more comprehensive. Garrison (2009) analyses the various state tax incentives available in the United States of America in detail on a State-by-State basis. The summary of State-by-State incentives is adapted from Garrison (2009):

STATE	**TAX INCENTIVE/(S)**
Alabama	*Income Tax:* Deduction in respect of installation costs for change from gas or electricity to wood for domestic heating. Granted in the year the conversion is completed.
Alaska	No income tax, sales tax or property tax incentives currently. Private applications to the Alaska Energy authority are considered.
Arizona	*Income Tax:* Deduction granted in respect of: • rated energy efficiency, capped at $5 000 per dwelling (expired 31 December 2010); • cost of conversion of wood fireplace to "qualified" wood stove, wood fireplace or gas fireplace. Tax credit granted in respect of:

	• solar powered energy source acquired for non-residential use (expires 31 December 2012); • installation of solar power in domestic dwellings. *Sales Tax:* Exemption granted for: • retailers selling solar energy devices; • contractors who install solar energy devices (expired 1 January 2011). *Property Tax:* Exemption in respect of installations for production of solar energy for on-site consumption. Property tax assessed on 20% of the depreciated cost of renewable energy equipment (valid to 31 December 2040).
Arkansas	No income tax, sales tax or property tax incentives currently. “Consumers’ Guide to Renewable Energy” is available.
California	*Property Tax:* Incentive granted for (thermally isolated) solar energy devices used for energy storage.
Colorado	*Sales Tax:* Tax credit offered at municipal and county level for installation of renewable energy devices. *Property Tax:* Tax credit offered for installation of renewable energy devices. Property tax exclusion equal to the incremental cost per kilowatt of renewable energy facilities over the construction cost of comparable non-renewable energy facilities.
Connecticut	*Sale Tax:* Exemptions granted for: • weatherization products; • compact fluorescent light bulbs; • solar energy systems. *Property Tax:* Exemptions in respect of solar energy systems, renewable energy.

Delaware	No income tax, sales tax or property tax incentives currently. Cash incentives available for installation of renewable energy.
Florida	*Income Tax:* Renewable energy production tax credit equal to 1 cent per kilowatt hour (expired 31 December 2010). Grants awarded for research and development into renewable energy. Variable rebates in respect of solar heating systems (expired 30 June 2010). *Sales Tax:* Sales tax exemption in respect of: • solar energy systems; • hydrogen fuelled fixed equipment used for energy generation. *Property Tax:* Exemption on "improved real property" using renewable energy.
Georgia	*Income Tax:* Variable capped income tax concessions for installation of solar-powered heating systems (expires 31 December 2012). *Sales Tax:* Annual limited period tax holiday granted for the purchase of energy efficient items. Sales tax exemption for biomass products.
Hawaii	*Income Tax:* Individual and corporate income tax credits for installation of renewable energy systems.
Idaho	*Income Tax:* Deduction granted to individuals in respect of the installation of any alternative energy device. *Sales Tax:* Rebate in respect of acquisition of any machinery or equipment used to generate a quantified amount of electricity (expired 1 July 2011). *Property Tax:* Exemption replaced by wind or geothermal power tax on electricity generation equal to 3% of wind or geothermal energy savings.

Illinois	*Property Tax:* Concession in respect of wind and solar powered energy systems.
Indiana	*Income Tax:* Tax credit in respect of the cost of designated heating and cooling equipment on an annual basis. *Property Tax:* Property tax exemption in respect of solar heating or cooling systems.
Iowa	*Income Tax:* Variable income tax credits granted in respect of: • production or acquisition of renewable energy (expired 1 January 2012); • wind energy production (expired 1 January 2012). *Sales Tax:* Exemption in respect of wind power conversion and materials purchased to produce electricity from wind power. *Property Tax:* Reduced property valuations at municipal and county level on properties using wind power. Exemption in respect of: • any property used to convert methane gas for energy production; • installation of solar energy systems that do not improve the value of the property.
Kansas	*Property Tax:* Exemption granted in respect of: • property used to generate electricity from renewable energy; • property used to collect, transport or refine landfill gas.
Kentucky	*Income Tax:* Tax credit in respect of: • additions to domestic residences that are energy efficient in nature; • installation of solar heating systems in domestic and commercial buildings; • energy efficient lighting, heating and cooling systems used in commercial properties (effective until 1 January 2016); • construction of designated energy-efficient houses (effective until 1 January 2016);

	• various income tax credits and concessions for "eligible projects". *Sales Tax:* Refunds on property used: • to construct or upgrade alternative fuel and renewable energy facilities; • in processes that increase output with lower energy consumption.
Louisiana	*Income Tax:* Tax credit in respect of installation of wind or solar energy systems. *Property Tax:* Exemption for solar powered systems used to run residential buildings and swimming pools.
Maine	No income tax, sales tax or property tax incentives currently. The State has programmes to promote the efficient use of electricity.
Maryland	*Income Tax:* Varied tax credits relating to: • cost incurred in constructing, or converting existing buildings, to "green" buildings; • installation of fuel cells relying on alternative energy sources; • solar panels installed in "green" buildings; • installation of wind turbines in "green" buildings (expired 31 December 2011); • production of electricity from alternative energy sources (expired 31 December 2011). *Property Tax:* Concessions for: • installation of solar heating and cooling systems; • properties that use solar energy and other energy efficient forms of heating and cooling (granted at county and municipal levels).
Massachusetts	*Income Tax:* Deductions in respect of: • transfer of intellectual property used for energy conservation; • installation of energy efficient systems for heating and cooling.

	Tax credit granted in respect of renewable energy sources. *Sales Tax:* Exemptions granted for: • acquisition costs of equipment to heat residences, using alternative energy sources including solar, wind and hydro-power. *Property Tax:* Exemptions granted in respect of properties that make use of solar, wind and hydro-power for heating purposes.
Michigan	*Income Tax:* Tax credit granted for "home improvements" (expired 1 January 2012). *Property Tax:* Exemption granted on properties that make use of alternative energy sources (expires 1 January 2013).
Minnesota	*Sales Tax:* Exemptions for solar and wind conversion systems. *Property Tax:* Exemption in respect of solar energy systems.
Mississippi	No income tax, sales tax or property tax incentives. The State has programmes to promote the efficient use of energy.
Missouri	*Income Tax:* Deduction granted in respect of costs incurred in undertaking a "home energy audit" (expires 31 December 2013); Tax credit granted to wood energy producers for products produced from Missouri forests. *Sales Tax:* holiday in respect of new energy efficient appliances on an annual basis.
Montana	*Income Tax:* Tax credit granted in respect of: • installation costs of energy conserving water, heating or cooling systems. (A tax deduction is also granted in respect of the above. Such deduction extends to commercial and residential buildings); • individuals for the installation of low emission wood or biomass combustion or other "non-fossil" energy systems; • individuals for the construction of new residences with geothermal system;

	• individuals and corporate entities that install alternative energy systems. *Property Tax:* Limited period property tax reduction where alternative energy systems have been installed. Exemptions granted in respect of: • equipment using alternative energy to produce energy; • property making use of low emission or biomass combustion devices, or other "non-fossil" energy sources. Such exemption is available to commercial and residential property).
Nebraska	*Sales Tax:* Exemption granted in respect of property used in a "community-based energy development project".
Nevada	*Property Tax:* Abatements granted in respect of: • buildings rated in terms of "Green Building Rating System"; • property used for generation of energy from alternative energy sources. Exemption granted in respect of residential, commercial or industrial properties that employ heating and cooling systems using wind, solar, geothermal or hydropower, or converted solid waste.
New Hampshire	*Property Tax:* Exemptions for properties employing solar energy systems.
New Jersey	*Sales Tax:* Exemption for the sale of solar energy systems. *Property Tax:* Exemption granted in respect of properties having renewable energy systems.
New Mexico	*Income Tax:* Tax credit in respect of: • construction of sustainable buildings (expires 31 December 2013); • installation of solar heating systems (expires31 December 2015); • production of renewable energy (expires 1 January 2018).

	Sales Tax: Deduction of sales tax on: • equipment used to produce bio-energy and other bio-products; • installation of solar energy systems.
New York	*Income Tax:* Tax credits granted for: • "greening" buildings; • installation of alternative energy "fuel cells" in a "green" building; • installation of solar energy systems; • installation of ozone-friendly air-conditioning in a "green" building (expired 31 December 2009). *Sales Tax:* Exemption in respect of the installation and servicing of residential solar heating systems. *Property Tax:* Exemptions granted for: • residential homes using energy conserving heating methods; • properties utilising solar or farm waste energy systems (expired 1 January 2011). Property tax abatement granted for properties utilizing solar electric generating systems in large urban areas (expires 15 March 2013).
North Carolina	*Income Tax:* Tax credits granted for: • cost of residential, commercial or other property that uses renewable energy (expired 1 January 2011); • persons making donations to non-profit organizations for the purpose of producing the above-mentioned property. *Sales Tax:* Holiday granted on the sale of energy efficient products for limited period annually. *Property Tax:* Exemption granted in respect of properties employing solar electric systems.
North Dakota	*Income Tax:* Tax credit for the installation of alternative energy devices, including solar, wind, geothermal, biomass) (expired 1 January 2011).

	Property Tax: Exemptions granted for: • installation of heating and cooling systems using alternative energy sources. Property tax reduction for the installation of wind turbine electricity generation unit (expired 1 January 2011).
Ohio	*Franchise Tax:* Exemption granted for "an exempt facility". *Sales Tax:* Exemption granted for "an exempt facility". *Property Tax:* Exemption granted for "an exempt facility".
Oklahoma	*Income Tax:* Tax credit for: • the construction of energy efficient buildings; • the production and sale of electricity from "zero emissions facilities".
Oregon	*Income Tax:* Tax credits granted for; • solar and fuel cell systems; • wind powered electric systems; • energy conserving equipment used to heat swimming pools; • energy efficient appliances (expires 1 January 2016); • the cost of energy conserving facilities. *Property Tax:* Exemption granted in respect of property utilizing solar, geothermal, hydro, or water powered heating and cooling systems (expired 1 July 2012).
Pennsylvania	*Income Tax:* Tax credit grated for taxpayers who invest in alternative energy production projects (expires 1 January 2017). *Property Tax:* Exemption excluding wind turbines in the value of the property being assessed (limited period of applicability – expired in January 2007).
Rhode Island	*Income Tax:* Tax credit afforded to persons installing "eligible" renewable energy systems in their residences. *Sales Tax:* Exemption in respect of the sale of solar heating systems.

	Property Tax: Exemptions and concessions afforded on properties that have installed renewable energy systems.
South Carolina	*Income Tax:* Varied tax credits granted in respect of: • installation of solar energy systems; • use of methane gas in manufacturing; • installation of heating systems powered at least to the extent of 90% by biomass products. *Sales Tax:* Concessions as follows: • limitation on the tax levied on certain energy efficient homes; • sales tax holiday is granted for a limited period annually on the sale of energy efficient appliances purchased for non-commercial use (expires 31 October 2019); • sales tax exemption on any equipment powered by, or used to produce or distribute hydrogen, and materials used in construction of building or machinery using hydrogen technology within research areas.
South Dakota	*Income Tax:* Alternative tax in lieu of state tax levied on companies operating wind farms for power generation. *Property Tax:* Tax credit afforded in respect of residential or commercial property employing renewable energy sources. Property tax exemption granted in respect of the property value attaching to wind turbines and blades on wind farms.
Tennessee	*Property Tax:* Assessed value reduction in respect of commercial or industrial property utilizing wind energy.
Texas	*Franchise Tax:* Deduction granted in respect of the cost of solar systems. *Sales Tax:* Annual limited period tax holiday on energy efficient products. *Property Tax:* Exemption granted in respect of the installation of solar or wind powered energy systems.

