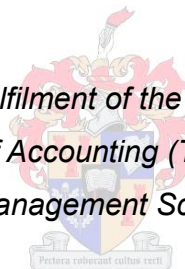


The role of tax instruments in reducing emissions from electricity generation in selected developing countries – a comparative study

by
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in the Faculty of Economic and Management Sciences at Stellenbosch University*



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DECLARATION

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I am sincerely grateful to our Saviour, Jesus Christ, for giving me strength, keeping me motivated and for granting me the ability to complete this degree.

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SUMMARY

There is not a single country in the world that remains unaffected by climate change, caused, *inter alia*, by the emission of greenhouse gases (emissions). Urgent change is therefore needed and government intervention is necessary. There are many different government approaches and instruments that can be used to reduce the emissions from electricity generation and frequently a combination of instruments will be most effective. One such measure is tax instruments. The effective use of tax instruments could stimulate investment in renewable energy, energy efficiency or research and development relating to these fields and could indirectly contribute to the reduction of emissions associated with electricity generated from coal and other non-renewable sources.

A comparison is drawn across selected developing countries (South Africa, Brazil, China and India) that face similar climate change challenges to determine the primary focus of the countries in applying tax instruments to reduce their emissions from electricity generation (i.e. supply or demand; incentives or disincentives; direct or indirect taxes; and renewable energy, energy efficiency or research and development). The comparison also serves to determine whether the South African government's use of tax instruments is in line with that of the comparative countries.

It was found that the tax instruments in South Africa and India focus almost equally on the supply and demand of electricity, while the tax instruments in China focus on the demand side and those in Brazil place slightly more emphasis on the supply side.

The primary focus in all the countries studied appears to be the use of incentives, rather than disincentives. The focus of their tax incentives appears to fall equally on the use of direct and indirect taxes, with the exception of South Africa, where hardly any indirect tax incentives are used.

Furthermore, there seems to be an almost equal focus on renewable energy, energy efficiency and research and development in the countries studied, with the exception of China, where the number of tax instruments specifically aimed at energy efficiency significantly exceeds the number of instruments specifically aimed at renewable energy and research and development. Based on the findings, Brazil does not use tax instruments to target energy efficiency.

A number of tax instruments were identified which the South African government could also consider in an attempt to contribute to the reduction of emissions from electricity generation.

OPSOMMING

Daar is nie 'n enkele land in die wêreld wat onaangeraak is deur klimaatsverandering, wat, onder andere, deur die vrystelling van kweekhuisgasse (vrystellings) veroorsaak word, nie. Dringende verandering is dus nodig en staatsingryping word genoodsaak. Daar is heelwat verskillende benaderings en instrumente wat die staat kan aanwend om die vrystellings wat deur elektrisiteitsopwekking veroorsaak word, te verminder en dikwels sal 'n kombinasie van instrumente die effektiëste wees. Een so 'n maatreeël is belastinginstrumente. Die effektiëwe gebruik van belastinginstrumente kan investering in hernubare energie, energiedoeltreffendheid of navorsing en ontwikkeling met betrekking tot hierdie velde stimuleer en kan indirek bydra tot die vermindering van vrystellings wat met die opwekking van elektrisiteit uit steenkool en ander nie-hernubare bronne verband hou.

'n Vergelyking word getref tussen uitgesoekte ontwikkelende lande (Suid-Afrika, Brasilië, China en Indië) wat aan soortgelyke klimaatsverandering-uitdagings blootgestel is, om te bepaal waar die lande se primêre fokus in die toepassing van belastinginstrumente om vrystellings uit die opwekking van elektrisiteit te verminder, lê (d.w.s. vraag of aanbod; aansporings of ontmoedigings; direkte of indirekte belasting; en hernubare energie, energiedoeltreffendheid of navorsing en ontwikkeling). Die vergelyking word ook getref om te bepaal of die Suid-Afrikaanse regering se gebruik van belastinginstrumente in lyn is met dié van die vergelykende lande.

Dit is bevind dat die belastinginstrumente in Suid-Afrika en Indië feitlik eweveel fokus plaas op die vraag en aanbod van elektrisiteit, terwyl die belastinginstrumente in China op die vraag-kant fokus en dié in Brasilië effens meer klem op die aanbod-kant plaas.

Die primêre fokus in al die lande wat bestudeer is blyk die gebruik van aansporings, eerder as ontmoedigings, te wees. Die fokus van hul belastingaansporings blyk eweveel op die gebruik van direkte en indirekte belastinge te wees, met die uitsondering van Suid-Afrika waar daar feitlik geen indirekte belastingaansporings gebruik word nie.

Daarbenewens blyk daar feitlik eweveel fokus op hernubare energie, energiedoeltreffendheid en navorsing en ontwikkeling in die lande wat bestudeer is te wees, met die uitsondering van China waar die getal belastinginstrumente wat spesifiek op energiedoeltreffendheid gemik is, die getal instrumente wat spesifiek op hernubare energie en navorsing en ontwikkeling gemik is, beduidend oorskry. Gebaseer op die bevindings, gebruik Brasilië geen belastinginstrumente om energiedoeltreffendheid te teken nie.

Daar is 'n aantal belastinginstrumente geïdentifiseer wat die Suid-Afrikaanse regering ook kan oorweeg in 'n poging om by te dra tot die vermindering van vrystellings uit die opwekking van elektrisiteit.

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LIST OF ABBREVIATIONS

The following abbreviations, with their meanings attached, are used in this document:

BRICS	BRICS association of countries, consisting of Brazil, Russia, India, China and South Africa
BASIC	Emerging geopolitical alliance, consisting of Brazil, India, China and South Africa
CDM	Clean development mechanism
CER	Certified emission reduction
COFINS	Brazilian federal social contribution tax
CO ₂	Carbon dioxide
CRS	Centre for Resource Solutions
CSLL	Brazilian social contribution tax
DSM	Demand-side management
EE	Energy efficiency
EIT	Enterprise income tax
EMC	Energy management contract
ESCO	Energy service company
HNTE	High and new technology enterprise
ICMS	Brazilian state VAT
IPCC	Intergovernmental Panel on Climate Change
IPI	Brazilian industrialised product tax
IPP	Industrial policy project
IRS	Internal Revenue Service

kWh	Kilowatt hour
MAT	Minimum alternative tax
MBI	Market-based instruments
MW	Megawatt
PIS	Brazilian federal social contribution tax
PROINFA	Incentive Programme for Alternative Sources of Energy (Brazil)
R&D	Research and development
RE	Renewable energy
REIDI	Special Incentives Regime for Infrastructure Development (Brazil)
REINFA	Special Taxation Regime for the Development and Production of Alternative Energy Sources
SANEDI	South African National Electricity Development Institute
SUDAM	Superintendency for the Development of the Amazon (Brazil)
SUDENE	Superintendency for the Development of the Northeastern States (Brazil)
VAT	Value-added tax

CHAPTER 1: INTRODUCTION

1.1 Background

South Africa, as in the rest of the world, is facing increasing growth in electricity demand, while growth in the supply of electricity is insufficient. In addition to this challenge of security of supply, the world faces the challenge of climate change that is caused, *inter alia*, by the emission of greenhouse gases (hereafter referred to as “emissions”). Urgent change is needed and government intervention is necessary. Government policies need to be properly planned and appropriately implemented to address these challenges.

The South African government is committed to helping reduce global emissions and aims to reduce their country’s emissions by 34 per cent and by 42 per cent below business as usual emissions levels by 2020 and 2025, respectively (Republic of South Africa, 2009a). The South African government has admitted that fiscal and energy policies need to be aligned, since fiscal policies can either promote or hinder the accomplishment of energy policy objectives (Republic of South Africa, 1998:16). In order to address the issues of electricity shortages and increasing emissions from coal-sourced electricity, either the demand for, or supply of, electricity, or both, could be addressed. This would reduce the demand for electricity generated from sources with high emissions and/or increase the supply of electricity from renewable sources.

Unlike coal, which can be exhausted, renewable energy (RE) utilises natural sources of energy generated from the sun, wind, water, biomass or from the internal heat of the earth to produce electricity or other energy types (Republic of South Africa, 2004a:1) and generally does not produce any emissions. Coal is currently the largest contributor to South Africa’s electricity supply, but has the most waste problems, including emissions. In line with its commitment to reduce emissions, the government of South Africa focuses on energy efficiency (EE) on the demand side and on increasing RE on the supply side (Republic of South Africa, 2004a & 2009b).

The initial costs of generating electricity from renewable sources are high (Buffkins, 2012) and it is therefore difficult for these forms of electricity to compete with coal-generated electricity. Tax incentives, combined with other instruments, could, however, stimulate investment in RE and assist in meeting government's RE contribution targets (CRS, 2005:25). In turn, this could improve electricity security and indirectly contribute to the reduction of the country's emissions.

In addition, it is crucial that strategies relating to EE are developed in order to withstand the climatic conditions and alleviate the electricity supply constraints in South Africa. EE refers to the ability to produce the same output, but with less energy consumed (Niesing, 2012). Tax instruments can potentially play a role in managing the demand for and consumption of electricity in the form of incentives for EE, as evidenced by the success achieved in the Netherlands (Lomas, 2012), as well as in the form of penalties (disincentives) for using non-renewable electricity (Bierbaum & Friedman, 1992:59). Throughout the study, the term "tax instruments" is used as a collective noun for tax incentives, tax disincentives or both. Tax incentives also have the potential to encourage investment in research and development (R&D) of technologies for electricity generation and use that limit emissions, such as RE and EE technologies (KPMG, 2013b:17).

Although tax instruments are not the only instruments that can address the challenges of security of supply and reduction in emissions (Bierbaum & Friedman, 1992:59; Giraudet, Guivarch & Quirion, 2011:24), they could potentially play an important role (Ashiabor, 2005:295). Some economists and researchers argue that tax incentives are generally redundant and ineffective when trying to stimulate investment (Bird, 2008:9). However, tax incentives are still widely used, even though the empirical evidence on the cost-effectiveness thereof is highly inconclusive (Zee, Stotsky & Ley, 2002:1497). Although there are mixed opinions about the use and effectiveness of tax incentives, they still drive much of the tax policy in both developing and developed countries (Calitz, Wallace & Burrows, 2013:3). A study undertaken by the Centre for Resource Solutions (CRS) in America found that tax incentives, in combination with other policies, are powerful tools to help encourage RE technologies (CRS, 2005:25).

The actions taken by the South African government indicate that it is serious about increasing the contribution of RE to total energy usage and supply, and about improving EE. The Department of Minerals and Energy has acknowledged that RE developments in other countries need to be monitored, adapted and developed for local use (Republic of South Africa, 1998:80). It could therefore be valuable to consider the actions taken by governments of other countries in order to learn from their mistakes when developing policies for managing the challenge of high emissions from electricity generation. To the best of the author's knowledge, based on a literature search pertaining to the topic, no other studies have been undertaken relating to tax instruments affecting the generation and use of electricity and neither has such a comparison been drawn among developing countries.

1.2 Research problem

The electricity supply in South Africa is under significant strain: the country's economy has been growing significantly over a large number of years, leading to significantly higher electricity demand. However, the electricity supply has not been growing sufficiently to provide for this increased demand.

South Africa remains heavily reliant on the country's inexpensive and abundant coal to generate electricity, but using coal has significant weaknesses, including the polluting effects of emissions. However, the South African government has committed to reducing its emissions by 2025 and to improving its EE. The government also plans to diversify the country's energy supply and is encouraging the use of RE technology (Republic of South Africa, 2012b:170-171). One way of increasing the electricity supply without increasing emissions is to increase investment in RE. The effective use of tax instruments could stimulate such investment.

Another way of addressing the challenge of limited electricity supply and high emissions is by limiting the overall demand for electricity or by limiting the demand for electricity generated from non-renewable sources. Once again tax instruments can be used to encourage green behaviour, such as EE.

Tax instruments could therefore potentially play a role in promoting RE, EE and R&D relating to these fields. A consideration of the tax instruments used by governments of other countries in order to reduce the emissions from electricity generation would be useful. However, no other studies were identified which relate to tax instruments affecting the generation and use of electricity in developing countries and no comparison has been drawn between South Africa and other developing countries.

1.3 Research objective and value of research

Although there has been significant investment in RE in South Africa since 2012, when the country ranked among the top ten countries in the world on clean energy investment (Bloomberg New Energy Finance, 2013:27,43) and many projects have been undertaken to manage the demand of electricity, there is still room for improvement. The former South African Minister of Energy acknowledged that far more action is required to put the country on a low carbon path (Republic of South Africa, 2012a) and that progress in terms of EE has not been achieved as expected (Republic of South Africa, 2013a).

The objective of this study is to investigate which tax instruments are used to indirectly contribute to the reduction of emissions from the generation of electricity, or prevent it from increasing, in selected developing countries. A comparison is drawn between developing countries that face similar climate change challenges to determine if the South African government's use of tax instruments to reduce its emissions from electricity generation is in line with the use of tax instruments by other developing countries. Four members of the BRICS association of countries, namely Brazil, India, China and South Africa, were chosen for this comparison. Tax perspectives on both the demand by consumers and the supply by producers of electricity are investigated.

The following specific research questions will be addressed, with reference to available literature:

- Do the selected countries primarily focus on addressing the demand or the supply of electricity?
- Do the selected countries primarily use tax incentives or disincentives?
- Do the selected countries primarily use direct or indirect taxes?
- Do the selected countries primarily focus on addressing RE, EE or R&D?
- Which instruments identified in China, Brazil and/or India warrant consideration for use by the South African government?

The study can potentially highlight areas for improvement or, at the very least, for consideration by the South African government, in particular the Department of National Treasury. The study can potentially also assist investors in RE or EE technologies and taxpayers to understand the tax instruments currently available in South Africa, which might be applicable to them.

1.4 Research design and methodology

The research performed in this study follows a historical, non-empirical method and uses secondary data. A literature review is performed in order to understand the role of tax instruments in reducing emissions from electricity generation in South Africa, Brazil, India and China and a comparison is drawn across these countries.

Sources used include statutory laws (relevant sections from the countries' income tax or other tax laws), academic articles in accredited journals, books, dissertations and articles in non-accredited journals and magazines. Preference is given to academic articles and dissertations.

The following key words and combinations thereof were mostly used in searching for relevant and useful sources: "renewable energy/electricity", "green energy/electricity", "tax", "incentives", "climate change", "green tax", "fiscal policy", "market-based/economic/fiscal instruments", "developing countries" and "BRICS".

The searches were primarily performed in Ebscohost, Google scholar, National ETD portal, Google and the websites of accounting and auditing firms KPMG, PWC, E&Y and Deloitte.

1.5 Rationale for comparing South Africa to Brazil, India and China

The effects of global warming are likely to have a stronger impact on developing than developed countries. Developing countries are likely to experience the countless problems associated with global warming more severely, because of their sensitivity to such adverse impacts. Furthermore, these countries are less likely to have the resources, both financial and institutional, to effectively adapt in such circumstances and would not be able to escape the potentially significant adverse consequences of their energy challenges, which include reducing their energy-related emissions, unless their governments intervene (Ahuja & Tatsutani, 2009:7,10). Many industrialised countries have been relocating their carbon-intensive manufacturing activities to developing countries for various reasons, thereby worsening the problem for the latter. This has led to increased pressure for the developing countries to increase their environmental protection efforts and embark on more sustainable development pathways (Weiss & Jacobson 1998 and Blackman & Sisto 2006, cited in Freitas, Dantas & Iizuka, 2011:118). Although all developing countries are not the same, these countries do face similar economic challenges and have similar goals (Todaro, 2000:29-42).

There is an ongoing shift in RE activity from developed to developing countries. During 2012, investment in RE in developing countries increased by 19 per cent, while investment in developed countries decreased by 29 per cent in the same year. China and South Africa, *inter alia*, experienced sharp increases in RE investment in 2012, with China being the top scorer globally in respect of RE investment in 2009, 2010 and 2012 (Bloomberg New Energy Finance, 2011 & 2013:11). India, South Africa and Brazil also made significant investments in RE and were seventh, eighth and ninth respectively in RE investment in 2012 (Bloomberg New Energy Finance, 2013:23,25). According to the United Nations Industrial Development Organization (UNIDO, 2009:18), Brazil, India and China are examples of countries where government policies have assisted in establishing an RE market. Not only are

the four selected countries, namely South Africa, Brazil, India and China, actively promoting RE; they are actively using tax instruments to achieve their green policy objectives (KPMG, 2013b).

In addition, the four selected countries are all developing economies with electricity supply shortages and very high emissions from the burning of fossil fuels and all have committed to reduce their emissions. The selected countries also all form part of the BRICS association of major emerging economies: Brazil, Russia, India, China and South Africa.

The BRICS countries have unique economic characteristics and the association was formed in order to leverage on their trading characteristics (Nteo, 2012:5). The BRICS countries are largely dependent on fossil fuels and the per capita carbon emissions of this group of countries are relatively high: roughly two-thirds of the global average. These countries have similar ambitions for human development and social improvement, but the funds invested in education, health and infrastructure, as a percentage of their savings, vary significantly among them (May, 2008:4). The BRICS countries are experiencing significant challenges to the continued growth of their economies, but without proportionately large increases in their emissions (Freitas *et al.*, 2011:118).

Finally, Brazil, India, China and South Africa are all non-Annex countries in the Kyoto Protocol, while Russia is an Annex I country. As a result, Russia has very different responsibilities in terms of the protocol than the other countries. The protocol is an international agreement linked to the United Nations Framework Convention on Climate Change that sets internationally binding targets for the reduction of emissions on Annex I and II countries (UNFCCC, 2014a), while non-Annex countries are merely encouraged to voluntarily reduce their emissions. Russia is likely to have very different government policies for addressing climate change challenges than the other BRICS countries. This is likely to make Russia less comparable to South Africa than the other three BRICS countries and therefore Russia is excluded from the study. In further support of this exclusion, the other four BRICS countries, excluding Russia, have formed a group called BASIC: an emerging geopolitical alliance, to strengthen their negotiating muscle (Nteo, 2012:6) as they

committed themselves to act jointly at the United Nations Climate Change Conference in Copenhagen in 2009 (Dasgupta, 2009).

1.6 Delimitation

This study is limited to an investigation of the role of tax instruments in addressing the challenge of high emissions from electricity generation, and not that of other government measures or combinations of instruments. The study further proposes tax instruments which the South African government could consider for future use. The impact of the use of such proposed tax instruments on the revenue authorities, including the earmarking of tax revenue, the administration of these tax instruments and the funding of tax incentives, is not addressed.

In order to determine the primary focus of the tax instruments applied by the selected countries, only tax instruments which are currently effective are considered. Furthermore, the number of different tax instruments identified in each country is compared, regardless of the financial impact of the instruments, the effectiveness of the instruments in truly changing human behaviour, the remaining period of the instruments before they will be phased out or withdrawn, and the ease of compliance with the requirements for the respective incentives.

Only literature written in English is considered. It is recognised that sources in other languages could contain tax proposals relevant to this study, but this could serve as a basis for expansion in future research by other researchers fluent in such other languages.

1.7 Overview of chapters

The proposed study is set out in the following chapters:

Chapter 2: The role of tax instruments

This chapter investigates the role that tax instruments can play in achieving governments' goals and targets regarding RE, EE and emission reductions. It includes a discussion of the following research questions:

- Is government intervention justified to address environmental challenges?
- Can tax instruments be used successfully to address environmental challenges?
- Are tax instruments effective in stimulating investment in RE, EE and R&D?
- Is it more effective to address the demand or the supply of electricity when using tax instruments to address the challenges of high emissions from electricity generation?
- Which of the two - tax incentives or disincentives - is considered to be the most effective instrument to address the challenge of high emissions from electricity generation?

Chapters 3 to 6: The tax instruments used in each of the selected developing countries (South Africa, China, Brazil and India)

These four chapters discuss the tax instruments used in each of the selected countries to indirectly contribute to the reduction of emissions from electricity generation. It differentiates between tax instruments used to address the supply of electricity and tax instruments used to address the demand for electricity. Furthermore, it differentiates between normal taxes, indirect taxes and other taxes or levies. Lastly, each of these four chapters concludes on the primary focus of the tax instruments used in that country with regards to the following:

- supply or demand;
- incentives or disincentives;
- direct or indirect taxes; and
- RE, EE or R&D.

The findings in these chapters will facilitate the comparison between the selected countries in Chapter 7.

Chapter 7: A comparison of the tax instruments used in the selected countries and proposed considerations for South Africa

This chapter compares the tax instruments applied by the selected countries and discusses the following research questions:

- Do the selected countries primarily focus on addressing the demand or the supply of electricity?
- Do the selected countries primarily use tax incentives or disincentives?
- Do the selected countries primarily use direct or indirect taxes?
- Do the selected countries primarily focus on addressing RE, EE or R&D?
- Which instruments identified in China, Brazil and/or India warrant consideration for use by the South African government?

