LEVERAGING FINANCIAL AND FISCAL REFORMS TO UPSCALE RENEWABLE ENERGY ACCESS IN THE SOUTH AFRICAN BUSINESS SECTOR

by

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CERTIFICATE OF ORIGINALITY

I hereby certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of the requirements for a degree except as fully acknowledged within the text.

I also certify and declare that this thesis and the work reported herein was composed by and originated entirely from me. Information delivered from the published and unpublished work of others has been acknowledged in the text and references are given in the list of references.

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ABSTRACT

The aim of this study was to the investigate the role of financial and fiscal reforms in upscaling renewable energy access for the business sector as a mechanism to promote sustainability, reduce carbon emissions, and enhance energy security in South Africa. The literature review analysed the available incentives for South African businesses to establish policy impediments towards energy security and decarbonisation goals. This qualitative, comparative review benchmarked best policy practice in China, Denmark, India, and Germany, as countries that have advanced in their transition towards renewable energy. The findings of the study indicate that the cost of compliance is high and fiscal instruments are onerous and complex. Furthermore, some businesses lack awareness of their eligibility to access renewable energy tax incentives. For financial instruments, the predetermined rate is critical in ensuring that an excessive burden is not imposed on the fiscus. The study recommends simplifying the design of financial and fiscal instruments to ensure that more South African businesses upscale renewable energy investments. Additionally, lowering the administrative costs of compliance as well as limiting the multiple agencies that govern financial and fiscal reforms can contribute towards simplifying the administrative and regulatory burden.

MANWELEDZO

Tshipikwa tsha ngudo iyi ndi u sedzulusa mushumo wa tshanduko dza masheleni na dza ikonomi kha u alusa fulufulu ḽi vusuludzeaho u itela u swikelela sekhithara ya vhubindudzi sa kushumele kwa u bveledza u ṱuṱuwedza ho khwaṱhaho kana u dzingindela u fhungudza u phaḓalala ha khaboni na u khwaṱhisedza tsireledzo ya fulufulu kha ḽa Afrika Tshipembe. Maṅwalwa o sengulusa u wanala ha zwiṱukuṱuku zwa mbadelo kha mabindu a Afrika Tshipembe u itela u thoma pholisi ya ṱhuṱhuwedzo yo livhiswaho kha tsireledzo ya fulufulu na zwipikwa zwa u fhelisa khaboni. Tsedzuluso ya mbambedzo ya khwaḽithethivi yo ela pholisi dza khwiṋesa dzi itwaho kana yo edzwaho kha ḽa China, Denmark, India na Germany, sa mashango o bveledzaho tshanduko yao u ya kha fulufulu ḽo vusuludzwaho. Mawanwa a ngudo o sumbedza uri mutengo wa u tevhedza u nṱha na zwishumiswa zwa ikonomi zwi khou lemela na u konḓa. Zwiṅwe hafhu, maṅwe mabindu a shaya tshenzhelo ya u tea hao u swikelela zwiṱuṱuwedzi zwa muthelo zwa fulufulu ḽo vusuludzwaho. U itela zwishumiswa zwa masheleni, phimo yo dzulaho yo tiwa ndi ya ndeme kha u khwaṱhisedza uri muhwalo muhulu a u khou engedzwa kha ikonomi. Ngudo dzi themendela u leludza nyolo dza zwishumiswa zwa masheleni na zwa ikonomi u khwaṱhisedza uri mabindu manzhi a Afrika Tshipembe a gonyisa u bindudza kha fulufulu ḽo vusuludzwaho. Nṱhani ha izwo, hu na u fhungudza mbadelo dza ndaulo ya u tevhedza khathihi na u fhima mazhendedzi manzhi ane a langa tshanduko ya masheleni na ya ikonomi na u kona u dzhenelela kha u leludza muhwalo wa ndaulo na wa ndangulo.

TSHOBOKANYO

Maikaelelo a thutopatlisiso eno e ne e le go sekaseka seabe sa diphetogo tsa ditšhelete mo go oketseng phitlhelesego ya maatla a a ntšhwafatsegang mo lephateng la kgwebo, e le sediriswa sa go tsweletsa tsweletsego, go fokotsa tlhagiso ya khabone le go tokafatsa go nna teng ga maatla mo Aforikaborwa. Tshekatsheko ya dikwalo e lokolotse diketleetso tse di bonwang ke dikgwebo tsa Aforikaborwa gore di tlhame dipholisi tsa ditshiamelo tse di lebisang kwa go nneng teng ga maatla le maitlhomo a go fedisa khabone. Tshekatsheko eno ya khwalitatifi le papiso e lekanyetsa ditiragatso tse di gaisang tsa dipholisi kwa Tšhaena, Denmark, India le Jeremane, jaaka dinaga tse di setseng di tsweletse pele mo go kgabaganyetseng kwa maatleng a a ntšhwafatsegang. Diphitlhelelo tsa thutopatlisiso di supa gore ditshenyegelo tsa kobamelo di kwa godimo mme didiriswa tsa ditšhelete di opisa tlhogo e bile di marara. Mo godimo ga moo, dikgwebo dingwe ga di na kitso ya gore di ka fitlhelela diketleetso tsa lekgetho la maatla a a ntšhwafatsegang. Malebana le didiriswa tsa ditšhelete, kelo e e setseng e beilwe e botlhokwa go netefatsa gore matlotlo a naga ga a rwesiwe mokgweleo o o boitshegang. Thutopatlisiso e atlenegisa gore go nolofadiwe moralo wa didiriswa tsa ditšhelete le matlotlo go netefatsa gore dikgwebo tsa Aforikaborwa di le dintsi di oketsa dipeeletso tsa maatla a a ntšhwafadiwang. Go tlaleletsa moo, go fokotsa ditshenyegelo tsa tsamaiso ya kobamelo gammogo le go lekanyetsa palo ya ditheo tse dintsi tse di tsamaisang diphetogo tsa ditšhelete go ka akgela mo go nolofatseng mokgweleo wa tsamaiso le taolo.

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ACRONYMS AND ABBREVIATIONS

CBT	Carbon Tax
CER	Certified emission reduction
CO_2	Carbon dioxide
CIT	Corporate Income Tax
GBI	Generation based incentives
GHG	Greenhouse Gas
EE	Energy efficiency
FITs	Feed in tariffs
IEA	International Energy Agency
NERSA	National Energy Regulator of South Africa
NM	Net metering
RE	Renewable energy
REG	Renewable energy generation
R&D	Research and development
REN21	Renewable Energy Policy Network for the 21st Century
RET	Renewable energy technologies
SANEDI	South African National Energy Development Institute
SARS	South African Revenue Service
UNCTAD	United Nations Conference on Trade and Development.
UNEP	United Nations Environment Programme.
VAT	Value added tax
WIPO	World Intellectual Property Organization

CHAPTER 1

INTRODUCTION

1.1. BACKGROUND

Sustainable energy is of imperative on the global development agenda (Banerjee Moreno, Sinton, Primiani & Seong 2017:I; Dong, Wei, Liu & Zhao 2023:1,2). Modern energy services that are dependable and reasonably priced lead to improved employment, healthcare, and educational opportunities (Banerjee et al 2017:I; Dong et al 2023:2). Energy access can thus contribute to reducing extreme poverty and promoting shared prosperity (Banerjee et al 2017; Shivanna 2022:163). The United Nations Sustainable Development Goal 7, one of 17 global objectives, guarantees that every person should have access to modern, affordable, sustainable, and dependable energy by 2030 (UNCTAD 2023:4).

Humanity has greatly benefited from industrialization, but after 200 years of using fossil fuels, clearing land, and polluting the environment, the planet's limits are being reached (United Nations 2023:1,2). Breaching these boundaries would mean dire repercussions for humanity (Shivanna 2022:166). Limiting the harmful effects of climate change requires that the world's greenhouse gas (GHG) emissions must be halved by 2030 and brought to net zero emissions by 2050 (Hoegh-Guldberg, Jacob, Taylor, Bolaños, Bindi, Brow, Camilloni, Diedhiou, Djalante, Ebi & Engelbrecht 2019:2-3). Mitigating these challenges requires the collective effort of government, businesses, and communities to reduce the environmental effect of nearly 400 million businesses worldwide (Shivanna 2022:163). Investments in renewable energy technology (RET) are required to limit global median temperature rise between 2030 and 2052 by at least 1.5 °C over pre-industrial levels (Hoegh-Guldberg et al 2019:2-3). Businesses have the potential to lead the way in developing the green economy. While Gupta and Barua (2018:124) acknowledge the positive correlation between financial incentives and sustainable business practices, they highlight the impediments created by the high cost of RET investments. Prior research shows that the financial barrier to implementing green innovation is comprehensive, given the uncertainty of payback timeframes (Qadir, Al-Motairi, Tahir & Al-Fagih 2021). Gupta and Barua (2018) draw attention to the fact that businesses are discouraged from pursuing sustainable practices in

the absence of assistance from external stakeholders, including customers, governments, and business partners throughout the supply chain.

The South African business sector plays an integral role as a driver of the green economy (Aboelmaged & Hashem 2019:861; Broccardo & Zicari 2020; Purwandani & Michaud 2021:578; Enaifoghe & Ramsuraj 2023:3). The adverse consequences of climate change have the potential to compromise the socio-economic advancement of South Africa (Department of Environment Forestry and Fisheries 2020:1). Eighty per cent of South Africa's total GHG emissions come from the energy sector, the main source of GHG emissions (Department of Environment, Forestry and Fisheries 2020:11). Liquid fuels and electricity are produced using coal and crude oil, with coal providing 90% of the total electricity generated (South Africa 2020:12; New Development Bank 2023:5). Lower carbon dioxide (CO_2) emissions from the energy sector would follow from a decrease in the use of coal-generated electricity (Sonter, Dade, Watson & Valenta 2020:1).

South Africa is on the precipice of an existential energy crisis (Steyn, Tyler, Roff, Renaud & Mgoduso 2021:14). The multifaceted systemic structural, economic, and governance issues emanate from solvency constraints in the national energy supplier (Steyn et al 2021:15; Hanto, Schroth, Krawielicki & Burton 2022:165-166), coupled with the decay of aging infrastructure has contributed to a persistent widening gap between electricity supply and demand (Dippenaar 2018:1; Steyn et al 2021:10). Furthermore, South Africa’s over-dependence on coal as a single energy source exacerbates the vulnerability to supply disruptions (New Development Bank 2023:5).

On the global front the volatility of fossil fuel prices together with the mandate to accelerate decarbonisation efforts, compound the impetus to upscale RE access in the South African business sector (Steyn et al 2021:13). South Africa has introduced an incentive to upscale rapid private investment in electricity generation from RE sources to assist in alleviating the current energy crisis (South Africa 2023). The incentive is only available for two years until 31 March 2025 to encourage investment and aims to assist businesses that would not have been in a position to invest in RE if it were not for the incentive (South Africa 2023).

Globally, countries have introduced a range of financial and fiscal incentives to upscale RE access (Cox 2016:1; Chen, Harris & Zolt 2018:1; United Nations 2018:1; Mashayekhi &

Kazemi 2019:1252). Countries like China, Germany, Denmark, and India are leading in renewable energy generation (REG); having significantly expanded RE investment (REN 2023; Shurpali, Agarwal & Srivastava 2019:161,171,173; Thakur & Chakraborty 2019:696; Qadir et al 2021:3593; IEA 2022:13,14). Some of these reforms include tax measures, for instance the introduction of a carbon tax to curb fossil fuel use and tax incentives that reduce a taxpayer's tax liability. Similarly, financial reforms include feed-in tariffs (FITs) and net metering (NM) policies that accelerate the payback period on RE investment by incentivising self-consumption and compensating for REG transferred back into the grid (REN 2023:23).

1.2. RATIONALE

South Africa's RE resources comprise vast stores of biomass, wind, and solar energy potential that provide the country with a comparative advantage (Jain & Jain 2017). Transiting from coal to RE sources can stimulate the green economy in South Africa (Akinbami, Oke & Bodunrin 2021) and mitigate the country's power shortages (Jain & Jain 2017). However, investment in RE has stalled which means that public and private investment is required to transform the electricity sector (Zafar, Shahbaz, Sinha, Sengupta & Qin 2020:11). The investment in renewable energy can include a combination of government subsidies, regulatory, financial, and fiscal policies, that can be used to encourage decarbonization of the energy system (Meier, Vagliasindi & Imran 2014), improve energy security, and boost economic development (UNCTAD 2023). In 2022 the RE sector contributed 13.7% (30.2 TWh) to the country's energy mix, mainly through solar and wind energy (Pierce & Le Roux 2023:2).

Successfully upscaling REG requires the optimal design of financial and fiscal incentives targeting the business sector to mitigate RE adoption externalities (Qadir et al 2021). Akinbami et al (2021:5078) and Qadir et al (2021) concur that in order to encourage RE investment, education campaigns are required at the forefront of all energy policy to drive awareness of the potential benefits of RET. Eberhard (2013) reviewed South Africa's experience with feed-in tariffs (FITs) versus auctions and found that FITs aim to establish market certainty and simplify procurement processes; and showed that the market for RET is much smaller in the context of a developing country. Msimanga and Sebitosi (2014) highlight that the range of policy options include: price-setting and quantity-forcing policies,

investment cost reduction policies and public investments, as well as market facilitation activities. South Africa adopted competitive bidding, a quantity-forcing policy, which is also a restrictive policy as some stakeholders are excluded.

Jain and Jain (2017) identify the barriers to RE investment and found that political volatility, inconsistency in the long-term energy strategy of the country, ineffective grid usage and integration, as well as a skills shortage limit RE implementation in the country (Akinbami et al 2021:5078; ASSAf 2023:3). Dippenaar (2018) investigating whether tax incentives stimulated investment in RE; found that the RE decision frameworks are governed by non-tax factors and recommended that the qualifying criteria for tax incentives should be expanded and simplified. Engelbrecht and Hassan (2024) reviewed the solar photovoltaic panel tax incentive and found that the solar tax incentive is restrictive and excludes access to several South Africans. Ultimately, an enabling environment for RE development includes a wide range of financial and fiscal policies that reduce market barriers and accelerate RE markets (Msimanga & Sebitosi 2014).

Qadir et al (2021) analysed the barriers to upscaling RE investment and reviewed incentive strategies for REG. Their study highlighted the importance of policy design that provides financial incentives, such as FITs, NM, and subsidies, including policies that create an enabling business environment, such as research and development (R&D) tax incentives, corporate income tax (CIT) and value added tax (VAT) reductions, as well as the availability of loans to establish the required infrastructure. Qadir et al (2021) further identify that hybrid policies that incorporate both fiscal and financial incentives is an under researched area. This study seeks to address this gap in the literature by exploring the financial and fiscal policy mix required to upscale the pace of REG in South Africa's business sector.

1.3. PROBLEM STATEMENT

Energy is the underlying factor in all socio-economic activity and development, and is essential for the eradication of poverty (UNCTAD 2023). South Africa's transition to RE is dampened due to cheap coal reserves. Recognised as the 11th largest emitter of GHG globally, South Africa ranks amongst the least energy-efficient countries in the world (South Africa 2023:5). Coal-fired power generation continues to dominate the electricity mix,

accounting for around 80.1% (176.6 TWh) of the total energy mix, nuclear energy made up 4.6%, diesel made up 1.6% with RE making up the remaining portion 13.7% (30.2 TWh) (ASSAf 2023:5; Pierce & Le Roux 2023:2). Additionally, South Africa faces energy security challenges due to shortages of electricity supply and energy outages (ASSAf 2023:5; South Africa 2023:5). This is worsened by population increase which in turn increases energy demand resulting in an increasing disparity between electricity supply and demand (Steyn et al 2021:10). Chaumontet, Mudaly, Tokple and Allie-Ebrahim (2022) advocate that South Africa can resolve its current energy constraints and increase the accessibility, affordability, and dependability of its power supply by creating an energy system based on renewables (ASSAf 2023:5).

A paradigm shift is required to direct investment decisions towards sustainable energy resources and technologies Shi. Accelerating RE access will necessitate large investments in RE technologies (Sen & Ganguly 2017:1175) as well as the removal of institutional, technological, social, and economic barriers such as the lack of funding and high capital costs (Mousavian, Shakouri, Mashayekhi & Kazemi 2020:1252). Meeting the energy needs of the future requires urgent financial and fiscal reforms to address these barriers (Qadir et al 2021:3594) and direct investment promotion policies supporting the transition to renewables (UNCTAD 2023).

South Africa's high carbon energy intensity level and heavy dependence on coal coupled with sluggish improvements in upscaling RE efficiency, the increasing demand for energy resources, and volatile oil prices are causing the general expenditure on energy to escalate and further impede the economic growth of the country (South Africa 2023). It is imperative that the South African business sector initiate measures to reduce their carbon footprint as a mechanism to mitigate the effects of climate change and generate a stable energy supply for business operations. These factors necessitate a review of the existing policy frameworks to establish the optimal financial and fiscal policy mix required to support green growth and economic resilience in South Africa.

1.4. THESIS STATEMENT

The study recognizes that sustainable energy and development are critical to the future of the South African economy, not only from an environmental perspective, but also in terms of security of the energy supply. Financial and fiscal reforms are required to upscale RE access and enhance energy security in the business sector and promote the reduction of carbon emissions in South Africa.

1.5. RESEARCH QUESTIONS

The study is organised around the following research questions:

1. What is the role of financial and fiscal instruments in upscaling RE access in South Africa?
2. What policy reforms are required to support REG in South Africa's business sector?

1.6. RESEARCH OBJECTIVES

The primary objective of the study is to investigate the role of financial and fiscal instruments in upscaling RE access for South African businesses. To achieve this objective, the following sub-objectives are outlined:

1. Review RE financial and fiscal instrument design considerations.
2. Analyse the current RE financial and fiscal instruments for South African businesses.
3. Conduct a comparative analysis of the RE financial and fiscal instruments in China, Denmark, Germany, and India.
4. Provide recommendations for the South African business sector based on comparative country policy benchmarks.

1.7. DELINEATION AND LIMITATIONS

The study acknowledges that there is a separate and growing residential market for RETs, though the business sector presents the greatest opportunity for upscaling RE in the long term. The study performs a comparative analysis on selected jurisdictions. While country contexts may differ within a jurisdiction the application of administrative reforms can provide

valuable benchmarks for policy formulation. The study relies on the existing business RE incentives and will not perform an in-depth analysis of the effectiveness of the available RE incentives.

1.8. UNDERLYING ASSUMPTIONS

The study assumes that the funding barrier will solely be alleviated by fiscal and financial incentives and does not consider other factors. Furthermore, it is assumed that applying good practice policy design will create adequate financial and fiscal instruments that can stimulate RET investment by South African businesses.

1.9. RESEARCH METHODOLOGY

Saunders, Lewis and Thornhill (2016:726) defines research design as the framework for the collection and analysis of data to answer research questions and meet research objectives providing reasoned justification for the choice of data sources, collection methods, and analysis techniques. Braun and Clarke (2006), Malterud (2001:484) and Thorne (2000:69) believe that in addition to providing a comprehensive explanation of their techniques of analysis, researchers should be transparent about what they are doing and why. Nowell, Norris, White and Moules (2017:1) characterises qualitative research as a valuable paradigm of inquiry and states that in order to produce meaningful results, the intricacy of qualitative research necessitates the application of rigorous and systematic techniques such as thematic analysis. The methods and procedures applied in this study are detailed below.

1.9.1. Research design

Creswell (2011:180) defines research design as the researcher's knowledge claims, data collection and analysis techniques, as well as data gathering procedures. Qualitative research is an investigative process where the researcher gradually makes sense of a social phenomenon by contrasting, comparing, replicating, cataloguing, and classifying the object of study (Miles & Huberman 1994). A qualitative methodology is employed in this study as it uses words or descriptions to record aspects of the world rather than precise measurements.

Saunders, Lewis and Thornhill (2016:726) defines paradigm as a set of basic assumptions which underwrites the frame of reference, mode of theorising, and ways of working in which a group operates. Guba (1990:17) defines paradigm as a basic set of beliefs that guide action (Lincoln & Guba 1994; Creswell 2011:240; Mertens 2015). Davies and Fisher (2018:21) argues that a paradigm is a world view, or a belief system, and highlight that the paradigm governs how we ask research questions and conduct the research study. Interpretivism is based on relativism which views reality as being subjective and which differs from person to person (Guba & Lincoln 1994). Saunders, Lewis and Thornhill (2016:726) defines interpretivism as a philosophical stance that advocates that humans are different from physical phenomena because they create meanings; and argues that human beings and their social words cannot be studied in the same way as physical phenomena due to the need to take account of their complexity.

An interpretive paradigm aims to explore and understand the context of naturally occurring events and employs inductive reasoning (Schneider, Ehrhart & Macey 2013), where theories are not tested, but developed from specific observations (Davies & Fisher 2018:21). Saunders, Lewis and Thornhill (2016:718) defines interpretive paradigm as the way humans attempt to make sense of the world around them. An interpretive paradigm is applied in this study as policy benchmarks can inform policy learnings from the application of financial and fiscal reforms in the comparative countries.

Thematic analysis is a process that identifies, analyses, organises, characterises, and reports themes that are present in a data set (Braun & Clarke 2006; Nowell et al 2017:2). A comparative analysis is conducted on the fiscal and financial instruments of four jurisdictions, i.e., China, Denmark, Germany, and India as jurisdictions that have upscaled REG through the use of financial and fiscal parameters. Themes are then applied to establish benchmarks that can be modelled for the South African context.

1.9.2. Literature review

Paula and Criado (2020:1) describe a literature review as a synthesis of the available literature to strengthen the foundational knowledge on a specific subject matter. Saunders, Lewis and Thornhill (2016:714) describes a literature review as a detailed and justified analysis and commentary of the merits and faults of the literature within a chosen area, which demonstrates familiarity with what is already known about the research topic.

The documentary data used for the literature review consisted of articles in accredited journals, online publications, government databases data, discussion papers and other documents issued by National Treasury, discussion papers and other documents issued by NERSA, textbooks and other writings, reports issued by government departments and agencies, promulgations issued by SARS, legislation, and speeches by various speakers.

The research method provides a platform to gain in-depth insights into the challenges experienced in the application of financial and fiscal policy reforms in the comparative countries. Document reviews were conducted on secondary data that were analysed through themes. The thematic analysis explored themes such as designing FIT, NM, and tax incentives.

1.9.3. Methodological integrity

Qualitative research must be thoroughly documented, systematised, and the analytical methods used sufficiently detailed to enable credible assessments (Nowell et al 2017:30). Additionally, it must demonstrate that the data analysis was carried out in a precise, consistent, and comprehensive manner (Nowell et al 2017:30). Lincoln and Guba (1994) supplemented the traditional quantitative assessment criteria of validity and reliability with attributes of credibility, transferability, dependability, and confirmability, so strengthening the notion of trustworthiness.