Utah	*Income Tax:* Tax credit for: • installation of residential and commercial energy systems; • production and use or sale of electricity produced by energy systems powered by wind, geothermal power, or biomass equipment. *Sales Tax:* Exemption granted in respect of assets used in producing renewable energy (expired 30 June 2009).
Vermont	*Income Tax:* Tax credit for investments in energy systems. *Sales Tax:* Exemption granted for personal assets used in a self-contained property that generates its energy from solar power. *Property Tax:* Concession granted to towns to exempt real and other property using alternative energy sources.
Virginia	*Sales Tax:* Limited period tax holiday granted on the sale of energy efficient products (expired 1 July 2012). *Property Tax:* Exemptions granted for: • properties exceeding accepted energy efficiency standards; • properties employing solar power and recycling equipment.
Washington	*Sales Tax:* Exemption granted on: • assets using solar, wind, fuel cell, or landfill gas technology; • solar heating equipment (extends to replacement parts and labour costs of repair work). (Both these exemptions expired on 30 June 2009).
West Virginia	*Income Tax:* Concessions granted in respect of energy generating capacity and wind turbines. *Sales Tax:* Limited period tax holiday exemption granted on energy efficient assets acquired for domestic use (valid for 7 days in September 2008, and 91 days in each of the 2009 and 2010 calendar years).

	Property Tax: Tax reduction on wind turbines installed at wind power project sites.
Wisconsin	*Property Tax:* Exemption for properties that have solar and wind energy systems installed.
Wyoming	*Sales Tax:* Exemptions granted in respect of: • assets used in energy production processes using wind, hydro, or geothermal power or land fill gas, biomass of hydrogen (expired 30 June 2012); • Use tax exemption on the above mentioned assets (expired 30 June 2012).

[Adapted from Garrison (2009: 44-66)]

It is clear from the summary above that the majority of income tax incentives are granted by way of direct tax credits; income tax deductions are not granted as widely. It is submitted that the incentive in the form of a tax credit is preferable from the taxpayer's point of view as the tax liability is reduced directly, as opposed to being directly linked to the taxpayer's marginal rate of taxation, a view supported by Milne (2011).

Sales tax incentives generally take the form of exemptions, although not all exemptions are permanent; the exemptions are in some cases granted for limited periods, usually at the same time of year (September to November annually).

Property tax incentives are invariably granted on the basis of an exemption based on energy efficiency, or a reduction in the assessed value of the property.

Although the enacted incentives are not universal across all States, such incentives are generally aimed at encouraging investment in energy efficient building and equipment, and the use of alternative energy sources that do not require coal power or other fossil fuels. Great emphasis is placed on the use of wind-, hydro- and geothermal power, and the use of biomass materials (in some States) and even recycling of landfill gas.

In States that do not have any specific corporate, individual, property or sales tax incentives, other state-specific renewable energy programs are available (Garrison, 2009: 44).

Certain States' incentive packages are involved and complex, with maximum caps placed on the percentage credits and deductions afforded. In addition, carryovers of the credits or deductions are permitted, in some cases for up to ten years after the purchase or installation expense is incurred, in respect of which the credit or deduction is being claimed. The incentive packages available in the United States are far more sophisticated than the incentive allowances that are available in South African tax legislation. In South Africa the use of energy efficient products and non-fossil fuel power is encouraged, but from a fiscal point of view the range of incentives available in the various American States are far more broad-based compared to South African incentives. The United States' incentives are granted in respect of investments in cleaner and more efficient technology, and are not granted based on the activity profile of the person making the investment (i.e. whether or not the investor is a trader or whether the investment is made in the production of income).

The tax incentives listed above are not all permanently available; a detailed examination of Garrison's (2009) analysis indicates that some are once-off concessions. Others have short windows of applicability; some have, at the time of writing, expired. There are incentives that are due to expire at the end of 2012; others will be available for periods extending beyond 2020. The fact that certain incentives have already expired is not an indication that they will not be replaced with new incentives in the future.

Therefore it is it is submitted that "expenditure side" mechanisms such as environmental tax incentives that might bring about the necessary changes in technology and behaviour are an important consideration, whether introduced independently or in conjunction with "revenue side" instruments such as carbon taxes.

3.3 ENVIRONMENTAL TAX POLICY IN SCANDINAVIA

Speck (2008) states that Scandinavia has had a carbon tax regime for many years; transport taxes including taxes on gasoline were introduced in Denmark in 1917 and

in Sweden in 1924. Sweden introduced taxes on mineral oils and coal in 1957. Finland introduced carbon taxes in 1990, and such taxes have also been introduced in other European and Scandinavian countries, including Sweden, Denmark, Germany, the Netherlands, Norway, Poland, Slovenia and the United Kingdom (Speck, Skinner, Hogg & ten Brink: 2005). Many Scandinavian countries have introduced other environmental taxes, including taxes on various forms of air pollution, water, waste, and a variety of products (Speck, *et al.*: 2005). Given that the use of carbon taxes has become more prevalent in Scandinavian countries, especially since the early 1990s (Speck: 2008), it is appropriate from the perspective of this research to examine the implementation of carbon taxes in Scandinavia.

Speck (2008) observes that, as with the Clinton Administration's proposed BTU tax in America, environmental concern was not the main motivating factor for the introduction of carbon taxes in Scandinavia – the introduction of taxes was originally advocated, *inter alia*, as a means to raise revenue. In the 1980s environmental taxes were introduced as a mechanism for environmental protection, under the premise that the "polluter must pay". The purpose of the "polluter pays principle" is to account for the social cost of environmental pollution (referred to as externalities) so that these costs are reflected in the total energy price.

South Africa has taken the same stance on the introduction of carbon taxes (National Treasury: 2010). South African environmental policy is discussed in detail in chapter four.

Speck (2008) refers to the studies of Pigou (1932) and Baumol and Oates (1971) which concluded that the most effective tax would be a uniform tax across all energy types in order to "[equalize] marginal costs so that the total cost of abatement would be minimized" (Speck, 2008: 36), and that this would achieve optimal efficiency (Nordhaus: 2007).

European Union countries, however, grant full or partial exemptions and/or rebates to selected industries and do not have uniform tax rates across all energy types (Speck: 2008).

Barker, Junankar, Pollitt & Summerton (2007, in Speck (2008)) observe that uniform tax rates could potentially lead to relocation of industries to countries that impose environmental taxes at lower rates, leading to higher emissions in countries that do not have environmental taxes (Speck: 2007, in Speck (2008)).

Various Scandinavian countries have different environmental taxation policies and the extent to which taxes are levied and the extent of the sector exemption or rebate granted, varies by country.

3.3.1 Sweden

Environmental taxes in Sweden extend to include not only a carbon tax, but also an energy tax, a sulphur tax, a nitrogen oxides tax, a tax on nuclear power generation and value-added taxes on energy. The rates at which these various taxes are levied differ between taxes and their scope of applicability is not uniform across all sectors. For example, the industrial sector only pays carbon taxes at the rate of fifty percent of the general carbon tax rate, and is not subject to energy taxes at all (Johansson: 2000).

Speck (2008) documents the introduction of various environmental taxes in Sweden. Sweden first introduced energy taxes in 1924 with a tax on gasoline, extending the range of energy taxes to cover diesel (1937), mineral oil and coal (1957), liquid petroleum gas (1964) and natural gas (1985). Environmental tax reform in Sweden has been on-going – in 1991 a carbon dioxide tax and a sulphur tax were introduced. The nitrogen oxides tax was introduced in 1992. The introduction of the carbon dioxide tax enabled Sweden to cut income taxes by 4.6% of GDP in 1991, the reduction of income taxes being a key political motivator for its introduction. Currently, Swedish environmental policy applies differential carbon tax rates for different energy types, and levies these taxes at differential rates by industry. Prior to 1993, when Sweden introduced exemptions for industry, forestry, fishing and agriculture, no tax concessions had been granted at all, resulting in Sweden levying the highest energy taxes in Europe.

The above-mentioned industries are still exempted from paying energy taxes and are liable for a reduced tax in respect of carbon dioxide.

Unlike many other European countries, Sweden linked its environmental taxes in 1995 to the Swedish Consumer Price Index, and this has ensured that the real rates of tax are kept constant (Speck: 2008).

Johansson (2000) notes the characteristics peculiar to the Swedish energy system, *inter alia*:

- electricity production that is almost totally non-reliant on fossil fuels – nuclear and hydro-power are being used to provide energy in preference to energy sources derived from burning fossil fuels;
- twenty seven percent of the total energy demand is met from renewable energy sources, and fifteen percent is met from biomass and hydro-power;
- low population density and an abundance of forests which provides an abundance of potential bio-energy; Swedish industry is heavily reliant on bio-fuels and the by-products of industrial processes may be used to meet the internal energy demand.

Possibly the greatest result of the introduction of environmental taxes in Sweden is a change in the demand structures for various fuel types. For example, Johansson (2000) observes that over the period 1990 to 1998, demand for wood-based fuels for District (Municipal) heating purposes increased from approximately 4 TeraWatt hours per annum to approximately 15 TeraWatt hours per annum, whereas the demand for crude oil increased from almost 0 TeraWatt hours per annum to approximately 2 TeraWatt hours per annum. The rate at which demand for wood products increased is greater than that for crude oil. Although the greatest increase in demand is for wood fuels, there has also been an increase in the demand for bio-fuels for electricity generation. By comparison, the implementation of the Swedish environmental tax regime in the industrial sector has been rather limited in its effect. Reasons advanced for this are as follows:

- lower taxes in the industrial sector compared to other sectors;
- the economy was not wholly or mainly fossil fuel-reliant when carbon taxes were introduced; and
- low priority given to energy costs in the Swedish industrial sector as energy is considered to be a relatively cheap component in that sector.

Despite the limited effect in the industrial sector, the Ministry of Environment (1997, in Johansson (2000)) indicates that the environmental reform of 1991 did have positive effects in terms of carbon dioxide emissions.

Its statistics indicate that carbon dioxide emissions in 1995 were fifteen percent lower that they would have been without fiscal intervention. Estimates for the year 2000 indicated that carbon dioxide emissions would have been twenty to twenty five percent higher in the absence of the reforms. Ninety percent of this is attributed to environmental reform, the balance to efficiency savings and grants.

The sulphur and nitrogen oxide gas emissions taxes have also had positive effects. The Swedish Environmental Protection Agency (1997a, in Johansson (2000)) provides emissions reductions figures for sulphur and nitrogen oxide gases:

- sulphur tax: thirty percent reduction on 1989 emissions over the period 1989 – 1995; and
- nitrogen oxide tax: sixty percent reduction in emissions over the period 1990 – 1995. Approximately eighty percent of this reduction is due to the nitrogen tax.