Chapter 8: Conclusion

The last chapter concludes on the results of the study and also highlights specific tax instruments that the South African government can consider for future use, as identified in the comparative countries. It summarises all the findings and addresses the research problems that were identified.

CHAPTER 2: THE ROLE OF TAX INSTRUMENTS

“In the battle against climate change, government leadership is indispensable. Through legislation and regulation, governments exert a stronger influence on environmental practices than any other force motivating businesses.”

(PWC, 2010:9)

2.1 Introduction

This chapter investigates the role that tax instruments can play in achieving governments' emission reduction goals and targets. In order to reduce the emissions from electricity generation, either the demand for, or the supply of, electricity, or both, can be addressed. On the demand side, EE could be encouraged in order to reduce the demand for electricity overall or to reduce the demand for electricity generated from non-renewable sources, specifically. On the supply side, RE could be encouraged, i.e. the generation of electricity from renewable sources with fewer emissions. In addition, the R&D of EE or RE technologies can be encouraged to affect both the supply and demand of electricity.

This chapter discusses the following aspects in order to determine the role that tax instruments can play in reducing emissions from electricity generation:

- the rationale for government intervention, which might include the use of tax instruments, to address environmental challenges;
- the effectiveness of tax instruments in promoting RE, EE and R&D;
- the effectiveness of tax instruments in targeting the demand for electricity versus the supply of electricity; and
- the effectiveness of using tax incentives (carrots) versus tax disincentives (sticks).

2.2 Rationale for government intervention and possible instruments to use

Prices of goods and services generally do not include environmental costs and benefits. Externalities can therefore arise. Negative externalities arise when certain costs arising from activities between producers and consumers are not included in market prices, resulting in these costs being carried by society as a whole, instead of

by the parties involved in the activities (Republic of South Africa, 2004a:v,27). Government intervention is often necessary where there are environmentally-related market failures, for example externalities (Republic of South Africa, 2013b:8). It is important to incorporate the environmental costs and benefits into the prices of goods and services in order to allocate the cost of environmental damage and climate change back to the producers or consumers who are responsible for the damage (Gerhard, 2012:26). The concept of “the polluter pays” is often used by environmentalists to describe this principle of reflecting the external environmental costs of economic activities in the prices of goods or services in order to transfer the costs to the person creating the pollution (Ashiabor, 2005:298). According to Ahuja and Tatsutani (2009:10), developing countries would not be able to escape the potentially significant adverse consequences of their energy challenges, which include reducing energy-related emissions, unless their governments intervene.

Market mechanisms, such as market-based instruments (MBIs), are increasingly used by governments to promote environmentally friendly behaviour. Such instruments are no longer only used by developed countries, but are also increasingly being implemented by developing countries (Economy, 2006 cited in Nteo, 2012:12). As a result of all the environmental challenges faced globally, attention has been shifted away from government regulations for environmental governance to the use of market mechanisms (Economy, 2006:173).

MBIs are instruments that governments can use to influence consumer behaviour through price signals (Hockenstein, Stavins & Whitehead, 1997:14), as such instruments aim to correct environmental market failures through the price mechanism (Republic of South Africa, 2006:2). Broad examples are taxes (negative MBIs) and tax incentives (positive MBIs). MBIs consist of those that use existing markets and those that create new markets. MBIs that use existing markets are those that aim to improve environmental outcomes by building on markets and prices that already exist. In other words, such an instrument aims to internalise un-priced environmental costs and benefits by incorporating them into price structures. Examples of such instruments include fiscal measures, such as subsidies, tax instruments and user charges (Republic of South Africa, 2006:44).

There are a number of different ways in which governments can intervene to help promote a transition to a greener industry. Some approaches that can be followed are shown in Table 1. This table differentiates between three different government policy categories or approaches. The measures identified by different researchers are then matched across the various categories and approaches. These types of government policies are all proven to be effective in promoting RE (KPMG, 2013a:1,5).

Table 1: Government policy categories and approaches

Policy category (REN 21, 2013:76)	Policy category (World Energy Council, 2010:21)	Policy approach (Gray & Talberth, 2011)
Regulatory	Quota-based and price-setting	Regulatory-based and some elements of expenditure-based
Fiscal incentives	Financial incentive	Tax-based and some elements of expenditure-based
Public financing	Public investment / market facilitation	Expenditure-based and institution-based

(Source: own compilation)

Tax instruments form part of the fiscal or financial incentives category and are optional government instruments to use when aiming to promote a transition to a greener economy. Tax instruments that target RE, for example, indicate to investors that the government is committed to RE (Bahnemann, 2009 cited in Chacon, 2013). The key to successful government intervention is to plan and design the appropriate policies thoroughly prior to implementation (Geller, Harrington, Rosenfeld, Tanishima & Unander, 2006:570).

The following section explores the effectiveness of tax instruments in targeting governments' environmental objectives.

2.3 Effectiveness of tax instruments

2.3.1 General effectiveness of tax instruments

Ashiabor (2005:295) found that economic instruments, for example fiscal incentives such as tax instruments, can be useful in constraining pollution, if applied correctly. He also found that positive fiscal policy instruments, such as tax incentives, tax subsidies, tax credits and grants, have been the primary instruments for addressing the issues of fuel security and environmental protection since the 1970s (Ashiabor, 2005:300).

MBIs, in the form of environmentally-related taxes and charges, may address certain environmental concerns more efficiently than traditional regulatory approaches (Republic of South Africa, 2006). According to Cargill (2011:32), the use of MBIs is perhaps the most cost effective manner to achieve environmental goals. Bierbaum and Friedman (1992:64) agree that market-based approaches, such as carbon taxes or marketable permits, can be effective in lowering emissions in the electric utilities sector, but point out that government regulations, such as limits on allowable emissions and EE standards, could also be effective in lowering emissions. According to Niesing (2012:16) though, government regulations alone are not enough to reduce demand for energy and energy prices and incentives have a significant role to play. In order to operate effectively, MBIs, for example subsidies and taxes, require some form of regulatory measures, monitoring and enforcement (Republic of South Africa, 2006:44). Bierbaum and Friedman (1992:58) and the Department of National Treasury (Republic of South Africa, 2013b:7) point out that a combination of regulatory and market-based policies is required to prevent global warming.

There is no one-size-fits-all government approach to effectively create a green economy and frequently a combination of policy instruments, which might include tax instruments, is necessary to reduce emissions (Republic of South Africa, 2006:43; Bierbaum & Friedman, 1992:63; Nteo, 2012:59). According to Winkler (2005:31), studies have indicated that a combination of policy instruments is likely to be the most effective in achieving the largest environmental and economic benefits. Denmark is an example of a country that successfully used a combination of

complementary policies, including tax incentives, to encourage the development of its wind energy industry (Wiser, Hamrin & Wingate, 2002:3). Nteo (2012:59,67) explains that an array of country-specific characteristics must be considered and governments should establish a combination of instruments that is appropriate for their circumstances. The combination of instruments used in different countries is therefore likely to differ.

When considering the effectiveness of tax incentives specifically, certain researchers regard them as effective, but only when used in combination with other instruments (CRS, 2005:25). Other economists and researchers argue that tax incentives are generally redundant and ineffective when attempting to stimulate investment (Bird, 2008:9). Nevertheless, tax incentives are still widely used, even though the empirical evidence on the cost-effectiveness thereof is highly inconclusive (Zee *et al.*, 2002:1497; Nathan-MSI Group, 2004). The benefits of investment tax incentives are often overstated, while the costs are often underrated or completely overlooked (Nathan-MSI Group, 2004). Incentives focussed on investment may be successful, but too often problems arise, *inter alia*, as a result of competing policies, substitutability between capital and other inputs, impact of long-term incentives and competition from other countries. These problems can mitigate or exacerbate the impact of incentives (Calitz *et al.*, 2013:5-6). Although there are mixed opinions about the use and effectiveness of tax incentives, they still drive much of the tax policy in both developing and developed countries (Calitz *et al.*, 2013:3).

Tax incentives might be justified; however it is important to remember that many other factors, including other economic, non-economic and social policy considerations, drive investment decisions (Calitz *et al.*, 2013:7). There is empirical evidence on the effectiveness of tax incentives, but a country's overall economic characteristics may play a more important role than tax incentives (Zee *et al.*, 2002:1509). The Nathan-MSI Group (2004) agrees that tax can affect investments, but that non-tax considerations are far more important in determining most investment decisions. Although some believe that tax incentives distort investment decisions and are often ineffective, inefficient and prone to abuse and corruption (Easson & Zolt, 2002:1), tax incentives are likely to remain part of development policy in South Africa and around the world (Calitz *et al.*, 2013:22).

Green taxes (disincentives) can be effective in fighting climate change. These taxes lead to increased revenue and decreased pollution and, over the long term, the circumstances of societies will improve and less global warming will occur. Such taxes are, however, not necessarily practical for developing countries, as they can affect a country's competitiveness: green tax increases the producer's costs and if it is only imposed within one country or region and not outside of it, this will have a negative impact on the country's exports (Anjum, 2008).

It is not clear whether tax instruments are effective at targeting governments' environmental objectives, or which government instrument is the best to use. It is difficult to determine the impact of tax instruments on specific governmental objectives, as tax instruments often form part of a combination of government measures. As discussed, certain researchers believe that MBIs, which can include tax instruments, are the most cost effective way to achieve environmental goals and that carbon taxes can be effective in reducing emissions. Some believe that MBIs may address certain environmental concerns more efficiently than regulatory measures, while others believe that MBIs should be accompanied by regulatory measures to prevent global warming. Certain researchers believe that tax incentives are effective, while others believe that they are ineffective. Nteo (2012:59,67) and the Nathan-MSI Group (2004) point out that the most effective instrument would depend on a country's specific circumstances and governments should exercise judgement when selecting appropriate instruments. Many researchers agree that there is no one-size-fits-all government approach and that frequently a combination of instruments, which might include tax instruments, would be necessary.

According to Deloitte (2010:2), the challenge faced by all governments is to create incentives that offer good returns during the early stages to promote an industry, and then to phase the incentives out as the industry develops. Green taxes (disincentives), on the other hand, should be phased in over time (Anjum, 2008).

Other aspects to consider when designing effective tax instruments are:

- The instruments should also address other societal and economic development objectives (Ahuja & Tatsutani, 2009:10) and governments should be careful not to focus their attention on the design of tax incentives and neglect other important government policies (Nathan-MSI Group, 2004).
- The cost or benefit and opportunity costs involved should be considered (Calitz *et al.*, 2013:4).
- Instruments should be easy to understand and assess (Deloitte, 2010:2).
- Proper incentives should be made available over the long term, as investment processes, operational lives of plants, and transmission and distribution infrastructure usually stretch over decades (Bouttes, Dassa & Crassous, 2011).
- Incentives should be based on a clear combination of price signals and related regulatory measures at production and consumption level. In other words, they should reflect total real cost and steps must be taken to ensure timely investments and smooth integration of intermittent electricity generation (Bouttes *et al.*, 2011).
- The instruments should contain sufficient details to ensure that they create the desired effect (Bouttes *et al.*, 2011).

The next section explores the effectiveness of tax instruments relating to RE specifically, to determine if the same conclusion is reached about the effectiveness of tax instruments.

2.3.2 Effectiveness of tax instruments relating to renewable energy

Countries must compete with each other to offer attractive regimes, in order to attract investors to industries which governments aim to promote, such as an RE industry (World Energy Council 2010:56). By increasing the RE contribution to total energy usage and supply, emissions can be reduced (Republic of South Africa, 2004a:27). The challenges pertaining to electricity security and high emissions from electricity generation can therefore be addressed, *inter alia*, by increasing the generation of RE.

As is evident worldwide, economic instruments, such as green taxes (disincentives), fiscal incentives, market instruments and other direct regulatory measures, can be used to increase RE generation (Ashiabor, 2005:295). KPMG performed a study among 28 countries to determine the tax instruments and other incentives used by governments to promote an RE industry. Regulatory policies, fiscal incentives and public financing were used by the countries studied. Fiscal incentives include grants, subsidies or rebates, as well as certain tax incentives (KPMG, 2013a:1). The World Energy Council (2010:21) and the Department of Minerals and Energy (Republic of South Africa, 2004a) state that government intervention, in the form of financial incentives, can be used to promote an RE industry. The use of fiscal incentives is one type of government approach that is proven to be effective in promoting an RE industry (KPMG, 2013a:1,5).

According to KPMG (2013b:20), governments of both developed and developing countries are most active in using tax incentives in the RE policy area, as opposed to the other eight green policy areas identified by KPMG, which include EE, *inter alia*. The CRS (2005:25) examined a number of countries worldwide to learn from their tax incentive policies to promote RE and concluded that tax incentives are effective, powerful and highly flexible instruments to promote RE industries. The World Resources Institute (2008:1) and the Intergovernmental Panel on Climate Change (IPCC) agree that certain tax instruments are effective. According to the IPCC (2007 cited in Nortje, 2009:6), carbon taxes (disincentives) and tax incentives for the production, consumption and R&D of RE, *inter alia*, are effective tax instruments to address the challenges of climate change. Carbon taxes are taxes or

levies on carbon emissions or on the use of non-renewable energy or energy sources with high emissions (Nortje, 2009:6). The United Nations Industrial Development Organisation (UNIDO, 2009:18) agrees that tax instruments are potentially effective as they found that tax credits, *inter alia*, have been used successfully to promote RE in developing countries.

Tax incentives in isolation are, however, not the most effective instruments to promote an RE industry (CRS, 2005:20,25) and, since it is unlikely that one financial incentive on its own will be sufficient, a combination of incentives that complement one another can play a significant role (Gouchoe, Everette & Heynes, 2002). On the other hand, although tax disincentives, such as carbon taxes, discourage high energy consumption and encourage reductions in emissions, a tax alone is insufficient. There are many different decision makers and therefore a larger arsenal of policy instruments is needed (Bierbaum & Friedman, 1992:59). Giraudet *et al.* (2011:214) agree that there is not one specific instrument, nor is there a combination of instruments, that can be used in all circumstances.

Apart from encouraging investors, government measures such as tax incentives are also necessary to encourage and support R&D activities in the early stages of an RE industry. However, as soon as the industry is established and more mature, the focus should be on other types of policies, including, *inter alia*, feed-in tariffs, RE certificates or renewable portfolio standards that are possibly supported by tax credits (World Energy Council, 2010:21-22).

Tax incentives should comply with the following guidelines in order to effectively stimulate an RE industry (CRS, 2005:20-24):

- Tax incentives should target the stage of development of the industry: R&D and investments should initially be encouraged, production should be encouraged later and, eventually, the incentives should be phased out.
- Incentives should be large enough to ensure competitiveness of the renewable technology.
- A sufficient tax liability is required to benefit from the total tax incentive.
- The incentives should be easy to administrate.

- Tax-exempt public sector organisations should also be able to participate in the incentive programmes.
- The public should be made aware of and informed regarding the incentives.
- They should be credible and enforceable, the qualifying requirements should not change radically and all participants must be treated fairly and uniformly.
- They should be subject to quality and safety standards.
- The incentives should be technology neutral, in other words, they should not limit the RE technologies that qualify for the incentives.
- They should be predictable and consistent.

In the next section the effectiveness of tax instruments relating to EE will be discussed.

2.3.3 Effectiveness of tax instruments relating to energy efficiency

According to KPMG (2013b:11), it is becoming more common for governments all over the world to adopt policies that combine RE and EE. EE is often the preferred approach as an inexpensive and easy way of addressing the challenges of limited supply and climate change, as opposed to building new renewable electricity plants.

The acceptance of EE measures can be encouraged by the use of financial incentives, which can include tax incentives. Subsidies for fossil fuels can be removed or energy or carbon taxes (disincentives) can be implemented in order to improve EE. It should, however, be borne in mind that the demand for energy is relatively price inelastic in the short run (Geller *et al.*, 2006:571). This means that the demand for energy would not change significantly in the short term if energy prices are increased, as energy is a necessity and generally does not have many substitutes, if any at all. A larger impact on energy demand can, however, be achieved if a portion of the tax revenue is used to support EE programmes (Geller *et al.*, 2006:571).

EE can be promoted by using carefully designed financial incentives, aimed at avoiding expensive efforts that will not have a significant effect on the marketplace. This can be achieved by following these guidelines (Geller *et al.*, 2006:571):

- Offer incentives for newly commercialised technologies, especially those with high initial costs, but good prospects for cost reduction, as demand and production increases and learning takes place.
- Retain such policies for at least ten years in order to ensure an orderly development of EE markets.
- Revise these policies periodically.
- Phase the incentives out as particular technologies become well established and more cost effective.
- Balance the desire to provide stable and predictable policies to businesses with the desire to revise policies as market conditions change.
- Involve the private sector.

KPMG studied 21 major economies of the world to establish which tax instruments are used in the area of green policies. The majority of these countries use tax incentives to encourage EE in business (KPMG, 2013b:11). It is difficult to conclude on the effectiveness of tax instruments in achieving EE since evidence is sparse (KPMG, 2013b:11). However, one example of the success thereof is the Dutch energy investment allowance scheme that contributed to the country's increased business investment in EE in 2012 (Lomas, 2012). According to Zhou, Levine and Price (2010:6445), the use of tax and fiscal policies, such as taxes on energy consumption, tax rebates for EE and tax credits for investment in EE measures, *inter alia*, have been found to be effective instruments to encourage EE in certain countries.

The next section discusses the effectiveness of tax instruments in the field of R&D.

2.3.4 Effectiveness of tax instruments relating to research and development

Tax instruments aimed at encouraging R&D have the potential to encourage R&D of RE and EE technologies, which could, in turn, contribute to the reduction of emissions from electricity generation. KPMG found that 18 of the 21 countries studied use tax instruments to promote R&D. This is because innovation is critical to governments' green policy goals. R&D drives down the cost of technologies, improves the business case for private sector investment, reduces costs to governments and enables solutions to be delivered at scale (KPMG, 2013b:17).

One of the benefits of using a disincentive, such as a carbon tax, is that it creates dynamic incentives for R&D of low-carbon technologies (Republic of South Africa, 2013b:9). Sawyer (2005:148) analysed the impact of tax credits (incentives) on R&D expenditure levels, by studying the results of other researchers' studies. He concluded that additional tax credits will normally produce additional R&D expenditure and will generally be cost effective. The IPCC (2007 cited in Nortje, 2009:6) also found that tax incentives for the R&D of RE, *inter alia*, are effective instruments to address climate change.

According to the CRS (2005:14), in order for tax credits to effectively encourage R&D, the industry should be large enough and profitable enough to ensure that the tax credits will result in an appropriate level of useful research being undertaken. In the early stages of the industry, when substantial income taxes are not yet paid, other forms of government support may be more appropriate. In such circumstances, government funding might be more effective.

2.3.5 Conclusion

Some researchers believe that tax incentives are effective in stimulating investment, while others believe that tax incentives are generally ineffective in this regard, as other non-tax considerations generally have a larger impact on investment decisions. Tax disincentives can effectively fight climate change, but are not necessarily practical for developing countries, as they can impact negatively on a country's competitiveness.

According to KPMG, governments of both developing and developed countries actively use tax incentives to encourage an RE industry and the CRS found that tax incentives, in combination with other incentives, can effectively stimulate an RE industry. The IPCC regards carbon taxes and tax incentives for the production, consumption and R&D of RE, *inter alia*, as effective instruments to address climate change.

Tax instruments, such as taxes on energy consumption, tax rebates for EE and tax credits for investment in EE measures, *inter alia*, have been found to be effective measures to encourage EE. KPMG found that it is becoming more common for governments all over the world to adopt policies that combine RE and EE.

Sawyer found that additional tax credits will normally produce additional R&D expenditure and that they will generally be cost effective. The IPCC found that tax incentives for R&D of RE, specifically, are effective in addressing climate change. The CRS agrees that tax credits can be effective in stimulating R&D, as long as the industry is large enough and profitable enough in order for the tax credits to result in an adequate uptake of R&D activities.

It is clear that tax instruments could be effective in reducing emissions from electricity generation, depending on a country's specific circumstances. In general, a combination of instruments, which could include tax instruments, is likely to be more successful.

2.4 Effectiveness of tax instruments in targeting demand versus supply

In order to address the issue of high emissions from coal-sourced electricity, either the demand for, or supply of, electricity, or both, could be targeted. Tax instruments can play a role in managing the demand for electricity in the form of incentives for EE and/or disincentives for using non-renewable electricity. On the supply side, tax incentives can encourage the generation of renewable electricity, by making it more cost-effective in order to compete with less expensive coal-generated electricity. Tax incentives for R&D also have the potential to encourage investment in R&D of technologies for electricity generation and use that limit emissions, such as RE and EE technologies. This section addresses the question of whether it is more effective to focus tax instruments on the demand or supply side.