1.9.3.1. Credibility

In the realm of quantitative research, credibility is frequently linked to internal validity (Korstjens & Moser 2018:121). Credibility addresses whether the findings and judgments made by the researcher can be trusted and the extent to which they provide comprehensive and sensible interpretations of the data (Lincoln & Guba 1994). The purpose of credibility is to establish confidence that the results are true, credible, and believable. A wide range of secondary data sources were used to confirm the study findings, which lends credence to the veracity of the study, with the author of each secondary source cited.

1.9.3.2. Transferability

Transferability is the ability for an investigation to be widely applied (Nowell et al 2017:3); or the extent to which the results of a qualitative inquiry can be generalized or transferred to other contexts or settings (Forero, Nahidi, De Costa, Mohsin, Fitzgerald, Gibson, McCarthy & Aboagye-Sarfo 2018:2; Liamputtong 2019:374). The policy mix of financial and fiscal instruments can provide policy lessons for other countries.

1.9.3.3. Dependability

Dependability is the ability, to the extent that all conditions are equal, to obtain the same results if the study were to be repeated (Morse 2015). Dependability is attainable through credibility, triangulation, splitting data, duplicating the analysis, and the use of audit trails (Guba & Lincoln 1994:373). When the study procedure is certain, logical, traceable, and thoroughly documented, the research is considered reliable (Tobin & Begley 2004:392). Meticulous documentation was maintained in the study that allowed tracking of all inputs, thereby providing a logical foundation to provide reliable results.

1.9.3.4. Confirmability

Confirmability indicates the degree to which the data analysis and conclusions are derived from the evidence collected (Tobin & Begley 2004:392). The purpose of confirmability is to establish that the results of a study can be corroborated by other researchers. The results of the data analysis are the only basis for the conclusions drawn in this study.

1.10. ETHICAL CONSIDERATIONS

The study mainly assesses previously published secondary data and literature, thus all scholarly works were appropriately referenced and cited. The University of South Africa Ethics Committee granted approval for ethical clearance. In addition, each chapter of the study was examined for plagiarism using the Turnitin program, and the overall similarity per centage was determined to be within allowable parameters.

1.11. SIGNIFICANCE OF THE STUDY

This study contributes towards establishing the range of incentives required to upscale REG as a mechanism to provide both energy security and support South Africa's decarbonisation efforts. The contribution of this study lies in developing an in-depth understanding, awareness, and knowledge of financial and fiscal instruments available for the generation of RE by South African businesses. This study will also encourage businesses to obtain knowledge regarding RE; financial and fiscal instruments available for generation of REG; and tax literacy. Tax literacy is needed by businesses to access the available financial and fiscal incentives, which will enable them to make the appropriate tax decisions for their businesses pertaining to their involvement in the RE transition space. The study will contribute to businesses making the most appropriate decision regarding which financial and fiscal instruments to use, whether tax incentives or other fiscal incentives, as well as determining how the incentives should be structured. For example, does the business only utilize tax incentives to reduce the tax payable or refundable or do they utilize the accelerated depreciation incentive; a second example is whether to focus on government grants or loans. In future this study could be used as an instrument to determine which financial and fiscal instruments are appropriate for businesses participating in REG.

1.12. CHAPTER OVERVIEW

In order to satisfy the study objectives outlined in section 1.6, this study has been structured into six chapters:

Chapter 1: Introduction

This chapter provides the context to the study and justifies its importance. The rationale for the study, research objectives, research questions, and research methodology are set out. Chapter 1 also introduces the challenges and barriers to REG experienced in the South African business sector.

Chapter 2: Financial and fiscal instrument design considerations

This chapter reviews the financial and fiscal incentive design considerations. The considerations around a good tax incentive design are discussed. The design of a FIT and NM policies are also explored.

Chapter 3: Incentives for renewable energy generation in South Africa

This chapter reviews the current RE landscape and discusses the current available South African RE financial and fiscal incentives for businesses. The challenges faced by South African businesses when transiting to renewable energy are identified as well as the shortcomings of the available incentive schemes.

Chapter 4: Selection of comparative jurisdictions

This chapter sets out the rationale for the comparative country selections. Lessons will be adopted from these countries.

Chapter 5: Comparative analysis

This chapter analyses the financial and fiscal reforms in China, Germany, Denmark, and India to establish how their policies function in upscaling REG. The policy lessons from the comparative jurisdictions are used as a benchmark to improve the shortcomings of the current RE financial and fiscal incentives in South Africa.

Chapter 6: Conclusions and recommendations

This chapter concludes the study and provides policy recommendations on financial and fiscal policy reforms to upscale RE in the South African business sector. Potential areas for future research are identified.

CHAPTER 2

FINANCIAL AND FISCAL INSTRUMENT DESIGN CONSIDERATIONS

2.1. INTRODUCTION

The world-wide mandate to transform energy systems is based on three fundamental goals: “achieving climate targets, ensuring affordable energy access for all, and maintaining energy security” (UNCTAD 2023:1). Notably, financial and fiscal regulatory policies collectively serve as important government instruments in curbing carbon emissions and stimulating investment in the RE sector. These policy goals can be achieved through a range of policy reforms that promote the low-carbon economy, including taxing fossil fuels, offering tax incentives for low-carbon emission substitutes (UNEP 2018:21), and providing financial incentives to upscale REG (Qadir et al 2021). Countries have to align their policy mix towards delivering on their Paris agreement pledges (UNEP 2018:22).

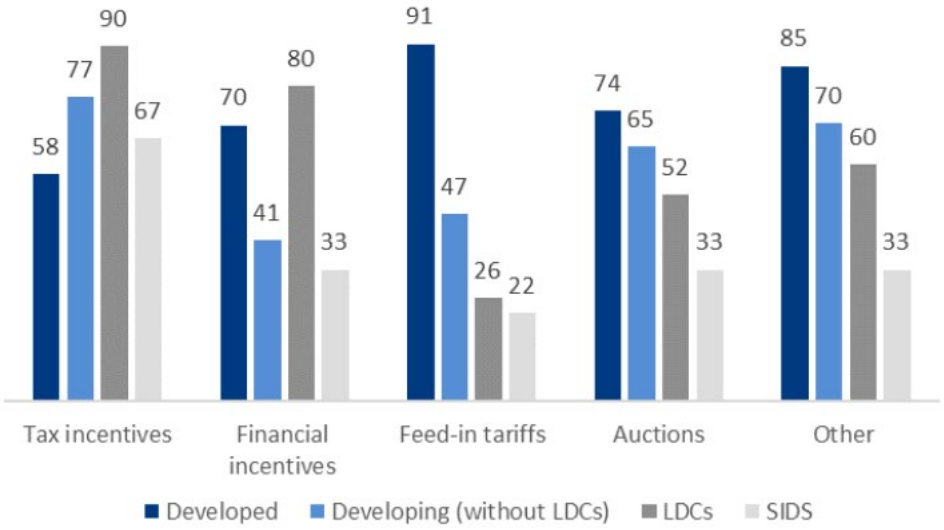
This chapter is laid out as follows. Section 2.2 sets out the role of financial incentives in the energy transition. Section 2.3 extrapolates on financial incentive design considerations. Sections 2.4. and 2.5 discusses the role and design of fiscal incentives in the energy transition. Section 2.7 explores the financial and fiscal policy instrument mix. Section 2.8 presents the conclusion on financial and fiscal instrument design.

2.2. ROLE OF FINANCIAL INCENTIVES IN THE ENERGY TRANSITION

Globally, countries utilise incentives and other instruments such as FITs, net metering etc to encourage the adoption of RET (UNEP 2018:3). Nuclear and fossil fuel power plants have lower generation costs than RE plants, thus energy produced from RE resources is not as competitive as electricity generated from traditional carbon-based sources (Abdmouleh, Alammari & Gastli 2015:251). Transitioning towards RET requires large upfront capital costs which is identified as one of the main barriers towards RE adoption (Dippenaar 2018:4). Financial incentives can address this barrier by easing the burden of the RET acquisition cost and increasing access to capital (Cox 2016:1). Furthermore, financial incentives can facilitate the development of REG markets (Dong, Zhou & Li 2021).

This section reviews the financial policy instruments to upscale REG investment. Figure 2.1 reflects the types of incentives implemented by countries to promote REG. Amongst these instruments, tax incentives are favoured in developing countries while developed countries favour financial incentives, FITs, and auctions.

Figure 2-1: Range of financial and fiscal instruments applied worldwide



Source: UNCTAD (2023:7).

2.3. FINANCIAL INCENTIVE DESIGN

To mitigate the upfront capitals costs countries have introduced financial incentives for businesses that invest in REG (Cox, 2016:1; UNCTAD 2018:13). Abdmouleh et al (2015:251) states that the absence of a guaranteed market for RE threatens the financial viability of many RE projects. Furthermore, RE markets can be stimulated through different mechanisms such as power purchase agreements and facilitating grid access (Menanteau, Finon & Lamy 2003). Feed-in Tariffs (FIT) and Net metering (NM) are used to regulate the power purchase and offer support for a guaranteed RE market; and are benchmarked as efficient instruments to upscale REG (Abdmouleh et al 2015:251; Mousavian et al 2020:1252).

2.3.1. Feed-in tariffs design considerations

Feed-in tariffs are the most widely used form of RE financial instrument. They are imposed by governments to reward companies that generate electricity from RE (IEA 2022:34; REN21 2023). A barrier to RE investment is grid non-availability, where the grid has insufficient capacity to absorb additional power generated (Mousavian et al 2020:1252). In such circumstances, the electricity generated is either not purchased or goes to waste (Pilz & Al-Fagih 2019); which prevent investment in RE (Eslamizadeh, Ghorbani, Costa, Künneke & Weijnen 2022:6).

Feed-in tariffs are the most common form of grid connection incentive (Dong et al 2021:2). With FITs, the producer benefits from a fixed price of electricity that is set by the government (Zhao, Chen & Chang 2016). Legislative measures are necessary to bind the power grid companies to purchase power generated by such RE producers (2021:3958). A FIT system forces grid operators to buy the electricity output and guarantees a premium price for green electricity produced (Poullikkas, Kourtis & Hadjipaschalis 2013:975; Eslamizadeh et al 2022:6).

To stimulate investment in RE sources requires the electricity price to be guaranteed for an extended period of time (Abdmouleh et al 2015:251). Typically, the contract duration ranges on average between 10 and 25 years with a set cost per kilowatt-hour (Menanteau et al 2003). Efficient contract design provides businesses with investment stability (Abdmouleh et al 2015:251; Cox & Esterly 2016:1; IEA 2023). A predetermined rate together with a long-term contract duration, provides contract certainty which lowers project risk, bearing a positive correlation for RE investment (Cox & Esterly 2016:1; Zhao et al 2016; Guild, 2019:421; Mousavian et al 2020:1252; United Nations, 2023:11). In Europe, FITS are a common policy instrument implemented to support renewable energy development (Menanteau et al 2003). Germany and Denmark are acknowledged as pioneers in this regard and have increased their per centage of REG through the application of FITS (Keyuraphan, Thanak, Ketjoy, Rakwichian 2012:440; Abdmouleh et al 2015:256). Similarly, China experienced an increased installed wind capacity from 41.7 MW in 2001 to 17,630.9 MW in 2011 through the usage of FITs (Ming, Ximei, Na & Song 2013). There is agreement that a FIT system is more effective and has generally resulted in lower electricity prices (Komor 2004; Sawin 2004; Komor & Bazilian 2005:1880; Lipp 2007:5482; Keyuraphan et al

2012:440). In addition, FIT policies are considered an advanced form of production-based incentive (Haas, Panzer, Resch, Ragwitz, Reece & Held 2011:2192).

2.3.1.1. Benefits of feed in tariffs

A FIT system is simple to set up and can be readily updated to handle more capacity. In addition to low to medium administrative and transaction costs, a FIT offers price security as well as a fair rate of return (IEA 2023:37), and is affordable in relation to tax incentives (Lipp 2007:5494). Notably, a lower administrative cost presents a significant advantage in emerging nations where building a strong national commerce network is challenging (Haas et al 2011:2192). The FIT has a proven track record of success in enhancing financial accessibility, which in turn fosters REG. Building a strong industry assists in reducing inequality and promoting employment. A FIT's price stability promotes the marketing of a broad range of technologies and gives new operators a chance to significantly transform the energy mix (NERSA 2009:17-18).

The key design characteristics for FITs to attract investment include: contracts to provide favourable grid access conditions (Lipp 2007: 5482), investment stability guaranteed by a long-term duration (Sawin 2004), and low administrative and regulatory barriers (Haas et al 2011:2192; Keyuraphan et al 2012:440). Of these, the contract duration is a key factor for profitability (Komor 2004). It must also be kept in mind that determining who bears the extra cost of feed-in tariffs can impact the policy's outcome (Komor & Bazilian 2005:1880). Reducing the administrative burden, like facilitating the delivery of permits and authorizations, helps improve the results of FITs. Efficient FITs are also technology specific. Lastly, transparent and optimum tariff levels are crucial features. If too low, the financial incentives will not induce project developers to invest, and if too high, consumers will have to bear an unnecessary cost (Groba & Indvik 2013:386; Aguirre & Ibikunle 2014; Guild 2019:421; Jenner, Mousavian et al 2020:1253). The rate must be well designed because if too high it will become a burden to the fiscus. The burden to the fiscus will be a huge problem as South Africa's tax base is decreasing rapidly (SARS 2023). Thus, the rates, the design, and execution of FIT policies are key factors in supporting the development of RE (UNCTAD 2023:12).

Good design characteristics of a FIT include being easy to understand and simple to use, with set rates, and transparent capacity targets (Guild 2019:422). A budget cap and uniformity in policy are also essential components of policy design (Couture, Cory, Kreycik & Williams 2010:1,7). Other essential FIT design elements include guaranteed grid access, stable, long-term purchase agreements that typically last 15 to 20 years, and payment amounts that are based on the costs of REG (Mendonça 2007). The following implementation options are taken into account when designing FIT policies: forecast obligation, purchase obligation, non-utility purchase agreements, eligibility criteria, contract-related design elements, FIT policy adjustments, and caps on policies (Mousavian et al 2020:1253). An additional design component, is a geographically specific FIT policy (Dong et al 2021:4). Thus, in summary, the key design elements for FIT are the rate, duration of the FIT programme, and the ability to do modifications during the FIT contract. Modifications are key so that if there are developments which require changes or updates then these can be incorporated timeously.

2.3.1.2. Eligibility criteria

The scope of FIT rules is determined by the eligibility criteria. This section examines four criteria: project size, location of grid interconnection, eligible technology type, and eligible recipients of FIT payments. Less participation restrictions can increase a jurisdiction's rate of penetration of RE while fostering wider support for increased RE deployment (Mendonça et al 2009). Technology includes hydro, wind, solar PV systems, and biogas. The potential of local resources can also be used to decide on the choice of technological eligibility. The entry of variable sources like solar and wind can be balanced by more dispatchable sources like biomass, and more base-load sources like biogas and geothermal energy, through FIT regulations that include a range of technology types. Limiting eligibility based on project size places an artificial upper limit on the number of eligible projects, which can limit the ability of a FIT policy to promote significant amounts of RE development (Couture et al 2010:1,7).

The policy's overall costs may rise if eligibility is extended to cover projects of various sizes, for example, by varying the FIT payments based on project size, from rooftop PV to massive ground-mounted arrays (Couture et al 2010:1,7). Smaller projects will typically have higher marginal costs for RE generation and are more expensive (per kWh) than larger ones that gain from economies of scale. A significant factor in assessing the effectiveness of FIT

initiatives is eligibility criteria; and the eligibility procedures should be in line with the objectives of the FIT policy designers (Aguirre & Ibikunle 2014).

2.3.1.3. Purchase obligation

A key component of lowering risk and boosting investment security is the purchase obligation. Purchase obligations provide project developers with a guarantee that energy supply companies or grid operators will purchase the renewable electricity they produce (Couture et al 2010:1,7).

2.3.1.4. Contract duration

Typically, a FIT is a long-term policy commitment, involving contracts that span 10-25 years. The duration of a feed-in tariff payment is closely linked to the goal of a particular policy (Schiffer & Trüby 2018:5). Longer contract terms provide stability, security, and risk reduction to the RE developers and their investors (Wiser, Pickle & Goldman 1997:67). The contract length is generally considered essential for minimizing financial risks, with longer contract terms generally leading to a lower cost of capital and a higher degree of investment security (De Jager, Rathmann, Klessmann, Coenraads, Colamonico & Buttazzoni 2008). The length of the contract under a feed-in tariff is also central to ensuring reliable cost recovery for investors (Couture et al 2010:1,7).

2.3.1.5. Feed-in tariff policy adjustments

Feed-in tariff policy adjustments pertain to the frequency and mode of changes made to the overall FIT policy throughout its duration (Couture et al 2010:7).

2.3.1.6. Caps on feed-in tariff policies

The different methods by which FIT policies can be capped are taken into consideration (Dong et al 2021:4). Various caps are imposed by some jurisdictions to control the growth of the RE market and the overall costs of their FIT policy. Caps can limit the programme's

influence on electricity costs in the short and long term, and they can control the policy beyond what the eligibility criteria allow (Couture et al 2010:1,7).

2.3.1.7. Forecast obligation

Forecast commitments focus on heavily weather-dependent resources like solar electricity and wind power, which may eventually be deployed on a massive scale (Couture et al 2010:7).

2.3.1.8. Transmission and interconnection issues

Transmission investments are necessary to support any significant expansion to the electrical supply network (Couture et al 2010:1,7).

2.3.1.9. Funding feed-in tariff schemes

A feed-in tariff scheme can be financed in a few different ways: by the taxpayer or by carbon permits auction. In many instances, any additional FIT expenses have been absorbed straight into the rate base. In so doing, the possibility that the funds might be taken out of the budget or reallocated to other purposes is eliminated, and the costs are distributed throughout the community (De Jager et al 2008).

Where finances are raised from a carbon auction to fund a FIT scheme, the funds are absorbed from current government revenues, additional taxes, or a state fund that allocates utilities for the purpose of financing RE development. Alternatively, taxing utilities and diverting this revenue to pay for RE electricity is another way to finance a FIT. One method to achieve this is to introduce a tax credit specifically for utilities (Couture et al 2010:1,7).

The FIT policy's long-term stability is a critical component of its success (Wiser et al 1997:67; De Jager et al 2008). Furthermore, RE deployment across a range of technology types is encouraged by differentiating the tariff levels based on REG costs (Couture et al 2010:1,7). Price security and lower administrative costs are thus critical design considerations (Dong et al 2021:4; Mendonça 2007; Ragwitz et al 2007).

Net-metering is important as it has proven effective in upscaling REG in a number of countries, including Denmark, USA, Canada, and India (Brown & Sappington 2017:1). A NM scheme's objectives are to meet future energy demands and raise public awareness of the need for energy conservation (Rauf, Al-Awami, Kassas & Khalid 2021:2). In a NM system, state-regulated retail rates are used to pay for the energy; these rates reflect the total cost of the electricity, including delivery, administrative, tax, and profit costs, that utilities charge end-user customers. Most countries use retail rates in their NM programmes to reimburse the prosumer[1] (Thakur & Chakraborty 2018:776), and the going rate for retail power is usually reflected in the compensation (Guild 2019).

Net-metering allows businesses generating surplus electricity to export extra energy onto the grid in return for kWh and/or financial credits (Poullikkas et al 2013:975; Revesz & Unel 2016:59). The prosumer owns the extra power that is not consumed (Poullikkas et al 2013:975). Businesses thus benefit from the revenue generated from the excess electricity they produced over the energy consumed during the billing period (Brown & Sappington 2017:2). Prosumers upload their electricity surplus into the grid, and when they do not produce enough electricity, they are able to extract energy from the grid (Azimoh et al 2017:1). In other words, the grid is used as a free virtual energy storage and the benefit of using the grid for energy storage is its capacity which is larger than that of the ordinary battery (United Nations 2023:13).

At the conclusion of the 12-month billing cycle, any excess credit is either given to the utilities, carried over indefinitely to the customer's subsequent power bill, reconciled annually at any rate, or the client is given the choice to select between the final two alternatives (Poullikkas et al 2013:975). Because it does not require any new procedures, new rates to be established, or unique equipment, NM is easy to administer (Abdmouleh et al 2015:251). To carry over credits till the end of the year, the utility only needs to add a line to each NM customer's ledger (Poullikkas et al 2013:977).

2.3.2. Net-metering design considerations

[1] Produces and consumes electricity.

For the NM design, it is necessary to consider the rate that is used, i.e., whether it is the main retail rate or the cost avoidance rate. The lowest amount that a utility must pay for solar energy that is shared to the power grid from an approved and connected system is known as an avoided cost rate. Avoided cost rates are based on the costs that an energy supplier would have incurred if electricity were produced internally or acquired from another source.

A second factor to consider is duration i.e., the duration a customer's monthly excess generation may be "carried over" to subsequent billing cycles and utilised to offset electricity consumption (Revesz & Unel 2016:62). A feature of NM is long carry over provisions. Furthermore, limitations include capacity constraints with respect to the size of NM generator; and distinctions between home and business settings would vary. Another point to consider in the design of NM is setting an aggregate capacity limit, which restricts the total amount of net-metered generation that can be installed within a utility service area (Revesz & Unel 2016:63).

Electricity producers are drawn to community solar projects with greater eligibility and higher reimbursement rates (Revesz & Unel 2016:64). The export rate must be established at a level that does not result in higher tariff charges than the costs that are saved. Customised contracts for NM clients must include the tariff details, an assurance that exported energy would be purchased under regular operating circumstances, and customer and utility responsibilities on legal, technical, safety, and financial matters.

The key design elements for NM are therefore the rate and grid guarantee by the utility company (Abdmouleh et al 2015:251). The design around the rate is critical because the rate that is mainly used, the retail rate, must be adequate to cover the costs of energy generation (UNCTAD 2023), but must also not be excessive, as an excessive rate results in a burden to the fiscus which is already constrained due to the decreasing tax base (SARS 2023). With regard to the grid guarantee it is significant because it guarantees the storage capacity for excess RE generated as the grid acts as a storage battery for NM (Thakur & Chakraborty 2018:776).