These statistics indicate favourable results in reducing carbon dioxide emissions, although it is submitted that the system employed in Sweden is not as efficient as it might be. Johansson (2000) alludes to political interference with the implementation of environmental taxes and more specifically, a reticence to introduce carbon taxes on electricity generation in the 1990s. These factors, coupled with the introduction of investment grants for wind power generation and biomass power, would have reduced the effect of such a tax. The use of renewable energy was a government priority at that time, but differential grants for wind power versus biomass power point to political agendas at both governmental and municipal levels.

The Swedish experience regarding political interventions is not isolated; Aldy, *et al.* (2008) and Bruvoll and Larsen (2004) both found political interference to be a contributing factor to the efficiency of carbon tax regimes, especially in Denmark, Finland and Norway.

3.3.2 Norway

In Norway carbon taxes have been in effect since 1991, but Bruvoll and Larsen (2004) note that of the total fourteen percent reduction in greenhouse gas emissions due to the adoption of alternative energies and changes in energy mix, only two percent of these reductions is attributable to carbon taxes. The small contribution of carbon taxes to achieving reductions in greenhouse gas emissions is largely attributed to, *inter alia*, exempting certain sectors from the tax and inelastic demand in sectors subject to the tax. It is submitted to be trite that granting of exemptions would negate the effectiveness of a carbon tax in those sectors where exemptions are granted. Inelasticity of demand in sectors subject to the carbon tax is thought to be as important a consideration in evaluating the effectiveness of the tax as the granting of exemptions. The reason advanced is that where demand is inelastic, consumption patterns would not be greatly affected by the implementation of a carbon tax, thus weakening the potential effectiveness of the tax in terms of achieving reductions in emissions.

The petroleum industry comprises a large sector of the Norwegian economy, accounting for twenty five to thirty percent of its carbon dioxide emissions (Bruvoll & Larsen: 2004). Carbon dioxide emissions per unit GDP in Norway fell by 12 percent between 1990 and 1999, but this is ascribed more to energy substitution than carbon taxes (Bruvoll & Larsen, 2004: 501). Other factors affecting the effectiveness of carbon taxes in Norway include:

- differential carbon tax rates per sector (i.e. non-uniform implementation across sectors); and
- carbon tax exemptions in certain (fossil fuel) industries.

Sectors that enjoy lower carbon taxes, such as paper and pulp, can substitute other energy forms thus weakening the effect of the carbon tax, although further greenhouse gas reductions may be achievable in that sector in the face of higher carbon taxes (Bruvoll & Larsen: 2004).

It is noted that the sectors that have been exempted from the carbon tax have been granted exemptions in a bid to maintain competitiveness (Bruvoll & Larsen: 2004).

In the absence of sector exemptions, many of these (such as metals and industrial chemical sectors) may be unprofitable (see Bye & Nyborg (1999), and Sutherland (1998), both in Bruvoll & Larsen (2004)). Nonetheless, differential tax rates by sector and sector exemptions impact negatively the effectiveness of the carbon tax policy. It is recognized that uniform carbon taxes are required across all sectors if the implementation thereof is to be optimal (see Hoel (1996); Aldy, *et al.* (2008)).

Therefore the Norwegian and Swedish environmental policy regimes would appear to be similar in that carbon taxes were introduced in both countries in 1991. Furthermore both countries have experienced positive results in terms of reductions in greenhouse gas emissions. However, the carbon and other taxes introduced have not been optimally successful, given political concerns. The introduction of environmental taxes at differential rates and the granting of rebates are also limiting factors when considering the optimal potential for such taxes in achieving reductions in greenhouse gas emissions.

3.3.3 Denmark

Speck (2008) observes that environmental tax reform in Denmark commenced in the early 1990s with the introduction of three taxes in the form of an energy tax, a sulphur tax and a carbon dioxide tax. Having introduced carbon taxes at the same time as Sweden and Norway the Danish energy tax system, like that of Norway and Sweden, is not uniform as taxes are not applied consistently across all sectors. For example, the energy tax is payable in full on industrial space heating, but is fully exempted in industries involved in processing. Partial or full carbon dioxide tax exemption is granted based on the nature of the process and whether the industry has entered into agreements for energy efficiency with the Government. Carbon dioxide taxes are still levied on space heating.

3.4 CARBON TAX POLICY IN OTHER EUROPEAN COUNTRIES

It would appear that the implementation of environmental policies in Europe is in many respects similar to those implemented in Scandinavia. Sector-specific rebates and exemptions are recognized to be defining characteristics of European carbon tax policy (Ekins & Speck (1999, in Bruvoll & Larsen (2004: 497))).

3.4.1 Germany

Energy has been taxed in Germany for over sixty years, but coal has only been taxed since 2007 (Speck: 2008). This range of taxes has been systematically broadened since 2007, with taxes now levied on gasoline, diesel, oil and heating fuels. The German system makes provision for tax relief to selected industries including, *inter alia*, manufacturing, agriculture, forestry and fishing industries. The exemption only applies where energy use exceeds a given amount. Further exemptions are granted specifically to the manufacturing industries. Because German energy and carbon taxes are recycled in order to reduce company pension contributions, the manufacturing industry will qualify for a refund of energy taxes "where the energy burden is greater than [the] tax relief from the reduction in the pension fund contributions paid by the company" (Speck, 2008: 49).

3.4.2 The United Kingdom

The taxation system in the United Kingdom is not as complex as the policies of the countries referred to above, as tax is not levied on the different types of energies and fuels, with the exception of an energy tax on transport fuel (Speck: 2008). Instead, a general consumer tax, the Fossil Fuel Levy, was introduced, with these tax revenues being used to subsidize renewable energy. The Fossil Fuel Levy was reduced to zero percent in 2003, and was replaced with the Climate Change Levy, originally implemented in 2001. All commercial and industrial entities that use fossil fuels for production and heating are subject to this levy, while domestic households are exempted. Similar to policies adopted in other countries where energy and carbon taxes are recycled; in the United Kingdom the Climate Change Levy is applied to reduce social security contributions.

Due to concerns over the United Kingdom's international competitiveness, an exemption from the Climate Change Levy exists for high energy industries where it can be shown that the industry concerned has complied with set energy efficiency guidelines (Speck: 2008). Therefore this is yet another example of where carbon taxes have been introduced, but a lack of uniformity exists across all sectors.

3.5 CONCLUSION

This chapter has focused on environmental tax policy development and reform in selected international jurisdictions, including the United States of America and selected Scandinavian and European countries.

Although it is acknowledged that many other European countries have developed environmental protection policies, the countries discussed were selected to illustrate the range of environmental taxes and levies and incentive measures that could be applied in South Africa.

All the countries analysed have legislated energy and carbon tax policies. These policy interventions are "revenue side" mechanisms, designed to generate revenue for the taxing authority and are based on the principle that the polluter must pay to compensate for the social costs of any environmental damage for which it is responsible. The ultimate motivation behind levying such taxes is to make polluters financially liable for their emissions and to ensure that products reflect the full cost of environmental pollution.

It has been noted that the United States of America is an "Annex I country" and is bound by the Kyoto Protocol to reduce its greenhouse gas emissions even though that country subsequently withdrew from the Protocol over fears that its economic growth would be negatively affected. In spite of this, America has had an energy tax regime in place since the early 1970s, motivated by the need to acknowledge the costs of environmental degradation, and ignoring these costs would create unfair economic opportunities.

The proposed introduction of a broad-based British Thermal Unit energy tax in 1993 was motivated primarily by the desire to improve the American budget deficit (Milne: 2011), but encountered opposition on the basis of unfair exposure to the tax. Nonetheless, the United States has continued to impose carbon taxes. Despite the problems experienced with the implementation of broad-based energy taxes, unlike the other countries analysed, America views the use of "expenditure side" tax incentive measures for achieving reductions in greenhouse gas emissions favourably, and these incentive measures have been introduced *in conjunction* with punitive

carbon taxes.

The Scandinavian countries discussed have also had long-standing environmental tax policies, with carbon taxes being the latest of the various environmental taxes to be promulgated. The literature reviewed indicates that the various energy and carbon taxes legislated in these jurisdictions have been successful in achieving reductions in greenhouse gas emissions. However, political pressures and inconsistent concessions granted to the various industries in those countries have diminished the potential for these taxes to achieve reductions in emissions.

Energy taxes have similarly formed part of German environmental policy. Whereas the Scandinavian countries discussed introduced carbon taxes in the early 1990s, Germany followed more recently, introducing carbon taxes in 2007. Certain industries are afforded exemption from environmental taxes. It is submitted that this must have an impact on the efficiency of the taxes, as well as the quantum of revenue that could potentially be derived. Energy taxes are recycled within the German economy to subsidize employment costs.

English environmental policy is, by comparison, less sophisticated than in the other countries investigated with only one energy tax and a levy placed on all industries consuming fossil fuels. Domestic households are exempted from the latter tax. As in Germany, the revenue from these levies is recycled within the economy.

Therefore it is submitted that although the various taxing jurisdictions may have different policies in terms of the taxes that are levied, economic competitiveness is submitted to be a common factor affecting all of them.

In all cases the effectiveness of such taxes has been compromised by political and economic agendas and the potential revenues that were expected have not been realized.

Victor (2001: 86) notes the following in relation to environmental taxes:

> . . . it would be extremely difficult to estimate the practical effect of such a tax . . . countries could offset a tax on emissions with less visible compensatory policies that offer loop-holes for energy intensive . . . firms . . . Indeed, every country that has applied a carbon tax to date

> has added loop-holes – especially for energy-intensive firms – that have blunted the practical effect of the tax on energy prices and behaviour.

It is submitted that Victor's (2001) observations corroborate the experiences of the United States of America in the Clinton Administration's bid to introduce a broad-based carbon tax in 1993, and in those European and Scandinavian countries that have implemented carbon taxes, where such taxes have failed to yield the returns anticipated. It is submitted that these perceived theoretical weaknesses in carbon tax regimes strengthen the argument for the use of tax incentives to combat climate change. Of all the jurisdictions considered, the most comprehensive system of incentives is available in the United States of America, which favours "expenditure side" tax incentives.

Tax incentives have been legislated at both Federal and State levels. Most of the States in America have well developed broad-based environmental tax incentives, designed to encourage investment in cleaner infrastructure. These are available not only to trading entities, but also to individuals, and extend beyond income tax incentives to cover sales tax and property tax incentives as well.

The purpose of tax incentive policies is to actively encourage investment in cleaner energy. In the United States, where States have not legislated specific incentives measures, alternative energy programmes have been introduced aimed at encouraging consumers to change to cleaner energy sources and reduce reliance on fossil fuels. Broad-based environmental tax incentives are not available in the Scandinavian and European countries discussed, although the sector-specific exemptions from the various environmental taxes and rebates granted in those countries might be regarded as indirect incentives to change to cleaner technology.

It is submitted that the combination of punitive taxes and tax incentives as applied in the United States of America is comparatively superior to the levying of only punitive taxes.

Chapter four will focus on the theoretical, legal, practical and socio-economic affecting South Africa's stated in intention to introduce a carbon tax as part of the broader environmental policy, as well as other economic issues informing the development of an appropriate environmental protection policy in South Africa.