Government intervention is needed on both the supply and demand side of electricity generation. High initial costs make it difficult for the RE industry, on the supply side, to compete with conventional (non-renewable) energy options in the short to medium term and therefore government support is needed to establish the RE industry (Republic of South Africa, 2004a:27) and accelerate the shift towards a greener industry (Gray & Talberth 2011). On the demand side, Ahuja and Tatsutani (2009:10) have found steady historical improvement in EE and energy intensity, but point out that, without government intervention, such improvements are unlikely to keep pace with the continued growth in demand, especially in countries that are still in the early stages of industrialisation. Apart from the necessity of government support in order to promote the RE market and to encourage EE, government support is also needed in the early stages of R&D (Ahuja & Tatsutani, 2009:13).

2.4.1 Demand

Demand-side management (DSM) is defined as organised activities that are used by governments and utilities to influence the amount and/or timing of electricity use for the benefit of the electricity utility, the electricity consumer and the community (Charles River Associates, 2005:6). DSM is an efficient solution, especially for short-term shortages in supply and it makes use of, *inter alia*, EE measures or methods to shift electricity usage from peak to off-peak periods. DSM initiatives take only a few months to implement, whereas the construction of a new power station to alleviate supply constraints can take up to eight years (Eskom, 2008 cited in Slambert, 2010:8). Examples of DSM initiatives include, *inter alia*, promoting the use of EE technologies, such as compact fluorescent lamps, solar water heating systems and smart meters (Slambert, 2010:15). Although DSM initiatives have numerous benefits, the concept of DSM, as such, generally does not make use of tax instruments to target the challenges of emissions and electricity supply shortages and is therefore not discussed further in this study. However, the benefits highlighted here regarding the short implementation period of DSM, as opposed to building new power stations, are relevant for this study. Tax instruments focussed on the demand side, such as EE, may be more effective in the short term, although tax instruments focussed on the supply side, for example the generation of renewable electricity, are also necessary in the long term.

Numerous sources agree that it is effective to target EE as a demand-side measure (Niesing, 2012:22; Winkler, 2007:34). Many different instruments can be used to target EE, of which tax instruments are just one such type. Ahuja and Tatsutani (2009:10) found that EE improvements offer the largest and least costly emissions reduction potential and can ease supply constraints. Furthermore, they found that small, incremental and cumulative improvements in EE over long periods can deliver enormous benefits by making the economies of countries less wasteful, more productive and more competitive (Ahuja & Tatsutani, 2009:11). According to Niesing (2012:21), EE begins with a change in human behaviour and EE and DSM are significantly affected by government interventions, such as incentives. He agrees that EE can have the largest positive effect in reducing the emissions in the world in the short term (Niesing, 2012:22). Furthermore, he points out that EE presents the

lowest emission reduction cost option and presents financial benefits within a relatively short payback period (Niesing, 2012:23). It is, however, not sufficient to target EE in isolation. In the long term, it is important to also target the supply side (Winkler, 2007:34).

2.4.2 Supply

Governments around the world actively use tax incentives and other measures to promote RE (KPMG, 2013b:20). The CRS has found that tax incentives are effective instruments to promote RE, when combined with other instruments (CRS, 2005:25). In fact, government policies all over the world tend to combine EE (demand-side) and RE (supply-side) measures (KPMG, 2013a:2).

2.4.3 Combination of demand and supply

Bierbaum and Friedman (1992:61) observed that three studies performed by three different parties to propose an action plan to the United States government to address the challenges of global warming all had different proposals. The parties had different opinions and suggested different approaches and types of government policies and instruments. One study focussed on reducing emissions on the supply side, while the other two focussed on targeting the demand. The one proposed the use of a combination of instruments, which included tax instruments, while the other study proposed only limited financial measures. Although Bierbaum and Friedman's study is based on the United States of America, it emphasises the fact that there is no blueprint approach to address these challenges of emissions and electricity supply constraints. The government of each country should assess, *inter alia*, its specific challenges, circumstances, country characteristics and available resources when designing government policies and implementing measures to target its objectives. Based on this assessment, they might conclude that targeting either the demand or supply, or both, would be the most effective approach.

The next section explores the use of tax incentives (carrots) versus tax disincentives (sticks) to determine which is the most effective.

2.5 Effectiveness of using carrots versus sticks

Tax instruments can be effective tools to address the challenge of high emissions from electricity generation, especially when used in combination with other instruments. Relevant tax instruments could include, *inter alia*, incentives for EE, disincentives for using non-renewable electricity, incentives for generating renewable electricity and incentives for researching and developing RE and EE technologies.

Both tax incentives and disincentives are used by governments all over the world to address environmental challenges, when aiming to reduce carbon emissions and promote EE (KPMG, 2013b:1). KPMG (2013b:14) found that the use of tax incentives and disincentives varies widely since each country is unique in the way that it manages its policy response to climate change and the reduction of carbon emissions. However, governments across the globe seem to be making increased use of both incentives and disincentives (Chanel, 2012).

The major driver of the strong growth in the global RE industry is government incentives, including credits, grants, tax holidays, accelerated depreciation allowances and other non-tax incentives. Disincentives in the form of, *inter alia*, taxes and penalties, such as carbon taxes, cap and trade schemes and energy taxes are also used by governments to reduce emissions (KPMG 2013a:1). Deloitte (2010:2) found, similarly to KPMG (2013a:1), that a broad range of incentives are used globally to promote RE. The incentives used vary from market mechanisms, like carbon credits and renewable obligation certificates, to feed-in tariffs and tax incentives, such as production tax credits. All these instruments have different complexities, strengths and weaknesses (Deloitte, 2010:2). Even within individual countries, a combination of mechanisms is often used and many of these mechanisms co-exist. This section explores which of the two tax instruments - incentives or disincentives - is suggested by literature as the most effective in reducing emissions from electricity generation.

2.5.1 Use of tax incentives (carrots)

The perception exists that incentives, such as tax subsidies, tax credits and grants, have a much greater impact on consumer behaviour than taxes (disincentives), since they are perceived as a reward, while taxes are seen as punishment. There is, in fact, empirical evidence that incentives (carrots) are generally more effective in swaying customers towards RE and EE than environmental taxes (sticks) (Bennet & Moore, 1981:319,321). According to Ahuja and Tatsutani (2009:12), subsidies for conventional fossil fuels (non-renewable energy sources) could be phased out over time and the funds could be used to provide subsidies for more sustainable forms of energy or more efficient technologies. Subsidies (incentives) are widely used, since they are more politically acceptable than taxes (disincentives) (Ashiabor, 2005:300). Tax incentives, specifically, have also been successfully used in well-known cases (Nathan-MSI Group, 2004) and, according to the Katz Commission of Inquiry, a governmental objective can be achieved more efficiently by means of tax incentives than by government expenditure programmes (Katz 1994, cited in Taljaard, 2008:33).

However, tax incentives also have disadvantages (Nathan-MSI Group, 2004). The advantages and disadvantages of tax incentives are presented in Table 2.

Table 2: Advantages and disadvantages of tax incentives

Advantages of tax incentives	Disadvantages of tax incentives
<ul style="list-style-type: none"> • can enhance returns on investment; • can create positive externalities; • are relatively easy to target and fine tune; • signal openness to private investment; • are useful in a world of capital mobility; • are necessary for responding to tax competition from other jurisdictions; • compensate for other deficiencies in the investment climate; • can enhance revenue; and • offer political advantages over direct expenditure programmes. 	<ul style="list-style-type: none"> • actual revenue cost can be high if the investments would have been feasible anyway; • can lead to tax avoidance schemes that further erode the revenue base; • can divert administrative resources from revenue collection, which leads to revenue losses; • can require punitive fiscal adjustments (e.g. higher taxes on other entities); • can create serious economic distortions that reduce efficiency and productivity; • create inequities by favouring some taxpayers over others; • are not a very transparent and accountable development tool; • stimulate political manipulation and corruption; and • alternative instruments can have a more favourable and lasting impact on productivity, growth and development.

(Source: own compilation, based on Nathan-MSI Group (2004))

According to the CRS (2005:25), tax incentives are effective instruments, especially when used in combination with other government measures. Although tax incentives have been applied successfully, they frequently do not deliver favourable results (Nathan-MSI Group, 2004). PWC conducted interviews in the international business community regarding environmental regulation, legislation and tax instruments, and executives' perspectives thereon. Many interviewees agreed that a combination of

tax incentives (carrots) and taxes (sticks) should be used to encourage businesses to reduce their environmental impact (PWC, 2010:9,31). Bart Kuper, Tax Director of TNT Holding B.V. (interviewed by PWC, 2010:16) stated:

If we all think we're going to win the game by giving incentives to people who behave well, instead of levying a tax for those who pollute, then we are a long way from home. If we only do this by sending out carrots and not using sticks, we will run out of carrots.

It is therefore clear that incentives cannot be used in isolation; disincentives are also necessary.

2.5.2 Use of tax disincentives (sticks)

Developed and developing countries have very different approaches when it comes to tax penalties (sticks) on non-renewable energy sources. Only the developed countries in KPMG's study make use of such penalties. Developing economies appear to avoid using sticks, presumably on the basis that such penalties could damage development and growth prospects (KPMG, 2013b:20). According to Anjum (2008), green taxes are not necessarily practical for developing countries, as they can affect a country's competitiveness: green tax increases the producer's costs and if they are only imposed within one country or region and not outside of it, they will adversely affect that country's exports, making them uncompetitive. There are, however, various measures that can be taken to reduce the impact on a country's competitiveness. Van Schalkwyk (2012:53) agrees that incentives to promote green behaviour are preferred to disincentives in developing countries. However, green tax disincentives can be effective in fighting climate change as they can lead to decreased pollution. In the long term, the circumstances of societies will improve and global warming will be reduced (Anjum, 2008).

In terms of the “polluter pays” principle, a tax is imposed on environmentally harmful substances or activities. This ensures that external environmental costs are reflected in the prices of goods or services (Ashiabor, 2005:298) and thereby internalised in the decision-making process as to how and to what extent the polluting activity should be carried out at all, if at all. All inherent economic costs should be carried by the consumer and producer (Anjum, 2008). An example of this principle is the implementation of a carbon emissions tax.

The role of carbon emissions taxes is twofold: firstly, it assigns the externality costs back to the parties who created the emissions, thereby increasing the cost of the activity. Secondly, it serves as motivation to reduce activities with high emissions and/or to find more environmentally friendly ways of performing these activities (Gerhard, 2012:26). Although taxes (disincentives) are sometimes necessary to correct environmentally harmful behaviour, Ashiabor (2005:300) and Anjum (2008) warn that they should be implemented with caution, as issues of competitiveness can arise if competitor regions do not impose such taxes. Mitigation or compensation measures may therefore also be necessary to remain competitive with other industries or sectors (Republic of South Africa, 2006:91). It may also be necessary to have measures in place to cushion the effects of a tax in certain sectors or industries (Anjum, 2008). Examples include the exemption of certain industries, or economic support for certain sectors during the transition phase. Such measures could make the tax less successful, but might be crucial, from a political perspective, to impose the tax at all (Anjum, 2008).

According to Chanel (2012), the jury is still out on the effectiveness of carbon pricing schemes, which include carbon taxes. Lu, Tong and Liu (2010) explored the impact of a carbon tax on the Chinese economy by constructing a dynamic recursive general equilibrium model. The result of their simulation indicated that a carbon tax is an effective policy tool, because it can reduce carbon emissions with little negative impact on economic growth. Bierbaum and Friedman (1992:59-60) state that carbon emissions taxes will undoubtedly encourage lower emissions, as they send price signals to reduce energy consumption; but a tax alone is insufficient. According to the Stockholm Environment Institute (2009:24), certain factors, such as infrastructure lock-in, reduce the flexibility to substitute polluting activities or fuel sources with

cleaner alternatives and therefore reduce the efficiency of environmental taxes (disincentives). Subsidies for R&D or efficiency standards can, however, create possibilities for substitution. This illustrates the importance of using different, complementary government instruments, which could include tax instruments (Stockholm Environment Institute, 2009:24; Republic of South Africa, 2006:91). Bierbaum and Friedman (1992:59-60) further state that a combination of financial incentives to pursue efficiency, combined with disincentives for high energy use, the so-called “carrot and stick” approach, can be particularly effective.

Although a combination of tax instruments is necessary, the use of too many instruments could be complex and poses the risk of confusing investors, which could result in the instruments being less effective (Deloitte, 2010:2). PWC (2010:23) also noticed that the general belief among business executives is that existing environmental taxes, regulations and incentives are ineffective, inconsistent and unclear. It is therefore important for governments to pursue the correct balance between instruments and care should be taken as not to implement conflicting policies that partially undermine each other (Ahuja & Tatsutani, 2009:10). Conflicting policies can become perverse incentives that reward the current state of affairs over more environmentally-friendly behaviour (PWC, 2010:24). An example is when a government implements measures to stimulate EE, but the effect thereof is weakened by subsidies that tend to stimulate increased consumption (Ahuja & Tatsutani, 2009:10). This is often the result of governments attempting to respond to various pressure groups and it is not always possible to co-ordinate these policies, generally due to political reasons. It may therefore not be possible for governments to pursue a comprehensive set of policies simultaneously (Ahuja & Tatsutani, 2009:10).

2.6 Chapter conclusion

Government intervention is often necessary where there are environmentally-related market failures and developing countries would not be able to escape the potentially significant adverse consequences of their energy challenges, unless their governments intervene. There are many different approaches that governments can follow and many different instruments that they can use to target environmental objectives. Often a combination of instruments will be most effective in preventing global warming. Economic instruments such as green taxes, fiscal incentives, market instruments and other direct regulatory measures are popular and useful measures to control pollution. MBIs are increasingly used by governments to promote environmentally friendly behaviour and attention has been shifted away from government regulations for environmental governance to the use of market mechanisms. MBIs are arguably the most cost effective means of achieving environmental objectives. The terms “economic instruments” and “MBIs” include, *inter alia*, tax instruments. Tax instruments can therefore successfully address environmental challenges, especially in combination with other instruments.

Tax instruments have been found to be effective in encouraging EE and R&D. According to the CRS, tax incentives are also effective in stimulating RE, if they are used in combination with other incentives.

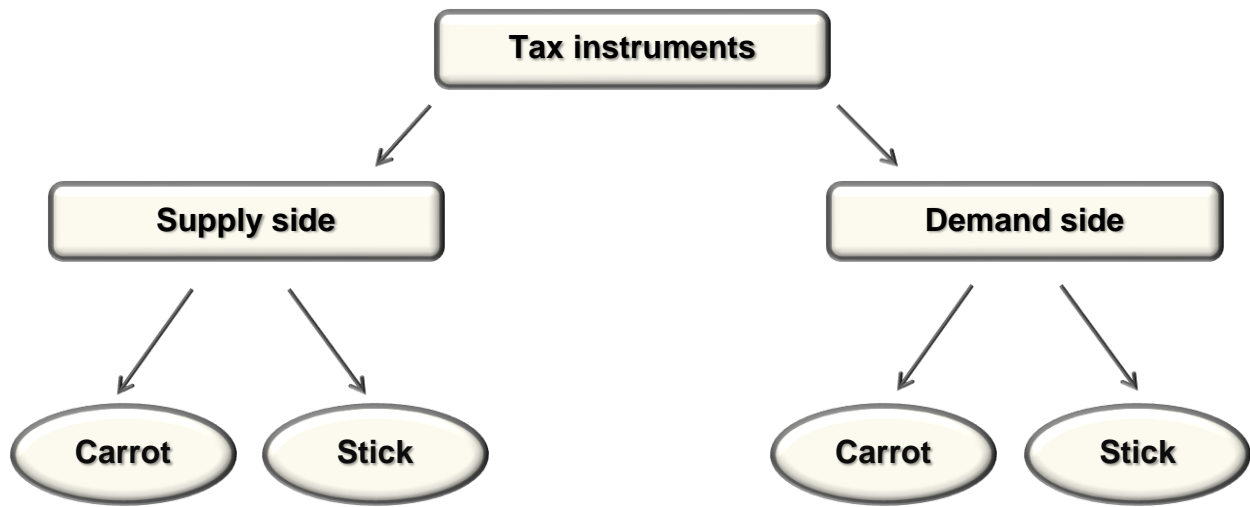
When deciding whether to focus the tax instrument on the demand or supply side of electricity in order to reduce emissions, there is no blueprint for the most effective approach. A country’s specific circumstances, characteristics and challenges should be considered. There is literature that suggests that it may be more effective in the short run to address the demand for electricity, in the form of EE measures, rather than the supply thereof. It is, however, not sufficient to only address the demand for electricity and governments around the world are actively using tax instruments to promote the supply in the form of RE. In the long run, it is important to also address the supply side and a combined approach is likely to be more effective.

The topic of tax incentives to stimulate investment is a controversial one. Some believe tax incentives are effective in stimulating investment, while others believe they distort investment decisions and are generally redundant and ineffective when attempting to stimulate investment. Empirical evidence on the cost-effectiveness of tax incentives appears to be inconclusive and many factors besides tax instruments drive investment decisions. Although there are mixed opinions about the use and effectiveness of tax incentives, they remain an integral part of the tax policies of both developed and developing countries and it is expected that they will continue to be used globally.

Some argue that incentives might be preferred to disincentives, since they are more politically acceptable or perceived as a reward, as opposed to punishment. Others argue that disincentives are also necessary. Carbon taxes can be effective in reducing emissions, but it is not sufficient to use only one instrument, such as a tax disincentive. There is not one specific instrument, nor is there a combination of instruments that can be used in all circumstances and each government should determine a combination of instruments that is appropriate for its country's challenges and objectives. It is important for governments to pursue the correct balance between instruments, since a combination of instruments can be more effective than a single instrument, but if too many instruments are used, it can become confusing and less effective.

There are many types of instruments, including tax instruments, which can be used by governments to address their environmental objectives. Such instruments can either be aimed at the demand for, or the supply of, electricity, or both, and can consist of incentives, disincentives or a combination of the two, as illustrated in Figure 1. Each government should assess its own circumstances and evaluate the advantages and disadvantages of each possible instrument to determine the most suitable instrument or combination of instruments for its objectives. The next chapter explores the tax instruments used by South Africa to address the challenges of high emissions from electricity generation.

Figure 1: Areas of use of tax instruments



(Source: own compilation)

CHAPTER 3: TAX INSTRUMENTS USED IN SOUTH AFRICA

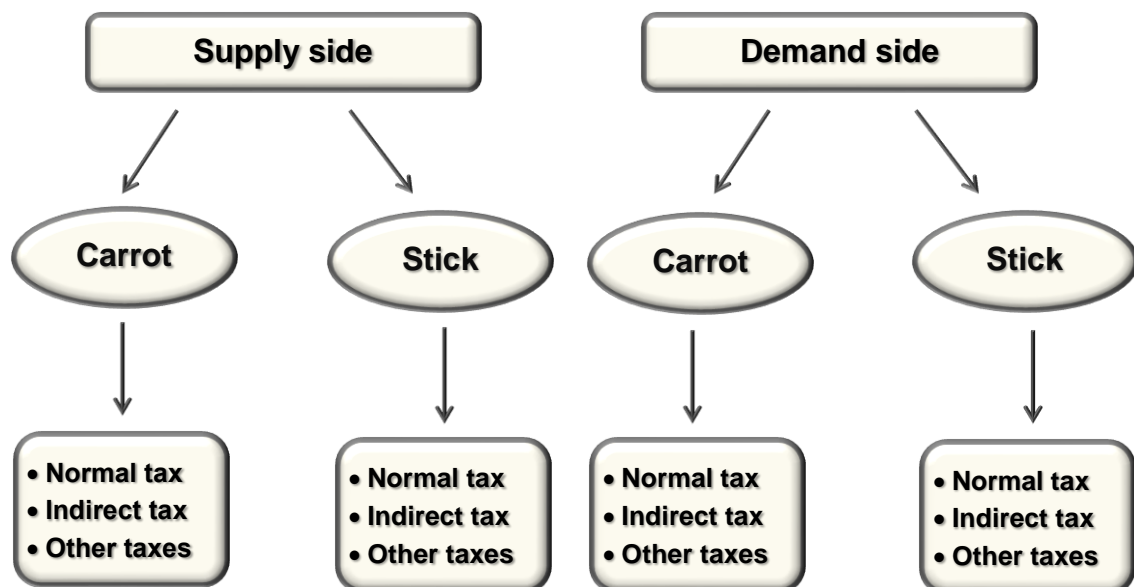
“South Africa’s recent focus on green issues and measures to curb carbon emissions have led to the introduction of both taxes aimed at increasing the cost of environmentally unfriendly behaviour and income tax deductions rewarding environmentally friendly behaviour.”