2.3.2.1. Benefit of net metering

Revesz and Unel (2016:64) state that NM may lessen the monopolistic utility grid, increase power reliability, and ease power network congestion. With NM, the grid is able to store extra energy generated during the day for use at night (Saquib, Chakma & Shiblee 2022:94). Some of the benefits of NM include an easy-to-understand billing concept, the ability to maintain previously decided retail rates, reducing the need to construct new infrastructure, and the ability for prosumers to receive compensation for excess electricity, which increases businesses financial return on investment (Rauf et al 2021:4). Furthermore, NM does not require significant regulatory changes and is easy to implement in conjunction with current retail rates (Thakur & Chakraborty 2018:780).

2.3.2.2. Eligible forms of renewable energy sources

Renewable energy generation (REG) technologies are required for a NM plan to be eligible. Individual participants, both natural and legal, can take part in the NM tariff. As a result, those who install RE generation technologies on both residential and commercial properties are eligible to participate equally in the NM tariff system. This includes, but is not restricted to, electrical energy production facilities that use renewable fuel cells, solar, wind, water, geothermal energy, biomass, biogas, and biomass (Thakur & Chakraborty 2018:776).

2.4. ROLE OF FISCAL INCENTIVES IN THE ENERGY TRANSITION

As a significant amount of funding is needed to implement a RE transition for the business sector (Blake 2022:1), fiscal incentives are required to expedite RET investments (Foster-Pedley & Hertzog 2006:57; Cox 2016:1; Qadir et al 2021:3590). Fiscal instruments include “profit-based deduction of the standard CIT rate or profit tax rate, tax holiday, loss carry forward; expenditure-based accelerated depreciation, investment and reinvestment allowances, R&D tax incentives, tax credits; indirect taxes and duties; exemption or reduction of VAT on capital material, exemption on import taxes and duties and production-based tax credits” (UNCTAD 2023:8).

This section follows with defining a tax; discussing the principles for designing good tax policy; and an exploration of the various fiscal incentives that can be introduced in a tax system to upscale RE access.

2.4.1. Defining a tax

Taxes are contributions that the government demands from people in exchange for the state's services (Miller 1891:235). According to the OECD (2018:320), taxes are limited to mandatory, unrequited payments to the federal government. As the advantages taxpayers receive from the government are usually out of proportion to their tax contributions, taxes are considered unrequited (Davis Tax Committee 2018:52). Income taxes are levied on income earned by individuals, businesses, and trusts. Since income taxes are progressive in nature, a higher tax rate is imposed on higher income levels (Davis Tax Committee 2018:52). This progressive structure aims to achieve redistribution objectives, like giving the poor more opportunities to close the wealth gap (Davis Tax Committee 2018:52).

Another aspect of tax is to influence behaviour, for example, environmental taxes regulate activities that have a negative impact on the environment and thus corrects behaviour (Miceikiene, Lideikyte, Savickiene & Cesnauske 2019:31; Kotlán, Němec, Kotlánová, Skalka, Macek & Machová 2021:1; Wolde-Rufael & Mulat-Weldemeskel 2021:22395). In addition to correcting behaviour, environmental taxes also generate revenue for the state (Miceikiene et al 2019:31). This is important, as the aim of any tax system is to raise enough revenue to cover the expenses of government expenditures (Wolde-Rufael & Mulat-Weldemeskel 2021:22395). To do this, there must be steady and adequate tax collection with limited tax adjustments to meet state expenses, which requires the tax system to be stable and predictable with certainty (Brunori 2016:13).

2.4.2. Principles of good tax policy

It is necessary for a good tax policy to be open, transparent, efficient, and well-informed. The effectiveness of tax policy can be hampered by a lack of public knowledge (Mirrlees & Adam 2010:20). Fairness, simplicity, neutrality, administrability, compliance, equity, sufficiency, cost effectiveness, and ease of administration and are the criteria for developing a "good tax" (Avi-Yonah & Sartori 2011:10; OECD 2014:30-31; Brunori 2016:12,15,20; Shome 2021:54-56). The vertical equity principle states that a person should pay taxes in proportion to their income (Avi-Yonah & Sartori 2011:14; Slemrod & Bakija 2017).

i) A tax that applies uniformly to all taxpayers is considered fair (Avi-Yonah & Sartori 2011:14; Slemrod & Bakija 2017).

ii) A simple tax is one that is easy to understand and comply with. In general, less complicated taxes are easier to administer, have clear regulations, and are simple to comprehend with a defined scope (Nichols 2005:14; OECD 2014:30-31; Shome 2021:56). Simplicity is typically evaluated by examining administrative and compliance expenses (Nichols 2005:14; OECD 2014:30-31; Shome 2021:56).

iii) A neutral tax is one that does not affect parties' preference for a particular type of exchange over another (Nichols 2005:14; OECD 2014:30-31; Shome 2021:56).

iv) The creation of an administrable tax, one that is feasible to implement and maintain, and applies tax legislation or administrative regulations in an unbiased manner in order to overrule legislative intent (Nichols 2005:14; Shome 2021:56).

v) The time and money people spend adhering to the tax code is measured by compliance expenses.

vi) Equity within a tax system is defined as the ability to pay the principal. If a tax has the least impact on market processes, it is considered effective and efficient (Nhekairo 2014:3). Equitable and efficient tax collection means that taxes must be collected in the proper amount and at the proper time (OECD 2014:30-31). A reasonable tax is one that produces enough revenue to meet the need for which it is imposed (Nichols 2005:4-5).

2.5. FISCAL INCENTIVE DESIGN

Fiscal incentives are important government tools to promote specific economic goals. Similar to fiscal incentives that can encourage the upscaling of RE by reducing tax liability, governments use disincentives to discourage certain behaviours. Some of the disincentives include carbon taxes, carbon credits, renewable obligation certificates, energy taxes, cap and trade programmes (REN 2023). The various types of fiscal instruments are discussed below.

2.5.1. Tax incentive

Tax incentives are used to attract local or foreign investment capital (Davis Tax Committee 2018). A tax incentive is defined as a preferential treatment of particular taxpayers based on a beneficial specific outcome (UNEP 2018:43). A tax incentive is a provision that allows for an exemption, credit, preferential tax rate, or a delay in tax payment (Blake 2022:35). According to Bergner et al (2017:5) incentives are special tax laws that provide specific actions, investments, contributions or preferential treatment. Tax incentives can also be described in terms of their impact on lowering the overall cost of taxes for a particular project (UNEP 2018:6).

Investment tax incentives are defined as: “Targeted tax provisions that provide favourable deviations from the standard tax treatment in an economy resulting in reduced or postponed tax liability with the objective of promoting investment” (OECD 2022:6). For a tax incentive to be effective, it must be carefully designed. Gaining an understanding of how various countries create incentives is a crucial first step in assessing their effectiveness and efficiency as well as their ability to contribute to sustainable development outcomes (Celani, Dressler & Wermelinger 2022:31). The next section discusses the benefits and drawbacks of tax incentives.

2.5.1.1. Qualities of a tax incentive

Tax incentives should have the following four characteristics in order to achieve and maximise a net benefit: effectiveness, neutrality, efficiency, simplicity, and transparency (Bergner et al 2017:13**;** Blake 2022:35; Celani et al 2022:2). Effectiveness emphasises the need to lessen the negative effects of taxes and increase economic gains. Efficiency emphasizes the importance of the relationship between the benefits of tax incentives and their associated costs. Neutrality refers to a tax break that benefits certain companies at the expense of others, reducing the fairness of the tax system overall by providing advantages to some companies (Bergner et al 2017:13**;** Blake 2022:35; Celani et al 2022:2). Simplicity and transparency relate to the lowering of compliance costs and streamlining of administrative activities which can be achieved most effectively through clear, uncomplicated regulations that are easy for taxpayers and tax administrations to understand and follow (Bergner et al 2017:13; Blake 2022:35).

2.5.1.2. Benefits of tax incentives

The success of a tax incentive schemes rests on how well they are designed, carried out, and monitored (United Nations 2018). Depending on the country context, tax incentives come with varying advantages and drawbacks. A tax incentive scheme can result in low additional investment at a high cost to the government, whilst it may also play a major role in attracting new investments that can considerably accelerate a country's economic objectives (Cox 2016:4). Some policymakers advocate that tax incentives are bad both in theory and in practice (UNEP 2018:3). Since tax incentives affect investors' decision-making, they should theoretically be considered detrimental. Tax incentives are detrimental in practice because they are often inefficient, wasteful, as well as prone to corruption and abuse. There is conflicting empirical evidence regarding the cost-effectiveness of tax incentives in relation to the incremental increase in investment. It is also challenging to determine whether the tax incentives generated the additional investments, even though economists have made significant strides in understanding the relationship between higher tax incentives and increased investment (Zolt 2014). This is partly because it is difficult to link and estimate the marginal investment associated with the tax incentive (Blake 2022:89). An additional factor that influences the effectiveness of tax incentives is the investment climate including investor trust in a revenue authority (UNEP 2018:4-5,8-9). Tax incentives are thus frequently criticised for eroding the tax base without having a significant impact on the amount of investment (UNEP 2018:13).

On the other hand, tax incentives can be an excellent tool for attracting investments that otherwise would not have been possible (European Commission 2017:3). They are effective and adaptable tools for promoting the growth of the RE sector. Unlike grants or cash subsidies, tax incentives do not require the government to make any financial investments. Giving tax benefits is easier than giving grants to investors, even when the costs to governments of doing so may be similar (UNEP 2018:13-14). The following are some advantages of tax incentives for the growth of the RE sector. Tax incentives are adaptable instruments as their implementation can be tailored to meet various objectives. Tax incentives can be applied to all market sectors or to subsections of the sector. They can also be implemented for a specific duration. Tax incentives are a useful supplement to other RE incentive schemes. The cost of investing in RE for both producers and consumers is directly decreased by tax incentives. Lastly, it's widely supported that tax incentives are simple to comprehend and manage (Blake 2022:1; UNEP 2018).

2.5.1.3. Costs of tax incentives

The four main cost categories of a tax incentive regime include revenue costs, resource allocation costs, enforcement and compliance costs. Other factors to consider include corruption and a lack of transparency.

2.5.1.3.1. Revenue costs

The two main sources of the tax revenue losses resulting from tax incentives are lost income from projects that would have been undertaken even in the without tax incentives for the investor, as well as lost revenue for government for businesses that fraudulently claim incentives. When people abuse tax incentive programmes to avoid paying taxes on income or activities that do not qualify, the revenue base is eroded, adding to the additional revenue cost of the incentives (UNEP 2018:15).

2.5.1.3.2. Resource allocation costs

Effective tax incentives will encourage further investment in sectors, areas, or countries where it otherwise would not have occurred. Tax incentives may lead to the allocation of resources in a way that either overinvests in some activities or underinvests for government in other non-tax-favoured sectors (UNEP 2018:17).

2.5.1.3.3. Implementation issues, reporting and monitoring compliance

It is important to keep incentives straightforward. To put best practices into action, it is recommended to make public a list of all investment tax incentives together with an explanation of their purposes and methods of use. Where possible, all tax incentives for investments should be put under the jurisdiction of a single government agency, and it should be ensured that the parliament or a legislative body has approved the incentives. After calculating the lost revenue due to the incentives, a public declaration of tax expenditure should be released (UNEP 2028). A regularly assessment of current incentives to determine whether they are still successful in accomplishing their intended objectives should be performed (UNEP 2018). Greater regional cooperation must be encouraged to determine who stands to gain the most from the incentives (UNEP 2018). Sometimes, incentives that are dependent on continued performance come with requirements, such as the need to export a certain per centage of goods or maintain a certain number of jobs during the tax incentive period. Continuous observation is necessary to reap these rewards (UNEP 2018:28).

2.5.1.3.4. Enforcement and compliance costs

Like any tax policy, the government's enforcement of the tax rules and taxpayers' compliance require resource costs. The expenses incurred in guaranteeing that the qualification requirements are fulfilled and in enforcing any recapture terms upon termination or non-maintenance of the qualification requirements are included in the cost of enforcement. The more complicated the tax incentive structure is, the higher the possible costs of enforcement and compliance (UNEP 2018:16).

2.5.1.3.5. Costs associated with corruption and a lack of transparency

Foreign investment in a nation may be seriously hampered by corruption. In tax incentive schemes where officials have broad discretion to choose which investors or projects receive preferential treatment as well as when there are unclear qualifications standards, there is a higher risk of misuse and high corruption opportunities. If it is shown that a tax incentive was gained illegally, the related privileges should be withdrawn included taxes that were avoided and any other applicable penalties (UNEP 2018:18).

2.5.1.3.6. Estimates of the costs of tax incentives

The cost to the fiscus from lost tax revenue needs to be assessed against the value of the benefits of increased investment. There are challenges with calculating the cost-benefit analysis of tax incentives as studies show that they are not a reliable indicator of efficiency (UNEP 2018:19). One method of doing a cost-benefit analysis is to estimate the cost of each job generated in terms of lost revenue and/or direct financial aid. Even if they are successful in drawing investment, tax benefits may still be more costly than the advantages that the new investment offers (UNEP 2018:19).

2.5.1.3.7. Common abuses of tax incentive regimes

Sustaining conformity with qualifying conditions and detecting instances of tax evasion or avoidance necessitate constant investment monitoring. Examples of tax incentive abuses include companies forming new firms in order to receive incentives, domestic companies restructuring in order to attract foreign investment, and asset overvaluation in order to receive tax credits and claim accelerated depreciation. Additional abuses include integrating related companies into transfer pricing models, and receiving credits for newly created jobs while actually creating fictitious employees (UNEP 2018). The greatest scope for abuse of tax incentives occurs where they are not accurately targeted at the issue that is sought to be addressed. Specifying with precision the type of activity that qualifies for a tax incentive is critical to ensuring its effectiveness (UNEP 2018:28).

2.5.1.4. Tax incentive design considerations

The main elements that should be considered when designing, awarding, and managing tax incentives to encourage investment and growth, are outlined in this section. It also describes further abuses of tax incentives and incentive programmes.

When designing tax policy the starting point is to consider the goals of the tax system (UNEP 2018). An essential step in designing an incentive is to ensure its intent is to achieve higher-level goals (Lantz & Doris 2009; Cox 2016:3), it should: explain the way in which an incentive reduces taxes (OECD 2022:5); consider the availability of public sector resources,

consumer preferences, and a larger financial infrastructure (Cox 2016:4). Also evaluate and consider the communities or populations that could gain the most from specific incentives, for example, incentive programmes may target lower-income communities with limited access to finance (Cox 2016:9). Furthermore consider the exit strategy of the tax incentive for the effectiveness of the RE tax incentive, for example, as the industry matures, tax incentives may be decreased and stopped (Nortje 2009:23); and consider the goals and objectives of the tax system. Lastly, it must be kept in mind that the degree of advancement in a country's RE technologies dictates the particular requirements for which tax incentives should be designed (Cox 2016:9).

Principles like efficiency, simplicity, and fairness dictate how taxes are designed; however, tax incentives are an exception to this rule because they go against the idea of equity, which is that taxes should be applied equally and fairly to all activities regardless of their nature (Cox 2016:3; UNEP 2018; OECD 2022:2). The government's efforts to advance a specific economic objective are typically used to justify tax incentives; if this objective is significant enough, it may offset the unfairness and complexity concerns the incentive raises. To maximize clarity in scope and administration, a checklist of items needs to be taken into account while creating a tax incentive to ensure that the tax incentive's legal wording adheres to the underlying policy (UNEP 2018:37-38**;** Blake 2022:35).

Designs should consider the present laws and initiatives that can prevent incentives from working, e.g. subsidies for fossil fuels and how potential incentives can add value to the market and avoid any market distortions. It should maintain market stability by delivering a long-term policy message, such as five to ten years, as policy signal can be critical to achieve successful financial incentive outcomes (Lantz & Doris 2009; OECD 2022:2). Furthermore, to ensure success it is key for a design to consider the opportunities that may exist for private partnership and/or investment to support incentive success, which communities or populations might benefit most from certain incentives, and how can consumer preferences inform incentive design. It should also consider global effective models and examples of successful financial incentive design and implementation which can be used as a benchmark (Lantz & Doris 2009; Cox 2016:10). Incentive programme implementation thus needs to be well planned, and educating the public on the advantages of RE sources and the specific financial incentives available is important. Positive results are reinforced through education campaigns that raise awareness on the business sectors

awareness on available tax incentive. Furthermore, one may increase participation rates by making sure the processes for participating in the incentive programmes are simple to comprehend (Cox 2016:5-7). It can be beneficial to the incentive programme overall to have a strong plan in place to track output, expenses, market uptake, and other aspects (Nelson & Pierpont 2013).

Tax incentive designs are multifaceted, intricate, and frequently aimed at a particular industry, geographic area, or investment within an economy. More accurate targeting may assist in preventing income loss or improve the efficacy of tax incentives. More accurate targeting, however, frequently leads to intricate designs that obscure incentives from the eyes of the public, legislators, and investors. Designs should consider the eligibility requirements, governance aspects, and instrument-specific design elements (Celani et al 2022:1). The reduction rate when considerations are made to either reduce VAT and/or CIT must be adequately designed. This is of critical importance because a higher reduction rate means a loss of tax revenue, which would have a bearing on an already overburdened tax base and ultimately the fiscus. The same consideration must be made when exempting businesses from VAT or import duties (OECD 2022:4).

2.5.1.4.1. Eligibility, geographical conditions, and eligible persons

The terms under which an economy targets incentives and the extent to which it may do so are described by its eligibility conditions. When designing a tax incentive programme, the considerations should be the kind of investments the policy hopes to draw in as well as who would qualify for the tax incentive. A person's residency or nationality, as well as the location of an entity's creation, may significantly impact their eligibility for a tax incentive (Cox 2016:10; OECD 2022:2).

2.5.1.4.2. Targeting incentives

Numerous nations offer favourable tax treatment to specific economic sectors or categories of activities in order to, for example, target sustainable development goals like job creation. To encourage investment in high-unemployment areas, policymakers could offer tax incentives or link the incentives directly to employment (OECD 2022:2). For example, requiring the creation of a certain number of new jobs as a qualifying requirement. Other economies may also consider sector or geographical conditions when targeting incentives (UNEP 2018:21).

2.5.1.4.3. Timing

When creating and drafting a tax incentive, the age of the firm should be taken into account. For instance, the tax incentive may be intended for newly established businesses; then it is possible that the incentive will only be available to businesses created after a specific date, because in order to promote specific sectors of the economy, tax incentives are typically aimed at promoting new activity (UNEP 2018:28). Another example would be verifying that when a tax incentive is granted to create new employment, the new employment is actually created, and is not merely work that is being shifted from one firm or time period to another. Lastly, one should consider putting strong measures in place to prevent businesses from exploiting the restructuring of current operations to qualify for tax incentives for new businesses (OECD 2022:2).

2.5.1.4.4. The governance of investment tax incentives

This section outlines the laws that create and govern the tax incentive, including the organisations in charge of issuing it. Globally, income tax law and certain investment legislation are the primary sources of incentives (OECD 2013:20); in this regard, tax incentives become more opaque to investors and more difficult to monitor and evaluate when dispersed throughout multiple laws and regulations. In addition, investment tax incentives are granted and managed by several agencies in two-thirds of all economies (Celani et al 2022:5), leading to the recommendation to designate a single government department or organisation to provide and manage the incentives.

2.5.2. Grants, VAT, accelerated depreciation, research and development, and rebates

Financial incentives can take the shape of tax breaks, grants, refunds, loan programmes, guarantees, and credit upgrades, however, they can also be performance-based. Accelerated depreciation, value added tax (VAT) incentives, and property tax, are forms of tax benefits (UNEP 2018:3). To encourage the deployment of REG, tax policies offer tax discounts, credits, and/or the reduction or elimination of certain taxes. In contrast, grants, rebates, and performance-based incentives offer a direct monetary incentive to support RE and do not require payback. Before a technology is implemented, grants may be given for feasibility studies, business development, research, development, and demonstration, or other purposes. Alternatively, grants may be provided after a system is up and running. Grants are monetary assistance that does not have to be repaid, and that is granted by a government for specified purposes to an eligible recipient (Abdmouleh et al 2015:251). Rebates are frequently given after the sale and/or installation of a vehicle and are usually applied to discrete purchases such as appliances. Performance-based incentives are given in accordance with how well an installed technology performs in real time, such as a payment of cents per kilowatt-hour (Cox 2016:2; Celani et al 2022:5; OECD 2022:6). Investment allowances are offered over and above the standard depreciation allowances, and these allow the investor to deduct an amount beyond the investment's purchase price. Investment tax credits are used against the required tax payment, whereas investment allowances reduce taxable income (Dippenaar 2018:5,7; UNEP 2018:3,26).

The concept of tax credits pertains to giving each eligible investor a predetermined amount of tax relief in the form of a tax credit account. Tax credits are a type of tax incentive that directly lowers a taxpayer's tax burden, and this may include the potential exclusion of any corporate income tax that is owed (Cox 2016; Dippenaar 2018:5; UNEP 2018:26). For RE systems installed by businesses, sales or VAT incentives can lower or eliminate sales or VAT taxes. The VAT incentives include VAT exemptions and VAT reductions (Cox 2016; UNEP 2018:23). Early in a RE project's development, accelerated depreciation reduces taxable revenue and postpones tax payments by hastening the depreciation of fixed assets utilized in energy production. Only firms with outstanding taxes are eligible for these benefits, and for this reason, tax incentives usually do not yield any direct financial benefits to the impoverished (Cox 2016:1-2; Dippenaar 2018:5; UNEP 2018:3).

2.5.3. Green bank loans

Guarantees, credit improvements, and loan programmes are frequently created to offer loans with lower interest rates and/or lesser risk for REG borrowers. The provision of a loan loss reserve fund, or other mechanisms that act as an insurance in the case of loan failure, lowers loan interest rates on sponsored traditional revolving loans. Revolving loan funds are successful structured so that net losses to the fund are offset by income from repaid loans, or interest payments, allowing the fund to continue issuing loans after experiencing losses (Abdmouleh et al 2015:251).

Property-assessed loan programmes, which are associated with mortgages, offer financing for small-scale RE installations and initial energy efficiency upgrades on a property, which are subsequently reimbursed by owners of commercial and residential real estate. Credit enhancements, which use a variety of strategies like reserve accounts and interest rate buy-downs, lower the credit risk connected with real estate transactions. Loan guarantees, which give a lender confidence that a loan will be fully or substantially repaid in the case of borrower default, are frequent credit enhancement incentives that support lower loan interest rates (Abdmouleh et al 2015:251). Green banks can reduce the need for continuous public support by offering loans and other incentives through innovative financing techniques and public-private collaborations. Financial incentives for RE can be "bundled" by green banks to support several stages or facets of the technology's deployment. For example, grants can be used to help the development of a business model for RE, while loans can be used to support the installation and startup of the technology (Cox 2016:3; Dippenaar 2018:5). Low-interest loans are usually given by national or regional financial institutions with public subsidy support, and loan guarantees are usually provided with public subsidy support. These incentives reduce the burden of the initial investment by decreasing equipment costs and addressing market barriers (Abdmouleh et al 2015:251).