CHAPTER 4: ENVIRONMENTAL TAX POLICY FORMATION IN SOUTH AFRICA

4.1 INTRODUCTION

Chapter 3 discussed environmental policy in the United States of America and certain selected Scandinavian and European countries. It was found that all the jurisdictions referred to have energy and carbon tax policies that are designed to hold the polluter accountable for the cost of environmental pollution attributable to their greenhouse gas emissions. Although the carbon taxes introduced have yielded positive results (especially in Scandinavia) in terms of reductions in emissions, the success of the carbon taxes has been compromised to varying extents due to political and economic pressures.

Tax incentives to encourage investment in cleaner energy are widely used in the United States, where incentives are legislated at both Federal and State levels. Nearly all States have their own incentive packages. States that do not have incentive schemes have alternative programs in place to facilitate environmental policy objectives.

This chapter will address the second stated goal of the research, focusing on the theoretical, legal, practical and socio-economic factors informing the development of environmental tax policy in South Africa including the introduction of a carbon tax, as contemplated by the National Treasury (2010) and formally proposed by the National Treasury (2012a). The experiences of other international jurisdictions are considered in conjunction with these factors with a view to determining an optimal environmental tax policy in South Africa. Specifically, an argument is advanced for the introduction of tax incentive measures and the positive role that incentives can play in striving to achieve investment in cleaner energy to realize reductions in greenhouse gas emissions.

4.2 THEORETICAL, LEGAL, PRACTICAL AND SOCIO-ECONOMIC ISSUES INFORMING THE INTRODUCTION OF A CARBON TAX IN SOUTH AFRICA

4.2.1 Human Activity

A large proportion of the observed increased concentrations of greenhouse gases in the atmosphere are due to human activity (Houghton: 2009). Stern (2007), Specter (2008) and Houghton (2009) suggest that greenhouse gas levels are higher today than they have been in the last six hundred and fifty thousand years.

Houghton (2009: 37) reports that since the start of the Industrial Revolution about six hundred Gigatonnes of carbon dioxide have been released into the atmosphere. Carbon dioxide concentrations in the atmosphere have increased from two hundred and eighty parts per million (ppm) to approximately three hundred and eighty ppm since the start of the eighteenth century. Total greenhouse gas concentrations (including greenhouse gases other than carbon dioxide) are currently approximately four hundred and thirty ppm (measured in) carbon dioxide equivalent (CO_2e) (Stern: 2007), representing an increase in current concentrations of approximately fifty four percent on pre-industrialization levels. Emissions from human activities, whether industrial, commercial or residential, have resulted in atmospheric concentrations of greenhouse gases increasing from 6.5 Gigatonnes in 1999 to 7.8 Gigatonnes in 2005 (Houghton: 2009). If increases in carbon dioxide emissions are not curtailed, it is estimated that the global average temperature will increase by about "a third of a degree Celsius or more every 10 years – or three or more degrees in a century" (Houghton, 2009: 13). It is submitted that this must be viewed as a current priority as Houghton (2009: 16) notes: "to 'wait and see' is an irresponsible response".

South Africa acknowledges the environmental damage for which it is responsible resulting from its greenhouse gas emissions and is currently considering policy interventions to address this (National Treasury: 2010). It is submitted that interventions are required, not only because of the social and economic impacts of environmental destruction, but also because of the requirements of the South African Constitution.

4.2.2 The Constitution of the Republic of South Africa

Section 24 of the Constitution of the Republic of South Africa ("the Constitution") guarantees to everyone the right –

> (a) to an environment that is not harmful to their health and well-being; and
>
> (b) to have the environment protected, for the benefit of present and future generations,
>
> through reasonable legislative and other measures that –
>
> (i) prevent pollution and environmental degradation;
>
> (ii) promote conservation; and
>
> (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

Section 184(3) of the Constitution states –

> Each year, the South African Human Rights Commission must require relevant organs of State to provide . . . information on the measures that they have taken towards the realisation of the rights in the Bill of Rights concerning . . . the environment.

These two sections imply that Government has a duty to ensure that the requirements of the Constitution are complied with. The Constitution is not prescriptive as to how the environment is to be protected and conserved, but section 24 makes it clear that all measures may be employed provided that they are reasonable. This is obviously subjective, but it appears that measures will be considered reasonable if they provide for the prevention of pollution, promotion of conservation and ecologically sustainable development whilst promoting economic growth.

4.2.3 Sustainable Development and Environmental Tax Policy

South Africa considers sustainable development to be fundamental to economic development (National Treasury: 2006). Sustainable development was defined by the Brundtland Commission in 1987 to be "development which meets the needs of the present, without compromising the ability of future generations to meet their own needs" (National Treasury, 2006: 10).

It is recognized that environmental protection is key to achieving sustainable development, and hence increasing emphasis is being placed on environmental issues in economic policy formation. Reducing greenhouse gas emissions and converting to renewable (non-fossil fuel) forms of energy are considered to be policy imperatives to protect the environment and hence contribute to sustainable development. At the World Summit on Sustainable Development held in Johannesburg in 2002, the South African Government committed itself to reducing its greenhouse gas emissions and investing in renewable energy sources (Department of Minerals and Energy, 2003: vii). The forms of renewable energies recognised by the South African Government include solar power, wind power, biomass, bio-fuel, hydropower, wave power, tidal power and ocean current energies, and geothermal activity, noting that these are naturally occurring and can be used to produce various energy types, including electricity, gaseous and liquid fuels and heat (Department of Minerals and Energy: 2003). It should be reiterated that these forms of alternative energy are widely regarded as environmental imperatives in the United States, where investment in these forms of energy is actively encouraged through environmental policy at both Federal and State levels.

The Department of Minerals and Energy (2003) and Hemraj (2009) both note that South Africa has a highly coal-dependent economy with ninety percent of its electricity demands being met from fossil fuels. The majority of South Africa's greenhouse gas emissions stem from the combustion of coal, putting South Africa in the top twenty percent of greenhouse gas emitters worldwide, and accounting for forty two percent of the carbon emissions on the African continent. Although South Africa is still a developing economy, its greenhouse gas emissions can be expected to increase as its economy expands. Because South Africa's economy is still developing, and given South Africa's dependence on coal as its primary energy source, it can be expected that its greenhouse gas emissions will *increase* as the economy expands. Consequently South Africa faces a challenge with regard to its original commitment to the Kyoto Protocol and reducing greenhouse gas emissions. Notwithstanding the fundamental weaknesses in the Kyoto Protocol and its enforceability (discussed in chapter 1), South Africa has a responsibility to identify ways and means of achieving reductions is greenhouse gas emissions. Stern (2007: 27) states that emitters have little incentive to reduce their greenhouse gas emissions as the social and other costs

thereof (such as environmental degradation) are borne, not by the emitter, but by society. Emitters (of greenhouse gases) are (generally) not required to compensate anyone for the damage caused by their activities, and this is an externality (or market failure) that would remain, unless corrected by policy interventions.

The shortcomings of the Kyoto Protocol present opportunities for alternative policy interventions. Various mechanisms to achieve the change to cleaner energy sources and reduced emissions are being considered, including revenue-generating taxes (especially carbon taxes). The implementation of carbon taxes is promoted because increasing taxes on "bads" (all forms of activity that have a negative social impact) and reducing taxes on "goods" (such as labour) could *potentially* realize the following "double dividend" (emphasis added) (National Treasury, 2006: 7):

- better environmental quality, and
- greater economic efficiency and increased employment.

4.2.4 The Decision to Implement a Carbon Tax in South Africa

In the 2012 National Budget Speech the Minister of Finance announced the intention of the South African Government to introduce an environmental tax regime (National Treasury: 2012a). Although still in the early (public comment) phase of introduction (National Treasury, 2012a: 16), the stated intention to implement carbon taxes similar to those already legislated in other international jurisdictions raises the question as to whether South Africa will be able to manage the implementation of such a policy effectively, or whether such a policy will realize sub-optimal results similar to those realized in the Scandinavian countries investigated.

Victor (2001) summarizes the advantages and disadvantages of a carbon tax system.

4.2.4.1 Advantages

The advantages are as follows:

- **economic efficiency:** because carbon dioxide exists in the atmosphere for lengthy periods, it is considered "a 'stock' pollutant" (Victor, 2001: 81). One can choose to manage the quantities of pollutant that are emitted through caps and quotas, but

in order to manage the costs associated with carbon dioxide emissions, it is more efficient to place a price on the carbon dioxide that is emitted;

- **cost control:** setting a carbon price allows countries to manage the costs of reducing their emissions, as opposed to committing themselves to quota-based emissions caps that could come with a limitless price-tag;
- **no need for asset transfers:** pricing emissions directly obviates the need for the creation of assets that would otherwise be transferred between countries in terms of emissions trading schemes.

4.2.4.2 Disadvantages

The disadvantages are as follows:

- **political issues:** The imposition of a carbon tax may be justified on the basis of political considerations in that governments may prefer to tax emissions due to the revenue that a carbon tax would generate. Environmentalists might also prefer emitters to be penalized, whereas emitters would favour other mechanisms that are not so financially punitive;
- **reticence to adopt:** The imposition of a carbon tax on emissions may alienate a government from its voting population. Victor (2001: 84) notes particularly the failure of the Clinton Administration's attempts to introduce a "British Thermal Unit tax", noting further that this could (have) lead to "political electrocution". The Clinton Administration's experience with introducing environmental taxes is discussed more comprehensively in chapter 3.

Aldy and Stavins (2007a, in Aldy, Ley and Parry (2008)) consider the following to be paramount considerations in the design of a carbon tax system:

- **cost effectiveness** – carbon taxes can only be cost effective if implemented by all countries at the same level, with uniform increases in the tax rate. All taxes must be implemented in terms of long-term strategy;
- **equity** – countries with developing economies are likely to bear a larger carbon cost as their gross domestic products are lower than those of developed countries;
- **broad country participation –** reductions in global carbon dioxide emissions can only be achieved if there is participation from many countries;

- **agreement on taxes** – countries need to come to an agreement on the rate at which carbon taxes should be introduced in a bid to move away from set emissions reductions levels such as those advocated by the Kyoto Protocol. Kyoto-style levels could be very costly for countries whose emissions have increased since 1990 (the Kyoto base-year), when compared to countries whose emissions have decreased since that date;
- **institutional capability** – it may be easier for taxing jurisdictions to implement carbon taxes as opposed to trying to manage emissions reductions targets;
- **verification** – review of carbon tax policies internationally is necessary to ensure adequacy of carbon tax policies in realizing carbon emissions reductions, and also to evaluate and compare results of carbon tax implementation across countries.

Carbon taxes are also considered to be preferable to command and control measures that seek to manage emissions through regulatory measures. The South African National Treasury (National Treasury: 2010) observes that tax systems create opportunities for increased efficiency as the punitive nature of the tax may encourage firms to reduce their emissions at a faster rate if they can do so in a cost-effective manner. Further efficiencies can be gained through research and development into cleaner energy that will result in reduced emissions. In the alternative, regulatory measures would set minimum emission reduction targets for emitters. Such regulatory measures do not provide an incentive for emitters to reduce their emissions further than is necessary from a compliance point of view. It is submitted that if carbon taxes are not implemented in a "harmonized" fashion and levied on all polluting industries at the same rate according to quantity of greenhouse gases emitted, the tax will yield less than optimal results in terms of reductions of greenhouse gases and revenues raised.