(Bradley Pearson, interviewed in Van der Merwe, 2010)

3.1 Introduction

In this chapter the tax instruments used in South Africa that can contribute to the reduction of emissions from electricity generation will be discussed. Such tax instruments can either be aimed at the demand or the supply side of electricity generation. Demand-side instruments are aimed at reducing the demand for electricity overall, or reducing the demand for electricity generated from sources and processes with high emissions only. Tax instruments aimed at the supply of electricity are instruments that seek to increase electricity generation from renewable sources with lower emissions. Some instruments seek to encourage R&D relating to RE or EE and such instruments can therefore address the demand or the supply of electricity. Figure 2 sets out the basic structure that is followed in Chapters 3 to 6 to discuss the tax instruments available in the countries under consideration.

Figure 2: Basic structure followed in Chapters 3 to 6



(Source: own compilation)

3.2 Supply side: use of tax incentives (carrots)

Tax incentives can take the form of normal taxes, indirect taxes or other taxes or levies. Indirect taxes include Value-Added Tax (VAT) and customs duties. The only other taxes or levies that will be addressed are property rates. The normal tax incentives will now be discussed, followed by the indirect tax incentives and other taxes or levies.

3.2.1 Renewable energy incentives

In terms of section 12B of the Income Tax Act no. 58 of 1962 (the Income Tax Act) a taxpayer who owns machinery, plant, implements, utensils or articles (referred to as assets) brought into use for the first time solely for the production of renewable electricity, is entitled to an accelerated depreciation allowance. This allowance is only applicable where the taxpayer uses those assets to generate electricity from wind; sunlight; water, if used to produce electricity of 30 megawatts (MW) or less; or biomass. A taxpayer is also entitled to such an allowance in some circumstances if the assets were acquired in terms of a certain type of instalment credit agreement, as defined in the Value-Added Tax Act no. 89 of 1991 (the VAT Act).

Section 12B grants the following allowances, not apportioned for a portion of a year, based on the lower of the actual cost to the taxpayer or the cash price of the asset in an arm's length transaction and including the cost of installation or construction to a qualifying taxpayer:

- 50 per cent in the year it is brought into use;
- 30 per cent in the second year; and
- 20 per cent in the third year.

This allowance also applies to all improvements and support structures that form part of the asset. The support structures must, however, be brought into use on or after 1 January 2013 and be mounted or fixed to and integrated with the asset. The useful life of the support structure will be limited to that of the underlying asset. The onus rests on the taxpayer to prove that the support structure is used to generate renewable electricity (Cliffe Dekker Hofmeyr, 2013:5). If the asset was acquired to

replace a damaged or destroyed asset, any section 8(4)(e) recoupment that was excluded from the taxpayer's income in any year of assessment up to the date when that asset was brought into use by the taxpayer, should be deducted from the above cost. The total allowances claimed in terms of this section may not exceed the actual cost of the asset to the taxpayer.

According to Cliffe Dekker Hofmeyr (2013:5), it may, however, be difficult to determine which assets are used to generate electricity, in other words to establish where the process of electricity generation starts and ends. The term "electricity generation" is not defined and there have not been any court cases in South Africa considering this aspect. Gardner (2013:9) agrees that it is uncertain what the process entails and is of the opinion that "to generate electricity in the context of section 12B must mean the process of producing electricity up to the point at which it is in a form which can be sold".

The section 12B allowance is not allowed in respect of the following assets: leased assets; assets used by a company that were previously brought into use by another company that had already claimed this allowance or an allowance in terms of sections 12(1) or 27(2)(d), if substantially the same person(s) manage, control or own the companies; assets that have previously been disposed of by the taxpayer; assets for which a section 12E allowance has already been claimed; and assets for which the taxpayer retains ownership as seller in certain instalment credit agreements.

3.2.2 Clean development mechanism projects

Section 12K of the Income Tax Act provides for the exemption of amounts received by or accrued to a taxpayer in respect of the disposal of any certified emission reduction that the taxpayer derived from a qualifying clean development mechanism (CDM) project, for purposes of normal and capital gains tax. The CDM was established as part of the Kyoto Protocol and provides a mechanism for Annex I (developed) countries to reduce their obligations to reduce their emissions by purchasing credits from CDM projects that avoid emissions in non-Annex (developing) countries. CDM projects can only be implemented in non-Annex

countries and include RE, EE and other related projects that reduce emissions (Republic of South Africa, 2013c:63).

The CDM executive board must approve the methodologies according to which the CDM projects are developed and it must be demonstrated that the emission reductions achieved by the project are additional and would not have taken place under a business as usual scenario. The carbon emission reduction credits earned by the CDM projects are also referred to as certified emission reductions (CERs) and can be sold over the carbon market to developed countries (Republic of South Africa, 2013c:63).

Section 12K was introduced in 2009 to encourage investment in CDM projects and provides an exemption of the proceeds on the disposal of CERs. The exemption serves as incentive for any person holding a CDM project that is registered before 31 December 2020 and the CERs obtained from such projects. The initial exemption was only valid until 31 December 2012, but it has since been extended to 31 December 2020 (Republic of South Africa, 2013c:63). Since the proceeds from the sale of the CERs are exempt, the expenditure incurred in securing the CERs will not qualify for a tax allowance in terms of section 11(a) of the Income Tax Act (Edward Nathan Sonnenbergs, 2011:6).

There are various requirements that must be met for a project to be approved as a CDM project. The process of gaining approval slows the project planning process, thereby increasing the costs for project developers (Pegels, 2009:4951). As at 28 February 2014, South Africa had 84 registered CDM projects, of which 12 had been issued with CERs (Republic of South Africa, 2014b).

3.2.3 Research and development incentives

The section 11D allowance is classified as a supply-side and demand-side incentive, since the R&D activities could be undertaken in the fields of RE or EE. According to KPMG, R&D relating to green and energy-saving industries is the new focus area (2013a:43-44).

The current section 11D of the Income Tax Act provides for a 150 per cent allowance in respect of all expenditures actually incurred on or after 1 January 2014, but before 1 October 2022, directly and solely on R&D activities undertaken in South Africa. Such activities must be approved by the Department of Science and Technology. The expenditure must be incurred in the production of income, in carrying on any trade and incurred on or after the date on which approval was applied for from the Department of Science and Technology. If a taxpayer incurs expenditure to fund such government-approved R&D carried out by another person on behalf of the taxpayer, the taxpayer qualifies for the 150 per cent allowance under section 11D, as long as the R&D activities are carried out by the Council for Scientific and Industrial Research; an institution, body or board that is exempt from tax in terms of section 10(1)(cA); or a company that forms part of the same group of companies (as defined), but that has not claimed the section 11D allowance itself. In the latter case, however, the company that funds the R&D can only claim 50 per cent of the actual expenditure incurred. Stiglingh, Koekemoer, Van Schalkwyk, Wilcocks and De Swardt (2013:282) clarify that the 50 per cent allowance should be based on the actual R&D expenditure incurred by the group company carrying out the R&D, and not on the profit charged between the two group companies. If a taxpayer receives an amount from a government or semi-government agency to fund R&D expenditure, the taxpayer does not qualify for a section 11D allowance in respect of the amount so funded and the amount of the funding must be deducted from the R&D expenditure before calculating the 150 per cent allowance.

The expenditures that qualify for the allowance in terms of section 11D are those expenditures incurred directly for the purposes of discovering non-obvious scientific or technological knowledge; developing or creating an invention, functional design, computer program or knowledge essential to the use of such invention, design or program; or making a significant and innovative improvement of function, performance, reliability or quality to any invention, functional design, computer program or knowledge. There are certain activities that are specifically excluded and that do not qualify for this allowance for R&D such as, *inter alia*, routine testing, development of internal business processes, market research, social science research, mineral exploration or prospecting, the development of financial products and the creation of trademarks or goodwill. No allowance is granted for expenditure incurred in respect of, *inter alia*, immovable property, machinery, plant, implements, financing costs or administration costs. If a prototype or pilot plant is, however, created solely for the R&D process and the intention is not to use it for production after completion of the R&D activities, such capital expenditure can qualify for the 150 per cent allowance in terms of section 11D.

Section 12C provides for an allowance over three years on the cost of new and unused R&D machinery or plant, first brought into use by that taxpayer, without apportioning the amount of the allowance for a portion of a year. The allowance is as follows:

- 50 per cent of the cost in the first year;
- 30 per cent in the second year; and
- 20 per cent in the third year.

Section 13(1) allows a taxpayer to deduct the cost of a building owned by the taxpayer and used for R&D in equal portions over 20 years. Costs incurred relating to R&D activities carried out in preparation for a trade, but before the commencement of trade, can be deducted in terms of section 11A once the taxpayer starts to trade, as long as it would have been deductible in terms of section 11D if a trade had been carried out. If pre-trade expenditure in respect of approved R&D is incurred, section 11A will therefore also grant an allowance of 150 per cent of the expenditure incurred.

3.2.4 Indirect taxes: VAT

There is no exemption from VAT on the disposal of CERs in terms of the VAT Act, but it can be argued that the sale of a CER constitutes a supply of a service and that the sale of a CER to a non-resident is therefore a zero-rated supply in terms of section 11(2)(l) of the VAT Act (KPMG, 2013a:43).

The sale of electricity is subject to VAT at the standard rate of 14 per cent and there is no preferential treatment for electricity generated from renewable sources. VAT is calculated on the final price of the electricity supplied, including the amount of the environmental levy discussed in section 3.3.1 (Stiglingh *et al.*, 2013:1047).

3.2.5 Indirect taxes: customs duties

In accordance with schedule no. 1, part 1 of the Customs and Excise Act no. 91 of 1964 (Customs and Excise Act), certain goods imported into South Africa do not attract any customs duties. These items all relate to the generation of wind energy specifically and consist of glass fibres for blades used in wind turbines; aluminium bars, rods and profiles for blades used in wind turbines; generators for wind turbines; and wind-powered electric generating sets and rotary converters.

All of these items are free from customs duties when they originate in European Union or Southern African Development Community member states, with the exception of the glass fibres for wind turbine blades. Such imports attract duty at a rate of 1.9 per cent if imported from a country that is a member of the European Free Trade Association, namely Iceland, Liechtenstein, Norway and Switzerland.

There does not appear to be any other preferential treatment of imported goods which will be used in the generation of electricity from renewable sources.

3.2.6 Other taxes or levies: property rates

Preferential property rates for properties used in the generation of renewable electricity, for example a wind farm, do not appear to exist.

Section 8 of the Municipal Property Rates Act no. 6 of 2004 makes provision for different categories of rateable property and municipalities can levy different rates for the different categories. Although provision is made for “public service infrastructure”, which is defined in section 1 and includes power stations, power substations or power lines forming part of an electricity scheme serving the public, there is no distinction between electricity from renewable sources and electricity from non-renewable sources. South Africa therefore does not make use of property rate incentives in order to reduce emissions from renewable electricity generation.

3.3 Supply side: use of tax disincentives (sticks)

The only tax disincentives relating to the supply of electricity in South Africa are the environmental levy and a carbon tax. Each will now be discussed separately.

3.3.1 Other taxes or levies: environmental levy

An environmental levy is used to penalise generators of electricity from non-renewable sources in South Africa. In accordance with section 54A and schedule no. 1, part 3B of the Customs and Excise Act, an environmental levy of 3.5 cent per kilowatt hour (kWh) is levied on electricity generated in South Africa. This environmental levy is, however, not levied on electricity generated by plants with an installed capacity of five MW or less; electricity generated from renewable sources; electricity generated from specified co-generation activities; and electricity generated from concentrated solar power and non-renewable sources of which the energy input does not exceed 15 per cent of the total energy input over a calendar year. Renewable sources include biomass, geothermal, hydro, ocean currents, solar, tidal waves or wind, whereas non-renewable sources include coal, petroleum-based liquid fuels, natural gas or nuclear.

Although the environmental levy is levied on the generator of non-renewable electricity, it is likely that the levy is simply passed on to the consumers since electricity is relatively price inelastic. Consequently, the levy is discussed as a disincentive on both the supply and demand side of electricity in this study.

3.3.2 Other taxes or levies: carbon tax

South Africa is in the process of finalising its carbon tax programme and the carbon tax is likely to be implemented in 2016 (Republic of South Africa, 2014a:25). The Department of National Treasury published a carbon tax policy paper, “Reducing greenhouse gas emissions and facilitating the transition to a green economy” in May 2013 and comments were welcomed until 2 August 2013. It was initially proposed that the carbon tax would be implemented on 1 January 2015 (Republic of South Africa 2013b:15), but the implementation was subsequently postponed by a year to allow for further consultation (Republic of South Africa, 2014a:25).

The main characteristics of the proposed carbon tax are as follows (Republic of South Africa 2013b:53-64):

- A phased approach will be followed. The tax will start at a modest rate of R120 per ton of carbon dioxide (CO₂), increasing by ten per cent per annum during the first phase of five years. This annual rate of increase will be reviewed at the end of the first phase. The effective tax rate will be much lower when taking the tax-free thresholds into account.
- A basic tax-free threshold of 60 per cent of actual emissions is proposed, below which the tax will not be payable. An additional ten per cent relief is proposed for certain sectors, such as energy and trade intensive sectors and for sectors with process emissions, i.e. where technical or structural reasons limit their potential for emission reductions. These thresholds will be reduced during the second phase.
- The agriculture, forestry, land use and waste sectors will be exempt from paying the carbon tax on their emissions during the first phase of five years and this exemption will be reviewed during the second phase.

- Carbon offsets could be used to reduce a firm's carbon tax liability, with limits of five or ten per cent, depending on the sector.

Although the carbon tax will be levied on the generator of electricity with emissions, it is likely that the tax will simply be passed on to the consumers. Consequently, the carbon tax is discussed as a disincentive on both the supply and demand side of electricity in this study.

3.4 Supply side: conclusion

South Africa's supply-side tax instruments consist of accelerated depreciation allowances for assets used in the production of renewable electricity; exemption of proceeds from the sale of CERs from approved CDM projects; 150 per cent allowances for expenditure incurred on R&D activities undertaken in South Africa, which could be in respect of RE; exemption from customs duties for imports of certain items related to the generation of wind energy; an environmental levy on electricity generated from non-renewable sources; and a carbon tax which is likely to only be implemented in 2016.

3.5 Demand side: use of tax incentives (carrots)

As was the case with the sticks, the carrots relating to the demand for electricity in South Africa can take the form of normal taxes, indirect taxes or other taxes or levies. The relevant carrots will now each be discussed separately, commencing with the normal tax incentives.

3.5.1 Energy efficiency allowances

In terms of section 12L of the Income Tax Act, taxpayers are entitled to claim a notional allowance for EE when calculating their taxable income, based on the energy savings achieved by an EE project. The taxpayers should carry on a trade and should make use of independent and registered professionals, accredited by the South African National Accreditation System, to measure and verify the value of the energy savings. These professionals must measure the taxpayer's energy consumption before and after the implementation of the EE project in order to

calculate the energy savings and the South African National Energy Development Institute (SANEDI) must issue an EE savings certificate to the taxpayer upon completion of the process (Republic of South Africa, 2013d:5-7).

The value of the allowance is presently calculated as 45 cents per kWh (or equivalent) of energy savings during the year of assessment, made against a baseline measured at the beginning of the year. Section 12L is effective from 1 November 2013 (Republic of South Africa, 2013d:10) and applicable to energy savings achieved in any year of assessment ending before 1 January 2020. Since a new baseline is calculated each year, based on the electricity usage of the preceding year, section 12L actually encourages continuous energy savings. A taxpayer that implements an EE project can only claim the allowance in the first year of the project and can only benefit from the allowance in subsequent years if additional energy savings are realised, compared to the preceding year's electricity usage (Kasavel, 2014). This would mean that a new EE project should be implemented in order to achieve more energy savings.

No allowance can be claimed if the taxpayer receives a concurrent EE savings benefit from a government or semi-government agency. Such benefits potentially include CERs from CDM projects and the section 12L allowance could potentially be disallowed to taxpayers that earn CERs (Edward Nathan Sonnenbergs, 2012:9).

Before an entity can claim this allowance, it needs an accredited professional to measure its energy savings. The expected benefit of claiming the tax allowance should therefore exceed the expenditure incurred in the measurement and verification process by the accredited professional before a company would be likely to utilise this incentive (Thetard, 2013).

3.5.2 Industrial policy project incentives

Section 12I of the Income Tax Act provides an allowance to companies for qualifying industrial policy projects (IPPs), which include greenfield and brownfield manufacturing projects. One of the many requirements for a project to be approved as an IPP by the Minister of Trade and Industry is the use of improved EE and cleaner production technology (KPMG, 2013a:43). A greenfield project is defined in section 12I and refers to a wholly new industrial project using new manufacturing assets, while a brownfield project refers to an expansion or upgrade of an existing industrial project. Another one of the many requirements for a project to qualify as an IPP relates to the cost of the manufacturing assets acquired for purposes of the project. In the case of a greenfield project, the cost of the manufacturing assets acquired has to exceed R200 million. In the case of a brownfield project, such cost has to exceed the higher of the following:

- R30 million; or
- the lesser of R200 million or 25 per cent of the expenditure incurred to acquire assets previously used in the project.

As a result, this incentive is limited to very large projects only.

The allowance can be claimed in the year during which the asset is brought into use for the first time by the company, as long as the asset was acquired and contracted for on or after the date of approval and was brought into use within four years from the date of approval. In terms of section 12I, the following can be claimed as an allowance in the calculation of a company's taxable income, if the requirements are met:

- 35 per cent of the cost of a new and unused manufacturing asset used in an IPP that does not constitute a preferred project;
- 75 per cent of the cost of a new and unused manufacturing asset used in an IPP within an industrial development zone as long as the IPP is not a preferred project;
- 55 per cent of the cost of a new and unused manufacturing asset used in an IPP that is a preferred project; or

- 100 per cent of the cost of a new and unused manufacturing asset used in an IPP within an industrial development zone, if the IPP constitutes a preferred project.

The cost of the manufacturing asset is deemed to be the lower of the actual cost to the taxpayer and the cash price of the asset in an arm's length transaction. The tax allowance is further limited to the following amounts:

- R550 million for greenfield IPPs;
- R900 million if the IPP is a greenfield preferred project;
- R350 million for brownfield IPPs; and
- R550 million if the IPP is a brownfield preferred project.

Points are awarded if certain criteria are met and projects are approved as IPPs if a certain number of points are achieved. Similarly, an IPP is approved as an IPP with preferred status based on the number of points achieved (Republic of South Africa, 2010). Once again SANEDI has the responsibility to adjudicate, evaluate and support section 12I projects to the Minister of Trade and Industry. The section 12I allowance is only available from 2009 and applications for approval of projects must be received by the Minister of Trade and Industry by no later than 31 December 2015.

3.5.3 Clean development mechanism projects

The section 12K allowance in respect of CDM projects applies to both the supply and the demand of electricity generation, as it includes both RE (supply) and EE (demand) projects. The detail of section 12K is discussed in section 3.2.2.

3.5.4 Research and development incentives

The section 11D allowance for certain R&D activities also applies to both the supply and the demand of electricity generation, as it can relate, *inter alia*, to the R&D of RE or EE technologies. The detail of section 11D is discussed in section 3.2.3.

3.5.5 Indirect taxes: VAT

Although VAT vendors would be able to claim input VAT on the cost of EE technology acquired or electricity consumed, there are no VAT incentives specifically regarding EE or for renewable electricity purchased, as opposed to electricity generated from non-renewable sources.

3.5.6 Indirect taxes: customs duties

There does not appear to be any preferential treatment for energy-saving equipment or goods imported into South Africa.

3.6 Demand side: use of tax disincentives (sticks)

The only tax disincentives targeting the demand for electricity in South Africa are the environmental levy and carbon tax, each discussed below.

3.6.1 Other taxes or levies: environmental levy

An environmental levy is levied on incandescent light bulbs in order to promote EE and reduce electricity demand. In accordance with section 54A and schedule no. 1, part 3C of the Customs and Excise Act, an environmental levy of 400 cents per light bulb is levied on incandescent light bulbs that are either manufactured in or imported into the Republic of South Africa. Such a levy is in addition to any customs or excise duty that might also be payable.

An environmental levy of 3.5 cents per kWh is levied on electricity generated from non-renewable sources. Even though it is levied on the generator of non-renewable electricity, it is likely that the levy is simply passed on to the consumers since electricity is relatively price inelastic. It could therefore be argued that the levy is a demand-side disincentive. In theory this could reduce the demand for electricity from non-renewable sources, but since electricity is a necessity rather than a luxury, it is unlikely that the increased electricity price will significantly reduce the demand for electricity. In addition, consumers cannot choose where to buy their electricity and do not have an alternative supplier of renewable electricity. Since the environmental levy is levied on the generators of non-renewable electricity, it appears as if

government's intention was to target the suppliers. Consequently, it is regarded as a supply-side disincentive for the purposes of the analysis of the primary focus of the tax instruments used in South Africa (refer to section 3.8).