2.5.4. Corporate income tax incentive

Tax credits or deductions are two possible forms of corporate income tax incentives. Corporate investment tax credits for RE are calculated using the systems' initial cost, whereas production tax credits are based on the actual energy produced (Nortje 2009:10; Cox 2016). As a result, production tax credits may be more advantageous for gradually maximising energy output. However, additional tax benefits might be needed to offset the possibility of substantial upfront expenses. Tax deductions, however, lower a taxpayer's taxable income (Nortje 2009:10; Cox 2016).

Tax credits, tax allowances, reduced tax rates, and tax exemptions are four frequently applied instruments. The most popular tool in developing and emerging economies is the exemption from taxes. Tax exemptions are, however, frequently only valid for a short time. In addition, it is challenging for tax policy makers and scholars to compare the generosity of tax incentives and evaluate their effects across nations due to their highly heterogeneous designs and dependence on the standard tax systems of different economies (Celani et al 2022:9). Lastly, tax incentives are also frequently managed by several agencies and governed by laws other than tax law (Celani et al 2022:6).

2.5.5. Property tax incentives

Property tax incentives are used when RE installations are upgraded on a property. The taxes owing on the property improvements are reduced by these incentives (Cox 2016).

2.5.6. Rebates, grants, and performance-based incentives

To support RE sources, direct financial incentives are offered in the form of subsidies, rebates, and performance-based incentives. Grants are frequently used to support company growth, installation, operation, system demonstration, feasibility studies, as well as research and development (Dippenaar 2018:5). Encouragement of the use of RE can also be achieved through hybrid strategies, such as subsidies and subsidised loans. Rebates are often given after purchase and/or installation and are usually applied to separate purchases; for example, on-site RE installations commonly use rebates. Performance-based incentives

are given based on how well an installed technology performs; an example of this would be a payout of cents per kilowatt-hour (Cox 2016:1-2).

2.5.7. Tax holidays

Tax holidays are the most popular type of tax incentive for investments in developing nations. These tax incentives can be in the form of a lower tax rate, a complete exemption from all taxes (including profits tax and other taxes), or a combination of the two, such as a two-year exemption followed by three more years at half the regular rate. It is important to decide how long the exemption or discount will last (Cox 2016; Dippenaar 2018:5; UNEP 2018:24).

2.5.8. Investment allowances and credits

Investment allowances are offered over and above the standard depreciation allowances, and these allow the investor to deduct an amount beyond the investment's purchase price. In comparison, investment tax credits are used against the required tax payment, whereas investment allowances reduce taxable income (Dippenaar 2018:5; UNEP 2018:26).

2.5.9. Import tariffs or customs duties

Reduced import tariffs or customs duties are another form of tax incentive (UNEP 2018:5).

2.5.10. Carbon taxes and environmental tax incentives

Carbon taxes and tax incentives for the production, consumption, and research and development of RE sources are useful fiscal tools for addressing the issues posed by climate change (Nortje 2009). To balance the overall costs of producing power from fossil fuels or non-fossil sources, environmental taxes are established. By enacting an ideal environmental tax, this tool serves as a market regulator that would promote fair competition across power generation methods. Environmental levies come in different forms; For instance, they could be imposed on the consumption of energy, or the production of heat or power, CO_2, or SO_2 emissions. These taxes have two main effects: they directly boost the energy industry and

alter the production and consumption patterns of the economy. They also have an indirect effect by recycling the taxes to support RE and other environmental projects, and thus levying energy or carbon fees on traditional energy sources in an effort to reduce energy consumption (Abdmouleh et al 2015:251).

2.6. FINANCIAL AND FISCAL POLICY INSTRUMENT MIX

As discussed in section 2.2 the role of financial and fiscal incentives implemented by countries to promote REG differ for developing and developed countries. While tax incentives are favoured in developing countries, developed countries favour specific financial incentives, FITs, and auctions. Previous studies advocate that there is no ‘”one-size-fits-all” approach to climate policy formulation and that a combination of policy tools that include both financial and fiscal reforms are required for the specific country context (UNCTAD 2023).

Table2-1 below summarises the key issues for consideration when designing and selecting financial and fiscal policy instruments to support REG.

Table 2-1: Policy instruments considerations for the upscale of renewable energy generation

	Tax incentives	Feed-in tariffs	NM schemes
Design features	Consider the following: 1. Goals and objectives of the tax system. 2. Tax principles: efficiency, simplicity, transparency, and fairness. 3. Exit strategy of the tax incentive for the effectiveness of the tax incentive; as the industry matures, tax incentives may be decreased and or stopped. 4. Compliance costs. 5. Present laws and initiatives that can prevent incentives from working, e.g. subsidies for fossil fuels. 6. Easy to understand and simple to use. 7. Taxpayer education and awareness of the tax incentives.	1. Key element for FIT is the rate. • If the rate is too low, the financial incentives will not induce project developers to invest. • If the rate is too high, consumers will have to bear an unnecessary cost. 2. Duration of the FIT programme. 3. Long-term agreements are essential and provide certainty. 4. Ability to adjust to modifications during the FIT contract. 5. Modifications are key so that if there are developments which require any changes or updates then these can	1. Whether it is the main retail rate or the cost avoidance rate. 2. The retail rate must be adequate to cover the costs of energy generation. 3. The rate must not be excessive because an excessive rate results in a burden to the fiscus. 4. Guaranteed grid access. 5. An aggregate capacity limit. 6. The carry over period for the credit i.e. does the carry over gets limited to a year or more. 7. Taxpayer education and awareness of the tax incentives. 8. Taxpayer education and awareness of the NM.

	Tax incentives	Feed-in tariffs	NM schemes
		be timeously incorporated. 6. Guaranteed grid access. 7. Easy to understand and simple to use. 8. Low administrative and regulatory costs. 9. Transparency and uniformity in policy. 10. Consider taxpayer education and awareness of the FIT	

Source: Author's compilation.

2.7. CONCLUSION

The energy trilemma, which is the need for energy that is sustainable, affordable, and secure, lies in businesses and households adopting low carbon technologies. As RETs are generally more costly and less efficient than their high carbon counterparts, the financial investment barrier inhibits their adoption. For the business sector to afford the RE transition, effective and credible financial and fiscal incentives have to be designed and implemented. It is important to establish the goals of the incentive programme and design the programme in a way that best achieves those goals.

Renewable Energy deployment across a range of technology types is encouraged by differentiating the FIT levels based on REG costs and technologies. Price security and lower administrative costs as well as ensuring grid availability and legislation that binds the power grid companies to purchase the power generated by RE producers are critical design facets. With FITs, the producer benefits from the government setting the price of electricity (Zhao et al 2016). A FIT is favoured in the business sector as the contract duration is guaranteed with fixed tariffs that provides certainty and stability leading to the upscaling of RE.

For NM, the rate, i.e., whether it is the main retail rate, or the cost avoidance rate applied; as well as how long a customer's monthly excess generation may be "carried-over" to subsequent billing cycles and utilised to offset electricity consumption; are critical determinants.

Effectiveness, simplicity and transparency, neutrality, and efficiency were identified as key qualities in the design of tax incentives.

Chapter 3 follows with a review of South Africa’s RE incentive schemes.

CHAPTER 3

SOUTH AFRICAN INCENTIVES FOR RENEWABLE ENERGY GENERATION

3.1. INTRODUCTION

Accelerating the shift to zero GHG emissions is necessary to reduce the risks associated with climate change. It is predicted that expanding the use of energy to renewable sources will play a significant role in support of this mandate (Pueyo, Bawakyillenuo & Osiolo, 2016:7). The transition to RE is viewed as both addressing climate change while also offering a necessary supply of energy and addressing concerns about energy security (Müller, Claar, Neumann *&* Elsner 2020; Mankata et al 2021). Economies may reduce GHG emissions using a range of policy instruments, including incentives (Dippenaar 2018:2); and according to the OECD (2022) twenty five per cent of developing and emerging countries use incentives to promote investments in the generation of power from RE sources. Rapid population expansion and economic development in many developing nations have increased the need for energy (Yang & Park 2020:1). Similarly, South Africa is no different from other developing countries regarding the need for energy (Banerjee et al 2017) and is notoriously, the greatest CO_2 emitter in Africa (New Development Bank 2023:5).

An economy that avoids adverse effects on the environment while enhancing societal well-being through employment and economic expansion is commonly referred to as a "green economy" (Gasparatos, Doll, Esteban, Ahmed & Olang 2017:161; Georgeson, Maslin, Poessinouw 2017:2; Purwandani & Michaud 2021). Most countries provide tax incentives to promote investment in particular industries to stimulate the green economy (Haas et al 2011; Cox 2016:1; Chen et al 2018:1; UNCTAD 2018:1; Mashayekhi & Kazemi 2019:1252; Qadir et al 2021:3598). The provision of green energy incentives is necessary to address the high costs associated with investment in RE (Dippenaar 2018:3; Purwandani & Michaud 2021:578). Investment in RE is critical to assist with energy security which is essential for socio-economic growth of every country (Pathak & Shah 2019:506).

This chapter is laid out as follows. Section 3.1 introduces the chapter whilst section 3.2 details South Africa's energy mix. Section 3.3. defines South Africa's REG landscape. Section 3.4 presents South Africa's financial regulatory policy instruments with Section 3.5 further expanding on South Africa's fiscal policy instruments for REG. Section 3.6 details the challenges of South African businesses RE transition. Section 3.7 evaluates the limitations of financial and fiscal reforms for REG. Section 3.8 presents the conclusion to the chapter detailing the current energy status and the challenges of the available financial and fiscal instruments in South Africa.

3.2. SOUTH AFRICA'S ENERGY MIX

This section sets out the current energy status in South Africa. Developing nations such as South Africa are expected to have a higher demand for energy (Yang & Park 2020:1) because economic growth and poverty alleviation generally remain dependent on increased energy supply (Owusu-Manu et al 2021:320). Many developing countries, including South Africa, have experienced rapid economic development and population growth, leading to rising demand for energy (Pathak & Shah 2019:506). The pressure of energy demand is further exacerbated by the growing number of informal settlements (Falchetta, Michoud, Hatner & Rotner 2022:1). In South Africa, coal accounts for 91% of the electricity produced. Notably burning coal mostly produces CO_2 emissions, the primary GHG connected to climate change (ASSAf 2023).

3.3. SOUTH AFRICA'S RENEWABLE ENERGY GENERATION LANDSCAPE

This section discusses the current RE landscape, and promulgations made by the government regarding RE adoption. Farjana et al (2019:1200) suggests that the merging of RE sources in mining operations could reduce global warming potential and help achieve the 2050 sustainability targets. Shafiee, Alghamdi, Sansom, Hart, and Encinas-Oropesa (2020:1) further support the proposition of increased energy production from renewable sources such as wind, waves, sunlight, geothermal, hydro, and biomass in an effort to reduce societal dependence on energy generation from fossil fuels (Shafiee et al 2020:1). Shafiee et al (2020:1) identified solar as the fastest growing RE source and stated that the International Energy Agency (IEA 2023) estimates solar to supply 22% of the world's

electricity by 2050. South Africa increased solar energy generation by 400 MW of utility-scale PV in 2020, being the most substantial capacity added since 2017 (IEA 2023). Oyewo, Aghahosseini, Ram, Lohrmann and Breyer (2019:563) found that for South Africa, the best option, with the least cost while supporting economic expansion, is to upscale REG to 100% by 2050. Chaumontet et al (2022) add that transitioning to REG can contribute towards the development of a green economy and highlight the importance of managing outcomes against the Just Transition objectives (ASSAf 2023:5; Pierce & Le Roux 2023:2).

Apart from hydropower, modern RE solar, wind, geothermal, and modern bioenergy still contributes only marginally to Africa's energy mix, despite their vast potential. Africa accounts for only 3% of the world's installed renewables-based electricity generation capacity despite having large resource potential (IRENA 2022:64, 2023:1). The abundant sunshine in South Africa ought to be used to provide energy, as approximately 2 500 hours of direct sunlight are received in South Africa annually. Numerous wind farms generate wind energy, including at Jeffreys Bay (138 MW), Kouga (27 MW), and Metrowin Van Stadens (27 MW) South Africa 2023). With an estimated 2500 MW of power capacity, South Africa also has a higher potential for producing biogas (Elavarasan, Shafiullah, Padmanaban, Kumar, Annam, Vetrichelvan, Mihet-Popa & Holm-Nielsen 2020:74435). With an ambitious target of 21.5 GW of RE capacity by 2030, the South African government seeks to gradually reduce coal usage and adopt a variety of RE sources (ASSAf 2023:5; Pierce & Le Roux 2023:2).

The National Energy Regulator of South Africa (NERSA) and the Department of Mineral Resources and Energy established an Integrated Resource Plan that stipulates the needs for additional power capacity as well as need to limit GHG emissions (South Africa 2023:5). To support these objectives the Renewable Energy Independent Power Producer Procurement Programme was introduced as a competitive tender process, which aimed to incentivise private sector investment in grid-connected REG in South Africa (South Africa 2023:7). There was intense competition, with 390 entries; of these, 102 projects, or less than 25 per cent, were chosen for 6.3 GW, or R193 billion (South Africa 2023:7). This resulted in a need for other ways of supporting businesses to invest in RE. A total of 75 per cent of independent producers were not successful - providing the impetus to identify financial and fiscal instruments reforms to support the upscale of RE (Foster-Pedley & Hertzog 2006:57; Sen & Ganguly 2017:1175; South Africa 2023:7). Tax laws are used to

incentivise investment in climate-related projects in South Africa. According to Catalano, Forni, and Pezzolla (2020:5), tax incentives and other instruments are meant to promote private investment for mitigating climate change by encouraging RE adoption. To encourage the generation of RE and environmental restoration allowances, the following tax incentives were developed. This study focuses specifically on the REG financial and fiscal instruments to upscale RE access for businesses. Fiscal reforms include tax incentives such as capital subsidies, grants, and rebates, investment and production tax credits, energy production payments, sales tax, energy tax, CO_2 tax, VAT, and other tax reductions (REN 2023:4). Tax holidays, grants, credits, accelerated depreciation, and non-tax incentives are examples of tax incentives for RE (REN 2023:4). Governments can also contribute to the reduction of carbon emissions by enacting indirect taxes including energy taxes, excise taxes, and VAT, as well as carbon taxes and prices, cap and trade systems, and other levies (REN 2023:4). In addition, Section 12B of the Income Tax Act (58 of 1962) (hereafter referred to as the Income Tax Act) included an accelerated depreciation allowance for investments in biodiesel and biofuels (South Africa 2023).

In accordance with its Integrated Resource Plan, the South African government is thus launching and expanding the RE sector to diversify the nation's energy sources and secure the supply of electricity, enabling the development of new sectors, the creation of jobs, and localisation along the value chain, while lowering CO_2 emissions (Eberhard, Leigland & Kolker 2014; WIPO 2023). Currently, solar PV, wind, and concentrated solar power (CSP) plus storage make up South Africa's RE mix, with solar and wind being the main contributors of RE. Numerous financial and tax incentives have been made available to promote the adoption of RE as discussed above.

3.4. FINANCIAL REGULATORY POLICY INSTRUMENTS FOR RENEWABLE ENERGY GENERATION

Financial regulatory policy instruments comprise RE production incentives. Two instruments are widely used, namely, FIT and NM, as discussed below.

3.4.1. Feed-in tariffs

The FITs were first introduced in 2009 by NERSA. Unlike traditional consumer tariffs, FITs guarantee the price of electricity supply. The creation of a tariff, or a price that covers the cost of generation plus a reasonable profit to encourage developers to invest, is the fundamental economic idea underlying a FIT (NERSA 2009:1; Odeku, Meyer, Mireku & Letsoalo 2011:45; Pegels 2014; Azimoh et al 2017:1). The goal of the FIT was to give South Africa a chance to step up the country's deployment of RE and support the industry's continued expansion domestically, regionally, and globally (NERSA 2009:4). A sector-specific FIT programme with annual tariff reductions and fixed prices for 15 years was established by NERSA. Tariffs were increased and the guaranteed period was extended from 15 to 20 years after public meetings during which prospective investors voiced their displeasure with the incentives offered. However, despite these two changes being made, the FIT programme was never implemented (Pegels 2014). Critics attributed the programme's failure to policy ambiguity created by tariff rate volatility, bureaucratic hold-ups, and inconsistent statements and assertions from various government departments (United Nations 2023:12). South Africa attempted to achieve this goal with FITs, but was unsuccessful as FITs did not adhere to the country's public procurement regulations (Azimoh et al 2017:1).

3.4.2. Net metering

Another financial regulatory tool being considered for upscaling REG, is NM. An essential component of NM's success is its export tariff, which in the case of South Africa is authorised by NERSA (SARS 2023:3). The business will be credited for the excess energy that is exported to the grid using this tariff. Because of its larger capacity, the grid serves as a virtual battery for storing extra energy (SARS 2023:2). The tariffs ought to be designed to be cost-reflective and non-discriminatory. Currently, NM is permitted if it complies with NERSA regulations and obtains the necessary licences or registrations (SARS 2023:3). The export tariff should be high enough to encourage timely electricity output while remaining low enough to not add to the total cost of electricity. An important factor to consider includes equitable distribution of grid usage charges via appropriately designed demand and consumption tariffs. Preferably, a standard time-of-use tariff that is in line with the purchase structure and energy charges, should be used to pay the prosumer (SARS 2023:2), and the applicable use-of-system fees for the prosumer's usage of the grid in connection with

consumption must be paid. Grid-tied compliance, universal applicability to all generation, and clear tariffs are important requirements for NM (SARS 2023:3). Some advantages of NM include cost savings, a smaller carbon footprint, and a return on investment for solar energy consumers, access to a virtual storage, as well as creating a cleaner environment (SARS 2023).

3.5. FISCAL POLICY INSTRUMENTS FOR RENEWABLE ENERGY GENERATION

Environmental taxes, market mechanisms, tax incentives, and other direct regulatory measures are examples of economic tools that can be used to boost the production of RE (Haas, Panzer, Resch, Ragwitz, Reece, & Held 2011; Cox 2016:1; Chen et al 2018:1; Dippenaar 2018:2,4; UNCTAD 2018:1; Mashayekhi & Kazemi 2019:1252; Institute 2020; Wang 2022). Government subsidies, grants, tax vacations, accelerated depreciation allowances, and other non-tax incentives are the main stimulus behind the increased expansion of the worldwide RE market. Governments also utilize many forms of disincentives, including trade schemes, energy taxes, renewable obligation certificates, feed-in tariffs, and carbon taxes and credits, to encourage the development of RE sources (Foster-Pedley & Hertzog 2006:57; REN 2023; Cox 2016:1; Dippenaar 2018:6; Qadir et al 2021:3590; Blake 2022:1; UNCTAD 2023:1). Globally, tax incentives are the most common fiscal instrument used for the transition to RE (Qadir et al 2021:3590; UNCTAD 2023). However, there are various opinions about their effectiveness in addressing environmental challenges and altering consumer behaviour (Dippenaar 2018:4; UNCTAD 2023).

3.5.1. Production incentives

Within the fiscal policy framework, the production tax incentives contained in section 12B and section 12BA of the Income Tax Act are discussed below.

3.5.1.1. Section 12B

Section 12B of the Income Tax Act was promulgated on 1 January 2013 providing a tax incentive allowance for costs incurred from investing in RE assets. This section allows the taxpayer to claim an accelerated capital allowance on new and unused machinery, plant implements, utensils, or articles that were used for the first time in the production of electricity from renewable sources such as wind, solar, gravitational water forces, and biomass. In the first year, the allowance is computed as 50% of the cost and construction of the assets for the taxpayer, 30% in the second year, and 20% in the third year. All upgrades (other than repairs) and supporting structures that would be part of the machinery, plant, implement, utensil, or product are likewise covered by the allowance (REN 2023:46). A change to Section 12B of the Income Tax Act took effect on January 1, 2016, allowing for a 100 per cent deduction in the first year for self-consumption power generated by embedded solar photovoltaics with a maximum generation capacity of 1000 kilowatts.

3.5.1.2. Section 12BA

Section 12BA offers accelerated capital allowance. To accelerate private investment and help address the energy crisis, the tax incentive for promoting RE has been temporarily increased. Investments in RE projects that are put into operation for the first time on or after March 1, 2023, but before March 1, 2025, are eligible for this additional incentive, under section 12BA.

- Under section 12BA, a 125 per cent tax deduction in the first year for qualifying capital expenditure in relation to any RE project is available to taxpayers' conducting companies under the enhanced RE tax incentive. There is no cap on generation capacity during the two-year window period.
- The qualifying cost of these investments will have no limit implying that companies who spend money on renewable projects will be eligible for a cost-plus 25 per cent allowance in the year that the cost was incurred (South Africa 2023:17).

During the 2019 State of the Nation address, President Cyril Ramaphosa clarified that Eskom will create guidelines and a pricing structure for a fiscal instrument known as FIT (National Treasury. This was introduced to encourage a higher adoption rate of rooftop solar (South Africa 2019). Furthermore, it was highlighted that photovoltaic solar energy projects

are supported due to their limited water supply and minimal environmental impact (South Africa 2023). However, regardless of government efforts to roll out incentives, businesses are still experiencing numerous challenges in adopting RE; as a study by Dippenaar (2018) revealed that not all businesses have claimed the incentives or plan to do so in the future, despite the fact that some of them have RE and/or R&D related to RE projects.

3.5.2. Research and development allowance

The R&D allowance is contained in section 11D of the income tax act and is a general allowance available to all research and development activities and is not a specific to REG.

3.5.2.1. Section 11D

Aside from the standard deduction of 100%, this provision Section 11D allows for an additional 50% deduction for all expenditures related to qualifying R&D operations. Only R&D approved by the Department of Science and Technology will receive the additional 50%. The green and energy-saving sectors have been recognised as a new area of concentration for R&D (REN 2023:46).

3.5.3. Environmental incentives

In 2007, Section 37B of the Income Tax Act was enacted to encourage firms to purchase new and unused environmental treatment, recycling, and waste disposal assets. An allowance of 40% of the asset's cost in the first year and 20% each year for the next three years applies to an environmental treatment and recycling asset. Waste disposal assets can be written down in a straight line over 20 years at a rate of 5% per year (REN 2023:46-47).