4.2.5 Reasons for a Carbon Tax in South Africa

South Africa is in favour of introducing a carbon tax regime, citing social and economic responsibilities and international experience as primary motivating factors (National Treasury: 2010). The following observations are relevant:

- South Africa is largely reliant on fossil fuels, with the majority of carbon dioxide emissions coming from the electricity, metals and transport sectors;

- South Africa, as a developing country, is a “non-Annex-1” country, and is therefore not bound by the terms of the Kyoto Protocol as are “Annex 1”, or industrialised, countries;
- in terms of absolute carbon dioxide output South Africa is ranked in the top twenty countries in the world and greenhouse gas emissions will increase with economic growth; and
- South Africa has a responsibility to reduce its greenhouse gas emissions without compromising economic growth and at the same time increasing employment and reducing poverty and inequality.

The Draft Paper on Environmental Fiscal Reform (National Treasury: 2006) explores how market-related instruments, more specifically environmental taxes might be used to achieve sustainable development. South Africa has already enacted a range of environmental taxes and these have been levied in the following sectors:

- transport fuels;
- vehicle taxes;
- aviation taxes;
- product taxes;
- electricity;
- water supply; and
- waste water (a proposed tax).

These taxes account for approximately ten percent of total tax revenue, of which nearly seventy percent is collected by way of the general fuel levy (National Treasury, 2006: iii).

The National Treasury Discussion Document (National Treasury: 2010) builds on the Environmental Fiscal Policy Reform Paper (see National Treasury: 2006) and supports the introduction of a carbon tax to correct the externalities brought about by greenhouse gas emissions (National Treasury, 2010: 5). The rationale behind the proposed implementation of carbon taxes is that this is international practice, given that environmental tax reform has taken place in Finland, Sweden, Norway, Denmark, the Netherlands, the United Kingdom, Italy, Germany and Canada.

There is also the need to send a “strong price signal to both producers and consumers, acting as an incentive for more environmentally friendly behaviour over the long term” (National Treasury, 2010: 9).

Carbon taxes may either be implemented upstream (where the tax is to be levied at the point of entry into the economy), or downstream (where the tax is to be levied on the producer or consumer at the point of combustion) (National Treasury: 2010). Aldy, *et al.* (2008) advocate the implementation of taxes upstream. Practically, such a policy would require the carbon tax to be implemented at the point where fossil fuels are mined or extracted. The National Treasury (National Treasury: 2010) appears not to favour the imposition of taxes in an upstream fashion as doing so may not promote carbon capture and storage. It is submitted that the success of efforts to capture and store carbon should not be dependent on how and where the tax is levied in the economy. If carbon is not emitted into the atmosphere, there will be no need to store it.

The National Treasury (2010) observes further that the anticipated problems associated with the use of upstream taxes would extend to those sectors of the economy where fuels are not combusted. A solution might be to exclude those sectors from the tax base (by exempting them from the carbon tax), or through the granting of rebates. It is submitted that exempting or otherwise excluding such sectors from the tax base would only serve to create opportunities for political interference and lead to less than anticipated results in terms of reductions in emissions, similar to the Scandinavian and European experiences. The perceived difficulties with the implementation of carbon taxes and the granting of rebates and exemptions are submitted to be manageable through the use of parallel tax incentive measures, which are discussed in detail later in this chapter.

4.2.6 Price-Setting for Carbon Emissions

In assessing how energy should be priced, Hemraj (2009) poses the question as to how the social costs of environmental damage (externalities) can be internalised in a manner that promotes the effective allocation of resources, whilst not compromising economic growth.

The factors that affect pricing decisions should include the costs of externalities, the scarcity of resources and the most efficient manner of resource allocation. The fact that South Africa has a wealth of fossil fuels indicates that the price of those fossil fuels may be cheap by international comparison, but Hemraj (2009) notes that keeping energy prices low to support economic development may not be sustainable, advocating the use of market-based instruments to internalise environmental externalities by adjusting prices for *both* consumers and firms. Although it is recognised that economic growth realises social benefits, these do not occur without a cost and in the absence of environmental taxes, these costs would not be reflected in the cost of resources; this could result in inefficient resource usage and allocation. Environmental taxes would force a change in consumer behaviour through "production and consumption patterns" (Hemraj, 2009: 10), with the potential positive result that greenhouse gases will be reduced.

The National Treasury (2010) refers to, *inter alia*, Fankhauser (1994), Stern (2007), and Metcalf (2008), all of whom provide estimates of best and worst case scenario carbon prices and how the tax should be implemented. Clarke, Edmonds, Jacoby, Pitcher, Reilly and Richels (2007, in Aldy, *et al.* (2008)) estimate that carbon should be priced at between $40 - $95 per ton carbon dioxide, if carbon dioxide concentrations are to be stabilized at 450ppm (best case scenario) or $1 - $10 per ton if concentrations can only be capped at 650 ppm (worst case scenario), with annual increases thereafter. The pricing recommendations put forward by Clarke, *et al.* (2007) are made on the basis that it would be far more costly to reduce atmospheric greenhouse gas concentrations to the lower level of 450 ppm that to stabilize at 650 ppm.

These estimates assume a global cost-effective introduction of carbon taxes (Aldy, *et al.*: 2008). Fankhauser (1994) provides various carbon price estimates for ten year intervals, commencing at $20 per ton for the period 1991 – 2001, increasing to $28 for the period 2020 – 2030. The more recent studies of Stern (2007) and Metcalf (2008) afford similar projections. Stern (2007) estimates a carbon price of $30 per ton assuming concentrations can be capped at 550 ppm. With no stabilization, the estimate is increased to $85 per ton.

Metcalf (2008, in National Treasury (2010)) does not provide a stabilization target for greenhouse gas emissions, but proposes a tax rate of $15 per ton initially, with increases to be phased in thereafter. It is noted that long-term estimates put the cost of carbon at between $8 and $300 per tonne carbon dioxide equivalent (National Treasury, 2010: 23). Projections for South Africa value the carbon tax at R250 per tonne carbon dioxide equivalent over the period 2020 – 2040, increasing to R750 per tonne carbon dioxide equivalent over the period 2040 – 2050.

National Treasury (2010) suggests that Fullerton, Leicester and Smith's (2008) proposal that environmental taxes should be implemented at a moderate level and increased over time should be accepted, a proposal that supports Clarke *et al.*'s (2007) and Metcalf's (2008) recommendations. The reasoning for this is that, given that carbon dioxide remains airborne for "hundreds of years" (National Treasury, 2010: 26), it is more cost effective to phase the tax in over a set period than to bear the costs of emissions reductions in future.

Winkler and Marquard (2009: 12) propose a price at which a carbon tax might be introduced, suggesting a carbon price of R200 per tonne CO_2e. This carbon price would equate to approximately 20c per kilowatt hour in electricity and 45c per litre for liquid fuels. The tax would not be a sufficient incentive to change to alternative energy sources in the short term, but in the long term, the tax would rise at a rate that would precipitate such a change. These estimates may place the potential financial burden of the tax in perspective, but it raises the question as to the effect of such a tax on low income households.

4.3 ALTERNATIVES TO CARBON TAXES AND SOUTH AFRICAN ENVIRONMENTAL POLICY

Gerlagh and Van der Zwaan (2004) advocate the following as means to achieve reduction of greenhouse gas emissions:

- energy savings (for example substituting carbon energy with capital and labour); and
- the use of non-carbon energy (in the form of alternative energy sources).

Gerlagh and Van der Zwaan (2004) state that the use of energy savings is imperative to realize reductions in greenhouse gas emissions, but this can only be considered a short term intervention. In the long run investments in renewable energy will be necessary. Yet where energy is primarily provided by fossil fuels it is noted that the investment in renewable energy sources will be expensive. However the decision to invest in cleaner energy should not be deferred due to cost considerations as it is submitted that deferring the change will only aggravate the cost of capital investment. Furthermore, Gerlagh and Van der Zwaan (2004) note that greenhouse gas emissions must be reduced in the short term if global temperature increases are to be stabilized. Therefore it is submitted that all avenues to realize the dual outcomes of cleaner energy and reduced emissions should be investigated. Investment costs and elasticity of substitution are considered to be paramount factors affecting the desired outcomes of cleaner energy and reductions in emissions and are discussed in the following sections.

4.3.1 Cost and Timing of Investments

Gerlagh and Van der Zwaan (2004) investigated the timing and cost considerations for achieving reductions in greenhouse gas emissions, comparing two scenarios:

- business as usual – where no action is taken to reduce carbon emissions, and
- a scenario where action is taken to mitigate the average global temperature increase to two degrees Celcius above the pre-industrial temperature (considered to be an imperative to avoid “catastrophic” effects on the environment and the country (Government of the Republic of South Africa, 2010: 5)).

They observe that, where current energy systems are heavily reliant on fossil fuels, conversion to (cleaner) non-carbon energy sources will be a costly exercise. The premise that cleaner energy sources are more expensive is based on the assumption that energy sources are perfect substitutes. Assumptions such as these are not realistic due to differing characteristics of the technologies and hence cannot be considered to be perfectly interchangeable.

However, it is submitted that there is no guarantee that alternative energy sources will be cheaper to implement purely because they have different characteristics to fossil-fuel energy.

Learning rates and delays in converting to non-fossil fuel are will have a bearing as well. If alternative energy can be adopted with high learning rates, this may reduce the cost of energy production over the long run. Delays in converting to cleaner energy will place upward pressure on conversion costs as the costs of further environmental damage will have to be met in addition to the investment costs associated with the new energy source.

Gerlagh and Van der Zwaan (2004: 40) contemplate the effect of "learning-by-doing" on the cost of conversion to cleaner energy and reduced emissions. Learning-by-doing can realize a reduction in energy costs where investments in cleaner energy occur "up-front". Although early investments would necessitate large-scale investment in the first instance, it is concluded that the learning effect can contribute to cheaper energy production and reduced greenhouse gas emissions in the long term. In addition to achieving reduced greenhouse gases, higher learning rates are also expected to contribute to increased economic growth. It is submitted therefore that, in this respect, it should be considered as policy imperative to invest in non-fossil fuels sooner so as to realize these benefits to their maximum potential over the long term. How the costs of investment might be subsidized is explored later in this chapter.

4.3.2 Elasticity of Substitution

It is beyond the scope of this text to discuss the theoretical underpinning of learning rates in any further detail. Although Gerlagh and Van der Zwaan's (2004) study concluded that investments should be made up-front and not delayed in order to realize the potential long term benefits of reduced greenhouse gases, lower energy costs and economic growth, it is submitted that countries generally, and South Arica in particular, face a greater challenge beyond the immediate financing of investment costs. Given that long term reductions in emissions will be achieved through the change from fossil to non-fossil fuel energy sources, such reductions will be achieved in the most optimal manner if it can be assumed that there will be a high learning rate

with regard to the introduction of non-carbon energy, *and* that the elasticity of substitution between fossil-fuel and alternative energy sources is high (Gerlagh & Van der Zwaan, 2004: 56). The literature reviewed, however, suggests that in South Africa, the elasticity of substitution is not high.