3.6.2 Other taxes or levies: carbon tax

The carbon tax which is likely to only be implemented in 2016 applies to both the supply and the demand of electricity generation. It is levied on the generator of electricity with emissions, but as electricity is relatively price inelastic, the electricity generator is likely to pass this increased cost on to the consumer. In reality, it is unlikely that the increased electricity price will reduce the demand for electricity by much, since electricity is relatively price inelastic. The detail of the carbon tax is discussed in section 3.3.2.

3.7 Demand side: conclusion

South Africa's demand-side tax instruments consist of an EE allowance for energy savings achieved by an EE project; an IPP incentive for IPPs that use improved EE and cleaner production technology, *inter alia*; the exemption of proceeds from the sale of CERs from approved CDM projects; a 150 per cent allowance for expenditure incurred on R&D activities undertaken in South Africa, which could be in respect of EE; an environmental levy on incandescent light bulbs and on electricity generated from non-renewable sources; and a proposed carbon tax.

3.8 Chapter conclusion

South Africa makes use of various tax instruments to contribute to the reduction of emissions associated with electricity generation in the country. It appears as if equal focus is placed on the supply of and demand for electricity, with six currently effective tax instruments targeting each. Three instruments focus on RE specifically, two on EE and two on R&D. The majority (six) of the incentives are direct taxes and there is only one indirect tax incentive. There are seven tax incentives to promote environmentally good behaviour, while there are only two disincentives that penalise environmentally bad behaviour. Table 3 provides an overview of all the tax instruments used in South Africa.

Table 3: Overview of tax instruments used in South Africa

Supply-side instruments		
Carrots		Sticks
Normal taxes	Indirect taxes	Other taxes
<ul style="list-style-type: none"> • RE accelerated depreciation allowances • Proceeds from disposal of CERs from CDM projects are exempt (can include RE/EE) • 150% allowance for R&D expenditure, incl. pre-trade expenditure (can include RE/EE) • Accelerated depreciation allowances on R&D assets (50:30:20, but buildings 5%) 	<ul style="list-style-type: none"> • Customs duties exemption of assets used to generate wind energy (RE) 	<ul style="list-style-type: none"> • Environmental levy on electricity generated from non-renewable sources (RE benefit) • Carbon tax (not yet effective)
Demand-side instruments		
Carrots		Sticks
Normal taxes		Other
<ul style="list-style-type: none"> • Notional allowance based on energy savings by EE projects • Allowance of 35-100% of cost of new and unused manufacturing assets used in industrial policy projects (can include EE) - limited to very large projects only • Proceeds from disposal of CERs from CDM projects are exempt (can include RE/EE) • 150% allowance for R&D expenditure, incl. pre-trade expenditure (can include RE/EE) • Accelerated depreciation allowances on R&D assets (50:30:20, but buildings 5%) 		<ul style="list-style-type: none"> • Environmental levy on incandescent light bulbs (to encourage EE and reduce demand) • Environmental levy on electricity generated from non-renewable sources • Carbon tax (not yet effective)

(Source: own compilation)

CHAPTER 4: TAX INSTRUMENTS USED IN CHINA

“China’s enthusiasm for all things green remains as strong as ever... [T]here is now no mistaking China’s presence in the global renewables market.”

(EY, 2013b:21)

4.1 Introduction

China was the biggest investor in RE globally in 2009, 2010 and 2012 (Bloomberg New Energy Finance, 2011 & 2013:11) and the country’s wind industry has been growing at an unprecedentedly high rate since 2004. This growth is largely attributed to the effective implementation of a combination of domestic policies, which include the use of tax incentives, and international support (Zhang, Chang, Huo & Wang, 2009:553-554). According to KPMG’s green tax index, China ranks sixth overall out of the 21 countries studied (KPMG, 2013b:4), indicating that its government is actively using tax instruments to promote a greener economy (KPMG, 2013b:2). China has had a long history of using financial incentives and penalties to encourage desired outcomes (Seligsohn, Heilmayr, Tan & Weischer, 2009:10) and is an example of a country whose green tax policy is balanced between carrots and sticks (KPMG, 2013b:5).

4.2 Types of taxes

The tax instruments used by the Chinese government affect enterprise income taxes (EIT) and indirect taxes. EIT is a tax imposed on the taxable income of corporations. The indirect taxes relevant to this study include business tax, VAT and import taxes and duties. Business tax is a tax imposed on the turnover from the sale of immovable property and intangible goods, as well as on certain services that are not subject to VAT. VAT is imposed on the sale or importation of goods and the provision of processing, repair and replacement services within China. Consequently, business tax and VAT are mutually exclusive. While the VAT rate for a general VAT payer that does not qualify for any reduction is 17 per cent, business tax is charged at a rate of between three and 20 per cent (Deloitte, 2013b:17-18). Business tax is a cumulative tax, which means that a company is not entitled to a

credit for business tax or VAT paid on inputs in providing goods or services subject to business tax (PWC, 2012:12).

Each of the tax instruments used in China will now be discussed in respect of the supply and demand for electricity, respectively, commencing with the EIT instruments, followed by the indirect tax instruments and, lastly, any other potentially relevant taxes or levies.

4.3 Supply side: use of tax incentives (carrots)

4.3.1 High and new technology enterprise incentives

Qualifying high and new technology enterprises (HNTE), also referred to as advanced and new technology enterprises, are liable for EIT at a reduced rate of 15 per cent, instead of the normal rate of 25 per cent. Many enterprises engaging in activities in the green sector are regarded as HNTEs and applicable fields include solar, wind, biomaterial and geothermal energy (KPMG, 2013a:16). In addition, newly established and qualified HNTEs that are based in certain geographical areas, known as special economic zones, and that are incorporated after 1 January 2008 are granted a two-year EIT exemption, followed by three years of EIT levied at 12.5 per cent (EY, 2013a:250).

For a company to qualify as a HNTE, it should be a resident in China; own the intellectual property rights for the core technologies in its products; have sufficient R&D and science and technology personnel; perform continuous R&D activities and incur sufficient R&D expenditure; generate sufficient profits from high and new technology products; and fall within one of eight areas, including new energy and energy conservation technology (KPMG, 2012:4).

4.3.2 Clean development mechanism projects

When CERs from qualifying CDM projects are transferred, the portion of the proceeds which are remitted to the state are deductible for EIT purposes (KPMG, 2013a:16). According to the “CDM Project Operations Administrative Measures”, any revenue derived from the transfer of CERs from CDM projects should be divided between the Chinese government and the Chinese project enterprises, in accordance with certain specified ratios. In respect of EE or RE CDM projects, only two per cent of the revenue should be remitted to the government and is, consequently, deductible (KPMG, 2009).

In addition to the above incentives, the following income received by CDM enterprises is also exempt from EIT: donations received from international financial organisations; interest income derived from capital deposit or national bonds; and donations received from domestic and foreign entities or individuals (KPMG, 2013a:16).

It is possible for qualifying CDM project enterprises to also qualify as HNTEs, resulting in such enterprises enjoying a reduced EIT rate of 15 per cent in addition to these tax incentives for CDMs (KPMG, 2011a:4).

4.3.3 Research and development incentives

According to KPMG (2012), aside from the aforementioned R&D incentives available to HNTEs, companies involved in R&D activities and resident in China can claim a 150 per cent super allowance from EIT for qualified expenditure incurred during the year. In order to qualify, the company should design new products; formulate new technical procedures; develop new skills; and incur qualifying R&D expenditure. The following R&D expenditures qualify for the allowance:

- design fees, technical programming fees and direct expenditures for technical materials and translation of new products;
- direct costs of materials, fuels and power;
- direct salaries, bonuses and allowances;
- direct depreciation or rental of equipment;
- direct amortisation of intangible assets, including software;
- development and manufacturing costs of moulds and technical instruments used for interim tests or trials;
- on-site test expenditure of mineral exploration technology; and
- appraisal and certification expenditure in relation to the R&D-related revenues.

Tax losses attributable to R&D super allowance claims can be carried forward for up to five years (Deloitte, 2013a:9).

4.3.4 Indirect taxes: VAT

Specified R&D equipment imported by qualified foreign-invested R&D centres is exempt from VAT in China. Input VAT relating to equipment manufactured in China and purchased by qualified domestic R&D institutes and foreign-invested R&D centres is refundable (KPMG, 2012:7).

To increase the competitiveness of wind power, wind farm developers are entitled to a 50 per cent refund of VAT on the sale of self-manufactured electric power generated from wind power (KPMG, 2013a:16).

4.3.5 Indirect taxes: business tax

In addition to the EIT incentives relating to CDM projects, CDM project enterprises should also understand the business tax implications of the transfer of CERs. According to KPMG (2011a:4), it is unclear whether the transfer of CERs would be subject to business tax, as it is unclear whether CERs fall within the scope of “intangible assets”. The Ministry of Finance and the State Administration of Taxation is expected to issue guidance on the matter.

4.3.6 Indirect taxes: import tax and duties

Specified R&D equipment imported by qualified foreign-invested R&D centres is exempt from customs duty in China (KPMG, 2012:7) and certain wind and hydro power generation components are exempt from import tax and duties.

Since 2010, wind turbine and hydro turbine components can be imported duty-free by turbine manufacturers capable of meeting size and technological requirements (Chadbourne & Parke, 2010). Junfeng, Pengfei and Hu (2010:71,76) clarify this and state that the importation of parts and materials that are components to a single wind power turbine of no less than 1.5 MW power capacity are exempt of customs duties and that normal taxes apply to the importation of complete wind turbines not larger than three MW capacity.

4.4 Supply side: use of tax disincentives (sticks)

There is currently no tax disincentive in place to target the generation of electricity in China. A carbon tax was proposed in the country's 12th Five Year Plan, issued in 2011, but the implementation of the carbon tax has been delayed due to concerns that economic growth might suffer. The tax is intended to apply to carbon emissions from fossil fuels and a levy of five to ten yuan is expected to be introduced per ton of carbon (Haas, 2013). According to Jiang Zhaoli, head of climate change at the National Development and Reform Commission (cited in Wadhams & Carr, 2013), China is also experimenting with a cap-and-trade programme and still needs to decide whether it will simply use carbon trading, a carbon tax, or even both.

The introduction of the carbon tax will result in energy savings and emission reductions and will give a competitive advantage to RE sources. The main focus of the tax is coal and oil, since these are the main energy sources in China. Due to the concentration and strong market power of these two industries, they are able to easily control product prices and pass on the cost of the carbon tax to consumers (Dongsheng, 2012:54). As a result, it is likely that the carbon tax will rather serve as a disincentive targeting the *demand* of electricity.

4.5 Supply side: conclusion

China's supply-side tax instruments consist of EIT incentives for HNTEs; EIT incentives for CDM projects; EIT incentives for residents undertaking qualifying R&D activities; VAT and customs duty incentives for certain entities incurring qualifying R&D expenditure; VAT and customs duty incentives for generators of wind energy; and a proposed carbon tax.

4.6 Demand side: use of tax incentives (carrots)

4.6.1 Energy management contract incentives

An energy management contract (EMC), also known as an energy performance contract, is a mechanism whereby an energy service company (ESCO) and an energy user jointly set an energy savings target via an agreement. The ESCO provides the necessary services to help the energy user to reduce its energy consumption and the energy user will then reward the ESCO to such an extent that the ESCO will be able to recoup its investment in the EMC project and earn a reasonable profit (KPMG, 2011b:2). These payments are made from the energy user's resulting expenditure reductions, thereby avoiding any net increase in the energy user's expenditure or capital investments (Stender & Ye, 2010).

In order to qualify for tax incentives, there is a combination of qualitative and quantitative criteria that are imposed on both the EMC project and the ESCO. A qualifying ESCO is entitled to a three-year tax exemption, followed by another three years of paying EIT at a reduced rate of 12.5 per cent, starting from the year in which the revenue from the EMC project first arises (KPMG, 2011b:3-4).

Enterprises, including ESCOs, which invest in special equipment for energy conservation and use the equipment itself, are entitled to a credit of ten per cent of the investment amount against the EIT payable. This credit is awarded in the year in which the investment is made and if there is insufficient tax payable to utilise the full credit, the excess credit may be carried forward for up to five years. An ESCO should take note that if it transfers the EMC project assets to the energy user within five years of purchase, it will cease to enjoy the credit and would have to repay the tax on which the credit has been granted to the tax authority (KPMG, 2011b:4).

If the ESCO transfers the assets that have materialised in the course of the EMC project to the energy user at the end of the term of the EMC, the ESCO and energy user can treat the transfer of the assets as if the assets had been fully depreciated or amortised for EIT purposes. Also, if the energy user makes any contributions to the price of the assets so transferred, the ESCO will not have to recognise any revenues to take those contributions into account for EIT purposes. The energy user in an EMC project can claim an EIT allowance for the reasonable expenditures actually incurred in accordance with the EMC project (KPMG, 2011b:7).

It is possible for an energy user to take part in an EMC project and a CDM project simultaneously, since a key focus of CDM projects is the increase of EE (KPMG, 2011b:5).

4.6.2 Clean development mechanism projects

The tax incentives in respect of CDM projects target both the supply and the demand of electricity generation, as they include both RE (supply) and EE (demand) projects. The detail of the CDM project incentives is discussed in section 4.3.2.

4.6.3 High and new technology enterprise incentives

The tax incentives in respect of HNTEs target both the supply and the demand of electricity generation, as HNTEs should, *inter alia*, fall within one of eight areas, which include new energy and energy conservation technology (KPMG, 2012:4). The detail of the HNTE incentives is discussed in section 4.3.1.

4.6.4 Research and development incentives

The tax incentives available to enterprises that undertake certain R&D activities also apply to both the supply and the demand of electricity generation, as they can relate, *inter alia*, to the R&D of RE or EE technologies. The detail of these incentives is discussed in section 4.3.3.

4.6.5 Energy conservation incentives

Where income is derived from qualifying environmental protection and energy conservation projects, the enterprise is eligible for a three-year EIT exemption, followed by another three years of paying EIT at a 50 per cent reduced rate (i.e. 12.5 per cent) on such income from the year in which the first revenue is generated (KPMG, 2013a:16).

Enterprises investing in qualifying equipment related to environmental protection and energy conservation are also entitled to a tax credit. The credit is calculated as ten per cent of the amount invested in such equipment and it is credited against the enterprise's EIT payable for the year in which the investment is made. Where the tax payable is insufficient for the credit, the excess may be carried forward for up to five tax years (KPMG, 2013a:16). The enterprise that purchases the qualifying energy-saving equipment should also make use of the equipment itself. If the enterprise transfers or leases the equipment within five years of purchase, it is no longer eligible for the preferential treatment and it is required to repay the amount already credited against EIT payable (KPMG, 2011b:4).

4.6.6 Indirect taxes: VAT

An ESCO's revenues received in an EMC project are provisionally exempt from VAT (KPMG, 2013a:17). The period of exemption is yet to be defined by implementation rules to be issued by the State Administration of Taxation (Stender & Ye, 2010). In addition, if an ESCO transfers assets related to an EMC project to the energy user in the project, the transfer is also exempt from VAT (KPMG, 2011b:4).

As discussed in 4.3.4, specified R&D equipment imported by qualifying foreign-invested R&D centres is exempt from VAT in China. Input VAT relating to equipment manufactured in China and purchased by qualifying domestic R&D institutes and foreign-invested R&D centres is refundable (KPMG, 2012:7).

4.6.7 Indirect taxes: business tax

An ESCO's revenues received in an EMC project are also provisionally exempt from business tax (KPMG, 2013a:17).

As discussed in 4.3.5, it is unclear whether the transfer of CERs from qualified CDM projects would be subject to business tax, as it is unclear whether CERs fall within the scope of "intangible assets" (KPMG, 2011a:4).

4.6.8 Indirect taxes: import tax and duties

Equipment imported for self-use in certain domestic- and foreign-invested projects that are encouraged by the state is exempt from import duty. Some ESCO activities might fall within the scope of such projects, for example, the development of energy savings technologies. According to KPMG (2011b:4), the emphasis is on "development" and the mere acquisition and simple assembly of equipment from external suppliers might not constitute "development" for purposes of this incentive. If an enterprise was eligible for the import duty exemption on the importation of certain equipment, ownership of the assets generally may not be transferred within five years. If an ESCO therefore transfers these assets to the energy user in the EMC project within five years of purchase, the ESCO will have to repay the import duty, unless the energy user also qualifies for the import duty exemption.

In addition, specified R&D equipment imported by qualifying foreign-invested R&D centres is exempt from customs duty in China (KPMG, 2012:7).

4.7 Demand side: use of tax disincentives (sticks)

There are currently no tax disincentives implemented in China to contribute to the reduction of the high emissions from electricity generation. A carbon tax is, however, proposed and there is talk of a possible consumption tax in future. Each will now be briefly discussed.

4.7.1 Other taxes or levies: carbon tax

A carbon tax is currently being considered in China, but no implementation date has yet been communicated due to various concerns and strong opposition to such a tax. The Chinese government also still wants to decide between the cap-and-trade system, which is currently being piloted in a few areas, a carbon tax, or both. Once implemented, a carbon tax can potentially affect both the supply of and the demand for electricity. As discussed in section 4.4, it is likely that the generators of electricity will simply pass the costs of a carbon tax on to the consumers, thereby possibly rather impacting the demand for, than the supply of electricity. Since electricity is relatively price inelastic, it is unlikely that the demand for electricity will be reduced by much once a carbon tax is implemented.

4.7.2 Other taxes or levies: consumption tax

It is anticipated that a possible consumption tax might be imposed on certain high-energy consuming items during the 12th Five-Year Plan period, that runs from 2011 to 2015 (KPMG, 2011c). Such a tax, if imposed, would also serve as a disincentive relating to the demand for electricity.

4.8 Demand side: conclusion

China's demand-side tax instruments include EIT, VAT and business tax incentives for ESCOs involved in qualifying EMC projects; EIT incentives for CDM projects; EIT incentives for HNTes; EIT incentives for residents undertaking qualifying R&D activities; VAT and customs duty incentives for certain entities incurring qualifying R&D expenditures; EIT incentives for environmental protection and energy conservation projects; import duty exemptions for certain projects into which some of an ESCO's activities might fall; a proposed carbon tax and a possible future consumption tax on high-energy consuming items.

4.9 Chapter conclusion

China utilises various tax instruments relating to EIT, VAT, business tax and import tax and duties to contribute to the reduction of emissions associated with electricity generation in the country. The tax incentives consist almost equally of direct (ten) and indirect (nine) taxes. All 19 of the tax instruments encourage environmentally good behaviour. The proposed carbon tax and consumption tax on high-energy consuming items will penalise environmentally bad behaviour, if implemented, but there are currently no tax disincentives. The government appears to be more focused on the demand for, than the supply of electricity, with 16 instruments targeting demand and only ten targeting supply. This difference is largely attributed to the numerous incentives for EMC projects. Two instruments are focused on RE specifically, nine on EE specifically and four on R&D specifically. Once again, the large number of instruments specifically targeting EE is primarily attributable to the various incentives available for EMC projects. Table 4 provides an overview of all the tax instruments used in China.

Table 4: Overview of tax instruments used in China

Supply-side instruments		
Carrots		Sticks
Enterprise income tax	Indirect taxes	Other
<ul style="list-style-type: none"> • HNTEs pay tax at a reduced rate (can include RE/energy conservation/R&D) • HNTEs in a special economic zone get two-year tax holiday and another three years of paying tax at reduced rate • Portion of proceeds from sale of CERs from CDM projects are deductible (can include RE/EE) • Certain income received by CDM projects is exempt • 150% allowance for R&D expenditure (can include RE/EE) 	<ul style="list-style-type: none"> • VAT exemption on import of R&D assets • Customs duty exemption on import of certain R&D assets • Input VAT on acquisition of domestically manufactured R&D assets is refundable • 50% refund of VAT on sale of wind power (RE) • Customs duty exemption on import of certain wind and hydro power generation components (RE) 	<ul style="list-style-type: none"> • Proposed carbon tax

(Demand-side instruments are continued on page 64)

Demand-side instruments		
Carrots		Sticks
Enterprise income tax	Indirect taxes	Other
<ul style="list-style-type: none"> • EMCs (EE): three-year tax exemption and another three years of tax at reduced rate for ESCO • EMCs: contribution received by ESCO for assets transferred is exempt • EMCs: energy user may deduct expenditure incurred on project • Tax credit of 10% of investment amount in EE assets • Portion of proceeds from sale of CERs from CDM projects are deductible (can include RE/EE) • HNTEs pay tax at a reduced rate (can include RE/energy conservation/R&D) • HNTEs in a special economic zone get two-year tax holiday and another three years of paying tax at reduced rate • 150% allowance for R&D expenditure (can include RE/EE) • Income from qualifying environmental protection and energy conservation projects are exempt for three years, where after tax is paid at a reduced rate for another three years 	<ul style="list-style-type: none"> • EMCs: ESCO's income is exempt from business tax • EMCs: ESCO's income from transfer of assets is exempt from VAT • EMCs: transfer of assets by ESCO to energy user is exempt from VAT • Import duty exemption on importation of equipment for use in development of energy savings technologies (EE) • VAT exemption on import of R&D assets • Customs duty exemption on import of certain R&D assets • Input VAT on acquisition of domestically manufactured R&D assets is refundable 	<ul style="list-style-type: none"> • Proposed carbon tax • Possible future consumption tax: might be imposed on certain high-energy consuming items

(Source: own compilation)

CHAPTER 5: TAX INSTRUMENTS USED IN BRAZIL

“The country has a primary energy matrix with the almost 50% of renewable sources, but Brazil still needs to be part of [f] this global effort for the preservation of the planet. Given this, the Brazilian government started to create reductions in taxes charged over alternative sources in order to promote their development and exploration in Brazil.”