3.5.4. Available tax incentives

South Africa uses accelerated depreciation as one of its tax incentives (Celani et al 2022:16). The CIT rates set below the regular rate are known as reduced rates. Reduced tax rates and tax exemptions may be applicable temporarily or permanently. Tax deductions may be used to reduce capital or current expenses such as operating costs. Tax allowances

have the potential to expedite the write-off of capital expenditure value from taxable income, up to 100% of incurred expenses also known as acceleration, or they may exceed 100% of acquisition cost (Celani et al 2022:16). For instance, enabling businesses to write off 150 per cent of the cost of a new machine could fall under this category (Celani et al 2022:16).

In response to South Africa's continued energy limitations, the government revised the Electricity Regulation Act 4 of 2006 to allow the development of embedded generating projects of up to 100 MW, without the need for a generation licence. The capital allowances provided by the Income Tax Act 58 of 1962 increase the likelihood that RE projects will be included in the energy solution (South Africa 2021:1). The following tax breaks are provided to assist in meeting the energy limits: Section 12B of the Income Tax Act, which permits capital expenditure deductions for assets used in the production of RE, specifically encourages the development of smaller solar PV energy projects by offering an expedited capital allowance of 100 per cent in the first year for solar PV energy of less than 1 MW; roads and fencing utilized in the production of electricity are eligible for capital allowances under Section 12U of the Income Tax Act; Section 12B provides for a three-year income tax deduction of 50 per cent, 30 per cent, and 20 per cent for year one, two, and three, respectively, for new and unused machinery or plant and any upgrades to the qualifying equipment or machinery that qualify for the benefit (South Africa 2021:1). A new solar power system's cost can be written off as a depreciation expenditure, lowering the income tax burden, provided that the system is used for photovoltaic solar energy that is less than one megawatt and qualifies for a 100 per cent income tax deduction in the first year of usage. As a deferred tax asset, the reduction may be carried over to the following fiscal year.

Table 3-1: Available renewable energy tax incentives and financial incentives

Tax incentives	Section
Accelerated depreciation allowance – valid 1 March 2023 - 1 March 2025	12BA
Accelerated depreciation allowance	12B(1)(h)
Research and development of technologies	
Tax credits	12D
Depreciation allowance for R&D buildings	13(1)(b)
Research and development allowance	11D; 11A (Not specific to RE)
Financial instruments	
Feed-in tariff	Still at early stages in some municipalities
NM	Still a draft

Source: Author's compilation.

3.5.1. Certified carbon emissions reduction exemption

Section 12K of the Income Tax Act came into effect on 11 February 2009; providing for a tax exemption on any amount accrued in respect of the disposal of any certified emission reduction (CER) credit derived in the furtherance of a qualifying clean development mechanism. To stimulate the uptake of Clean Development Mechanism projects in South Africa, the exemption from income tax of income from primary certified emission reductions from 2009 to 2012, was extended to 31 December 2020, in line with the adoption of the second commitment period of the Kyoto Protocol (South Africa 2004:37, 2019:37). The VAT Act does not provide for exemption from VAT on the disposal of a CER credit. It is arguable that the disposal of CER credits should be viewed as a supply of services for VAT purposes and that, on exportation of CER credits, this service is zero-rated for VAT purposes (REN 2023:46). The aim is to incentivise investments in eligible low carbon initiatives including RE and energy efficiency projects in South Africa by partially offsetting the high project registration, monitoring and credit verification costs incurred by project developers (Dunkley 2020:34). Section 12K was repealed in 2019 due to the benefit of being embedded in the Carbon Tax Act (15 of 2019) (hereafter referred to as the Carbon Tax Act), that allows for CO_2 offset allowances up to a maximum of 10% of the total GHGs.

3.5.2. Carbon Tax

On June 1, 2019, the Carbon Tax Act came into effect as part of South Africa's climate change mitigation policy, with the goal of lowering GHG emissions in a sustainable, cost-

effective, and affordable manner (REN 2023:46). The carbon tax rate was set at ZAR 120 per tonne of CO_2, the equivalent of a taxpayer's GHG emissions. The Carbon tax (CBT) is assessed, collected, and enforced as an environmental levy under the Customs and Excise Act of 1964, as amended by the Carbon Tax Act. The CBT is levied on entities in the country that operate emissions-generating facilities with a total installed capacity equal to or more than the carbon tax threshold. The CBT applies to the CO_2 equivalent of GHG emissions as defined in the Carbon Tax Act of 2019. The emissions subject to CBT are calculated using either the Department of Environment, Forestry and Fisheries' approved reporting technique or the Carbon Tax Act, 2019's required formulas (Dunkley 2020:35; SARS 2022).

3.5.3. Energy transmission lines or cables allowance

The allowance for energy transmission lines or cables are contained in section 12D of the Income Tax Act and is a general allowance available to all energy transmission lines or cables and is not a specific to REG.

3.5.3.1. Section 12D

Section 12D allows for a deduction of five per cent per year for the cost of energy transmission lines or cables.

3.5.4. Energy efficiency incentives

The allowance for investment and training allowances are contained in section 12I of the Income Tax Act and is a general allowance available to all investment and training allowances and not specific to REG.

3.5.4.1. Section 12I

Section 12I, which allows for increased investment and training allowances, was enacted to assist the National Industrial Policy Framework's major objectives of diversifying South Africa's industrial output, fostering a knowledge-based economy, and nurturing labour-intensive businesses. These incentives are intended to support manufacturing-related

projects. Section 12I applies to machinery and equipment that includes components that are creative, energy efficient, and create jobs (South Africa 2023).

3.5.5. Energy efficiency savings allowance

The allowance for validated energy savings is contained in section 12L of the Income Tax Act and is a general allowance available to all validated energy savings and not specific to REG.

3.5.5.1. Section 12L

According to the Income Tax Act, Section 12L is an allowance offered to any commercial enterprise or trading body that can demonstrate measurable and validated energy savings over a 12-month period. Section 12L of the Income Tax Act came into effect in November 2013, stipulating a rate of 45 cents per kWh (REN 2023:46; SANEDI 2019:16). This rate was later increased to 95 cents per kWh starting in March 2015 for confirmed energy savings over a 12-month period. Since its promulgation it has assisted in the promotion of ZAR three billion in energy efficiency investments in energy-intensive industries such as mining (SANEDI 2020:54). Although initially intended to be phased out in 2020 to offset the potential negative effects of the carbon price, Section 12L was extended to the year of assessments ending January 1, 2026 (SANEDI 2020:14) in order to correspond with Phase 1 of the Carbon Tax, set to begin June 1, 2019.

3.6. CHALLENGES WITH RENEWABLE ENERGY TRANSITION

South Africa has various challenges. First, investing in renewable energy transition is expensive because of the high initial capital expenses associated with many RE sources (South African Department of Minerals and Energy 2003:27; Dippenaar 2018:3; Purwandani & Michaud 2021:578); switching from fossil fuels to renewable energy sources could severely impact South Africa's economy, which is heavily dependent on the country's coal production, processing, export, and consumption (South Africa 2004); and the demand for coal may decline in developed nations if they take strong measures to battle climate change, which would hurt South Africa's coal export revenue (South Africa 2004). Second, South

Africa has not sufficiently developed its RE technologies. The capital-intensive infrastructure needed to connect the hundreds of millions of businesses without grid energy presents serious financial challenges for governments in low-income nations such as South Africa (Falchetta et al 2022:1). The above challenges are experienced by most businesses.

Government’s resistance to shift to RE is strong, as seen by the government's reliance on traditional energy technology. These issues have hindered the state's efforts to pursue a more successful transition to RE sources by opposing market-oriented transition policies (Müller et al 2020:6). For example, even with the recent success of RE initiatives, Eskom's repeated unwillingness to provide grid access to independent power producers in recent RE transition projects, impeded their individual take-off, delaying the shift towards a more RE mix (Müller et al 2020:6).

While several studies emphasise the need to support the adoption of RE, few address the financial issue, which continues to be the main obstacle. The underlying causes that limit funding for RE projects are still mostly unknown, therefore, the goal of Mankata et al (2021) is to determine the financing options available for the transition to RE sources as well as obstacles to the provision of financial liquidity required to spur investment in RE (Mankata et al 2021:320).

Dippenaar (2018) states that the current tax incentives for RE give rise to the following problems: the majority of South African companies who participated in the study said they didn't know how to apply for the appropriate tax incentives; and didn't think the incentives’ efforts to effect a change in behaviour were convincing enough to persuade businesses to switch to more ecologically friendly behaviours. Most businesses found it challenging to submit a claim and to meet the requirements or conditions for tax incentives (Dippenaar 2018:7). A further challenge is the high cost of compliance as fulfilling the prerequisites for several tax incentives is regarded as being unduly challenging, costly, and onerous (Dippenaar 2018:7; South Africa, 2022:2), even though companies that engage in RE projects are eligible for a section 12B incentive that can return up to 125 per cent of their capital. Furthermore, although South Africa provides a tax credit for rooftop solar for enterprises, a challenge facing the programme is Eskom's proposal to alter the tariff structure of the rooftop solar tax incentive, with an increase in the capacity charge being a major part of the revisions (BusinessTech 2023). This is contrary to the intention of the

National Treasury as the higher capacity tax will discourage investment in RE. The energy regulator NERSA and its new fee structure determination method is another challenge (BusinessTech 2023). For example, RE consumers that use RE sources all day and connect to the grid at the nighttime peak, are charged more if they decide not to take part in the nightly basic load. Thus, because the rooftop solar policy promotes continuous consumption, it might not offer enough tax benefits to persuade customers to increase their solar usage. A further challenge is the absence of tax incentives for battery storage, which makes it necessary to encourage businesses to store excess energy produced during the day for distribution. Linked to this is the government's tardiness in deciding on FITs and NM, whereby private power producers would be permitted to feed in excess energy through input-in tariffs (BusinessTech 2023).

There are differing views and conflicting data regarding the usage and efficacy of tax incentives, which remain common and have a substantial impact on the tax policy of both developed and developing nations (Calitz, Wallace & Burrows 2013:2). Some scholars contend that tax incentives are helpful but only when combined with other tools (Nortje 2009:29). On the other hand, tax incentives, according to some, are known to skew investment decisions and are frequently abused or corrupted (Easson & Zolt 2002). Despite this, global development programmes are probably going to continue to include tax incentives (Calitz et al 2013:2; Dippenaar 2018:4). Nteo (2012) asserts that a variety of nation-specific factors need to be taken into account and that governments should set up a combination of tools suitable for their own situation (Dippenaar 2018:4). It's uncertain whether the tax incentives now available in South Africa are effective in changing energy-related behaviour or if they are adequate to persuade businesses to invest in RE sources (Dippenaar 2018:2). Empirical research studies show conflicting views on the cost-effectiveness of tax incentives, however, despite these differing views regarding the application and efficacy of tax incentives, they continue to be a crucial component of national tax laws and are anticipated to be employed internationally (Dippenaar 2018:6).

3.7. LIMITATIONS OF RENEWABLE ENERGY GENERATION INCENTIVES

Supporting REG in South Africa requires a mix of financial and fiscal reforms. In order to analyse the range of policy instruments available for businesses in South Africa, table 3.2

below tabulates the challenges of NM, FIT, and tax incentives to upscale the business sector's REG.

Table 3-2: Challenges of financial and fiscal instruments in South Africa

Financial and fiscal instrument	Challenges
FIT	• Short time frames identified with the old FIT introduced in 2009. • Policy ambiguity created by tariff rate volatility. • Bureaucratic hold-ups. • Inconsistent statements and assertions from various government departments.
NM	• Only a draft of NM is available, however, not meeting the standards of an effective NM policy as outlined in 2.3.3.1. • The draft does not mention capping of the largest net-metered generator that can be used, nor whether the size of a generator for a home and business setting would vary. • The draft does not consider setting an aggregate capacity limit, which restricts the total amount of net-metered generation that can be installed. • The draft falls short on details such as what must be contained in the customised contracts for NM clients such as including the tariff details, an assurance that exported energy would be purchased under regular operating circumstances, and customer and utility responsibilities on legal, technical, safety, and financial matters.
Tax incentives	• Tax incentives are complex and onerous.
General	• Poor and inadequate education of the financial and fiscal incentives. • Instruments are complicated and difficult to comply with. • High cost of compliance. • Not easy to claim. • Multiple government agencies dealing with incentives and also between government departments are inconsistent. • Businesses do not know how to apply to access the incentives.

Source: Authors own compilation.

3.8. CONCLUSION

Renewable Energy access can combat climate threats and recent studies show that it can reduce the cost of energy in local economies and is a major cause of job creation. This is relevant in the South African context with high unemployment as the operation and maintenance of RET can provide a range of job opportunities. It is evident that RE is a cost-effective solution that can help the environment and stimulate economic growth, but this requires supportive policy measures to stimulate investment.

A draft NM policy was issued in 2023 with the intention of upscaling REG; with NM as an alternative to FIT. The majority of businesses are unaware of the tax incentives and the cost of compliance is high. Fulfilling the prerequisites for several tax incentives is regarded as being unduly challenging, costly, and onerous (Foster-Pedley & Hertzog 2006:60;

Dippenaar 2018:7; South Africa 2022:2). Therefore, companies that are eligible for the current tax incentives do not take advantage of them. While tax incentives influence decisions, a number of other non-tax considerations influence South African businesses: despite companies needing to be convinced to alter their environmental practices, more businesses may decide to upscale REG if South Africa's financial and fiscal instruments are improved, and the application procedure is streamlined (Dippenaar 2018:10).

Chapter 4 follows with a discussion of the selection criteria for comparative countries.

CHAPTER 4

SELECTION OF COMPARATIVE JURISDICTIONS

4.1. INTRODUCTION

Several countries have effectively enacted policies to encourage the use of RET, lowering their carbon footprint (REN21 2023). The purpose of this chapter is to discuss how the use of comparative methods can aid in solving similar global issues. Countries with different tax laws, policies, and legal structures can provide policy lessons to benchmark how these policies function. This chapter further explains how comparative tax law methods can be used to solve the shortcomings in South Africa's green tax incentives identified in Chapter 3.7.

This chapter is laid out as follows. Sections 4.2 and 4.3 details the rationale used to select countries for the comparative RE incentive analysis, section 4.4 reviews RE incentives in China, Germany, Denmark, and India, and section 4.5 concludes the chapter, detailing the lessons for the future advancement of South Africa's RE incentives. The lessons learnt in chapter 4 are used in chapter 5.

4.2. COMPARATIVE TAX RESEARCH

There are two types of tax research: doctrinal and non-doctrinal. The primary function of doctrinal research is to analyse and synthesise laws, judicial rulings, and commentary (McKerchar 2008:19). Non-doctrinal research employs legislation research using techniques from different disciplines, including economics, accountancy, politics, and social sciences (McKerchar 2008:19). This non-doctrinal research study uses a comparative qualitative approach to examine RE incentives. A qualitative methodology is employed in the study as it "uses words or descriptions to record aspects of the world" rather than "precise measurements" (Bless, Higson-Smith & Sithole 2013). A comparative analysis is performed of jurisdictions that have used financial and fiscal incentives to upscale REG.

The purpose of comparative taxation is to find similarities and variations between domestic tax systems as well as viable solutions to shared issues (Garbarino 2009:4). It is based on the operations of tax laws of various nations (Garbarino 2009:4) and can have substantial benefits to the development and advancement of legislation in other jurisdictions. Comparative tax law can derive benefits from broadly applicable legal principles, offer resources for deepening one's understanding of tax law, and aid in the identification of model solutions (Buijze 2016:193). Comparing several jurisdictions helps identify potential solutions to a problem. The complexity and rapid change in the character of tax law, along with the diversity of local tax conceptions, present difficulties for researchers studying comparative tax law across different jurisdictions (Garbarino 2009:4) Buijze 2016:190). Furthermore, the ongoing political pressure and shifting governmental stances complicate comparative studies on tax law (Garbarino 2009:5; Buijze 2016:190,192). These limitations can be further addressed by using ideal types (Buijze 2016:190), one of three approaches of comparative tax studies discussed below in section 4.2.1.

4.2.1. Methods of conducting comparatives tax research

There are the three types of approaches to comparative taxes: ideal type, functional approach, and tax families' approach, as discussed below (Garbarino 2009:5; Buijze 2016:190,192).

4.2.1.1. Ideal types

Buijze (2016:189) suggests classifying jurisdictions into a small number of "ideal types" to address the difficulties and complexity and rapid change in character of tax law. The process of classifying jurisdictions into a restricted set of categories is what ideal types involve. This procedure creates groupings of jurisdictions by methodically analysing the various legal levels. Common features are seen among the jurisdictions in a particular category (Buijze 2016:189). Tax jurisdictions can be compared with ideal types without having to worry about the comparison becoming outdated. One advantage of using ideal types is that the comparison's findings can be applied to any jurisdiction that fits the ideal model. This methodology offers the benefit of enabling a methodical analysis of tax jurisdictions within the context of international law, yielding long-lasting results, and making it easier to apply

the conclusions to other countries (Buijze 2016:189). Ideal types permit extrapolation of the findings to other nations (Buijze 2016:193). A drawback of ideal types is the language barrier as it entails legal comparison (Buijze 2016:195).

4.2.1.2. Functional approach

The functional approach compares the purposes of national tax laws and groups domestic mechanisms into homogeneous “clusters” based on shared purposes. Since the functional approach forms the core of comparative research, it is also known as a comparative research paradigm and is commonly used in comparative law (Garbarino 2009:4; Buijze 2016:193). The functional approach is also adopted in comparative tax law and assumes that the basic function of legislation in each country can be compared. This is due to its ability to compare different tax laws addressing the same tax problems (Garbarino 2009:7; Avi-Yonah & Sartori 2011:4; Ash & Marian 2019; Buijze 2016:195-196). To ensure comparability across all jurisdictions, a functional approach allows for the removal of features that are unique to a given jurisdiction and would impede comparison, for example cultural interpretations (Buijze 2016:195-196). The functional approach begins with a particular issue and proceeds to analyse the mechanisms employed in the countries under investigation to address it. In comparative research, a functionalist should define the issue and contrast the ways in which it is addressed in other jurisdictions (Garbarino 2009:5; Avi-Yonah & Sartori 2011:2,4). A functional analysis also provides insight into how tax laws in different jurisdictions handle tax-related issues; sets of tax rules can be defined as “tax mechanisms” or “tax models” aimed at solving specific “tax problems” (Ash & Marian 2019). When faced with a tax problem, policymakers must decide on a specific course of action. This is why a "tax problem" is a tax matter that needs to be addressed and is therefore a policy issue (Garbarino 2009:5). Comparative taxation is the collection of a set of tax laws for comparison by concentrating on their processes and structural features.

4.2.1.3. Tax families

Thuronyi, Brooks and Kolozs (2016) and Avi-Yonah and Sartori (2011:3) recommend conducting comparatives tax research studies by using tax family classifications; comparing tax laws in jurisdictions with the same legal heritage. Any nation's legal system can be better

understood by looking at its historical roots through the family classification, which helps to reveal the underlying legal framework (Thuronyi et al 2016; Evans, Hasseldine, Lymer, Ricketts & Sandford 2017). Thuronyi et al (2016:19-38) determined the major tax families, in which all member countries have comparable tax laws and procedures, historical antecedents, and underlying legal cultures.

The major tax families are Commonwealth, American, French, Latin-American, Transition and post-conflict[2] northern European, southern European, Japanese / Korean and Miscellaneous family. Commonwealth[3] and American[4] are known as common law countries, whilst the remaining nations are known as civil law nations (Evans, Hasseldine, Lymer, Ricketts & Sandford 2017:10). Common law nations tend to have more powerful courts, whereas civil law nations have more precisely formulated laws that give judges less leeway to intervene (Evans et al 2017:11). Thuronyi et al (2016) discovered a different set of nations between common and civil law, namely, the European Union family (EU) with many tax laws shared throughout the EU family, such as VAT (Evans et al 2017:11). Table 4-1 provides a summary of all the tax family groups.

From the three approaches described above, countries are classified into tax families and the functional approach is applied to investigate how climate policies function in the selected jurisdictions. Therefore, the first criterion is to establish tax families. The next criterion applied is to look at the functional approach so that South Africa can draw lessons from countries who are faced with the same problems.

[2] Nations such as China and Bulgaria where a protracted civil war has been peacefully resolved
[3] Nations where the UK has had a significant effect on tax law
[4] Nations where the US has had a significant influence on tax law

Table 4-1: Tax families

Tax families	Commonwealth	French	American	Latin American	Transition and post-conflict	Northern European	Southern European	Japanese and Korean	Miscellaneous
Tax law influence	Mainly African countries, tax law of the United Kingdom	Mainly African countries, tax law of France	Tax law of the United States	Tax law of the United States, Germany, Italy, and other countries in the region	Former Soviet Union plus countries going through transition	Tax law of Germany	Tax law of Germany	Tax law of Germany and America	Mostly Islamic legal families
A	Australia, Antigua, Barbuda	Algeria		Argentina	Armenia, Azerbaijan, Afghanistan	Austria	Angola		Afghanistan
B	Bahrain, Bangladesh, Barbados, Belize, Botswana, Brunei Darussalam	Benin, Burkina Faso, Burundi		Brazil, Bolivia	Bosnia and Herzegovina, Bulgaria	Belgium			Bhutan
C-J	Canada, Cyprus, Dominica, Fiji, India, Jordan	Cameroon, Central African Republic, Chad, Comoros, Republic of Congo, Democratic Republic of the Congo, Cote d'Ivoire, Djibouti, France, Gabon, Guinea, Haiti		Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras,	Cambodia, China, Croatia, Czech Republic, East Timor, Hungary, Georgia	Denmark, Estonia, Finland, Iceland	Cape Verde, Equatorial Guinea, Greece, Eritrea, Ethiopia, Guinea-Bissau, Italy	Japan	Egypt, Indonesia, Iran
K-L	Kenya, Kiribati, Kuwait, Lesotho	Lebanon, Libya	Liberia		Kazakhstan, Kyrgyz Republic, Laos, Latvia, Lithuania	Latvia, Lithuania, Luxembourg		Korea	
M-O	Malawi, Malaysia, Malta,	Madagascar, Mali, Mauritania, Morocco, Niger,	Marshall Islands, Micronesia	Mexico, Nicaragua	North Macedonia, Moldova, Mongolia	Netherlands, Norway	Mozambique		

	Mauritius, Myanmar, Namibia, Nepal, New Zealand, Nigeria, Oman	Rwanda							
P	Pakistan, Papua New Guinea		Palau, Philippines	Panama, Paraguay, Peru	Poland		Portugal		
Q-R					Russia, Romania, Rwanda				
S	South Africa, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Samoa, Saudi Arabia, Seychelles, Sierra Leone, Singapore, Solomon Islands, Sri Lanka, Sudan, Swaziland,	Senegal			Slovak Republic, Slovenia	Sweden, Switzerland, Suriname	Sao Tome and Principe, San Marino, Somalia, Spain		Syria
T	Tanzania, The Gambia Tonga, Trinidad, and Tobago,	Togo, Tunisia			Tajikistan, Turkmenistan				Thailand Turkiye
U-Y	United Kingdom, Uganda, Zambia, Zimbabwe		United States	Uruguay, Venezuela	Ukraine, Uzbekistan, Vietnam				Yemen

Source: Thuronyi et al (2016).