There are numerous definitions and forms of elasticity of substitution (Stern: 2011), and various authors have attempted to define, expand and classify elasticity and complementarity (for example, see Hicks (1932), Lerner (1933), Robinson (1933), Hicks and Allen (1934a) and Mundlak (1968)). It is beyond the scope of this text to explain each of these definitions and their mathematical derivations in detail or to expound on the many other interpretations available in the literature.

Stern (2011: 79) refers to Robinson (1933) and Lerner (1933) who define elasticity of substitution as "an explicit measure of the difficulty of substituting between inputs". Alternatively, Lerner (1933, in Stern (2011: 79)) defines elasticity of substitution as a measure of "the degree to which the ratio of the two inputs varies as the marginal rate of substitution varies, keeping output constant". Therefore, in the context of substituting alternative energy sources, elasticity of substitution refers to the degree to which one energy source (for example, coal) may be substituted with an alternative energy source (nuclear energy) in the face of carbon taxes, assuming that energy output remains constant. Substitution between coal and nuclear energy would be elastic if such energy sources could be easily substituted. Conversely, the opposite would hold were it not possible to easily switch between the energy sources.

Gebreselasie (2008) and Serletis, *et al.* (2010) observed inelasticity between energy alternatives at sector level in South Africa. Where the substitution elasticity of alternative energy sources is low, conversion from one energy source (coal) to an alternative source (for example, nuclear, solar or wind energy) will come at an increased cost with potential delays in the implementation of the non-fossil fuel energy source. Consequently, such an eventuality will impact negatively on achieving reductions in emissions, and may impact negatively on economic growth. Serletis, *et al.* (2010) suggest that their findings (that interfuel substitution elasticities are generally low) support previous findings, citing Jones (1996) and Urga and Walters (2003).

Furthermore, given the finding that in South Africa energy substitution is generally inelastic and because of the "restricted" nature of the substitution elasticity of the various energy sources analyzed, fossil fuels will continue to be a primary energy source in the short term (Serletis, *et al.*, 2010: 27). Consequently, pricing adjustments are necessary to bring about the required conversion to non-carbon energy sources.

It is thought that such reliance on fossil fuels, even in the short term, will have negative consequences in terms of achieving reduced emissions and the conversion to cleaner energy. The change to cleaner energy sources will necessarily occur at a higher investment cost, and it is submitted that delays in effecting the change will only make the financial burden heavier with the passage of time. Furthermore, inelasticity of substitution between the various energy sectors will increase as greater demands are placed on the energy sector for energy supply, not only in consequence of an expanding economy, but also in consequence of demand for energy supply to areas of the country which formerly were not supplied with electricity. These perceived anticipated problems are thought to be not specific to any particular sector due to the general inelasticity reported in the literature. Due to the observed general inelasticity, it is suggested that introducing a cleaner energy alternative will not by itself relieve the pressures created by increased demand.

It is acknowledged that in light of inelasticity of substitution between energy sources in South Africa, and the desire to reduce greenhouse gas emissions, the timing of a change to cleaner energy will be an important consideration. It is submitted therefore that policy should be directed to encouraging an *earlier* change to cleaner energy. This recommendation is made not only to minimise the inflationary effect of delays in making the necessary investment, but also to mitigate the upward pressure on investment costs due to inelasticity of substitution.

With theoretical support for pricing adjustments (such as carbon taxes) to realize a (faster) change to alternative energy sources, the proposed introduction of carbon taxes in South Africa will place a financial burden on South African households, a cost that many will not be able to afford. On the other hand, the introduction of carbon taxes further supports the argument for rapid reinvestment in non-carbon fuels as cleaner energy will bring about reduced carbon tax exposure in the long term.

4.3.3 Potential Negative Impacts of Carbon Taxes

High investment costs and inelasticity of substitution are both considered to be primary barriers in the change to cleaner energy sources and achieving emissions reductions, and carbon taxes are considered a *desirable* policy option on the basis that the "polluter must pay". However, the effect of a carbon tax on low income households is a factor that cannot be ignored.

The implementation of a carbon tax regime will place increased financial pressure on polluters. These costs will either be passed down to the end-consumer by way of price adjustments, or in the alternative will impact the "bottom-line" financial returns reported by entities subject to the carbon tax. Passing down the carbon tax to end-consumers by way of price adjustments will negatively impact the consumption power of many South Africans. If carbon taxes are to be passed down in any measure to the end-consumer, it must be noted that such costs will have to be borne out of (after-tax) disposable income. The imposition of a carbon tax on poorer households will reduce their disposable income and they may find it increasingly difficult to meet their other financial obligations. The effect on households would be detrimental, given that approximately 25 percent of the South African population is unemployed (Statistics South Africa: 2012). It is submitted that the collateral effect of reductions in spending would impact negatively on economic growth. The same outcome may be expected if polluting companies are expected to absorb the carbon taxes levied on them.

Should the imposition of carbon taxes have the unintended consequences described above, the carbon tax may be perceived to be counter-productive if implemented in isolation. Winkler and Marquard (2009) observed that carbon taxes would affect poorer households through increased retail prices of fuel sources such as wood, coal and paraffin, and increased transport costs. Many South African households rely on fuels such as wood and paraffin for cooking and heat generation. Furthermore, a large proportion of the population makes use of public transport, and it is submitted that the predictions of negative impacts are well-founded. Winkler and Marquard (2009) note that energy costs constitute a large percentage of household expenditure in South Africa, and therefore poor households are more sensitive to price changes.

Industries are also heavily reliant on fossil fuel energy, and consequently carbon taxes might impact negatively on South Africa's international competitiveness. In spite of the social and economic benefits that a carbon tax might achieve, carbon taxes can and will have negative consequences, which the Government should seek to mitigate.

It is not suggested that carbon taxes should not be implemented. Given South Africa's stated intention to implement a carbon tax regime, it is not the intention of this text to argue against carbon taxes *per se*. However, the observed negative impacts that a carbon tax might realize is submitted to present an opportunity for alternative mechanisms to be evaluated, which, *in conjunction* with a carbon tax system, would assist in bringing about a positive environmental change.

The pricing adjustments promoted in Serletis, *et al.* (2010) *supra* do not address how lower-income households in South Africa would be affected. Winkler and Marquard (2009) do suggest policy measures that might alleviate the financial pressure of a carbon tax on the poor, suggesting, *inter alia*, food subsidies, grants and value-added tax concessions.

4.3.4 Carbon Taxes and Subsidies

Before evaluating the use of subsidies, it should be noted that Gerlagh and Van der Zwaan (2004: 62) observe that the use of subsidies to assist in financing investments in non-coal energy is often not the preferred financing vehicle, and that governments may opt for carbon taxes instead. The reasons cited for preferring carbon taxes over subsidies may be summarized as follows:

- the environment is a public good and governments' duty must be to protect that good through carbon taxes. Investments in newer (carbon free) technologies may be considered the mandate of the private sector;
- market imperfections should be regulated by the imposition of carbon taxes to internalize externalities;
- many other forms of carbon-free technology exist (e.g. wind power and solar energy, and hydropower). Subsidy policies may become too complex when taking all other forms of energy into account;

- if carbon taxes are recycled within the economy, other taxes can be lowered, whereas subsidies would be a cost that governments would have to bear.

Notwithstanding these concerns, it is submitted that the use of subsidies should not be ruled out, given the observed general low substitution elasticity of alternative (non-carbon) energy sources.

It has been stated above that where substitution (between alternative energy sources) is inelastic, conversion (to the cleaner energy source) will come at a higher cost. It is submitted that the costs involved may be beyond the fiscal capabilities of many industries in the private sector. Financial assistance will be necessary especially if the investment decision is to be made now, as suggested by Gerlagh and Van der Zwaan (2004). How countries might finance the transition to alternative non-fossil fuel energy sources would depend to a certain degree on the peculiar fiscal characteristics of each country.

Winkler and Marquard (2009) suggest subsidizing investments in renewable energies as an appropriate alternative application of carbon taxes within an economy. By recycling carbon taxes to subsidize investments in non-carbon energy, governments would not be required to bear the costs of such subsidies directly. The subsidy cost would effectively be internally funded. Reinvesting carbon taxes internally within an economy has support in the literature reviewed in that the carbon tax would be most efficient if applied within the economy in pursuit of potential "double dividends". The only departure from the recommendations in the literature is that the carbon taxes would not be applied to reduce employment (or other) taxes, but would be applied *directly* to support the conversion to non-carbon energies. Recycling carbon tax revenues internally to subsidise the cost of investments in non-fossil fuel energy would be advantageous to industry participants. An internally generated subsidy would mean that polluters will be bearing the cost of investing in cleaner technology whilst not requiring governments to fund such investments directly. The "polluter must pay" principle would not be violated as the polluter will still bear the cost of environmental pollution as regulated through the carbon tax.

Governments would merely be acting as a facilitator in a system that places the onus on polluters to bear the financial and social costs of their activities, and at the same time providing those polluters with the impetus and incentives to invest in environmentally friendly technology through the use of broad-based environmental tax incentives. In conjunction with a broad-based environmental tax incentive policy, private parties would be encouraged to take financial responsibility for the investment costs. Such an arrangement represents a "carrot-and-stick" policy intervention, but it is submitted that recycling carbon taxes within the economy represents an efficient way to subsidize investment costs in cleaner technology at the lowest direct cost to the South African government, whilst tax incentive measures would encourage co-operation from the private sector. Furthermore, if polluters are offered tax incentives to make the necessary capital investments, it is submitted that they will be *further* motivated to convert to non-carbon energy sources in addition to the desire to mitigate exposure to carbon tax liabilities. A large financial outlay will be required in the short term, but in the medium to long term the carbon taxes payable by polluters will decrease as their greenhouse gas emissions decline.

It is acknowledged that recycling carbon taxes to reduce payroll taxes would be viewed favourably by consumers, but applying carbon tax revenues to fund incentives to invest in alternative non-carbon energy is submitted to be an equally desirable alternative. Choosing to apply the carbon tax revenue to fund tax incentives for investment in non-carbon energy would still create scope for achieving the "double dividend". Emissions will decrease through the imposition of the tax, whilst economic growth will occur through sustainable development of South Africa's energy infrastructure. It is further submitted that this is a policy stance that South Africa would do well to investigate.

4.3.5 The Case for Tax Incentives in South Africa

It should be noted that throughout the above discussion it has not been suggested that carbon taxes should not be implemented. The literature reviewed is supportive of carbon taxes, and international experience has shown the beneficial effects of a carbon tax regime. It is suggested that, in light of South Africa's peculiar demographics resulting in about twenty five percent of the population being

unemployed (Statistics South Africa: 2012), an appropriate environmental tax policy should incorporate a combination of carbon taxes and broad-based tax incentives to realize decreased greenhouse gas emissions through the change to non-carbon energy, as well as economic growth through sustainable development. A policy such as this is directed mainly at assisting large polluters and firms to achieve these goals, but could be extended to assist individuals to contribute to greenhouse gas mitigation.