(Duran, 2013)

5.1 Introduction

Unlike South Africa, where the energy sector accounts for the majority of the country's total emissions (Republic of South Africa, 2013b:47), Brazil's largest source of emissions is its agricultural industry. Although Brazil's energy sector experienced the fastest growth in emissions of all sectors in the country during 2012, the sector is still regarded as environmentally friendly when compared with the energy sectors of the majority of other major economies (Tollefson, 2013). Brazil is committed to developing its RE industry (Chacon, 2013:1588) and has made significant investments in RE: it ranked ninth worldwide in terms of RE investment in 2012 (Bloomberg New Energy Finance, 2013:23,25). The country distinguishes itself from the rest of the world in that approximately 85 per cent of its electricity is generated from renewable sources, of which roughly 77 per cent is hydro power (Ministry of Mines and Energy, 2013:16). Fossil fuels, such as coal, oil and gas are the primary energy sources most explored in the world, but in Brazil, fossil fuels occupy a secondary position (Cavaliero & Da Silva, 2005:1746). RE sources account for 46 per cent of the primary energy production in Brazil (Ministry of Mines and Energy, 2013:21), compared to a global average of just over 13 per cent (United Nations Environment Programme, 2012:53).

The Brazilian government makes use of some tax instruments to achieve green policy objectives, but is ranked 18th overall out of 21 countries featured in KPMG's green tax index (KPMG, 2013:4). According to KPMG (2013:2), this indicates that Brazil is less active in using tax instruments to achieve its green policy objectives than the majority of the other countries listed in the index. The United Nations Industrial Development Organization (UNIDO, 2009:18) identified Brazil as an example of a country where government policies have assisted in establishing an RE

market. Although tax incentives did assist in stimulating additional investment in combination with long-term contracting under Brazil's Incentive Programme for Alternative Sources of Energy (PROINFA), the programme is regarded as having successfully encouraged investors to commit resources to RE projects without relying on tax incentives (Chacon, 2013:1599-1600). According to KPMG (2013:4), Brazil more actively uses tax incentives than tax penalties to achieve its environmental objectives.

5.2 Types of taxes

Brazilian resident companies and those foreign companies that are liable for tax in Brazil are charged corporate income tax on their taxable profits at a rate of 15 per cent. In addition, a surtax of ten per cent is imposed on legal entities on income in excess of 240 000 Brazilian real and CSLL is levied at nine per cent on adjusted net income of entities other than financial institutions, which pay CSLL at 15 per cent. CSLL is a social contribution tax and is hereafter referred to as such. The total effective income tax rate on companies (excluding financial institutions) is therefore 34 per cent (Deloitte, 2014a; EY, 2013a:164-168). Brazilian companies may annually elect to be taxed on actual or presumed income. The latter is only available if certain requirements are met and is based on a quarterly estimated income (Deloitte, 2014a).

Indirect taxes consist of the industrialised product tax (IPI), an excise tax levied by the federal government on the manufacture of goods and the importation of goods into Brazil, similar to a type of VAT (hereafter referred to as "federal VAT"); ICMS, a VAT levied by state governments (hereafter referred to as "state VAT") on the circulation and importation of goods and the provision of inter-state and inter-municipal transportation and communication services; import taxes; as well as PIS and COFINS, both federal social contributions on gross income. These federal social contributions operate as non-cumulative VAT-type taxes for certain taxpayers. The federal VAT is levied at an average rate of 20 per cent, depending on the type of product, while the state VAT is levied at rates ranging from four per cent to 25 per cent (Deloitte, 2014a; EY, 2013a:164-168).

Each of the tax instruments used in Brazil will now be discussed in respect of the supply and demand for electricity respectively, commencing with the corporate income tax instruments, followed by the indirect tax instruments.

5.3 Supply side: use of tax incentives (carrots)

5.3.1 SUDAM/SUDENE investment incentive plans

In order to encourage economic development and promote regional development, the Brazilian government designed two programmes, namely the Superintendency for the Development of the Northeastern States (SUDENE), which tends to favour operations in the poorer Northeastern regions, and the Superintendency for the Development of the Amazon (SUDAM). The incentives provided by SUDAM and SUDENE are generally available to approved Brazilian and foreign-controlled companies in respect of the implementation of new industrial projects or the planned expansion, diversification or improvement of an existing industry. Approval is granted based on a project's technical and economic feasibility, as well as its appropriateness as part of the regions' overall economic development (PWC, 2013a:2,37-38; Ernst & Young Terco, 2011:23).

In terms of the SUDAM and SUDENE programmes, approved companies whose activities fall into economic segments considered as a priority for the development of these regions, are eligible for a 75 per cent reduction of corporate income tax and non-refundable surcharges due on income generated by their operations, for a maximum period of ten years. This reduction is available for the implementation of new projects or the expansion, diversification or improvement of existing projects, provided the project is submitted and approved between 24 August 2000 and 31 December 2018 (PWC, 2013a:38). RE or EE projects could also possibly qualify for this incentive (KPMG, 2013a:12).

5.3.2 Research and development incentives

According to Deloitte (2013a:5), companies involved in activities aimed at achieving technological innovation can claim a super allowance for income tax purposes of 160 to 200 per cent of the total qualifying R&D expenditures incurred during the year. In order to qualify, the company should undertake R&D activities and incur qualifying R&D expenditure. R&D activities include the design of new products or production processes and the addition of new functionalities or characteristics to existing products or processes, provided that they result in incremental improvements that lead to improved quality or productivity and greater competitiveness (Deloitte, 2013a:5; PWC, 2012:2). R&D expenditure that qualifies for the allowance includes salaries, wages and certain payments to third parties, directly attributable to the conducting of qualifying R&D activities and incurred within Brazil (Deloitte, 2013a:5). According to EY (2013c:27), the allowance is only available to Brazilian entities carrying out the qualifying R&D activities.

The tax allowance starts at 160 per cent of the total R&D expenditure incurred, but is increased to 170 per cent if the entity increases the number of researchers exclusively dedicated to research projects by up to five per cent in a given year, compared to the previous year. However, should the number of researchers increase by more than five per cent in the year, the allowance is increased to 180 per cent of the total R&D expenditures incurred. Employees who have relocated internally to work exclusively in research projects may also be considered when calculating the increase in the number of researchers (Deloitte, 2013a:5). Costs incurred in developing a patent qualify for an additional 20 per cent allowance, but the additional incentive of 20 per cent is only granted once the patent is registered. If a company's taxable income is insufficient to utilise the full R&D allowance, the unused allowance is forfeited and may not be carried forward or carried back to other tax years (EY, 2013c:27-28; Deloitte, 2013a:5).

The Brazilian Internal Revenue Service (IRS) released a normative ruling during 2011 to clarify certain issues relating to employees that are partially dedicated to research projects, R&D subcontracting expenditures and expenditures which don't qualify for the allowance. The ruling states that employment contracts need to be amended, in order to expressly indicate that such employees work as researchers in technological innovation projects, in order for the expenditure relating to such employees to qualify for the allowance. Only certain subcontracting expenditures qualify for the allowance, as long as certain requirements are met. Lastly, the ruling clarifies that expenditures related to supporting administrative and indirect services do not qualify for the allowance, even if they can be associated with a research project (Deloitte, 2013a:5).

In order to qualify for the R&D super allowance, a company that incurred qualifying R&D expenditures is required to present a valid tax clearance certificate to the IRS, covering the entire calendar year in which the allowance is utilised. In addition, the IRS requires specific accounting controls relating to the recording of the R&D expenditures incurred (Deloitte, 2013a:6). Only companies that choose to be taxed on actual income on a quarterly or annual basis may apply for the R&D tax allowance (EY, 2013c:28).

New machinery, equipment and instruments acquired and exclusively dedicated to R&D, qualify for a 100 per cent depreciation allowance in the year of acquisition. Similarly, intangible assets used in R&D activities also qualify for a 100 per cent amortisation allowance in the year of acquisition. If such assets, initially acquired for R&D purposes, are subsequently sold or no longer used in the course of R&D activities, the expenditure paid or incurred becomes taxable (Deloitte, 2013a:5-6).

Qualifying R&D aimed at RE or EE could possibly qualify for these incentives, provided all the requirements are met.

5.3.3 Clean development mechanism projects

Brazil is the third-largest CDM market in the world, in terms of the number of registered CDM projects, after China and India (UNFCCC, 2014b). According to Dos Santos, Beuren and Haussmann (2012), no specific fiscal legislation exists yet in Brazil to establish the tax treatment relating to the disposal of CERs and the legal nature of CERs is thus unclear. Some authors consider CERs to be intangible assets, while others consider them to be securities or derivatives. As a result, different authors have different views on the tax treatment of CERs. The Brazilian Central Bank, for example, issued a circular letter in 2005 in which it classified the disposal of CERs as the exportation of services. The Brazilian IRS issued Consultation no. 59 of 2008 in which it states that revenues from carbon credit-related rights transferred abroad are subject to corporate income tax, but exempt from both types of federal social contributions (Receita Federal, 2008 cited in Dos Santos *et al.*, 2012:115). The Consultation is, however, similar to a private binding ruling in South Africa and thus only valid for the company that submitted the query to the IRS. According to Marques, Magellan and Parente (2010), the IRS does tend to treat revenue from the sale of CERs as revenue from exports and therefore as exempt from all federal social contributions. They point out that there are approximately 20 bills underway in Congress with different proposed approaches and although Bill no. 4.425, issued in 2004, exempts individuals and companies that carry out CDM projects from corporate income tax, social contribution tax and both types of federal social contributions, it is still far from resulting in a legal standard, as it still has a long legislative process to follow.

5.3.4 Indirect taxes: state VAT

Equipment and components used to generate wind or solar energy are exempt from the state VAT until 31 December 2015 (KPMG, 2013a:11). According to Varella, Cavaliero and Silva (2012:19), state and federal VAT are the two most relevant taxes that have promoted the use of certain photovoltaic solar energy equipment. The VAT incentives provided to the generators of photovoltaic solar energy have changed over the years and the only products currently exempted from state and federal VAT are photovoltaic modules.

5.3.5 Indirect taxes: industrialised product tax (federal VAT)

Equipment, machinery, instruments, apparatus, parts and tools acquired and used in qualifying R&D activities qualify for a 50 per cent reduction in the federal VAT. This incentive must be claimed when such assets are acquired (Deloitte, 2013a:6; EY, 2013c:27).

Equipment used to generate RE is generally exempt from federal VAT (KPMG, 2013a:11). For example, in the field of wind energy, the importation of wind turbines into Brazil is exempt (Sciaudone, 2012) and, in the field of solar energy, the photovoltaic modules used to generate solar energy are also exempt (Varella *et al.*, 2012:19).

Although there are no incentives specifically relating to the sale of electricity from renewable sources, all electric energy sales are exempt from federal VAT (KPMG, 2013c).

5.3.6 Indirect taxes: federal social contributions

The Brazilian government developed the Special Incentives Regime for Infrastructure Development (REIDI) programme to encourage investment in infrastructure construction projects by private entities, through tax incentives. According to the programme, qualifying legal entities engaged in various sectors, including the generation of electricity, which are administrators of the implementation of infrastructure projects, can apply for the tax incentives. Consequently, RE generators could possibly qualify for these incentives. The tax incentives granted to qualifying REIDI projects consist of a five-year exemption from any federal social contributions in respect of the local acquisition and importation of the following (if acquired by a benefited legal entity to be used in or incorporated into qualifying infrastructure projects as fixed assets): machinery, instruments and equipment; construction materials; and services by a legal entity established in Brazil (Farah, 2013).

5.3.7 Indirect taxes: various (proposed REINFA)

The Special Taxation Regime for the Development and Production of Alternative Energy Sources (REINFA) introduces more tax benefits (other than those already discussed in section 5.3) to encourage the generation and consumption of electric power from alternative sources. These incentives include exemption from all federal social contributions; import taxes; and federal VAT. This is, however, not yet a law in force and the project law, approved by the Brazilian Commission of Infrastructure Services, is still awaiting internal procedures in the Federal Senate (KPMG, 2013a:12).

According to Duran (2013), the tax incentives proposed by REINFA will be available to companies that engage in the following activities:

- research, development and production of equipment used to generate alternative energy, such as solar, wind or sea energy, or other energy storage technologies or materials; or
- the generation of electrical energy by wind, solar or sea power.

According to Brazil's National Policy on Climate Change, the government can grant several tax incentives to encourage the use of RE. However, no such federal incentives have been implemented as yet (KPMG, 2013a:12), although an RE incentive programme has recently been launched in one of the states, Minas Gerais. This programme will grant tax incentives, in conjunction with incentives for involvement in other forms of RE, to investors who build modules, inverters and solar plants. Financial details of the programme are yet to be revealed (Colthorpe, 2013).

5.4 Supply side: use of tax disincentives (sticks)

There are currently no tax disincentives that target the generation of electricity in Brazil. This is in line with the author's expectation, since the country's primary source of emissions is not its electricity sector and approximately 85 per cent of its electricity is already generated from renewable sources. According to the Chamber of Deputies (*Câmara dos Deputados*, 2013 cited in *Growth Analysis*, 2014:18), there is an ongoing debate about removing existing tax incentives for imported coal used in the generation of electricity. Imported coal is currently exempt from federal social contributions.

5.5 Supply side: conclusion

Brazil's supply-side tax instruments consist only of incentives and include reductions in corporate income tax to encourage regional economic development, which could apply to the fields of RE or EE; 160 to 200 per cent super allowances for companies undertaking qualifying R&D activities; accelerated depreciation allowances for assets used in qualifying R&D activities; state VAT exemption for equipment used to generate wind or solar energy; state and federal VAT exemption for photovoltaic modules used in the generation of solar energy; 50 per cent reduction in federal VAT for equipment used in qualifying R&D activities; federal VAT exemption for equipment used to generate RE; five-year exemption from federal social contributions on the acquisition and importation of certain assets and services by qualifying companies engaged in certain sectors, which includes the generation of electricity; and proposed additional indirect tax incentives to encourage the generation and consumption of electricity from renewable sources.

5.6 Demand side: use of tax incentives (carrots)

In Brazil, there are currently no tax incentives or disincentives specifically targeting the demand for electricity, for example EE measures (KPMG, 2013b:8). Some of the incentives discussed in section 5.3 are general incentives and not specific to EE, although EE projects could potentially meet the criteria and qualify for the incentives. These incentives will now be discussed briefly.

5.6.1 SUDAM/SUDENE investment incentive plans

The tax incentives available in terms of the SUDAM and SUDENE programmes to approved companies whose activities fall into economic segments considered by the government to be a priority for the development of these regions, can potentially benefit EE projects. The detail of these incentives is discussed in section 5.3.1.

5.6.2 Research and development incentives

The tax incentives available to companies that undertake qualifying R&D activities and incur qualifying R&D expenditures also apply to both the supply and the demand of electricity generation, as they can include the R&D of RE or EE technologies. The detail of these incentives is discussed in section 5.3.2.

5.6.3 Clean development mechanism projects

Tax instruments in respect of CDM projects typically target both the supply and the demand of electricity generation, as they include both RE (supply) and EE (demand) projects. As discussed in section 5.3.3, no specific fiscal legislation exists as yet in Brazil to establish the tax treatment relating to the disposal of CERs and the legal nature of CERs is thus unclear.

5.6.4 Indirect taxes: industrialised product tax (federal VAT)

As discussed in section 5.3.5, equipment acquired and used in qualifying R&D activities, qualifies for a 50 per cent reduction in federal VAT. Qualifying R&D activities can include the R&D of RE or EE technologies.

5.7 Demand side: use of tax disincentives (sticks)

Based on the literature reviewed, there are currently no tax disincentives targeting the demand for electricity in Brazil.

5.8 Demand side: conclusion

There are currently no tax instruments targeting the demand for electricity, specifically EE, in Brazil. There are, however, some general incentives for which EE projects could qualify, including corporate income tax reductions for qualifying projects that assist with the development of certain regions; 160 to 200 per cent super allowances for companies undertaking qualifying R&D activities; accelerated depreciation allowances for assets used in qualifying R&D activities; and a 50 per cent reduction in federal VAT for equipment used in qualifying R&D activities.

5.9 Chapter conclusion

Brazil is a unique country, in that approximately 85 per cent of its electricity is generated from renewable sources. Fossil fuels are the primary energy sources most explored in the world, but, in Brazil, fossil fuels occupy a secondary position. The largest source of emissions in Brazil is the agricultural industry. There are no tax disincentives and only seven tax incentives used by the Brazilian government to target the emissions by the electricity sector. Although tax incentives did play a role, PROINFA is regarded as having successfully encouraged investors to commit resources to RE projects without relying on tax incentives. There are slightly more indirect tax incentives (four) than there are direct tax incentives (three). A few of the incentives discussed in the chapter are general incentives, not specifically targeted at RE or EE. Although RE or EE projects could potentially qualify for the incentives, electricity generation from conventional sources could also potentially qualify for some of these incentives. Only two instruments specifically target RE and three target R&D. Although there are no instruments that specifically target EE, there are a few general incentives for which EE could potentially qualify. There appears to be slightly more focus on the supply of electricity than the demand for electricity, with seven instruments targeting supply and only four targeting demand. Table 5 provides an overview of all the tax instruments used in Brazil.

Table 5: Overview of tax instruments used in Brazil

Supply-side instruments		
Carrots		Sticks
Normal	Indirect taxes	
<ul style="list-style-type: none"> • Ten-year reduced rate for approved companies whose activities fall into economic segments considered by the government to be a priority for the development of the SUDAM / SUDENE regions (can include RE/EE) • 160-200% allowance for R&D expenditure (can include RE/EE) • 100% depreciation allowance on R&D assets in year one 	<ul style="list-style-type: none"> • 50% reduction in federal VAT on R&D assets • Equipment used to generate RE is exempt from federal VAT • Assets used to generate wind or solar energy (RE) are exempt from state VAT • REIDI infrastructure construction incentives (can include RE): five-year exemption of federal social contributions on acquisition and importation of assets and services • Additional RE incentives proposed in terms of REINFA (federal social contributions, import tax and federal VAT exemptions) 	<ul style="list-style-type: none"> • None
Demand-side instruments		
Carrots		Sticks
Normal	Indirect taxes	
<ul style="list-style-type: none"> • Ten-year reduced rate for approved companies whose activities fall into economic segments considered by the government to be a priority for the development of the SUDAM / SUDENE regions (can include RE/EE) • 160-200% allowance for R&D expenditure (can include RE/EE) • 100% depreciation allowance on R&D assets in year one 	<ul style="list-style-type: none"> • 50% reduction in federal VAT on R&D assets 	<ul style="list-style-type: none"> • None

(Source: own compilation)

CHAPTER 6: TAX INSTRUMENTS USED IN INDIA

“India has a number of policies that, while not driven by climate concerns, contribute to climate change mitigation by reducing or avoiding GHG [greenhouse gas] emissions.”

(Upadhyaya, 2010:563)

6.1 Introduction

India is the third largest greenhouse gas emitter globally (World Bank, 2013:54-58). Within India, the largest emitter is the country's energy sector (Upadhyaya, 2010:562). In 2007 the electricity generation sector was responsible for 37.8 per cent of the total greenhouse gas emissions in India: a percentage significantly higher than the emissions by the other sectors (Ministry of Environment and Forests, 2010:48). Access to energy is the Indian government's primary objective, as almost a quarter of the population lacks access to electricity (International Energy Agency, 2012:10). However, increasing the electricity supply could drastically increase the country's emissions, unless the electricity is generated from renewable sources. Electricity generated from coal represents 55 per cent of the total electricity generated in India, while electricity from renewable sources only accounts for about 11 per cent of the total electricity (Bana, 2012:20). This percentage from renewable sources is likely to increase in future, as the government requires state electricity distributors to purchase a minimum percentage of electricity from renewable sources (Upadhyaya, 2010:563). Each of these distributors can choose how to meet this requirement, using a combination of RE sources (Singh & Sood, 2010:658). While India's development challenges are likely to be aggravated by climate change, economic and social development remains the government's overwhelming priority (Upadhyaya, 2010:562; International Energy Agency, 2012:10).