4.3. RATIONALE FOR CHOICE OF JURISDICTIONS

This section sets out the criteria for the comparative country selection:

1. Firstly, countries that fall within the same tax family as South Africa were selected.
2. Secondly, from the sample above a further sub-group was identified to distinguish countries that are leading in REG.
3. Thirdly, countries utilising RE incentives as tools to upscale REG were selected.

4.3.1. Commonwealth countries

The first criterion selects Commonwealth countries as they are in the same tax family as South Africa. This resulted in the selection of the countries listed in table 4-2 below.

Table 4-2: Commonwealth countries

Alphabet	Commonwealth countries	Commonwealth countries which are advanced in RE adoption
A-D	Australia, Antigua and Barbuda, Bahrain, Bangladesh, Barbados, Belize, Botswana, Brunei Darussalam, Canada, Cyprus, Dominica	
E-L	India, Fiji, Jordan, Kenya, Kiribati, Kuwait, Lesotho	India
M-P	Malawi, Malaysia, Malta, Mauritius, Myanmar, Namibia, Nepal, New Zealand, Nigeria, Oman, Pakistan, Papua New Guinea	
Q-S	South Africa, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Samoa, Saudi Arabia, Seychelles, Sierra Leone, Singapore, Solomon Islands, Sri Lanka, Sudan, Swaziland,	
T, U	The Gambia, Tanzania, Tonga, Trinidad, and Tobago, United Kingdom, Uganda, Zambia, Zimbabwe	United Kingdom

Source: Evans et al (2017:13).

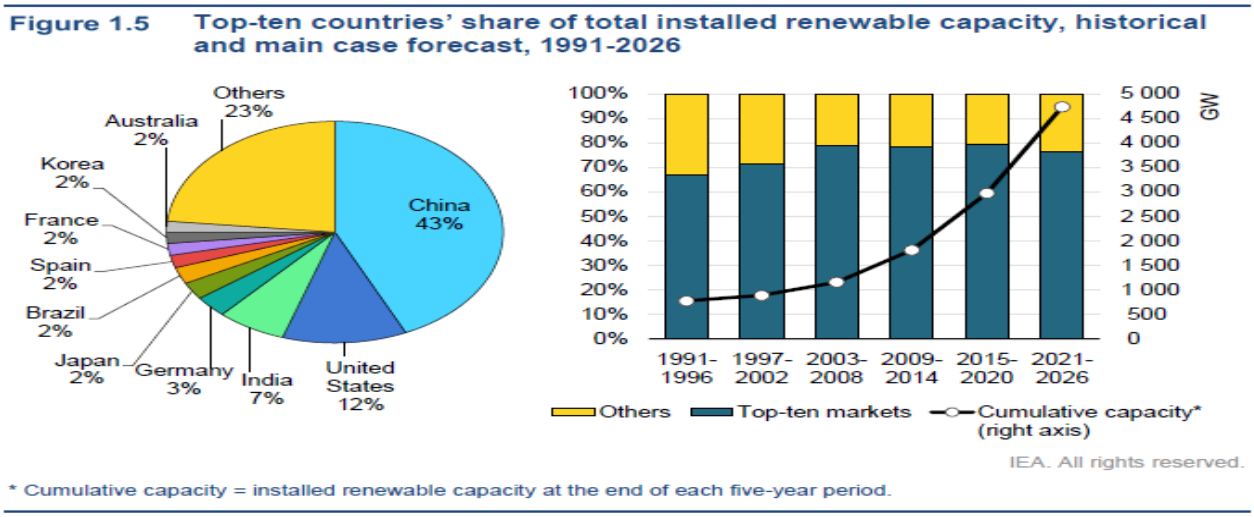
From the commonwealth tax family India and the UK are advanced in RE investment. Countries in the African continent have undeveloped policy frameworks, therefore, cannot be used as they have not advanced their RE sector (Banerjee et al 2017:11). Therefore, based on tax family and advanced RE adoption, India and the UK were selected (Global Wind Energy Council 2022:9). Therefore, we proceed to the second selection criteria.

4.3.2. Countries leading in renewable energy generation

The second criterion aims to identify nations that address a similar tax issue. In this regard, various organisations such as IEA (2023) and the Climate Council (REN 2023) have identified countries leading in RE adoption. In addition, it is imperative to extract insights

from nations that have made significant strides in addressing climate change. The top 10 leading countries by total installed RE capacity are: China (43%); United States (12%); India (7%); Germany (3%); Japan (2%); Brazil (2%); Spain (2%); France (2%); Korea (2%); Australia (2%) and others (23%). It should be borne in mind that these nations have distinct legal families. Figure 4-1 depicts a summary of the country's leading in RE adoption.

Figure 4-1: Countries leading in renewable energy



Source: IEA (2022:25).

4.3.2.1. China

China is the world's top producer of solar and wind energy and has shown significant growth over the years (REN 2023; Global Wind Energy Council 2022:9). China alone accounts for over 43% of the growth in RE, with the US, India, and Germany coming in second, third and fourth, respectively (IEA 2023:25). From 2022–2027 China is expected to add about half of the new renewable power capacity installed worldwide (Evans et al 2017:12). China is a member of the Transition and Post-conflict family (Thuronyi et al 2016), thus, even though China is not from the commonwealth tax family, due to its growth of 45% in RE adoption, valuable lessons can be learnt from them for South Africa (IEA 2023:25).

4.3.2.2. United States

After Europe and China, the United States is the third largest RE market (IEA 2023:37). Due to the abundance of tax breaks associated with RE adoption, the US leads the Index ranking for RE. An exemplary case of the efficacy of tax incentives is the US wind energy production

tax credit, which is commonly acknowledged for having been instrumental in the growth of the US wind energy sector by enhancing investor returns and facilitating the competitiveness of wind power in the market (IEA 2023).

4.3.2.3. Denmark

Denmark's renewable electricity capacity is planned to nearly double between 2022-2027, driven primarily by solar PV (IEA 2022:50). The Council for Climate change reported in 2022 that of all OECD nations, Denmark generates the most wind energy per person. More than half of Denmark's electricity comes from solar and wind energy. Denmark is home to the largest wind farm in Scandinavia, Kreigers Flak, and produces the most wind power per capita of any OECD nation (IEA 2022:49). As a result of their experience with the FIT, Denmark became recognised as a pioneering RE nation (Komor 2004; Sawin 2004; Komor & Bazilian 2005:1880; Lipp, 2007:5483; Haas et al 2011:2192; Keyuraphan et al 2012:440).

4.3.2.4. Germany

With targets of 80% renewable power by 2030 and nearly 100% by 2035, renewables are central to Germany's energy strategy. For the first half of 2022, 49 per cent of their power came from renewable sources (Global Wind Energy Council 2022:5). As a result of their experiences with the FIT, Germany became recognised as a pioneering nation in RE (Komor 2004; Sawin 2004; Komor & Bazilian 2005:1880; Lipp 2007 5482; Haas et al 2011:2192; Keyuraphan et al, 2012:440). Growth in RE in Germany is mostly fuelled by policies that support long-term climate goals (IEA 2023:52).

Based on the table 4-3 below not all countries leading in RE adoption utilise RE incentives, initiatives, and instruments to accelerate RE adoption. Therefore, only those countries that utilise RE incentives, initiatives, and instruments to accelerate RE adoption were further selected. Therefore, based on Figure 4-1 and Table 4-2 China, United States, Germany, India, and Denmark have been selected (IEA 2023:25; Global Wind Energy Council 2022:9).

The final selection criteria which focuses on countries utilising RE incentives to accelerate RE adoption follows in section 4.3.3.

4.3.3. Countries utilising renewable energy incentives

In chapter 3 section 3.8, it was revealed that most South African businesses either thought the tax incentives already in place were ineffective at influencing behaviour or only marginally helpful at encouraging investment in RE. Many South African firms felt that the country's current RE tax incentives are not sufficiently compelling to encourage them to adopt more environmentally friendly practices. Most South African businesses stated that it is difficult to apply for the various tax incentives and that there is a significant compliance burden. In addition, there is a complicated procedure involved in claiming the incentives. The requirements for satisfying the tax incentives are also excessively burdensome, expensive, and complex. One expensive requirement is that an organisation must hire a certified specialist to measure its energy savings before it can apply for the section 12L tax incentive. This drives up the costs of the firm even more, and in certain cases, makes the cost of claiming the incentive outweigh the benefit, discouraging the business from making use of the incentive (Dippenaar 2018:9).

Lessons from nations that have increased the adoption of RE through a variety of fiscal tools and incentives must be taken into consideration. In spite of having distinct legal families, South Africa can learn how to use fiscal tools and incentives to speed up the adoption of RE. It is thus possible to modify these fiscal policy instruments and incentives for the South African environment. The comparative nations included in this analysis were chosen based on their legal families and policies that addressed the inadequacies in the South African RE incentive system mentioned in chapter 3.

Table 4-3: Countries adopting renewable energy incentives

Countries leading with RE adoption	Countries using RE incentives
China	China
United States	United States
India	India
Germany	Germany
Denmark	Denmark
Japan	
Spain	
France	
Korea	
Australia	
France	
Italy	

Source: Author’s compilation (REN 2023:5; Qadir et al 2021:3593; IRENA 2022; IEA 2023:37,52).

Using efficient, focused policies and renewable resources, Germany, Denmark, China, are leading in reducing their emissions (Global Wind Energy Council 2022:2)**.** China was chosen because it is the world's leading producer of wind and solar energy with tremendous growth in recent years and has put in place a number of policies to support RE (REN 2023:5; Global Wind Energy Council 2022). China is becoming the world's leader in the field of RE (Chang et al 2020:589). It has been shown that diversified incentive programmes, such as tax and financial incentives, market-based tools, and other support policies, hasten investments in RE capacity and RET advancements in China (Wall et al 2019; Chang et al 2020:590; Wang et al 2022:1373).

As a result of their experience with FIT, Denmark and Germany became recognised as pioneering nations in RE. It is suggested that policy design and commitment are key factors for success of FIT policy (Komor 2004; Sawin 2004; Komor & Bazilian 2005:1880; Lipp 2007:5482; Haas et al 2011:2192; Keyuraphan et al 2012:440). Experiences with FIT systems have demonstrated a number of benefits over trade schemes. The administration costs for a FIT system are typically lower than those for implementing a national trading scheme, which is crucial for small countries where it is challenging to implement a competitive national trading scheme. A FIT system is simple to implement and can be quickly revised to account for new capacities. Lastly a technology-specific FIT has the benefit of having a steeper cost curve the higher it is, which helps reduce the producer surplus. Numerous FIT programmes have demonstrated their effectiveness and efficiency (Haas et al 2011:2192,2193; Yi, Xin-gang, Savaresi 2019:501-502; Yu-Zhuo & Ying 2019:1275; Lin & Xie 2024). The US is a member of the American tax family and is excluded from the comparative study as it follows a federal tax system.

4.4. CONCLUSION

This study presents non-doctrinal research, adopting a qualitative tax comparison methodology. This study conducts a qualitative review of South Africa’s RE tax incentives regime and practices in comparative jurisdictions China, Denmark, Germany, and India. The selection of these four jurisdictions for comparison is based on three criteria, namely tax families, advanced adoption in REG, and the utilization of fiscal and financial incentives to accelerate REG adoption. The aim of the comparative analysis is to draw lessons from these

four jurisdictions so that these lessons can be implemented by South African businesses to upscale REG. This review is conducted through the collection and analysis of secondary data from scholarly articles, books, legislation, and government publications.

The next chapter follows with the detailed comparative tax analysis of fiscal and financial incentives implemented in China, Denmark, Germany, and India. Chapter 5 reviews how comparative methods can be used to solve the RE financial and fiscal instruments shortcomings in South Africa (refer to section 3.6).

CHAPTER 5

COMPARATIVE ANALYSIS

5.1. INTRODUCTION

Several nations have effectively enacted policies to encourage the use of RE to lower their carbon footprint and, therefore, provide appropriate policies for comparison. The purpose of this chapter is to discuss how the use of comparative methods can aid in solving similar global tax issues. Countries with different tax laws, policies, tax functions, and legal structures can provide suitable lessons to benchmark how climate policies function.

This chapter further explains how comparative tax law methods can be used to solve the RE incentives, and other fiscal instruments' shortcomings, in South Africa's green tax incentives identified in Chapter 3.6. To extract lessons for the future development or advancement of South African RE incentive policies, a comparative framework will be constructed, based on the RE incentives, initiatives, and other fiscal instruments of foreign and South African companies.

This chapter is laid out as follows. Section 5.1 introduces the chapter and section 5.2 presents the country comparison review. Section 5.3 presents a detailed analysis for China, Germany, Denmark, and India; and section 5.4 concludes the chapter, detailing lessons for the future advancement of South Africa's RE incentives.

5.2. COMPARATIVE COUNTRY REVIEW

This section benchmarks best practice climate policies in China, Germany, Denmark, and India that support REG. A review is performed of NM, FITs, and tax incentives in the comparative jurisdictions to establish how the comparative countries solve similar problem of upscaling RE access in the business sector.

5.2.1. CHINA

5.2.1.1. Background: Renewable energy landscape

China leads REG in Asia (Thakur & Chakraborty 2019:696; Al-Motairi et al 2021:3593). China became one of the biggest producers of GHGs due to its rapid economic development and growing population with a concomitant rising energy use. By 2020, China's main energy consumption was predicted to exceed 4.8 billion tons of standard coal; however, only 70% of this demand could be satisfied by fossil fuels. At the same time, China has committed to lowering its CO_2 emissions per GDP unit from 2005 levels by 60 to 65 per cent by 2030. China has thus been compelled to actively encourage the generation of power from RE sources to meet its energy demands and reduce GHGs. China is one of the largest investors in RE globally and is responsible for almost 45% of the growth in REG in Asia. By 2025, China wants to produce one-third of its energy from renewable sources (Liming 2009:1097; Shurpali, Agarwal & Srivastava 2019:164; IEA 2023:7). In China, RE sources include geothermal, biomass, wind, solar photovoltaic, and small hydropower with output of less than 50 MW. The industrial plans, rules, regulations, and policies comprise the incentive system (Zhao 2016:147). The Chinese government employs four main incentive programmes: tariff and grid-connection incentives, tax and tax incentives, market development incentives, and research and development incentives (Li et al 2021).

5.2.1.2. Feed-in tariffs

China's FIT regulation has a significant impact on the willingness of businesses to invest in RE projects (Liming, 2009:1102; Zhao 2016:154; Sun et al 2020; Tobias-Mamina & Maziriri 2020; Xia, Lu & Song, 2020; Dong et al 2021:3; Li, Lin, Du, Feng & Zuo 2021:1; Song, Jia & Jiao 2022). The main PV market subsidy programme in China is the FIT, and it was designed to upscale PV. Aside from the FIT levels, other highly regarded policy design components are tariff and premium amounts, contract duration, budget cap, and policy consistency. Additionally, a number of studies highlighted the significance of a FIT policy that is tailored to the needs of each region. FIT is typically distinguished by system type such as rooftop or ground-mounted and system size rather than geographic location (Zhao 2016:147; Dong et al 2021:3). Without FITs, China would not have had any utility-scale PV projects before the middle of 2016; and the domestic market would decrease by 98% if the

FIT were to be cancelled, even after mid-2016. Put differently, the PV market in China is mostly reliant on its FIT subsidies (Dong et al 2021:3; Sun et al 2020).

An exception is the design of the zonal FIT policy in China, which offers improved identification opportunities to assess its influence on the expansion of PV capacity. The tariff is based on the distribution of solar radiation resources in China; a zone with superior solar resources is subject to a lower tariff (Dong et al 2021:3; Sun et al 2020). For example, zone one has the lowest FIT level and is home to the best solar resource areas in northwest China. For the duration of the FIT scheme, the division of FIT zones is based on solar resources and remains constant (Dong et al 2021:1). The length of the contract and the existence or lack of a cap have an effect in addition to the tariff's value. In addition, the efficiency of FITs is highly dependent on consistency; when a FIT has a low tariff, consistency is crucial. It was found that if a FIT is well built, its overall impact could be seven times greater (Dijkgraaf, van Dorp & Maasland 2018).

5.2.1.3. Net metering

The Chinese government implemented a single NM subsidy for the entire nation in an effort to grow the distributed solar electricity generation industry (Jia, Du, Zou & He 2020:1). The government also focused on the design of the NM in order to evaluate its effectiveness and success for the upscale of REG. Therefore, different levels of electricity consumption should be considered while formulating the NM strategy, in addition to the regional variation of solar radiation. The impact of electricity usage should be considered when designing a fair NM subsidy. To prevent excessive subsidies, the NM subsidy of distributed PV systems should be lower for areas with high power demand. Thus, distributed PV systems can become profitable by fully covering their investment cost with the present metering subsidies (Jia et al 2020).

5.2.1.4. Tax incentives

Tax incentive policies can promote RE investment making tax incentives more effective. Government subsidies are the main force supporting the development of RE enterprises (Yang, He, Xia & Chen 2019:156). The REG tax incentive policy includes VAT incentives, VAT rebates, CIT incentives, CIT rebates, R&D, expenditure breaks, and import duty (Liming

2009:1102; Zhao et al 2016:154; Sun et al 2020; Tobias-Mamina & Maziriri 2020; Xia, Lu, & Song, 2020; Chien et al 2021; Dong et al 2021:3). Businesses gain an advantage from tax reductions because they lower the cost of spending, which improves their cash flow options (Sun et al 2020). The Chinese government further encourages the upscale of RE by offering advantageous import taxes on essential RE components, and reductions in VAT on RE equipment (Kammen 2008:24). China has grown to be one of the world's biggest markets for RE, and a large part of this rapid expansion is attributable to its tax incentive programmes and other financial incentive reforms (Li et al 2021:1).

Increased fiscal incentives reduce the financial strain on REG businesses resulting in lower borrowing costs which promote RE investment leading to higher project profitability and a more efficient RE sector (Zhao et al 2021:5; Zhao et al 2016:154; Li et al 2021:1). Another strategy implemented by the Chinese government to upscale RE involves taxing the production of fossil fuels which results in the increased cost of electricity generation per unit for fossil fuel electricity. China thus created more finances for RE, obtaining funding from sources like a "special tax" on the use of fossil fuels (Liming 2009:1102; Li et al 2021:1; Qadir et al 2021:3598; Zhao et al 2021; Song, Jia & Jiao, 2022:2,8). By 2030, it is predicted that China's entire power demand will be 20% covered by RE sources (Dunlap 2021). In order to facilitate the progressive integration of RE sources into the system, China offers tax incentives, such as waiving import customs and taxes on RE equipment (Shurpali et al 2019:165). China put this policy in place to promote the import of technology that was not developed in the country (Zhao et al 2016). When these levies are removed, the cost of electricity per unit decreases, making RE technology competitive with alternative power sources.

Li, Mao, Chen and Yang (2022:800) states that tax incentives raise businesses' total factor productivity, which in turn improves businesses' environmental performance. For fiscal policy makers, this offers helpful information on boosting business productivity and encouraging the RE transition and upscale for businesses. To expedite the RE transition for Chinese businesses, the government focused on optimising the design of fiscal policy, adopting appropriate fiscal support for businesses, and the development and acceleration of RE. Tax and fee reductions are important fiscal policy tools (Li et al 2022:800; Yuan, Li, Wang et al, Wu & Chang 2023:607). Because of its special technique of calculating tax

liability (output VAT less input VAT), VAT is thought to have minimal economic distortion and low administration costs (Qi, Zhang & Chen 2023:3).

5.2.1.5. Lessons

China's incentive programmes have been a major factor in the industry's explosive rise in REG (Zhao, Chen & Chang 2016:154; Zhao et al 2021). China is developing solid, long-term fiscal policy; and the introduction of a special tax on fossil fuel is another way to upscale REG (Li et al 2021:1).

The Chinese government has enacted R&D investment regulations and FIT in addition to tax incentives to support REG (Zhao et al 2021:1,3,4; Zhang, Sirin, Fan & 2022; Lin & Xie 2024). China's FIT programme has proven to be a successful policy tool for encouraging investments in RE (Winter & Schlesewsky 2019:353; Zhao et al 2021; Zhang, Sirin, Fan, & Bu 2022:7; Lin & Xie 2024:6). With FIT, an exception is the design of the zonal FIT policy; the tariff is based on the distribution of solar radiation resources in China with a zone with superior solar resources being subject to a lower tariff ; Zhao et al 2021; Zhang, Sirin, Fan, & Bu 2022:7; Lin & Xie 2024:6).

The Chinese government currently offers R&D tax rebates, VAT rebates, corporate tax incentives, and expenditure breaks for clean energy production, among other current practices. Because of its special technique of calculating tax liability (output VAT less input VAT), VAT is thought to have minimal economic distortion and low administration costs, therefore, making VAT reduction an easier lesson to implement in South Africa ; Zhao et al 2021; Zhang, Sirin, Fan, & Bu 2022:7; Lin & Xie 2024:6).

Another lesson is waiving the import customs and taxes on RE equipment. When these levies are removed, the cost of electricity per unit decreases, making the technology competitive with alternative power sources. Lesson learnt from the Chinese government about the design of the NM is ensuring that the price or rate used to pay the prosumer for their excess electricity is reasonable. If it is too high and does not decline with the declining costs of REG, this leads to a financial gap which result in a subsidy burden for the fiscus or government purse (Zhao et al 2021; Zhang, Sirin, Fan, & Bu 2022:7; Lin & Xie 2024:6).