Van Heerden, *et al.* (2006) suggest that further concessions to individual consumers might be offered through reductions in food taxes. Van Heerden, *et al.* (2006) contemplated the potential benefits of recycling tax revenues in the pursuit of "double dividends" (being reduced greenhouse gas emissions and economic growth), suggesting that there is also potential to achieve a "third dividend" (by alleviating poverty). The study investigated the potential effect of a carbon tax, a fuel tax, an electricity tax and an energy tax on the ability to achieve these dividends, under varying assumptions on how the various taxes might be applied in the economy. As South Africa intends to introduce a carbon tax, the discussion in this chapter will only focus on the results of the Van Heerden study in terms of recycling carbon taxes.

Van Heerden, *et al.* (2006) attempted to determine which of the dividends, if any, might be achieved if carbon tax revenues are recycled to fund:

- direct tax cuts;
- indirect tax cuts; and
- food tax cuts (discussed in terms of Value-Added Tax (VAT) in this text).

It was found that reductions in greenhouse gas emissions (dividend number one) would be realized if carbon tax revenues are recycled to fund both direct and indirect tax cuts. Secondly, the dividend would also be realized if the revenues were applied to fund reductions in food taxes. However, the study found that dividends two and three (economic growth and poverty alleviation respectively) would not be realized through applying the carbon tax to fund either direct or indirect tax breaks, but *both* these dividends would be realized if the carbon tax was applied to fund cuts in food taxes.

One striking observation arising from the study (Van Heerden *et al.*: 2006) is that the

carbon tax is most effective if applied to fund reductions in food taxes, and this is considered to be the best policy alternative for South Africa in light of the unemployment concerns raised above.

In the South African context, it is submitted that the postulation of a positive relationship between economic growth and poverty alleviation and decreased food taxes (VAT on foodstuffs) is well founded. Decreased food prices would increase the purchasing power of disposable income, thus contributing to poverty reduction, whilst further spending would increase economic growth. It is submitted that this creates scope for the creation of tax concessions through directing carbon tax revenues to fund VAT exemptions on more foodstuffs.

Van Heerden *et al.* (2006) noted that economic growth would not occur if carbon taxes are applied to fund direct and indirect tax cuts. However, it is submitted that these findings should not rule out completely any incentive that would give rise to reductions in income tax liabilities, especially if these incentive measures bring about positive results in terms of reductions in greenhouse gas emissions and sustainable development. It is acknowledged that reducing taxes directly or indirectly in the short term may impact negatively on economic growth as the loss of revenue would not be available for investment in the economy, but it is the long run result that is paramount. Economic growth will not occur in a sustainable manner if greenhouse gases are not curtailed, which implies that the change should occur sooner rather than later. It has already been stated that delays in converting to non-carbon fuel sources will place further upward pressure on conversion costs, and it is submitted that delaying conversion and higher investment costs will have an amplified negative impact on economic growth. Therefore it would be better to suffer short-term negative impacts on economic growth if the long term outcome will be positive.

Therefore in analyzing the range of broad-based tax incentives, there is a good theoretical grounding for advocating a system whereby carbon tax revenues are recycled within the economy to fund broad-based tax incentives that are intended to accelerate the change to non-carbon energy.

The range of incentives that might be legislated for would have appeal for corporate

and individual traders and private individuals alike. Income tax incentives for industries might include accelerated write-off periods in respect of the capital investment costs of the non-carbon generating infrastructure and enhanced tax deductions for investment in training programmes for education of unskilled employees (beyond the current employment incentives afforded in terms of section 12H of the Income Tax Act). Income tax exemptions and deductions, and value-added tax exemptions might be afforded to anyone (whether persons carrying on a trade or private persons) who invests in heating and cooling systems and pool pump systems, all of which are powered by solar, wind or hydro-energy. Concessions might be extended to VAT exemptions in respect of the sale of solar, wind and hydro-powered energy systems. Exemptions or property rate reductions might be afforded to those who own properties that rely on non-coal energy infrastructure.

There is also scope for providing VAT exemptions on foodstuffs, extending beyond staple foods. VAT exemptions might also be granted on the sale of biomass products and bio-fuels. In South Africa there is a great demand for such energy sources, especially amongst the poor. Providing a VAT exemption on the sale of wood, wood chips and other bio-fuels would be of great economic value to poorer households.

These suggested tax incentives are very similar to those available throughout the United States of America (see Garrison: 2009). In South Africa many private individuals do not earn enough income to be liable for income tax, but all consumers are subject to consumption taxes such as VAT, and property taxes if they are property owners. Therefore more South Africans will benefit from VAT and property rate exemptions than from income tax deductions. Income tax concessions would have a greater role to play for taxpayers who have higher levels of income.

4.4 CONCLUSION

In satisfying the second stated goal of this research this chapter focused on the theoretical, legal, practical and socio-economic factors affecting South Africa's stated intention to introduce a carbon tax as part of the broader environmental tax policy.

An argument is presented for the most appropriate environmental tax policy for South

Africa. Most of the recommendations and suggestions are grounded in the literature reviewed.

Increased greenhouse gas concentrations in the atmosphere are attributable to human activity, with much of the increase having occurred since the Industrial Revolution. South Africa is cognisant of the fact that as a developing nation it is contributing to increased greenhouse gas concentrations and consequential environmental damage. In light of this, and recognizing its Constitutional duty to afford all South Africans access to a clean environment, South Africa is committed to taking steps to mitigate its greenhouse gas emissions, proposing to do so by implementing a carbon tax.

The advantages and disadvantages of carbon tax regimes are discussed. The proposed carbon tax is modelled very closely on carbon taxes introduced in other international jurisdictions and the introduction thereof is promoted largely due to the positive results achieved in other countries that have imposed a carbon tax on polluters. Moreover, carbon taxes are proposed as a pricing mechanism that will result in the cost of goods reflecting the social costs of environmental pollution ("externalities").

Factors affecting the pricing of the carbon tax are discussed, noting that many authors agree that the carbon tax will have to increase over time. Higher carbon taxes will be required to achieve greater reductions in emissions. South Africa has an economy that is highly reliant on coal, and therefore a carbon tax is likely to have a major financial implication for producers and consumers. It is submitted that the decision to introduce carbon taxes in isolation is not a matter that can be ignored, due to the anticipated impact of the tax on poorer households. A large proportion of the population live below the breadline, and the implications of a carbon tax on this group of people will be onerous without some form of compensating mechanism. It is noted that, in South Africa, switching between energy alternatives is generally inelastic. Therefore energy sources are not easily interchangeable and changing to non-carbon energy will be a costly investment. Such investments will only become more expensive over time, implying that the decision to invest should be made earlier rather than later.

Therefore the argument is put forward that if carbon taxes are to be introduced, the

revenues realized should be reinvested in the economy through a range of broad-based tax incentives that will effectively internally subsidize the financial costs of investing in non-coal energy. It is thought that these measures will assist and encourage industries, corporate entities and private individuals alike to invest in cleaner energy and become less reliant on coal and other coal-based products.

These recommendations are informed by, and are very similar to, the broad range of tax incentives available in the United States of America.

Chapter five will provide a retrospect of the discussions contained in the previous chapters, highlighting their salient points and the conclusions reached. The final concluding remarks will specifically address the research questions posed and research goals identified in chapter one. Problems encountered in carrying out the research will be identified, as well as potential avenues for further research.

CHAPTER 5: CONCLUSION

5.1 GREENHOUSE GAS EMISSIONS, HUMAN ACTIVITY AND THE KYOTO PROTOCOL

In 1992 the United Nations recognised carbon dioxide emissions to be the greatest contributor to global warming attributable to human activity. The Kyoto Protocol of 1997 sought to correct the environmental damage being caused by carbon dioxide emissions by allocating emissions reductions targets to developed countries. Political manoeuvring, delays in implementation and other fundamental problems with the enforceability of the Kyoto Protocol resulted in its "first commitment" term expiring at the end of 2012 without any success in achieving the reductions targets set by the Kyoto Protocol, as evidenced by the numerous conferences of the parties to the Kyoto Protocol between 1997 and 2011. The Kyoto Protocol has been largely regarded as a failure, and other policy instruments are playing a larger role in achieving the Kyoto Protocol's original aims.

5.2 GOALS OF THE RESEARCH

The first goal of this research is to document the existing environmental taxes and environmental tax incentives that have been enacted in the South African taxing statutes, which are aimed at environmental protection, achieving the conversion to cleaner non-carbon energy, and reducing greenhouse gas emissions. The second goal is to discuss the theoretical, legal and practical implications of the proposed introduction of a carbon tax in South Africa as part of the environmental policy. A review of the environmental tax policies of selected international jurisdictions comprises the third goal. Particularly, the policies of the United States of America, Scandinavia, Germany and England are analysed, with attention to the success of the environmental policies adopted in the international jurisdictions in terms of reducing greenhouse gas emissions.

These investigations are performed with a view to determining whether a "stand-alone" carbon tax regime is appropriate for South Africa, or whether alternative measures might be adopted, whether in conjunction with, or instead of carbon taxes,

in the formulation of an appropriate environmental protection policy aimed at reducing greenhouse gas emissions and the conversion to non-carbon energy.

5.2.1 Findings and General Discussion

Chapter two addresses the first goal of the research and discusses the various incentives that are available in South Africa in terms of the Income Tax, Value-Added Tax, Estate Duty and Transfer Acts, concluding that there are few incentives of which *all* persons can avail themselves. The majority of these incentives are to be found in the Income Tax Act, and the Estate Duty and Transfer Duty Acts offer limited incentives for environmental protection. There are currently no incentives legislated in the Value-Added Tax Act to encourage environmental protection or invest in cleaner energy. Those incentives that have been legislated in the Acts reviewed are restricted in their nature for the following reasons:

- they are available only to a particular class of taxpayer carrying on a specified public benefit activity;
- they are only available in respect of alienation of assets to persons carrying on public benefit activities; or
- they are only available to persons incurring the expenditure in the production of income, and in the carrying on of a “trade”.

With the exception of the concessions afforded in terms of sections 18A of the Income Tax Act and section 56(1)(h) of the Estate Duty Act, there are no incentives that are directed at private individuals to encourage and assist them in making an investment in non-carbon energy and to become less reliant on fossil-fuel energy.

It is noted further that South Africa intends to introduce a carbon tax, which is punitive in nature, and will have an inflationary effect on energy prices and product prices alike. Because South Africa has a highly coal-dependent economy, the imposition of a carbon tax will prove financially onerous for many South African households.

Chapter three addresses the third goal of the research and investigates the implementation of carbon taxes in the United States of America, Sweden, Norway, Denmark, Germany and the United Kingdom.

Fuel taxes have been in effect in the United States since the early 1970's. In 1993 the Clinton Administration's attempt to introduce a tax based on "British Thermal Units" was originally not promoted due to environmental concerns, but as a revenue-generating mechanism to reduce the American budget deficit. The tax was never passed into law over political concerns and fears over unequal treatment between sectors. Ultimately the proposed tax was replaced by an increase in the fuel tax.