According to the Ministry of New and Renewable Energy (MNRE, 2013:3), RE occupies a central place in India's National Action Plan on Climate Change. Significant investments have been made in RE and, according to Bloomberg New Energy Finance (2013:23,25), India ranked seventh globally in terms of investments in RE in 2012. The RE generating capacity in the country increased by 143 per cent from 2007 to 2012 (MNRE, 2013:2). Wind energy was the main contributor to this

growth (MNRE, 2013:15), due to strong institutional capacity and political commitment, both at the state and central government level (Sovacool & Ratan, 2012:5276). There was, however, a slowdown in the growth of the wind energy sector in 2012, after the accelerated depreciation incentives for investments made in the sector were withdrawn with effect from 31 March 2012 (MNRE, 2013:4; KPMG, 2013a:24). According to Singh & Sood (2010:660), a government's policy framework is instrumental to the success of RE in any country. The growth in India's RE sector has been encouraged by a variety of policy and support measures taken by the government, including financial incentives (Chandrasekar & Kandpal, 2004:931), fiscal policies such as tax incentives, preferential tariffs for renewable electricity and other promotional policies (Singh, 2007:643,645).

The Energy and Resources Institute (2008, cited in Upadhyaya 2010:563) estimated that, in the absence of a number of the energy policies in India, the country's CO₂ emissions would be almost 20 per cent higher than business as usual scenarios in both 2021 and 2031. The Indian government makes moderate to high use of tax instruments to achieve green policy objectives and is ranked tenth out of the 21 countries featured in KPMG's green tax index, which considers both incentives and penalties. In terms of incentives only, India ranks fourth on the index, but based on penalties alone, it only ranks 17th (KPMG, 2013b:4). Based on this index, India therefore more actively uses tax incentives than tax penalties to achieve its environmental objectives.

6.2 Types of taxes

In India, domestic and foreign companies paid income tax at an effective rate of 33.99 and 43.26 per cent, respectively, in the 2013-2014 tax year (Deloitte, 2014b:1). This is based on a basic income tax rate of 30 per cent for domestic companies and 40 per cent for foreign companies, a surcharge of between two and ten per cent on the amount of corporate income tax if the company's net income exceeds ten million Indian rupees and a "cess" of three per cent of the tax payable. "Cess" is a term used in India to describe a tax earmarked for a particular purpose, in this case for education (EY, 2013a:555,556; PWC, 2013b:839). Should a company's income tax liability be less than 18.5 per cent of its book profit, including the cess

and applicable surcharge if the book profit exceeds ten million rupees, a minimum alternative tax (MAT) is payable (EY, 2013a:559).

MAT is paid at an effective rate of 20.008 per cent for domestic companies and 19.436 per cent for foreign companies. This is calculated as 18.5 per cent of a company's book profit, which is an adjusted accounting profit, as well as the surcharge and cess, if applicable. MAT paid may be carried forward for a period of ten years and set off against such a company's income tax liability in subsequent years, calculated under the normal provisions of the Income Tax Act. The amount that can be carried forward and set off in future years is the amount of the MAT paid, limited to the difference between the tax payable based on the normal provisions of the Income Tax Act and the MAT that would have been payable in that subsequent year (EY, 2013a:559,560).

The indirect taxes that are relevant to this study include VAT, levied by the central government, at various rates on goods manufactured in India; customs duties at various rates on goods imported into India; a sales tax at various rates on sales of goods, either levied by the central government on interstate sales or by the state governments on intrastate sales (the latter is a type of VAT); and an entry tax levied at various rates by certain municipalities and state governments on the entry of goods into those municipal jurisdictions or states for use, consumption or sale (EY, 2013a:567,568).

Each of the tax instruments used in India will now be discussed in respect of the supply of and demand for electricity, respectively, commencing with the corporate income tax instruments and followed by the indirect tax instruments.

6.3 Supply side: use of tax incentives (carrots)

6.3.1 Renewable energy incentives

Companies involved in RE are entitled to an accelerated depreciation allowance of 80 per cent of the cost of RE assets, such as solar power generating systems and wind turbines, *inter alia* (KPMG, 2013b:21). For wind power projects, the incentive is, however, only available in respect of windmills installed on or before 31 March 2012. Companies that install windmills after that date can only claim the standard allowance of 15 per cent, instead of 80 per cent (KPMG, 2013a:24), and an additional 20 per cent in the first year. This additional 20 per cent allowance is available to companies that generate or distribute power and is only granted on the cost of new assets (PWC, 2013b:851). The declining balance method is usually applied when calculating depreciation allowances, but power generation and/or distribution companies have the option to claim depreciation allowances using the straight line method (EY, 2013a:565-566). This option is, however, not available for windmills installed after 31 March 2012 (KPMG, 2013a:24). Should a company elect the straight line method, the depreciation rates are aligned to the company's book depreciation rates (PWC, 2013b:851). Unutilised depreciation allowances may be carried forward indefinitely and offset against taxable income of subsequent years (EY, 2013a:566). It is important to note that companies can only claim the accelerated depreciation allowance if they do not benefit from the other generation-based incentives granted by the Indian government (KPMG, 2013a:24).

Generation-based incentives were introduced in 2009 and aim to attract foreign investors and large independent power producers to the wind power sector. In terms of these incentives, independent power producers can benefit from 0.50 rupees for every kWh of electricity sold to the grid (Bana, 2012:24).

In addition to the accelerated depreciation allowances, companies engaged in the generation and/or distribution of power, including electricity generated from renewable sources, are entitled to a ten-year tax holiday if the power generation began before 31 March 2014 (KPMG, 2013a:24). This income tax exemption applies for any period of ten consecutive years during the power project's first 15 years of operation (Bana, 2012:24). However, companies that benefit from this tax holiday

still have to pay MAT (refer to section 6.2), although it may be carried forward for ten years and offset against future income tax payable (KPMG, 2013a:24).

6.3.2 Research and development incentives

The Ministry of New and Renewable Energy in India supports R&D to develop new and RE technologies, processes and materials, *inter alia*, so as to manufacture RE products and systems domestically (MNRE, 2013:93). Companies conducting R&D activities in India or making payments to authorised R&D institutions can benefit from the following tax incentives, each discussed in more detail in this section (Deloitte, 2013a:17):

- 200 per cent super allowance for in-house R&D expenditures;
- 100 per cent allowance for R&D expenditure related to the business that does not otherwise qualify for the 200 per cent super allowance;
- super allowance of 125 to 200 per cent for donations or contributions made to specified entities for R&D; or
- tax holiday for export R&D services by a unit in a special economic zone.

Companies that undertake scientific research and that are engaged in the manufacturing or production of “articles” or “things” are entitled to a weighted allowance of 200 per cent of qualifying R&D expenditure in the year in which the expenditure was incurred. “Articles” and “things” could, *inter alia*, include RE or EE equipment. Qualifying expenditure is that which is incurred by a qualifying in-house R&D facility, on or before 31 March 2017, directly related to R&D, and which has been approved by the appropriate government departments. It includes the cost of obtaining approvals from regulatory authorities and filing patent applications (EY, 2013c:82), but excludes general and administrative costs, depreciation, overhead costs and allocated expenditures (Deloitte, 2013a:17). The allowance is available in respect of both revenue and capital expenditures. However, no allowance is granted in respect of land and buildings (EY, 2013c:82).

A qualifying in-house R&D facility is one that does not exist purely to carry out market research, sales promotion, quality control, testing, commercial production, style changes, routine data collection or activities of a similar nature. The unit should be located in a separate earmarked area and should have exclusive manpower of its own (Deloitte, 2013a:17). Separate audited accounts should be maintained for each approved R&D facility and an annual statement that indicates the progress of implementation of the approved programme should be submitted to the appropriate government department (EY, 2013c:87). The details of the expenditure must also be filed before this department for specific approval on or before 31 October, following the end of the relevant financial year (EY, 2013c:82). A certificate of completion, together with a report of the activities carried out, results obtained and further application for commercial exploitation, should be submitted to this same government department upon completion of the R&D activity (EY, 2013c:87).

A company is only entitled to the 200 per cent super allowance if it enters into an agreement with government for cooperation in an R&D centre and for the audit of the accounts maintained for that centre (EY, 2013c:82). There could be difficulties in obtaining approvals, in order to claim the allowance, where the company carrying out the R&D activities does not own the intellectual property concerned (EY, 2013c:86). Specific approval is required for the disposal of assets acquired to develop scientific R&D facilities (EY, 2013c:87). The weighted allowance is calculated on the “net” expenditure incurred and unused benefits from these allowances may be carried forward for a maximum of eight years (EY, 2013c:82,87). This incentive is only available until 31 March 2017 and R&D expenditure qualifying for the super allowance cannot be deducted under any other provision of the tax act (Deloitte, 2013a:17).

A company engaged in R&D activities can claim a 100 per cent allowance on both revenue and capital expenditures incurred on scientific research related to its own business (KPMG, 2013b:18), although no allowance is granted on the acquisition of land (EY, 2013c:82). An allowance is also available in respect of expenditure incurred relating to employee salaries or materials consumed within three years prior to commencement of the business, if it is certified by the relevant government departments. Such amounts may be claimed in the year in which the business commences. Unused benefits from these allowances may be carried forward for eight years (EY, 2013c:82).

Companies that make donations or contributions to other entities for scientific research are entitled to the following allowances in respect of those donations or contributions (EY, 2013c:83):

- 200 per cent weighted allowance if paid to a national laboratory, university or institute of technology; or to specified persons with a specific direction that the amount should be used for scientific research within an approved programme;
- 175 per cent weighted allowance if paid to a research association, university or college that has been approved and notified in the official gazette by the central government;
- up to 125 per cent weighted allowance if paid to any company engaged in scientific research, provided that the company is registered in India, its main objective is scientific R&D and it is approved by the Chief Commissioner of Income Tax; or
- up to 125 per cent weighted allowance if paid to approved institutions for social science or statistical research.

These specified entities should submit forms to the prescribed authorities to gain approval. Once again, unused benefits from these allowances may be carried forward for up to eight years (EY, 2013c:83).

Finally, a company engaged in the provision of R&D services to a foreign principal in terms of a service agreement and that sets its R&D unit up in a special economic zone, is eligible for a 15-year phased tax holiday on all profits earned from these R&D services, which constitute export services. The tax holiday is as follows (EY, 2013c:83):

- 100 per cent of export profits in the first five years are exempt from income tax;
- 50 per cent of export profits in the next five years are exempt; and
- 50 per cent of export profits in the final five years are exempt, on the condition that the profits are transferred to a specified reserve for purposes of acquiring plant or machinery within three years.

There are certain conditions regarding the formation and purpose of the unit in a special economic zone and approval is required from the relevant development commissioner (EY, 2013c:84). Although such a unit is eligible for a 15-year tax holiday, from 1 April 2012 it is, however, liable for MAT (refer to section 6.2) during that period of exemption (PWC, 2012:6; EY, 2013a:560). The indirect tax benefits available to units set up in special economic zones are discussed in section 6.3.5.

Qualifying R&D aimed at RE or EE could also possibly qualify for the aforementioned incentives.

6.3.3 Clean development mechanism projects

India is a leading destination among non-Annex countries with regards to CDM project implementation (KPMG, 2013a:24; Bana, 2012:21) and has the second highest number of registered CDM projects in the world (UNFCCC, 2014b). The mechanism has been fairly successful in promoting investment in sustainable projects and the majority of the projects originating from India are RE and EE projects (Upadhyaya, 2010:564; MNRE, 2013:3). There are, however, no tax incentives for CDM projects in India at present and there is uncertainty regarding the taxability of proceeds from the sale of CERs (Doshi & Surana, 2014).

6.3.4 Indirect taxes: state VAT

State governments in India have their own subsidies and incentives to promote RE. Some states offer significantly reduced VAT rates or VAT exemptions in respect of RE components (KPMG, 2013a:25; Rewave Infra Solutions, 2013:8). In Tamil Nadu, Gujarat and Maharashtra the VAT rate is five per cent, instead of 14.5 per cent and in Karnataka the VAT rate on RE components is 5.5 per cent (Rewave Infra Solutions, 2013:8).

6.3.5 Indirect taxes: various (special economic zones)

According to the Indian Ministry of Commerce and Industry (2009), units set up in special economic zones are eligible for various indirect tax benefits. There are certain conditions regarding the formation and the purpose of the unit and approval is required from the relevant development commissioner (EY, 2013c:84). The list of approved units includes non-conventional energy; therefore RE companies could potentially meet the requirements for these benefits (Ministry of Commerce and Industry, 2009). The indirect tax incentives offered to units set up in these zones are as follows (Ministry of Commerce and Industry, 2009; PWC, 2012:7; KPMG, 2013d):

- exemption from customs duty and excise tax in respect of the importation or domestic procurement of goods for development, operation and maintenance of such units;
- abatement of, or exemption from, sales tax levied by the central government;
- upfront exemption from service tax when specified services received by an approved unit are used exclusively for authorised operations and, in certain circumstances, even a refund; and
- exemption from state sales tax and other levies, as extended by the respective state governments.

6.3.6 Indirect taxes: customs and excise duties

RE indirect tax incentives include customs and excise duties exemptions or concessions on specified goods, such as RE spares and equipment required for setting up an RE power project (KPMG, 2013a:25; Sinha, 2011). According to Rewave Infra Solutions (2013:7), the incentives specifically related to the wind sector are excise duty exemptions and customs duty concessions for certain wind turbine components.

A company importing specified goods for use in its in-house R&D facility is eligible for a customs duty exemption on the purchase of the goods, provided that: the goods are not sold or transferred within five years; the R&D facility is registered with the appropriate governmental authorities, if applicable; and certification from the relevant authorities or agencies regarding the value and necessity of the goods is produced. Research institutions, other than hospitals, that import specified instruments, equipment or components qualify for a concessional rate of customs duty, also subject to the same conditions (EY, 2013c:85).

In addition to the above R&D incentive, an excise duty exemption is available to research institutions, other than hospitals, in respect of the acquisition of specified instruments, equipment and components manufactured in India, provided that: the institute is registered with and certified by the appropriate government department; the institution produces the relevant certificates and approvals to the manufacturer and seller, who then produce it to the excise authorities; the goods are not sold or transferred within five years from the date of installation; and the head of the institute produces certification stating that the goods are essential and used for R&D purposes (EY, 2013c:85).

Qualifying R&D aimed at RE or EE could also possibly qualify for the aforementioned R&D incentives.

6.4 Supply side: use of tax disincentives (sticks)

Based on the literature reviewed, there are currently no tax disincentives that specifically target the generation of electricity in India. Since July 2010, there has been a nationwide carbon tax on coal of 50 rupees per ton of coal produced in, or imported into, India (KPMG, 2013b:15). Although not directly targeting the generation of electricity, such a carbon tax could potentially serve as a disincentive for generators of electricity from coal, as it is likely to increase the input cost of coal.

6.5 Supply side: conclusion

India's supply-side tax instruments include accelerated depreciation allowances for RE assets; tax holidays for companies engaged in the generation and/or distribution of power, including RE; 100 to 200 per cent allowances for R&D expenditures incurred; 125 to 200 per cent allowances for donations or contributions made to specified entities for R&D; tax holidays for export R&D services by a unit in a special economic zone; reduced VAT rates or VAT exemptions in some states in respect of RE components; various indirect tax incentives for units in special economic zones; customs and excise duties exemptions or concessions on specified RE goods; customs duty exemptions on importation of specified R&D goods; excise duty exemptions in respect of specified R&D instruments, equipment and components manufactured in India; and a nationwide carbon tax on coal that could potentially impact electricity generators.

6.6 Demand side: use of tax incentives (carrots)

6.6.1 Energy efficiency incentives

Companies that purchase energy saving and RE devices are entitled to an accelerated depreciation allowance of 80 per cent of the cost of such devices in the year of acquisition. There is a long list of approved energy savings and RE devices which includes, *inter alia*, boilers, furnaces and heat pumps (KPMG, 2013b:12).

6.6.2 Research and development incentives

The tax incentives available to companies that undertake qualifying R&D activities and incur qualifying R&D expenditure or make payments to qualified R&D institutions apply to both the supply and the demand of electricity generation, as they potentially include the R&D of RE or EE technologies. The detail of these incentives is discussed in section 6.3.2.

6.6.3 Indirect taxes: customs and excise

As discussed in section 6.3.6, the importation of specified R&D goods qualifies for customs duty exemptions and specified R&D instruments, equipment and components manufactured in India are exempt from excise duty. Qualifying R&D activities can include, *inter alia*, the R&D of RE or EE technologies and is therefore relevant.

6.7 Demand side: use of tax disincentives (sticks)

Based on the literature reviewed, there are currently no tax disincentives specifically targeting the demand for electricity in India. The carbon tax on coal discussed in section 6.4 could potentially increase the cost of coal, which could, in turn, potentially increase the cost of electricity generated from coal. Such an increase in the cost of electricity could serve as a price signal and possibly incentivise electricity consumers to reduce their demand for electricity, especially electricity generated from coal. Consequently, it is likely that the tax is rather a demand-side instrument and it is therefore considered as such in the analysis of the primary focus of the tax instruments used in India (refer to section 6.9).

6.8 Demand side: conclusion

India's demand-side tax instruments consist of an accelerated depreciation allowance for certain energy saving devices; 100 to 200 per cent allowances for R&D expenditures incurred; 125 to 200 per cent allowances for donations or contributions made to specified entities for R&D; tax holidays for export R&D services by a unit in a special economic zone; customs duty exemptions on importation of specified R&D goods; excise duty exemptions in respect of specified R&D instruments, equipment and components manufactured in India; and a carbon tax on coal that could potentially impact electricity generators and/or consumers.

6.9 Chapter conclusion

India is the third largest greenhouse gas emitter in the world and the country's electricity generation sector significantly contributes to the total emissions. RE has a central place in India's National Action Plan on Climate Change and the RE generating capacity grew by 143 per cent from 2007 to 2012, mainly due to the growth in the wind energy sector. The increase in the generation of electricity from RE sources has been encouraged by a variety of government measures, including tax incentives. There are three instruments that specifically target RE, two that specifically target EE, including the carbon tax on coal, and four that specifically target R&D. The Indian government makes almost equal use of direct and indirect taxes to achieve its green policy objectives. There are seven indirect tax incentives and six direct tax incentives currently in use. India more actively uses tax incentives than it uses tax penalties to achieve its environmental objectives: there are currently 13 different incentives and only one disincentive (the carbon tax on coal). There appears to be equal focus on the demand and supply of electricity, as there are 12 instruments aimed at the supply and ten aimed at demand. Table 6 provides an overview of all the tax instruments used in India.

Table 6: Overview of tax instruments used in India

Supply-side instruments		
Carrots		Sticks
Corporate income tax	Indirect taxes	Other taxes or levies
<ul style="list-style-type: none"> • Accelerated depreciation for RE assets • Ten-year tax holiday (RE as well as electricity from conventional sources) • 100-200% allowance for R&D expenditure (can include RE/EE) • 125-200% allowance for donations or contributions made to specified entities for R&D • 15-year phased tax holiday for unit in special economic zone that exports R&D services 	<ul style="list-style-type: none"> • Customs and excise duties exemption or concession on specified RE goods • Reduced VAT rates or exemption in some states for RE components • Special economic zones (can include RE/R&D): customs and excise duties exemption • Special economic zones: central government sales tax abatement or exemption • Special economic zones: upfront exemption from service tax and possible refund • Special economic zones: exemption from state sales tax and other levies • Customs and excise duties exemption on R&D assets 	<ul style="list-style-type: none"> • Carbon tax on coal (could reduce generation of electricity from coal and encourage RE, but rather treated as demand-side instrument for purposes of analysis)
Demand-side instruments		
Carrots		Sticks
Corporate income tax	Indirect taxes	Other taxes or levies
<ul style="list-style-type: none"> • Accelerated depreciation for EE assets • 100-200% allowance for R&D expenditure, incl. 100% of pre-trade expenditure (can include RE/EE) • 125-200% allowance for donations or contributions made to specified entities for R&D • 15-year phased tax holiday for unit in special economic zone that exports R&D services 	<ul style="list-style-type: none"> • Customs and excise duties exemption on R&D assets • Special economic zones (can include R&D, which can include EE): customs and excise duties exemption • Special economic zones: central government sales tax abatement or exemption • Special economic zones: upfront exemption from service tax and possible refund • Special economic zones: exemption from state sales tax and other levies 	<ul style="list-style-type: none"> • Carbon tax on coal (could increase cost of electricity generated from coal and therefore encourage EE)

(Source: own compilation)

CHAPTER 7: A COMPARISON OF TAX INSTRUMENTS USED IN SELECTED COUNTRIES AND PROPOSED CONSIDERATIONS FOR SOUTH AFRICA

“As governments increasingly use tax as a tool to achieve green policy goals and make corporate behavior more sustainable, the global green tax landscape, in the form of both incentives and penalties, is evolving rapidly and becoming more complex.”