5.3. GERMANY

5.3.1. Background: Renewable energy landscape

Countries such as Germany have demonstrated that FITs can be used as a powerful policy tool to drive RE upscale and help meet combined energy security and emissions reductions objectives (Viebahn, Nitsch, Fischedick, Esken, Schüwer, Supersberger, Zuberbühler & Edenhofer 2007; Courtore 2010:1). The United States was the initial source of FIT policies in the late 1970s. This was followed by the FIT concept being introduced in Europe in the mid-1990s, initially landing in Denmark and Germany (Sacco, Megre, de Medeiros Costa, Brito & dos Santos 2024). As a result of their experiences with the FIT, Denmark and Germany became recognised as pioneering nations for FIT policy (Komor 2004; Sawin 2004; Komor & Bazilian 2005:1880; Lipp 2007:5482-5483; Keyuraphan et al 2012:440; Mcinerney & Bunn 2019:1240; Winter & Schlesewsky 2019:347; UNCTAD 2023:12). By 2005, Germany led the world in the production of solar and wind energy, and in the development of new biomass technologies (REN21 2023). In 2005, Germany's installed wind capacity reached 18,428 MW, while its solar PV installations reached around 1400 MW; this has since grown and it continued to be the leader in PV and wind energy in 2014 and 2022 (600 MW were added in 2005 alone) (Lipp 2007:5491; Zhang et al 2022).

5.3.1.1. Feed-in tariffs

The German electrical grid offers a FIT to users who contribute electricity from RE sources (Mcinerney & Bunn 2019:1240; Winter & Schlesewsky, 2019:347; United Nations 2023:12). The FIT system in Germany has demonstrated a number of benefits: the administration costs for the FIT system are typically lower; the FIT system is simple to implement and can be quickly revised to account for new capacities; and lastly, a technology-specific FIT has the benefit of having a steeper cost curve the higher it is, which helps to reduce the producer surplus. The FIT is more economical for developing RE when the right design aspects are included (Lipp 2007:5494). Numerous FIT programmes now in use have demonstrated their effectiveness and efficiency (Haas et al 2011:2192,2193; Savaresi 2019:501-502; Zhao et al 2021; Zhang et al 2022; Lin & Xie 2024:6). It is suggested that policy design and commitment are key factors for the success of FIT policy (Komor 2004; Sawin 2004; Komor

& Bazilian 2005:1880; Lipp 2007:5482; Haas et al 2011:2192; Keyuraphan et al 2012:440). As a result of their experiences with the FIT; Germany became recognised as a pioneering nation. FIT is a cost-effective incentive for generating electricity from RE (Haas et al 2011:2192,2193; Savaresi 2019:501-502; Zhao et al 2021; Zhang et al 2022; Lin & Xie 2024:6). Timely modifications to pertinent policies and laws are vital, as demonstrated by the growth of RE in Germany (Liu 2019:214) as the cost of RE gets revised with new technologies being explored.

5.3.1.2. Net metering

Net Metering has increased in appeal in Germany due to regulatory changes and higher retail electricity prices in important markets (IEA 2023:53). A well-designed NM policy provides an easy, affordable, and easily administered financial incentive. In addition, NM does not need any new procedures, new charges, or unique equipment. Lastly, NM is beneficial because the export electricity is paid for at a retail rate (Poullikkas et al 2013:976-977).

5.3.1.3. Tax incentives

One frequently employed tactic to expedite the large-scale development of the RE industry is to restrict the tax policy. Denmark and Germany both implemented tax policies that were highly restrictive. The German government imposed an ecological tax reform in 2001, imposing a tax on the use of fossil fuel-derived electricity, primarily to lower GHGs and support the economic development of RE (Zhao, Chen Chang, 2016:151). Many countries which implemented FIT schemes have proven that they are efficient and effective (such as China, Germany, and Denmark) (Zhao, Chen Chang, 2016:151). Additionally, tax credits, R&D incentives, and deductions are offered by Germany to homeowners that repair energy-inefficient doors or windows, purchase new insulation and heating systems, or make other energy-efficient house improvements. The German government supports RE companies through a variety of measures, such as investment aid, tax exemptions or reductions, tax refunds, RE obligation support schemes, and direct price support schemes, which include feed-in tariffs and sliding or fixed premium payments (Savaresi 2019:501-502; Mcinerney & Bunn 2019:1240; Winter & Schlesewsky 2019:347; Zhang et al 2022; Lin & Xie 2024:6;). The government offers tax breaks or reductions for investors in Germany, particularly for

wind energy (Abdmouleh et al 2015:256). The RE obligation support schemes, and direct price support schemes, include feed-in tariffs and sliding or fixed premium payments (Mcinerney & Bunn 2019:1240; Savaresi 2019:501-502; Winter & Schlesewsky 2019:347; Zhang et al 2022; Lin & Xie 2024:6).

5.3.1.4. Lessons

A FIT is more economical for developing RE when the right design aspects are included (Lipp 2007:5494). A FIT programme put in place in Germany, pays producers of RE a fixed rate per kilowatt-hour for power that is fed into the grid. Regardless of the market price of power, the FIT system ensures RE providers a steady and long-term income. Because businesses do not have to compete with traditional power plants or negotiate contracts with utilities, the FIT system further lowers entrance barriers for them. Timely modifications to pertinent policies and laws are crucial, as demonstrated by the growth of RE. Timely modifications are needed especially with FIT policy agreements in line with the reduction of REG costs. The FIT system in Germany has lower administration costs, it is simple to implement, and can be quickly revised to take into account new capacities or accommodate any modifications and or changes required. The design aspect of a FIT system is thus critical for its success.

The German government supports RE businesses through a variety of other additional measures, such as investment aid, tax exemptions or reductions, tax refunds, tax credits, R&D tax incentives, and deductions. Germany implemented tax policies that were highly restrictive. The German government imposed an ecological tax reform, by imposing a tax on the use of fossil fuel-derived electricity, primarily to lower GHGs and support the economic development of RE.

5.4. DENMARK

5.4.1.1. Background: Renewable energy landscape

Denmark is one of the first nations in Europe to impose an environmental tax. Since 1992, energy consumers have paid a CO_2 tax, with a portion of the proceeds going to RE producers. Denmark was not an exception in that the first oil crisis of 1973 sparked early interest in and support for RE. Denmark was the first country to use wind energy, and it can teach other nations how to integrate RE sources socially as well as technically (Hvelplund 2005; Haaland 2006; Lipp 2007:5482,5486; Mendonc, Lacey & Hvelplund 2009:384-386; Meyer 2014:306,307; Abdmouleh et al 2015:255; Zhang et al 2022:209).

The Danish incentive programme includes the wind cooperatives and FIT support programme. The majority of Denmark's wind farms were built by neighbourhood co-operatives and individual farmers up until the early 1990s, at which point more than 120,000 people acquired shares. Denmark's wind energy output increased three-fold in 1993, from 1200 to 4100 GWh. Consequently, by 2001, 80 per cent of all wind turbines in Denmark were owned by over 175,000 households, either individually or in "cooperatives". Denmark has been praised for its energy policy enabler of a successful deployment and integration of RE (Hvelplund 2005; Haaland 2006; Lipp 2007:5482,5486; Mendonc, Lacey & Hvelplund 2009:384-386; Meyer 2014:306,307; Abdmouleh et al 2015:255; Zhang et al 2022:209). Denmark has also committed itself to reach net-zero emissions no later than 2050, thus achieving independence from fossil fuels.

5.4.1.2. Feed-in tariffs

A FIT was one of the policies put in place to boost REG (Meyer 2014:306). Price is still the primary component of FITs, which is why they are frequently referred to as "fixed price incentives (Hvelplund 2005; Haaland 2006; Lipp 2007:5482,5486; Mendonc, Lacey & Hvelplund 2009:384-386; Meyer 2014:306,307; Abdmouleh et al 2015:255; Zhang et al 2022:209). Bölük and Kaplan (2022:26616) found that FITs are an effective financial incentive to encourage the upscale of REG.

5.4.1.3. Net metering

Denmark is a country where the NM policy has been successfully implemented (Rehman, Bhatti, Awan, Sajjad, Khan, Bo, Haroon, Amin, Tlili & Oboreh-Snapps 2020:170366; Martín, de la Hoz, Aliana, Coronas & Matas 2021:2; Ziras, Calearo & Marinelli, 2021:7). In 2012, the introduction of NM caused a surge in PV, with the benefit of the Danish NM system for PV prosumers being the hourly compensation of self-generation and consumption (Abdin & Noussan 2018:175; Martín et al 2021:2). Since the retail price of electricity is greater than the feed-in tariff, NM is advantageous in Denmark, making the NM more attractive for upscaling of RE (IBPC 2018:461).

5.4.1.4. Tax incentives

A tax exemption for wind power, and the creation of a public wind-power test station were some of the policies put in place to boost RE (Meyer, 2006). Denmark also frequently uses the tax policy restrictions as a way to accelerate the large-scale development of RE (Zhao, Chen and Chang, 2016:151, 157). Denmark levies a tax on CO_2 emissions from the burning of fossil fuels like coal and offers various tax breaks for using RE sources such as biomass and wind power (Zhao, Chen and Chang, 2016:151, 157). Thus, RE adoption was stimulated by R&D, FIT, and included direct subsidies and tax exemptions for company owners (Komor, 2004; Meyer, 2006). Denmark provides investment grants, energy tax exemptions, and energy supply taxes as some of the fiscal incentives to encourage the use of RE. Energy-related taxes do not apply to electricity produced from renewable sources (Energy Tax Exemption). Compared to traditional energy sources, some RE sources like biogas, geothermal energy, and solar energy have lower energy supply taxes (Energy Supply Tax) (IEA, 2023:117). Denmark offers financial subsidies to people, companies, and local governments who make investments in RE technologies (Investment Grants). As part of its effort to advance and upscale RE, Denmark raised the taxes on fossil fuels (IEA, 2023:117).

With 44% of its electricity coming from wind, Denmark continues to be among the nations with the greatest per centage of RE (Mendonc, Lacey & Hvelplund, 2009). Utilisation of a FIT system encouraged public ownership (Maagard, 2006; Meyer, 2006).

5.4.1.5. Lessons

In Denmark, RE adoption was stimulated by R&D, FIT, and included direct subsidies and tax exemptions for businesses. Denmark provides investment grants, energy tax exemptions, and energy supply taxes as some of the fiscal incentives to encourage the use of RE. Denmark offers financial subsidies to individuals, businesses, and local governments who make investments in RE technologies. A FIT, an investment incentive, a tax exemption for wind power, and the creation of a public wind-power test station were some of the policies put in place to boost REG. Denmark levies a tax on CO_2 emissions from the burning of fossil fuels like coal. As a result of their experiences with the FIT, Denmark became recognised as a pioneering nation. It is suggested that policy design and commitment are key factors for success of the FIT policy. A NM hourly policy is the most effective incentive responsible for the upscale of RE in Denmark.

5.5. INDIA

5.5.1.1. Background: Renewable energy landscape

India's need for electricity is rising (IEA 2023:7). Similar to China, India has committed to making improvements despite being one of the biggest emitters of GHGs. Since India receives sunlight for over 300 days a year, solar energy is regarded as one of the key components of the RE portfolio. In addition, due to its closeness to the equator, India receives high levels of solar radiation (4–7 kWh/m^2/day) (Shurpali et al 2019:161,171,173; Thakur & Chakraborty 2019:696).In 2019, fossil fuels, such as coal-based power plants, accounted for 65% of total energy demand, and RE 15%.

With 128,323 MW installed capacity for RE, India is ranked second in Asia behind China (IRENA 2022). Significant amounts of wind energy can also be generated in a variety of zones and places with high wind velocities. In this regard, India is among the world's top countries in the development and application of wind energy (Elavarasan et al 2020:74433; Qadir et al 2021:3593; Zhang et al 2022:208). India also boasts a respectable annual biomass production rate in addition to the valuable resource of many rivers and streams that can provide electricity.

India committed itself to lowering GHG emissions by introducing tax incentives such as the accelerated depreciation policy, grants, FIT, carbon tax, and low interest loans for investors in RE (Thapar, Sharma & Verma 2016:488; OECD 2018:51). Because of this strategy of accelerated depreciation, which permitted 100% depreciation in the first year of operation, India now has the greatest wind power industry (OECD 2018:51).

The Government of India has established the Ministry of New and RE for developing and deploying alternative sources of energy generation and supplementing the country's energy requirements. By reducing GHG and promoting environmentally friendly growth, these policies aim to create a more sustainable economy. By providing financial incentives, the Indian government encourages the use of clean energy technologies and growth of the RE sector (Thapar, Sharma & Verma 2016:488).

5.5.1.2. Feed-in tariffs

To further encourage the use of RE, the Indian government offers additional policy tools such as FIT to upscale RE access in the business sector (Liming 2009:1102; Singh, 2009:643,645; Singh & Sood 2011:662; Thapar et al 2016:488; Shurpali et al 2019:173,177; Elavarasan et al 2020:74436; International Energy Agency 2020; IRENA 2022; Rathore & Panwar 2022:7632; IRENA 2023). With regard to emerging energy technology, FITs are more efficient as they immediately lower the cost of implementing RE projects, improving their financial viability (Thapar et al 2016:488). In India, FIT agreements are for a period of 20 to 25 years.

5.5.1.3. Net metering

The Indian government further encourages the upscale of RE by offering NM to businesses (Liming 2009:1102; Singh 2009:643,645; Singh & Sood 2011:662; Shurpali et al 2019:173,177; Elavarasan et al 2020:74436; IRENA 2022; Kumar, A., Pal, D., Kar, S.K., Mishra, S.K. & Bansal, R. 2022;Rathore & Panwar 2022:7632). The adoption of RE is anticipated to be fuelled by its affordability, regulatory backing, and more business-friendly NM regulations implemented by the Indian government (IEA 2023:44).

5.5.1.4. Tax incentives

The Indian government also provides tax holidays, tax refunds, tax, rebates, concessional import duties, exemptions from sales and excise taxes, production tax concessions, capital subsidies, tax credits, import duty and excise duty concessions, and up to 80 per cent accelerated depreciation as opposed to the 15 per cent accelerated depreciation rate for all other businesses (Liming 2009:1102; Singh 2009:643,645; Singh Sood 2011:662; Ghosh 2015:35; Shurpali et al 2019:173,177; Elavarasan et al 2020:74436; Rathore & Panwar 2022:7632; IEA 2023). The most cost-effective strategy is accelerated depreciation as, in contrast to other policies that can stretch out the benefits over a longer period of time, the REG businesses can take advantage of all of its benefits from the very first year with accelerated depreciation (Abdmouleh,et al 2015:255; Shrimali, Trivedi, Srinivasan, Goel & Nelson 2016:266; Kumar, Pal, Kar, Mishra & Bansal 2022:1338).

The government further offers businesses grants and subsidies which are non-repayable direct cash to reduce the initial capital outlay of a RE project and enhances its viability. It is mandatory for distribution utilities and sizable power users to obtain a specific proportion of their overall electricity usage from RE sources. This is achieved through the actual purchase of RE or through exchangeable green certificates (Thapar et al 2016:488). Other measures include the issuance of tax-free solar bonds and long-term low interest loans from banks and National Housing Bank (NHB) that include rooftop solar power plant installation (Kumar et al 2022:1345). The Indian government imposed a carbon tax against fossil fuel in an effort to reduce emissions and raise money; the money raised by this carbon tax is utilised to encourage the upscale of RE (Thapar et al 2016:488; Shurpali et al 2019:99; Azad & Chakraborty 2021:2).

The Indian government has also provided land to RE businesses who struggle with land for REG upscaling. In order to obtain the land, the businesses they must undergo a clearance system. The implementation of a single-window clearance system has significantly enhanced the process of granting land acquisition approvals (Kumar et al 2022:1350). The Indian government has thus implemented clear, uncomplicated, administrative processes and paperwork for the incentive programmes (Shurpali et al 2019:149; Seetharaman et al 2019:9; Moorthy, Patwa & Gupta, 2019: 7638; Elavarasan et al 2020:74433; Rathore & Panwar 2022:7632).

India’s incentive scheme includes generation-based incentives (GBI), accelerated depreciation, and renewable purchase obligation (Kumar et al 2022:1338). Accelerated depreciation is a key incentive for new developments. Important features of India's tax exemptions and credits for GBI is to incentivise RE producers. Financial incentives are provided by this programme to RE producers in proportion to their electrical output. The REG projects are commercially appealing because of the GBI, which offers firms a direct cash gain and minimises their income tax liability (Shrimali et al 2016:266; Kumar et al 2022:1338; Rathore & Panwar 2022:7635). Excise duty and import tax waivers were among the tax reduction measures put in place for RE businesses; by utilising these tax reduction measures, businesses can lower their tax obligations and increase their return on investment for RE projects (Rathore & Panwar 2022:7632).

5.5.1.5. Lessons

Affordability, regulatory backing, and more business-friendly NM regulations are implemented by the Indian government. As FIT is more efficient they immediately lower the cost of implementing RE projects, improving their financial viability; and FIT agreements are for a period of 20 to 25 years. Tax exemptions, capital allowances, VAT exemptions, capital subsidies and credits incentivize the acquisition of RE technologies, reduce the financial strain on businesses, and increase the viability of RE projects. The implementation of waiving of excise duty and import tax for the purchase of RE related items is an important mechanism to facilitate upscale of RE. The Indian government provides accelerated depreciation in year one of up to 80 to 100 per cent. The implementation of a single-window clearance system has significantly enhanced the process of granting land acquisition approvals for REG. Investors must meet the government's eligibility standards and documentation requirements to receive tax benefits; these requirements are usually met through tax filings. The government has clear, uncomplicated, administrative processes and paperwork. The government further offer businesses grants and subsidies which are non-repayable direct cash to reduce the initial capital outlay of a RE project and this enhances its viability. The government made it mandatory for the energy utility to purchase electricity generated from RE projects.

5.6. COMPARATIVE COUNTRY ANALYSIS

A comparative analysis is done below to draw lessons from countries which are advanced in RE and have done so through the utilisation of various financial and fiscal instruments. Sections 3.4 and 3.5 identified available RE instruments in South Africa, however, there are limitations and challenges preventing a rapid RE transition to meet the energy challenges in South Africa as well as mitigation against climate change.

The limitations to RE generation in South Africa were discussed in Section 3.7. Challenges include the high cost of compliance, poor taxpayer education of the incentives, complex and onerous incentives, difficulty to claim and access the incentives, as well as some businesses not knowing about the available incentives. Further challenges relate to multiple government agencies and government departments dealing with incentives and these providing inconsistent information and directives. An example is the conflicting message between the National Treasury and NERSA regarding South Africa’s tax credit for rooftop solar for enterprises; one of the challenges facing this programme is Eskom's proposal to alter the tariff structure of the rooftop solar tax incentive, with an increase in the capacity charge being a major part of these revisions. Contrary to the intention of the National Treasury, the higher capacity tax will discourage investment in RE. The energy regulator NERSA and its new fee structure determination method present the second challenge. BusinessTech (2023) highlights two challenges. The rooftop solar policy promotes continuous consumption and may be ineffective in increasing RE usage. Another significant shortcoming is the absence of a tax incentive for battery storage, which makes it necessary to encourage businesses to store excess energy produced during the day for distribution. Government's slowness in deciding on FITs is another barrier, as private power producers would be permitted to feed in excess energy through input-in tariffs.

Lessons are drawn from the comparative country analysis to benchmark solutions to upscale RE generation in South Africa. The table below, table 5-1 analyses the policy options in the comparative countries.

Table 5-1: Policy options in the comparative countries

	SOUTH AFRICA	CHINA	GERMANY	DENMARK	INDIA
FINANCIAL AND FISCAL POLICY MIX	NM draft FIT draft Accelerated depreciation R&D	R&D NM FIT Import duty and custom Accelerated depreciation VAT and CIT reduction	R&D FIT Import duty and custom Accelerated depreciation VAT and CIT reduction Carbon tax and fossil fuel taxes	R&D NM FIT Import duty and custom Accelerated depreciation VAT and CIT reduction Carbon tax and fossil fuel taxes	R&D NM FIT Import duty and custom Accelerated depreciation VAT and CIT reduction
Weakness in SA policy	High cost of compliance. Poor taxpayer education of the incentives. Complex and onerous to comply. Multiple government agencies dealing with incentives, communicating conflicting messages.				

China

FIT design

A unique feature is the design of the zonal FIT policy in China, which offers improved identification opportunities to assess its influence on the expansion of PV capacity. China's FIT policy is zonal, and the tariff is based on the distribution of solar radiation resources in China. A zone with superior solar resources is subject to a lower tariff.

NM design

The impact of electricity usage is taken into account when designing the fair NM subsidy. To prevent excessive subsidies, the NM subsidies of distributed PV systems are lower for areas with high power demand.

Tax design

Waving of import taxes and custom duty on the purchase of RE equipment etc. Carbon tax and taxes on fossil fuel are implemented with fossil fuel taxes implemented to raise revenue that is used for the upscale of RE. Both the fossil fuel tax and carbon tax assist in reducing GHG. VAT reduction and VAT exemption are also implemented as well as CIT reduction. Because of its special technique of calculating tax liability (output VAT less input VAT), VAT is thought to have minimal economic distortion and low administration costs, therefore making VAT reduction an easier lesson to implement.

India

FIT design

FIT is more efficient as they immediately lower the cost of implementing RE projects, improving their financial viability. FIT agreements are for a period of 20 to 25 years in India.

NM design

Affordable, regulatory backing, and more business-friendly NM regulations. Simplicity with a single meter.

Tax design

The implementation of a single-window clearance system has significantly enhanced the process of granting land for REG. The government has clear, uncomplicated administrative processes and paperwork. The government further offer businesses grants and subsidies which are non-repayable direct cash to reduce the initial capital outlay of a RE project and this enhances its viability. The government made it mandatory for the energy utility to purchase electricity generated from RE projects. Tax exemptions, capital allowances, VAT exemptions, capital subsidies and credits incentivize the acquisition of RE technologies, reduce the financial strain on businesses, and increase the viability of RE projects. The implementation of waiving of excise duty and import tax for the purchase of RE related items is an important mechanism to facilitate upscale of RE. The Indian government provides accelerated depreciation in year one of up to 80 to 100 per cent.

Germany

FIT design The FIT system lowers entrance barriers. Timely modifications to pertinent policies and laws are crucial, as demonstrated by the growth of RE. Timely modifications are critical especially with FIT policy agreements in line with reduction of REG costs. The FIT system in Germany has lower administration costs, is simple to implement, and can quickly be revised to account for new capacities or to accommodate any modifications and or changes required. The design aspect of a FIT system is critical for its success. **Tax design** The German government supports RE businesses through a variety of additional measures, such as investment aid, tax exemptions or reductions, tax refunds, tax credits, R&D tax incentives, and deductions. Germany implemented tax policies that were highly restrictive, including an ecological tax reform, by imposing a tax on the use of fossil fuel-derived electricity, primarily to lower GHG and support the economic development of RE.
Denmark **FIT design** It is suggested that policy design and commitment are key factors for success of the FIT policy. **NM design** A NM hourly policy is the most effective incentive responsible for the upscale of RE in Denmark. **Tax design** R&D investment grants such as direct subsidies, energy tax exemptions, energy supply taxes and tax exemptions are some of the incentives available for businesses in Denmark. Denmark levies a tax on CO_2 emissions from the burning of fossil fuels like coal. These taxes on CO_2 taxes result in revenue to boost RE upscale.