In Sweden, Norway and Denmark the legislation of energy taxes has a long history and is well-documented. In all of these countries carbon taxes have yielded positive results in terms of reducing greenhouse gas emissions. It was observed, however, that the taxes failed to yield optimal results and have not been as successful as intended. The failure of these taxes to meet expectations has been attributed to political interference and inconsistent application of the tax, with exemptions from the tax being granted to specific industries meaning the tax has not been applied equally in a harmonized fashion across all sectors.

Germany has implemented a carbon tax, but the effectiveness of its introduction has been mitigated in a manner similar to that observed in the Scandinavian countries. In Germany the carbon tax is "recycled" within the economy to fund contributions to employment retirement funds.

England has an energy tax policy but is thought to be less sophisticated than the other countries analysed. England has an energy tax and a fuel levy that is charged in all industries consuming fossil fuels. Revenues from these taxes are recycled within the economy to subsidise social security costs.

Chapter three also investigates the use of tax incentive measures in the United States as a policy intervention to achieve a change in energy dependency. Garrison (2009) provides a detailed breakdown of the incentives that are available in the United States on a State-by-State basis.

The use of tax incentive measures in the United States is well-established. Most States have incentive packages that afford income tax deductions and/or income tax credits, sales tax "holidays", and property tax concessions in respect of investment in non-carbon energy sources. In States where no tax incentives are afforded, programmes designed to encourage investment in non-carbon energy have been established. It is submitted that the combination of environmental taxes and tax incentive measures in the United States is superior to policies that levy environmental taxes in isolation.

Chapter four addresses the second goal of the research and focuses on the theoretical, legal, practical and socio-economic factors informing the development of environmental policy in South Africa with a view to making recommendations for an appropriate framework of measures aimed at environmental protection. The advantages and disadvantages of carbon tax regimes are discussed. Particular attention is devoted to the publications of the National Treasury (2010) and the works of Gerlagh and Van der Zwaan (2004), Van Heerden, *et al.* (2006), Gebreselasie (2008), Winkler and Marquard (2009), and Serletis, *et al.* (2010).

It is noted that section 24 of the Constitution of the Republic of South Africa guarantees the right to an environment that is not harmful to one's health and to a protected environment. The Constitution provides that legislative and other means may be employed to ensure environmental protection and preservation for current and future generations, in a manner that will promote sustainable development. Therefore South Africa has a Constitutional responsibility to its citizens to protect the environment with a view to promoting sustainable development.

Mindful of the close relationship between sustainable development and economic development, South Africa intends to introduce a punitive carbon tax similar in design to carbon taxes that have been introduced in the other international jurisdictions analysed. Introducing carbon taxes in South Africa is promoted on the basis that:

- the cost of production of goods must reflect the social costs of environmental pollution;

- the use of carbon taxes is regarded as international best practice; and
- South Africa has already introduced taxes on travel, electricity and water.

How carbon should be priced is debated, with authors having differing views on the rate at which the tax should be introduced. Most opinions are directly related to assumptions regarding the level at which greenhouse gas emissions should be capped. There is general consensus that the tax will necessarily have to be higher if emissions are to be capped at lower concentrations and furthermore, irrespective of the rate at which the tax is implemented, the rate of tax should be increased over time to ease the burden of having to finance the cost of future emissions in future years.

South Africa is a developing country and its economy is highly dependent on coal and other fossil fuels. South Africa faces certain challenges in terms of carbon taxes and the fact that its emissions are expected to increase as its economy grows. It is submitted that the financial impact of carbon taxes will impact either the "bottom-line" profitability of polluting industries which will be subject to the tax, or by the end-consumer. It is thought that levying of carbon taxes will place financial strain on many households, and cannot be considered an optimal outcome in a country where a large proportion of the population is unemployed.

It has been shown that the costs associated with, and timing of, converting to non-carbon energy are important considerations in reducing greenhouse gas emissions, as illustrated by Gerlagh and Van der Zwaan (2004). Generally, conversion to non-carbon energy should not be delayed if the costs associated with the conversion are to be kept to a minimum. In the South African context it has been shown that it may not be so easy to achieve the change "up-front" due to inelasticity of substitution. Gebreselasie (2008) and Serletis, *et al.* (2010) both found that substitution of alternative energy sources in South Africa is generally inelastic, meaning that coal cannot be easily substituted with other energy forms. It is submitted that the documented inelasticity presents a challenge in South Africa, especially in the face of a proposed carbon tax as:

- the observed inelasticity will result in South Africa being reliant on fossil fuels in the short term;

- the carbon tax will place upward pressure on the energy price; and
- the costs of conversion will ultimately be higher.

Nonetheless, it is submitted that conversion to non-carbon energy should not be delayed over cost and inelasticity issues as the costs of conversion will only escalate with time, and all possible opportunities to minimise the total costs of conversion should be investigated. This presents the opportunity to investigate alternative measures to achieve the change to non-carbon energy and reductions in greenhouse gas emissions.

It is suggested that the use of broad-based tax incentives similar to the incentive measures available in the United States of America should be adopted as an additional intervention in South Africa.

It is stressed that incentive measures are not to be regarded as an alternative to carbon taxes – the literature reviewed supports carbon taxes and South Africa has already stated its intention to introduce a carbon tax (National Treasury: 2012a). Levying a carbon tax on polluters is submitted to be fundamentally correct as doing so will hold the polluter financially accountable for the environmental destruction attributable to their activities (commonly referred to as the "polluter must pay" principle). Incentive measures are thought to be an appropriate additional measure to subsidise the costs of conversion to non-carbon energy, and it is submitted that revenues raised from carbon taxes should be "recycled" in the economy by way of broad-based tax incentives to encourage traders and individuals, from both the private and public sectors, to invest in non-carbon energy.

There is widespread support in the literature reviewed for recycling carbon taxes in the economy so as to reduce taxes on "goods" (such as labour) (see for example Gerlagh and Van der Zwaan (2004), Van Heerden, *et al.* (2006), National Treasury (2010)). Recycling taxes within the economy can realise a potential "double dividend" in the form of:

- reduced emissions; and
- economic growth (through increased labour).

The recommendations advanced as to how the carbon taxes should be recycled support this general view in that investment in cleaner energy will reduce greenhouse gas emissions, and will contribute to economic growth in a sustainable manner through investment in cleaner energy infrastructure. The only departure is that the recommendations advanced in this work would see the carbon taxes applied directly to fund investment in non-carbon energy as opposed to being applied to reduce payroll (or other) taxes.

Specifically, the incentives that could be implemented in South Africa include:

- accelerated write-off periods for income tax purposes in respect of investment in non-carbon infrastructure;
- greater income tax deductions in respect of expenditure on training programmes for education of unskilled employees;
- income tax and value-added tax (VAT) exemptions in respect of investment in heating and cooling systems powered by wind, solar power or hydro-power;
- property rate concessions for properties that employ wind, solar power or hydro-power;
- VAT exemptions on foodstuffs, and the sale of biomass products and bio-fuels.

It is acknowledged that a large proportion of the South African population does not pay income tax, and therefore the suggested income tax incentives would not be of any benefit to those persons. The proposed VAT and property tax concessions, however, would benefit a far greater percentage of the population.

The proposed concession in respect of education of unskilled labour would not only afford a tax benefit to employers but would contribute positively to economic growth. Exempting foodstuffs has theoretical favour in the work of Van Heerden, *et al.* (2006), who found that if carbon taxes are applied to fund tax cuts on food, not only would the "double dividend" referred to above be achieved, but a potential third dividend might also be realised – that of alleviating poverty, which in turn would have a positive effect on economic growth.

5.2.2 Concluding Remarks in Terms of the Research Questions

In answering the research questions posed in chapter one, the following conclusions are reached:

- South Africa's current environmental policy is not yet well developed, but environmental taxes have already been levied on transport fuels, vehicles, aviation, products, electricity and water, with the intention to introduce a waste water tax. In the 2012 Budget Speech it was announced that South Africa intends to introduce a carbon tax on greenhouse gas emissions.
- Environmental taxes have been introduced in all of the international jurisdictions analysed. In Scandinavia environmental taxes have been in place for a long time. It is noted that in all these countries, the success of the carbon tax in terms of achieving reductions in greenhouse gas emissions has been compromised to varying degrees by political and other economic agendas.
- Although carbon taxes are viewed favourably internationally as a market-based mechanism to achieve reductions in greenhouse gas emissions, it is submitted that levying carbon taxes in isolation would not be the best response in South Africa in light of South Africa's economic profile, and the impact that such a tax would have on low income households.
- South Africa should consider broad-based environmental tax incentive measures to encourage and precipitate the change to non-carbon energy. These need not be funded directly by the Government, but could be funded directly from carbon tax revenues levied on polluters.
- It is submitted that because of the peculiar characteristics of the South African economy, including its dependence on coal, inelasticity of substitution between energy alternatives, and the cost and timing considerations that need to be considered in moving to non-carbon energy, the most appropriate environmental policy in South Africa is a combination of "revenue side" carbon taxes and "expenditure side" tax incentives. Levying carbon taxes on polluters will still hold them accountable for their emissions, whereas the recycling of carbon tax revenues in the economy to fund tax concessions for alternative energy dependency will encourage all South Africans, as far as lies

within their capabilities, to change to non-carbon energy. In so doing they will not only be contributing to the protection of the environment, as required in terms of the Constitution, but will be contributing to economic development through sustainable development, which is considered to be an imperative in South Africa's economic growth trajectory.

5.3 PROBLEMS ENCOUNTERED IN THE RESEARCH

The focus of this work was directed at particular areas of interest. The body literature on environmental law and environmental policy is extensive and far greater than this work might indicate. For the purposes of this study, only a few focus areas could be analysed in detail. There are many peripheral issues that are closely connected with the development and implementation of environmental tax policy that are alluded to in this work that could not be expounded upon without exceeding the limitation of scope of this project. These areas are nonetheless still acknowledged to be relevant.

A further area of concern is that the body of literature on issues relating to global warming, reducing greenhouse gas emissions, and environmental tax policy is expanding on a daily basis. In this respect, the original limitation of scope placed on the project prevented the entire body of literature being investigated fully.

Although the research methodology adopted in this research does not require the positivistic analysis of data *per se*, it is thought that doing so would have added value to the findings of the research. The findings of this work are largely formulated based on theoretical constructs and on the basis of the literature reviewed. Attempts to obtain budgeted data in terms of carbon tax revenues for South Africa and data regarding the cost of affording broad-based tax incentives were unsuccessful, and hence it is suspected that the recommendations of this research might be found wanting in that regard.

5.4 POTENTIAL AREAS OF FURTHER RESEARCH

It has been stated above that the limitation of scope of this project did not permit the entire body of literature to be investigated, nor did it allow for the investigation of the identified peripheral issues.

Given the rate at which the body of literature is expanding and the current topical nature of environmental tax law and policy, it is submitted that there exist many potential avenues for further research in these fields.

The eighteenth Conference of Parties to the United Nations Framework Convention on Climate Change has just agreed to extend the Kyoto Protocol for another eight years (Climate Action Sustainable Innovation Forum: 2012). In view of the concerns raised in this work about the perceived fundamental problems with the formulation of the Kyoto Protocol, it is suggested that the decision to extend the Protocol will impact directly on international environmental policy development. As a developing country, there are direct implications for South Africa and it is submitted that this decision is laying the foundation stone for a great body of future research.

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