(KPMG, 2013b:1)

7.1 Introduction

There are many different possible approaches that governments can follow and many different instruments that can be used to achieve environmental objectives. Consequently, the government of each country should assess, *inter alia*, its specific challenges, circumstances, country characteristics and available resources when designing government policies and implementing measures to achieve its objectives. However, it could be valuable to consider the actions taken by governments of other countries in order to learn from them when developing policies for managing the challenge of high emissions from electricity generation.

Often, a combination of instruments will be most effective in preventing global warming. It is therefore important that different, complementary government instruments, which could include tax instruments, are used (Stockholm Environment Institute, 2009:24; Republic of South Africa, 2006:91).

This chapter compares the tax instruments applied by the selected countries in order to investigate whether the primary focus of the tax instruments is on the demand or on the supply of electricity; whether the governments primarily use incentives or disincentives to achieve their objectives; whether they mostly use direct or indirect taxes; and whether there is more focus on RE, EE or R&D. Similar tax instruments applied in the different countries are also compared in an attempt to identify areas for possible improvement or expansion in South Africa.

7.2 Primary focus: supply or demand

The total number of tax instruments used by the selected developing countries to target the supply and demand of electricity generation is approximately equal, as illustrated in Table 7. The tax instruments in South Africa and India appear to focus almost equally on the supply and demand of electricity, while the tax instruments in China primarily focus on the demand for electricity, especially on energy management contract projects. In Brazil, however, the focus appears to be slightly more on the supply of electricity. This is in line with the expectation created from the literature reviewed, namely that a combination of supply-side and demand-side measures is necessary to effectively achieve reductions in emissions from electricity generation. It was found that tax instruments focused on the demand side, for example EE, may, in the short term, be more effective than tax instruments aimed at the supply side (Niesing, 2012:22). It is, however, not sufficient to target the demand side in isolation. In the long term, it is important to also target the supply side (Winkler, 2007:34).

Table 7: Number of instruments: supply or demand

Country	Supply	Demand
South Africa	6	6
China	10	16
Brazil	7	4
India	12	10
Total	35	36

7.3 Primary focus: incentives or disincentives

The primary focus in all the countries studied appears to be the use of incentives, rather than disincentives, as illustrated in Table 8. This corresponds with the expectation created from the literature reviewed, namely that developing countries prefer incentives to promote green behaviour and appear to avoid using disincentives (Van Schalkwyk, 2012:53). Disincentives are presumably avoided by developing countries on the basis that such disincentives could damage development and growth prospects (KPMG, 2013b:20) and can affect a country's competitiveness (Anjum, 2008). Bennet and Moore (1981:319,321) also submitted empirical evidence demonstrating that incentives are generally more effective in swaying customers towards RE and EE than environmental taxes.

Table 8: Number of instruments: incentives or disincentives

Country	Incentives	Disincentives
South Africa	7	2
China	19	0
Brazil	7	0
India	13	1
Total	46	3

7.4 Primary focus: direct or indirect taxes

The selected developing countries appear to place nearly equal focus on direct and indirect tax incentives, except for South Africa where hardly any indirect tax incentives are used, as illustrated in Table 9. Indirect taxes might be an area worth exploring for South Africa. This aspect is discussed further in section 7.7.

Table 9: Number of incentives: direct or indirect taxes

Country	Direct	Indirect
South Africa	6	1
China	10	9
Brazil	3	4
India	6	7
Total	25	21

7.5 Primary focus: RE, EE or R&D

As illustrated in Table 10, there seems to be almost equal focus on RE, EE and R&D in the countries studied, except in China where the number of tax instruments specifically targeted at EE significantly exceeds the number of instruments specifically targeted at RE and R&D. The reason for this is the large number of incentives available to energy management contract projects. Based on the findings, Brazil uses no tax instruments to target EE.

EE is often the preferred approach, as EE improvements offer the largest and least costly emissions reduction potential in the short term and small, incremental and cumulative improvements in EE over long periods can deliver enormous benefits (Ahuja & Tatsutani, 2009:10,11). Tax instruments have also been found to be effective in promoting RE when combined with other instruments (CRS, 2005:25) and it is becoming more common for government policies all over the world to combine EE and RE measures (KPMG, 2013b:11; KPMG, 2013a:2). This is also evident in the study, as all four countries selected make almost equal use of RE and

EE measures. Many countries also use tax instruments to encourage R&D, since innovation is critical to governments' green policy objectives (KPMG, 2013b:17).

Table 10: Number of instruments: renewable energy, energy efficiency or research

Country	RE only	EE only	R&D only
South Africa	3	2	2
China	2	9	4
Brazil	2	0	3
India	3	2	4
Total	10	13	13

7.6 Proposed considerations for improvement of existing tax instruments

The following types of incentives used in South Africa are similar to incentives used in some of the other countries:

- accelerated depreciation allowances in respect of RE assets;
- exempt proceeds from the disposal of CERs;
- super allowances in respect of R&D expenditures incurred;
- accelerated depreciation allowances in respect of R&D assets;
- customs duty exemption in respect of assets used to generate wind energy;
and
- incentives in respect of energy savings.

The detail of the above incentives is investigated and compared to similar incentives in the comparative countries in order to identify areas for possible improvement in South Africa.

7.6.1 Accelerated depreciation allowances: renewable energy assets

Both South Africa and India grant accelerated depreciation allowances to companies in respect of RE assets, as illustrated in Table 11. The cumulative benefit after three years is approximately the same in both countries, although the incentive in India appears to be more beneficial in the first year: 80 per cent of the cost may be claimed in year one, whereas, in South Africa, 80 per cent of the cost is only claimable in the first two years combined, as illustrated in Table 12. However, the South African allowance extends to more types of assets, including wind energy generation assets. The South African government could possibly consider expanding the current allowances to be more beneficial in year one. There do not appear to be any significant requirements in either of the countries that would make it more difficult to qualify for the incentive than in the case of the other country.

Table 11: Accelerated depreciation allowances: renewable energy

Country	Incentive	Qualifying assets	Requirements
South Africa	Depreciation over three years in ratio 50:30:20.	Assets used in generation of renewable electricity.	Brought into use for first time solely for production of renewable electricity.
India	Depreciation of 80%, using declining balance method.	Assets used to generate RE, other than wind power.	No such requirement was identified.

Table 12 compares the cumulative effect of the accelerated depreciation allowances in South Africa and India, respectively, using an asset with a cost price of 100 as an example.

Table 12: Comparison of cumulative effect of accelerated depreciation allowance

Country	Year 1	Year 2	Year 3	Total
South Africa	50	30	20	100
India	80	16	3.20	99.20

7.6.2 Exempt proceeds from the disposal of certified emission reductions

Both South Africa and China grant an exemption on the proceeds from the disposal of CERs, or a portion thereof, as illustrated in Table 13. The incentive in South Africa is more beneficial than the incentive in China, although China grants other incentives to CDM projects which South Africa does not. Based on the literature reviewed, there are no significant requirements in either of the countries that would make it more difficult to qualify for the incentive than in the case of the other country.

Table 13: Clean development mechanism incentives

Country	Incentive	Qualifying proceeds	Requirements
South Africa	Proceeds from disposal of CERs are exempt from income tax.	All proceeds from disposal of CERs derived from qualifying CDM projects.	CDM project should be registered before 31 December 2020.
China	Portion of proceeds from disposal of CERs are deductible for income tax purposes.	Only the portion of the proceeds remitted to the government (2%) is exempt.	No such requirement was identified.
China (additional)	Certain donations and interest income received by CDM are exempt from income tax.	Donations from international financial organisations or other entities/individuals; interest income from capital deposit or national bonds.	No significant other requirements were identified.

7.6.3 Super allowances: qualifying research and development expenditure

All of the countries studied grant super allowances in respect of qualifying research and development expenditure incurred, as illustrated in Table 14. The incentives in Brazil and India appear to be more beneficial than the incentive in South Africa. The South African government could possibly consider increasing the allowance granted in certain circumstances in respect of R&D expenditure incurred, especially in order to encourage the R&D of RE and EE technologies. All the countries have their own strict requirements in order to be able to claim the super allowances for the incurrence of approved R&D expenditures.

Table 14: Allowances for research and development expenditures

Country	Incentive	Qualifying expenditure	Requirements
South Africa	150% allowance; includes pre-trade expenditure.	Expenditure incurred directly and solely on R&D activities.	Approved R&D activities undertaken in South Africa. In production of income, in carrying on a trade.
China	150% allowance. No specific mention of pre-trade expenditure.	Expenditure incurred directly and solely on R&D activities.	R&D undertaken by Chinese residents. No other requirements identified.
Brazil	160-200% allowance, depending on number of researchers exclusively dedicated to research and if expenditure is incurred in respect of a registered patent.	Expenditure incurred directly and solely on R&D activities.	Undertaken by Brazilian entities that choose to be taxed on actual income. Valid tax clearance certificate required. Specific accounting controls required to record R&D expenditure.
India	200% weighted allowance if undertaken by certain manufacturer within in-house facility, otherwise 100%; 100% includes certain pre-trade expenditure.	Expenditure incurred directly and solely on R&D activities.	Approved R&D undertaken in India. 200% only if agreement is concluded with government for cooperation in R&D centre and for audit of accounts maintained for that facility.

7.6.4 Accelerated depreciation: research and development assets

All four countries studied grant accelerated depreciation allowances to companies in respect of R&D assets acquired, as illustrated in Table 15. The incentives in all three comparative countries appear to be more beneficial than the incentive in South Africa. The South African government could possibly consider increasing the allowance to more than 100 per cent of the cost of certain R&D assets or expanding the current allowance to be more beneficial in year one, in order to encourage the R&D of RE and EE technologies. There do not appear to be any significant requirements in any of the countries that would make it more difficult to qualify for the incentive than in South Africa.

Table 15: Accelerated depreciation allowances: research and development

Country	Incentive	Qualifying assets	Requirements
South Africa	Depreciation over three years in ratio 50:30:20.	Machinery or plant used in R&D activities.	New and unused, brought into use for first time.
China	150% allowance for R&D expenditure, including direct depreciation/ amortisation of equipment/ intangible assets.	All R&D assets, except those not depreciated/ amortised (e.g. land).	No such requirement was identified.
Brazil	100% allowance in year one.	Machinery, equipment and intangible assets exclusively dedicated to R&D.	New assets.
India	Both the 200% weighted and the 100% allowances are in respect of both revenue and capital expenditures.	200% weighted: all R&D assets, except land and buildings. 100%: all R&D assets, except land.	No such requirement was identified.

7.6.5 Customs duty exemption: renewable energy

South Africa, China and India all grant customs duty exemptions in respect of certain RE generation assets, as illustrated in Table 16. The incentives in China and India are granted in respect of more types of RE assets than the incentive in South Africa, which is only available for certain wind generation assets and components. The South African government could possibly consider extending the incentive to more types of RE assets. No significant requirements to qualify for the exemption were identified in any of the countries.

Table 16: Customs duty exemption: renewable energy

Country	Incentive	Qualifying assets	Requirements
South Africa	Customs duty exemption.	Certain assets and components related to generation of wind energy.	Only granted when items originate in certain countries.
China	Import tax and duties exemption.	Certain wind and hydro power generation components.	No other requirements were identified.
India	Customs and excise duties exemptions or concessions.	Specified goods, such as RE spares and equipment required for setting up an RE power project.	No other requirements were identified.

7.6.6 Incentives in respect of energy savings

South Africa and China both grant normal tax incentives to companies that generate energy savings, as illustrated in Table 17. The incentives in China appear to be more beneficial than the incentive granted in South Africa and the South African government could possibly consider expanding the current incentive. Various requirements need to be met in order to benefit from the notional allowance in South Africa, as well as from all the incentives available to the parties to qualifying EMC projects in China. The requirements that need to be met in order to qualify for the South African incentive appear to be more strenuous to comply with, which might discourage taxpayers from applying. Thetard (2013) also points out that the expected benefit of claiming the tax allowance should exceed the expenditure incurred in the measurement and verification process, before a taxpayer would be likely to utilise this incentive. The South African government could possibly consider simplifying the requirements of the allowance.

Table 17: Incentives in respect of energy savings achieved

Country	Incentive	Qualifying projects	Requirements
South Africa	Notional allowance based on energy savings achieved by EE projects.	EE projects.	<p>Carry on a trade.</p> <p>Independent, registered and accredited professionals required to measure and verify.</p> <p>Only claimable in first year of project, unless continuous savings are realised.</p> <p>Not allowed if a concurrent EE savings benefit is received from government or semi-government agency.</p>
China	Three-year tax exemption and three years reduced rate for qualifying energy service company (ESCO); exempt revenue in hands of ESCO if energy user pays for transfer of assets at end of project term; energy user can claim allowance for reasonable expenditure incurred on the project.	Energy management contract projects.	Combination of qualitative and quantitative criteria imposed on both the EMC project and the ESCO.
China (additional)	Company that derives income from qualifying environmental protection or energy conservation project: three-year tax exemption and three years reduced rate on such income.	Environmental protection or energy conservation project.	No other requirements identified.

7.7 Proposed considerations for expansion of existing tax instruments

Three types of tax instruments are used in more than one of the countries studied, but not in South Africa. Consequently, such instruments could be considered for use in South Africa. These instruments are:

- indirect tax incentives for R&D assets;
- indirect tax incentives for assets used to generate RE; and
- normal (direct) tax incentives for investment in EE assets.

Indirect tax incentives for R&D assets are currently implemented in China, Brazil and India. The incentives used in these countries include VAT, customs and excise duty exemptions on importation of certain R&D assets; input VAT refunds on domestically manufactured R&D assets acquired; and a reduced rate for federal VAT on R&D assets.

Indirect tax incentives for assets used to generate RE are currently also implemented in China, Brazil and India. The incentives used include customs and excise duty exemptions or concessions; a federal and state VAT exemption; and a VAT reduction or exemption in some states in India. The only indirect tax incentives available in South Africa are customs duty exemptions of certain assets used to generate wind energy (refer to 7.6.5).

Both China and India currently make use of normal tax incentives to encourage investment in EE assets. In China a tax credit is granted for investment in EE assets and in India accelerated depreciation allowances are granted in respect of such assets. In South Africa EE assets are likely to qualify for a standard depreciation allowance in terms of section 11(e) or 12C. Section 11(e) is available in respect of assets used for purposes of a taxpayer's trade and section 12C is available in respect of machinery or plant used for purposes of a taxpayer's trade, directly in a process of manufacture. Furthermore, certain EE assets could qualify for the additional allowance granted by section 12I in respect of the cost of new and unused manufacturing assets, limited to certain thresholds, used in qualifying IPPs. One of the many requirements for a project to be approved as an IPP is the use of improved EE and cleaner production technology. There are, however, strict criteria to qualify

for this additional allowance and only very large projects can potentially qualify. It is therefore likely that most EE assets will only qualify for the standard allowance in terms of either section 11(e) or 12C. It is worth considering preferential treatment for companies acquiring EE assets in South Africa.

Other types of incentives that warrant consideration by the South African government, are income tax exemptions (tax holidays) and reduced rates of income taxes in respect of qualifying RE, EE or R&D projects. Such incentives are utilised by the Chinese, Brazilian and Indian governments, albeit not in respect of the same types of transactions. The following tax exemptions and reduced tax rates identified in the study are applied in these three countries:

- HNTEs in China pay tax at a reduced rate.
- An HNTE in a special economic zone in China is entitled to a two-year tax holiday and another three years of paying income tax at a reduced rate.
- An ESCO in China is granted a three-year tax exemption, as well as another three years of paying income tax at a reduced rate.
- An entity in China that receives income from a qualified environmental protection or energy conservation project is entitled to a three-year exemption from income tax, where after income tax is paid at a reduced rate for another three years.
- Approved companies whose activities fall into economic segments considered by the Brazilian government to be a priority for the development of the SUDAM/SUDENE regions pay income taxes at a reduced rate for ten years.
- Indian companies engaged in the generation and/or distribution of power, are entitled to a ten-year tax holiday if the power generation began before 31 March 2014.
- A 15-year phased tax holiday is granted to a unit in a special economic zone in India that exports R&D services.

Additional incentives worth considering, although they are only available in China and India, respectively, are the income tax exemption of certain donations and interest income received by a CDM; and the 125 to 200 per cent weighted allowance available to companies that make donations or contributions to approved entities for scientific research. In South Africa, only the proceeds from the disposal of CERs derived from qualifying CDM projects are exempt from income tax and the South African government could possibly consider additional incentives, such as the exemption of certain income received by a CDM. Section 18A of the South African Income Tax Act provides only a limited allowance in respect of *bona fide* donations to certain beneficiaries, including non-profit entities and institutes or bodies established by law that, in the furtherance of their sole or principal object, conduct scientific, technical or industrial research, *inter alia*. However, these beneficiaries should carry on certain public benefit activities and it is unlikely that an entity conducting R&D activities would fall into any of these approved categories of activities. A similar incentive in respect of donations or contributions made to certain entities for scientific research in South Africa warrants consideration by the South African government.

CHAPTER 8: CONCLUSION

8.1 Concluding remarks

There is not a single country in the world that remains unaffected by climate change, caused, *inter alia*, by emissions. Urgent change is therefore needed and government intervention is necessary. There are many different government approaches and instruments that can be used to target these environmental challenges and, frequently, a combination of instruments will be most effective. One such measure is tax instruments.

Tax instruments can be effective in stimulating RE, EE and R&D, especially in combination with other instruments, and tax incentives form an integral part of the tax policies of both developed and developing countries. There is not one specific instrument or combination of instruments that can be used effectively in all circumstances and each government should determine the combination of instruments that is most appropriate for its country's challenges and objectives. It is important for governments to pursue the correct balance between instruments, since a combination of instruments can be more effective than a single instrument, but if too many instruments are used, it can become confusing and less effective. It is more effective to address both the supply and demand of electricity generation and to use a combination of incentives and disincentives in order to contribute to the reduction of emissions.

It is useful to compare the tax instruments used by South Africa, Brazil, India and China to address the challenges of high emissions from electricity generation, since these countries are all developing countries and there is increased pressure on developing countries to increase their environmental protection efforts and embark on more sustainable development pathways. There is also an ongoing shift in RE activity from developed to developing countries. Other similarities between the selected countries are as follows: they all form part of the BRICS association of major emerging economies; they all have electricity supply shortages; they all have very high emissions from the burning of fossil fuels; the governments of all four

countries are committed to reduce their countries' emissions; they all are non-Annex countries in terms of the Kyoto Protocol; they are all members of BASIC; they have all made significant investments in RE since 2012; and they are all fairly active in the use of tax instruments to achieve green policy objectives.

Based on the study performed, the following answers are submitted for the specific research questions of the study:

- The tax instruments in South Africa and India focus almost equally on the supply and demand of electricity, while the tax instruments in China primarily focus on the demand side, with a large number of incentives provided in respect of EMC projects. In Brazil, however, the focus of the tax instruments appears to be slightly tilted towards the supply of electricity.
- The primary focus in all the countries studied appears to be the use of incentives, rather than disincentives. Developing countries therefore appear to prefer incentives to promote green behaviour and tend to avoid disincentives, as suggested by the literature reviewed.
- The focus of the tax incentives implemented by the countries studied appears to be equally on the use of direct and indirect taxes, with the exception of South Africa, where hardly any indirect tax incentives are used. Certain indirect taxes worth considering in South Africa were identified.
- There seems to be almost equal focus on RE, EE and R&D in the countries studied, except in China where the number of tax instruments specifically aimed at EE significantly exceeds the number of instruments specifically aimed at RE and R&D. In Brazil, no tax instruments specifically targeting EE were found to be used.

Various types of tax incentives that are used in South Africa and some of the other countries were identified. Some of them appear to be more beneficial in South Africa, while others appear to be more beneficial in the comparative countries and it is therefore worth considering changing some of the incentives or qualifying criteria in South Africa. A number of tax instruments that are used in some of the other countries were identified and suggested for consideration by the South African government.

8.2 Recommendations

Certain tax instruments used in South Africa are similar to instruments used in China, Brazil and/or India, although the latter instruments appear to be more beneficial than the instruments used in South Africa in respect of super allowances for R&D; accelerated depreciation in respect of R&D assets; customs duty exemptions in respect of RE assets; and incentives in respect of energy savings. The South African government could possibly consider expanding the current incentives in order to encourage RE, EE or R&D relating to these fields. This could assist in keeping the emissions from electricity generation from increasing.

Various other specific tax instruments and types of instruments were identified in the comparative countries which could be considered for use in South Africa. These are summarised in section 7.7. There is, however, no standard recipe or blueprint that indicates which instruments to use in which circumstances and each government should consider its own specific circumstances when designing and implementing government policies and measures. It is recommended that the South African government use sound judgement and evaluate the advantages and disadvantages of the various incentives proposed for consideration in the context of the South African circumstances, characteristics, challenges, objectives and available resources.

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