Source: Author compilation.

5.7. CONCLUSION

The comparative analysis provided key lessons that can be incorporated into the South African RE incentive policy. There are varied fiscal policy mechanisms to promote RE adoption such as accelerated depreciation, VAT, CIT, FIT, import taxes and customs duty, and carbon tax. South Africa can adopt the VAT and CIT reduction to promote RE adoption and acceleration. South Africa can adopt FIT with adequate rates to accelerate their roll out. South Africa can adopt China and India's approach of exempting businesses from import and excise taxes on essential RE components. South Africa can further adopt the Chinese policy on VAT; China offers reductions in VAT on RE equipment and this can assist businesses especially during the tough economic times that South African businesses are facing by paying a lower cost excluding VAT. South Africa can further consider subsidies for the manufacturing of certain items in relation to RE as this would encourage manufacturing. Manufacturing could then result in sustainable industries which could further assist in stabilising the economy. South Africa can further adopt China's approach on offering reduced rates for CIT. When offering reduced CIT rates, the difference between the actual and reduced rates can be used as a contribution to the renewable energy fund in order to alleviate the pressure on the fiscus due to the diminishing South African tax base.

The same rationale can apply to VAT reduction. The Indian government provides concessional sales tax exemptions, five years of income tax vacations, and 100% depreciation in year one. As some businesses are not VAT vendors, they may not directly benefit from the VAT adjustments. Therefore, it might be beneficial to have reduced rates for businesses for a certain period as the reduction can be used for the renewable energy fund. South Africa can take a cue from Germany and Denmark and implement tax policies that are more restricted, including environmental taxes such as a carbon tax. Fossil fuel use in the industrial sector is decreased by the imposition of CO_2 taxes. By doing this, CO_2 emissions are significantly reduced, and the environment is improved. There are several benefits to taxing the environment, including lower pollution, more public money, and being environmentally friendly. The overall success of environmental levies is largely dependent on how they are designed. Environmental taxes can be used to deter negative environmental effects, to raise money that can be used to expand the production of clean energy, and to increase the usage of clean energy.

Worldwide, FIT is the instrument that is most frequently utilized to encourage RE generation. China, India, Denmark, and Germany utilise FITs to accelerate RE adoption. For FIT to incentivize investments in REG, government guarantees the purchase of electricity generated from RE for a fixed price that is higher than the grid price for a specific length of time. Denmark uses a combination of other policy initiatives including carbon taxes to reduce emissions. Other policies include programmes to solve climate and sustainability issues, FIT, and subsidies. For example, levying higher taxes on energy sources that emit large amounts of pollution, like coal, might effectively mitigate environmental harm, even while natural gas can be utilised at a reduced cost. This is due to the fact that it is challenging to phase out fossil fuels faster for the development of the clean energy sector. Prices for fossil fuels are another tool at the authorities' disposal. Because the relatively high cost of fossil fuels can encourage firms to switch to cleaner alternatives, fuel pricing can be used to reduce CO_2 emissions. Lastly, R&D are amongst the tools used to encourage RE adoption in Denmark. These measures can be integrated into the current South African revenue collection system and would therefore, comply with the need for ease of administration.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1. INTRODUCTION

The South African business sector struggles with their energy needs, particularly with regard to the economic constraints that surround the need for a low-cost, reliable, and sustainable energy supply. Over the last three decades, the cost of electricity has significantly escalated, and the supply has been typically sporadic. This has led to various firms seeking self-supply options or supplementary emergency supply options which are environmentally unfriendly, inefficient, and uneconomic in the medium to long term. During the period 2022-2023, there were instances of significant load shedding which hugely disrupted the operations of some firms and led to some questioning their presence in the SA economy. At a macro-level, energy costs and availability are amongst the top factors that multinational investors consider when evaluating investment destinations, hence, the cost and availability of energy may be viewed as constraints to investment and economic growth in South Africa. The public pressure on business to be more environmentally friendly and to contribute to sustainable development has also increased significantly over the last decade. Businesses are being driven to change their energy sources to more renewable ones and may be looking for RE solutions. However, there are limited options and limited success with RE initiatives particularly in relation to utility type purchases.

The study thus aimed to explore the financial and fiscal instruments available for businesses in South Africa to adopt, that would encourage and upscale REG. The study further performed a comparative tax analysis of available RE financial and fiscal instruments of other countries to draw lessons that advance RE adoption for South African businesses.

This chapter is laid out as follows. Section 6.2. details the findings of the study in relation to the objectives laid out in section 1.6 of this study. The policy implications of the study are explored in section 6.3. Section 6.4 details the limitations of the study whilst section 6.5 details the significance and contribution of the study. Section 6.6 describes recommendations for future research whilst section 6.7 presents the conclusion to the study

highlighting the lessons considered in order to design good financial and fiscal instruments for RE.

The study was guided by the following research objectives:

1. Review RE financial and fiscal incentive design considerations.
2. Analyse the current RE financial and fiscal instruments for South African businesses.
3. Conduct a comparative analysis of the RE financial and fiscal instruments in China, Denmark, Germany, and India.
4. Provide recommendations for the South African business sector based on lessons drawn from comparative country policy benchmarks.

This chapter thus provides: an integration of the research outcomes; the theoretical and policy ramifications of the study; limitations of the study; the study's contributions; and suggestions for future research endeavours.

6.2. FINDINGS OF THE STUDY

The findings of the study are discussed in relation to the research objectives of the study.

6.2.1. Objective 1: Review RE financial and fiscal incentive design considerations

6.2.1.1. Feed-in tariff

The FIT is a popular instrument used to upscale REG; adequate FITs are technology specific. The design, transparency, finding the right tariff level, and contract duration of the FIT policy are key factors for profitability. Other essential FIT design elements include guaranteed grid access, stable, long-term purchase agreements that typically last 20 to 25 years, and payment amounts that are based on the costs of REG. Long-term agreements provides certainty to businesses. If the FIT rate is too high, society will have to bear the cost, and this will create an unnecessary burden to the fiscus. However, if the rate is too low, the financial incentives will not convince businesses to invest in REG. It is critical to determine who bears the extra cost of the FIT programme as this can impact the policy’s outcome. Reducing the administrative burden, such as facilitation of the delivery of permits and

authorizations, helps in improving the performance of FITs. It is imperative to execute and manage the FIT policy well as this is crucial for its success. Other crucial aspects are to design an easy to understand and simple to use FIT policy, with set rates and transparent capacity targets. Furthermore, a budget cap and uniformity in policy are essential components of policy design. Additional design components to consider are: a geographically specific FIT policy; ensuring that the FIT policy is business friendly and that there is nothing vague in the policy details; and the design of the FIT must allow for modifications so that these modifications can be allowed during the contract as the need arises.

6.2.1.2. Net metering

Net Metering is a critical instrument implemented by countries to upscale REG. When designing the NM it is necessary to consider the rate, i.e., whether it is the main retail rate or the cost avoidance rate. The export rate must be established at a level that does not result in higher tariff charges than the costs that are saved. This is of essence to avoid excessive subsidies which may overburden the fiscus. How long a customer's monthly excess generation may be "carried over" to subsequent billing cycles and utilised to offset electricity consumption is another important factor to consider when designing an adequate NM. Setting an aggregate capacity limit, which restricts the total amount of net-metered generation that can be installed within a state or utility service area, is a further factor to consider. Additionally, it will be important to consider capping the largest net-metered generator that can be used and ensuring that the size of a generator for a home and business setting vary. Customised contracts for NM clients must include the tariff details, an assurance that exported energy would be purchased under regular operating circumstances, and customer and utility responsibilities on legal, technical, safety, and financial matters. Another critical design feature is ensuring that the NM are business friendly and that their policy terms are not vague. A sunset clause for the NM programme must be clearly documented so that the programme has an end date and does not exist forever after its objectives have been achieved.

6.2.1.3. Tax incentives

Tax incentives are strong, effective, adaptable tools for advancing the RE sector. The tax incentive design considerations are central to the success or failure of the policy instrument. Effectiveness, neutrality, efficiency, simplicity, and transparency were identified as key qualities in the design of tax incentives. The tax incentive programme must be straightforward to implement and encourage significant participation due to the ease of compliance. Tax incentives for RE must be credible, predictable, and consistent, and this can be accomplished by the government's sustained commitment to offering tax incentives. Transparency reduces the possibility of corruption whilst predictability ensures stability of the tax incentives granted - these principles are important for businesses as they are used for decision making.

The tax incentives pertaining to RE must be tailored to the industry's particular stage of growth. To prevent the termination of a tax incentive from negatively affecting the industry, it is imperative that the exit strategy be thoroughly planned and communicated to taxpayers. There must be a sunset clause for any tax incentive programme so that the programme has an end date and does not exist forever after its objectives have been achieved. In order to guarantee market competitiveness and adequate investor interest in the applicable RE technology, the tax incentive must be sufficiently significant. Should this prove unattainable, more incentives must be introduced to stimulate the appropriate RE technology. The tax incentive programme must be straightforward to implement and manage. For RE tax incentives quality standards should be implemented to ensure sustainability, with regular monitoring and evaluation to ensure that the tax incentives fulfil what they are intended to achieve as well as to ensure that there is no corruption.

6.2.2. Objective 2: Analyse the current RE financial and fiscal incentives for South African businesses

The majority of businesses do not know how to apply for the tax incentives and that the cost of compliance is high. It is challenging to claim and meet the requirements or conditions for tax incentives. Fulfilling the prerequisites for several tax incentives is regarded as being unduly challenging, costly, and onerous. Some businesses believe that the available current

tax incentives are ineffective and insufficient to encourage them to alter their environmental practices. Requirements to apply and comply with the current incentives are complex and difficult to comply with. The weaknesses and threats analysis of available financial and fiscal instruments in South Africa were identified in section 3.7 and are listed in table 6-1.

Table 6-1: Challenges with available financial and fiscal incentives in South Africa

Incentive	Challenge
FIT	• Short time frames identified with the old FIT introduced in 2009. • Policy ambiguity created by tariff rate volatility. • Bureaucratic hold-ups. • Inconsistent statements and assertions from various government departments.
NM	• Only a draft of NM is available, however, not meeting the standards of an effective NM policy as outlined in 2.3.3.1. • The draft does not mention the capping of the largest net-metered generator that can be used, or whether the size of a generator for a home and business setting would vary. • The draft does not consider setting an aggregate capacity limit, which restricts the total amount of net-metered generation that can be installed. • The draft falls short on details such as what must be contained in the customised contracts for NM clients such as the tariff details, an assurance that exported energy would be purchased under regular operating circumstances, and customer and utility responsibilities on legal, technical, safety, and financial matters.
Tax incentives	• Tax incentives are complex and onerous. • Poor and inadequate education of the financial and fiscal incentives. • Instruments are complicated and difficult to comply with. • High cost of compliance. • Not easy to claim. • Multiple government agencies dealing with incentives and between government departments are inconsistent. • Businesses do not know how to apply to access the incentives.

Source: Author's compilation.

6.2.3. Objective 3: Conducting a comparative analysis of the renewable energy financial and fiscal incentives in China, Denmark, Germany, and India

There are varied fiscal policy mechanisms to promote RE adoption such as VAT, CIT, FIT, import duty and carbon tax. South Africa can adopt temporary reduction VAT and CIT to promote RE upscale and acceleration thereof. China offers reductions in VAT on RE equipment that reduces the barrier of high investment cost for businesses as the VAT reduction lowers the RE investment cost. South Africa can further consider subsidies for the manufacturing of certain items in relation to RE as this would encourage manufacturing. When offering reduced CIT rates, the difference between the actual and the reduced rate can be used as a contribution to the renewable fund in order to alleviate the pressure on the fiscus due to the diminishing South African tax base. The same rationale can apply to VAT

reduction. The Indian government provides concessional sales tax exemptions, five years of income tax vacations, and 100% depreciation in year one. As some businesses are not VAT vendors, they may therefore not directly benefit from the VAT adjustments. Therefore, it might be beneficial to have reduced rates for businesses for a certain period as the reduction can be used for the renewable fund.

A FIT is the worldwide instrument that is most frequently utilized to encourage RE generation. China, India, Denmark, and Germany utilise FIT to accelerate RE adoption. For FIT to incentivize investments in RE generation, the government guarantees the purchase of generated RE for a fixed price that is higher than the grid price for a specific length of time. China implements a zonal FIT policy where the regions with abundant solar radiation apply a lower FIT rate. Since South Africa receives abundant sun during the year for over 200 days, there is no need to apply a zonal FIT. South Africa should rather focus on a reasonable rate, one that is not too high and will overburden the overstretched taxbase. South Africa can adopt FITs with adequate rates to accelerate their roll out. South Africa may also take a cue from Germany and Denmark and implement tax policies that are more restricted, including environmental carbon taxes. Fossil fuel use in the industrial sector is decreased by the imposition of CO_2 taxes. South Africa can adopt China and India's approach of exempting businesses from import and excise taxes on essential RE components and equipment. Furthermore, R&D are amongst the tools used to encourage RE adoption in Denmark, China, Germany, and India.

6.2.4. Objective 4: Provide recommendations for the South African business sector based on policy lessons benchmarked from the comparative analysis

First, there should be simplicity in the design of RE incentives as well as other fiscal instruments such as FIT and NM. Improving the simplicity of the design will ensure that more businesses take on RE investments, helping with decarbonisation efforts as well as improving energy security. Second, is making VAT zero or reducing it for a certain period, and the reduction of CIT rates. Reducing VAT will reduce the high investment costs that are a barrier to advancing the take up of RE. Making VAT zero will assist businesses who are VAT vendors to be able to claim input VAT. Due to VAT's simple way of calculating the VAT liable, makes VAT a simple and easy instrument to utilise. Furthermore, VAT also has the

advantage of low administration costs. Third, is to accelerate FIT and NM implementation with adequate rates. The acceleration of FIT will incentivise businesses to invest in RE to obtain a return on investment from the sale of electricity. This will assist businesses to recover their high investment costs. Acceleration of FIT roll-out will benefit the regulatory authority as they are easy and simple to implement with lower administration costs. Acceleration of NM roll-out will assist businesses to avoid wastage of excess RE generated during the day as the grid is used as a virtual storage. This can help as the grid has a bigger capacity for storage of excess energy than ordinary batteries.

South Africa can adopt the process followed by India of having a single clearance system instead of having multiple agencies involved in a clearance system. This will also avoid multiple government agencies offering conflicting and inconsistent messages. Furthermore, South Africa can take lessons from the Indian government which offers low administration, easy and simple instruments for upscaling and acceleration of REG; and increased carbon tax incentive rates to benefit businesses that invest in RE due to the cost of tax exceeding the benefits of adopting RE. It is recommended that the South African government adopt the lessons learnt from Germany, Denmark, China, and India of imposing taxes on the use of fossil fuel and other environmental taxes. The revenue generated from taxes imposed on fossil fuel and a carbon tax can be put in a fund that can be utilised in South Africa to offer nonrepayable grants to be used as an initial capital outlay for businesses. It is also important to educate taxpayers about the RE instruments offered and empower businesses to have a basic understanding of various REG instruments. It is also recommended to lower compliance costs and make is simple and easy to comply with the requirements of accessing RE financial and fiscal instruments. This will ensure that the tax compliance of businesses is improved. Lastly, it is important to reduce the regulatory requirements and number of agencies to take on financial and fiscal instruments so that the taxpayer deals with only one regulatory authority, such as the Receiver of Revenue, rather than having to comply with NERSA, the Department of Environmental Affairs, Eskom, and National Treasury, as this minimises inconsistencies and conflicting messages.

6.3. POLICY IMPLICATIONS OF THE STUDY

6.3.1. Question 1: What is the role of financial and fiscal instruments in upscaling renewable energy access in South Africa?

Improving simplicity of the incentive design will ensure that more businesses take on RE investments to improve energy security and decarbonisation efforts by reducing GHG emissions. Reducing VAT and CIT will reduce the high investment costs that are a barrier to advancing the take up of RE. Accelerating FIT and NM implementation with adequate rates and a reasonable period will encourage businesses to invest in RE to obtain the return from excess electricity sales.

6.3.2. Question 2: What policy reforms are required to support renewable energy generation in South Africa?

South Africa can benefit from the following mechanisms to simplify the RE financial and fiscal incentives:

1. Standardisation of incentives: The process of applying for and obtaining incentives could be made simpler by developing a standard set of financial and fiscal instruments. This could apply to all financial and fiscal instruments that are part of the South African RE financial and fiscal instruments mix. Additionally, a unified system would guarantee that developers and investors can immediately ascertain which instruments are available and how to be access them.
2. Streamlined application process: Bureaucratic obstacles including lengthy waiting periods, complex forms, and documentation requirements can make the application process for RE financial and fiscal instruments onerous. Streamlining the application procedure and cutting related expenses can aid in boosting the use of RE. It is recommended to simplify the application process and link it to the SARS system which is the system familiar to and utilised by businesses.
3. Regional and national coordination: To develop a complete and uniform system of financial and fiscal instruments that would promote the expansion and upscale of the RE sector, regional and national officials should coordinate their efforts and be linked so that businesses in rural areas can use their local SARS branches or SARS mobile branches to access a uniform and adequate service.

4. Data sharing platforms: Businesses can obtain comprehensive information about the various financial and fiscal instruments programmes offered in different regions by utilising an online platform that disseminates data on legislation and rewards. Additionally, this platform can assist policymakers as a dashboard of the success of the incentives and thus allowing adjustments as necessary. This is critical even for instruments such as FIT so that if there is a modification needed either regarding the duration of the contract or the rate then it is easy to identify the need and implement changes.
5. Ensuring transparency and predictability: The South African government through SARS must have a predictable, clear, and unambiguous financial and fiscal policy mix. In order to prevent abrupt changes that can deter investment in RE, officials should design transparent long-term financial and fiscal instruments.
6. SARS must increase the formal and informal taxpayers' education nationwide – to ensure the success of financial and fiscal policy advancements. By increasing the amount of informal environmental education, more businesses can access the available financial and fiscal instruments and upscale REG which will result in increased energy supply, a reduction of GHG, and cleaner environments.
7. The government must implement better environmental education to lower carbon emissions. The SARS should implement carbon tax for fossil fuel and utilise the revenue generated from the carbon tax to create a fund for RE investment. The government should raise public understanding of environmental issues through taxpayer education, which will improve the quality of the environment. By increasing the amount of informal environmental education, environmental sustainability and awareness can be attained.
8. Net Metering: The process must be streamlined and business friendly, to make it quick and easy. The procedure must be impartial, cost-reflective, and free from discriminatory practices towards prosumers. It is imperative that the prices are appropriately arranged and separated to accurately represent the various services offered. To prevent raising rates for all users, an export rate for energy exported onto the grid shouldn't be greater than the avoided purchase cost for the utility. The terms need to be transparent, business friendly, and applicable to all generation, and grid linked compliance. The grid consumption and distribution utility administrative expenses will be covered by the fixed components.

9. Feed-in tariffs: SARS must design a FIT policy with a rate that is reasonable enough to attract businesses to invest but not too high to result in a burden for the fiscus. The FIT should be designed with a reasonable period of around 25 years.
10. The SARS should implement VAT reduction and VAT exemption as VAT is thought to have minimal economic distortion and low administration costs, because of its easy and simplistic technique of calculating tax liability (output VAT less input VAT).
11. The SARS must create a single-window clearance system for the application process.

6.4. LIMITATIONS OF THE STUDY

The study was done using a comparative analysis on a few countries so this may not reflect a wider representation for exploring available financial and fiscal instruments for RE regarding businesses in various countries as the incentives might be different around the world. There are few studies on RE financial and fiscal instruments available for REG for businesses to compare with. The study relied on the existing RE financial and fiscal instruments available for businesses for REG and the study did not perform an in-depth detailed analysis of the effectiveness of the available RE financial and fiscal instruments. It is acknowledged that the tax framework which forms the basis of some financial and fiscal instruments in comparative jurisdictions varies.

6.5. SIGNIFICANCE AND CONTRIBUTION OF THIS STUDY

The research study fills the knowledge and empirical gap in the design adequacy of the RE financial and fiscal instruments to the investment decision into REG - which is a low-carbon transition technology by businesses to incentivise RE adoption. Prior research focused on the available financial and fiscal instruments and not on the design and / or effectiveness of the available financial and fiscal instruments in South Africa. Minimal research has been conducted on the adoption of RE as a decarbonising strategy in South Africa. Decarbonisation will accelerate climate change mitigation, reducing future harmful effects of climate change. Decarbonisation requires investment in green technologies. The design of adequate RE tax incentives will encourage investment in green technologies, inform the South African government of the effective RE financial and fiscal instruments mix to be put

in place to provide energy security and lessen the acceleration of climate change and its negative repercussions. The study contributes to the knowledge gap of the RE financial and fiscal instruments design, as well as the available RE financial and fiscal instruments required to decarbonise the South African energy industry by accelerating and upscaling RE adoption as well as alleviating the energy shortage in South Africa. Reducing the usage of fossil fuels slows down the acceleration of climate change and its negative impacts.

6.6. RECOMMENDATIONS FOR FUTURE RESEARCH

Three areas of research can be investigated in the future:

1. What could accelerate RE adoption more between carbon tax and green tax incentives?
2. The feasibility of having a comparison between NM, FIT, and carbon tax for upscale of REG in South Africa. This is to enable access which policy mix is effective in upscaling REG.
3. What could accelerate REG adoption more between carbon tax and feed-in tariffs?

6.7. CONCLUDING REMARKS

South Africa's RE financial and fiscal instruments policy is ineffective in encouraging the adoption and upscale of REG. Proper design of RE financial and fiscal instruments as well as implementation thereof is required to reduce reliance on fossil fuels as they are significant contributors to pollution and destruction of the environment as well as not providing much-needed energy security. This will assist industries to mitigate further temperature increases and the emission of GHG that advance climate change. Renewable Energy financial and fiscal instruments which are simple and easy to administer need to be designed to attract businesses to upscale RE. This requires RE financial and fiscal instruments with lower administration costs to adequately encourage investment by businesses and uptake of the financial and fiscal instruments to assist with energy security as well as decarbonisation efforts in heavy polluting industries where there is a high dependence on fossil fuel. It also requires adequately designed RE financial and fiscal instruments to encourage the upscale and acceleration of REG. Furthermore, awareness and education about the RE financial and fiscal instruments is needed for businesses to adopt REG.

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