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Exploring the Design of Financial Instruments and Tax Incentives to Up-scale Renewable Energy Generation in South Africa

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ABSTRACT

South Africa is at the precipice of an existential energy crisis. Notably, the country's endowment comprises vast stores of biomass, wind and solar energy potential that provide the country with a comparative advantage. Transiting from coal to renewable energy sources can stimulate the green economy and mitigate the country's power shortages. Moreover, by advocating for the decarbonization of the energy sector, a significant contributor to greenhouse gas emissions, this research underscores the potential for advancing South Africa's decarbonization objectives. This paper explores the design of financial instruments and tax incentives to promote the upscale of renewable energy development in South Africa. A qualitative appraisal is conducted on South Africa's incentive regime. The study contributes to the scholarship on policy design to stimulate renewable energy generation.

1. Introduction

In recent years, the global community has increasingly recognized the urgent need to transition towards sustainable and renewable energy sources to mitigate the adverse effects of climate change and to reduce dependence on finite fossil fuel resources (Hoegh-Guldberg *et al.*, 2018; Steyn *et al.*, 2021). As a signatory to the Paris Agreement and a member of various sustainability initiatives, South Africa has committed to accelerating its adoption of renewable energy technologies (RET) to meet its energy needs while addressing environmental concerns and promoting economic development (Owusu-Manu *et al.*, 2021; Qadir *et al.*, 2021). However, the successful deployment and widespread adoption of RETs are contingent upon the implementation of effective financial instruments and tax incentives that incentivize investment and promote growth in the renewable energy sector (UNCTAD, 2023). Load shedding, an enduring challenge in South Africa, presents a formidable obstacle to the nation's economic progress and remains a significant concern for countless businesses nationwide. When energy demand surpasses supply, load shedding becomes a necessary strategy to distribute electricity among various power sources. Eskom, South Africa's electricity power company, implements load shedding to manage the allocation of power across different locations. Energy serves as the cornerstone of all socio-economic activities and development, playing a pivotal role in economic growth, job creation, and poverty

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alleviation (UNCTAD, 2023; Shi *et al.*, 2022). The importance of energy access is underscored by its inclusion in Sustainable Development Goal 7, which aims to ensure universal access to modern, affordable, sustainable, and reliable energy (Banerjee, 2017; Dong *et al.*, 2023; UNCTAD, 2023). However, South Africa's energy-intensive economy predominantly relies on fossil fuels, particularly coal, which accounts for over 80 percent of energy generation, with renewable energy contributing a mere 13.7 percent (Pierce & Le Roux, 2023).

The substantial reliance on coal exacerbates anthropogenic greenhouse gas (GHG) emissions and air pollution which poses significant environmental and health risks (Pierce & Le Roux, 2023). Addressing these challenges necessitates a concerted effort to reduce GHG emissions, with a goal of halving emissions by 2030 and achieving net-zero emissions by 2050 (Hoegh-Guldberg *et al.*, 2018). RET investments are crucial for mitigating GHG emissions and limiting global temperature rise to 1.5°C above pre-industrial levels (Hoegh-Guldberg *et al.*, 2018). The high costs associated with RET investments present financial barriers that hinder businesses from embracing renewable energy (Qadir *et al.*, 2021).

To overcome these barriers and incentivize renewable energy adoption, a combination of government subsidies, regulatory financial policies, and financial instruments and tax incentives is essential (Chen *et al.*, 2018; Cox, 2016; Meier *et al.*, 2014; Mousavian *et al.*, 2020; UNCTAD, 2023). The optimal design of financial instruments and tax incentives is critical for promoting renewable energy investment and accelerating decarbonization efforts (Qadir *et al.*, 2021). Furthermore, education campaigns are essential to raise awareness of the benefits of renewable energy and drive adoption among businesses (Akinbami *et al.*, 2021; Qadir *et al.*, 2021). Against this background, this paper seeks to explore the design of financial instruments and tax incentives to promote the upscale of renewable energy development in South Africa as well as exploring interplay between financial instruments and tax incentives in upscaling renewable energy generation (REG) in South Africa.

This paper adopts a qualitative research approach to explore the design of financial instruments and tax incentives in South Africa to establish if these policy instruments are appropriately designed to stimulate REG. To achieve these objectives, the study adopts insights from economics, finance, taxation, environmental studies, and policy analysis through a comprehensive review of existing literature and analysis of relevant policy documents. This study seeks to contribute to the ongoing discourse on energy transition and sustainable development in South Africa by shedding light on the opportunities and challenges associated with different incentive mechanisms. The findings of this study aim to support evidence-based policymaking and strategic decision-making processes aimed at accelerating the adoption of renewable energy technologies and achieving South Africa's energy and sustainability goals in the 21st century.

The paper is set out as follows: First, it discusses the financial and tax incentive mix to support renewable energy investment, secondly it reviews optimal financial and tax incentive design considerations. Third, it examines South Africa's financial instrument and tax incentive policy mix landscape. Fourth, it identifies the policy shortcomings in South Africa’s REG incentive regime. Finally, it offers policy recommendations for REG in South Africa.

1. Financial and tax incentive mix for renewable energy investment

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). These

policy goals could 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 (Cox, 2016; UNEP, 2018) and providing financial instruments to upscale REG (Steyn *et al.*, 2021; Chen *et al.*, 2018; Qadir *et al.*, 2021). Notably, tax regulatory policies serve as instruments used in curbing carbon emissions and stimulating investments in the renewable energy (RE) sector. In addition to tax policies, financial regulatory policies also assist in stimulating RE investments (Qadir *et al.*, 2021). Countries must align these policy instruments to deliver on their Paris agreement pledges (UNEP, 2018).

Financial instruments and tax incentives could address various obstacles to RE investment such as initial capital outlay, research costs, cash flow etc. These obstacles could be mitigated with financial instruments and tax incentives. These financial instruments and tax incentives might decrease the financing costs, increase capital access, lessen the impact of large initial capital outlay, and encourage the development of new markets (Chen *et al.*, 2018; Cox, 2016). Tax incentives are commonly used tools to upscale REG due to their simple and flexible nature (Cox, 2016). However, reducing the advancement of climate change through the provision of sustainable energy requires systematic changes and cannot be achieved by a single driver in the form of tax incentives (Cox, 2016; Dippenaar, 2018; Nortje, 2009). A combination of instruments and incentives is required, for instance: feed-in tariffs, net metering (also referred to as net billing), tax incentives such as corporate income tax (CIT) reduction, VAT exemptions, rebates, grants, VAT reduction, taxes on fossil fuel, environmental taxes (such as carbon tax), exemption and wavering of customs duty and import taxes, and accelerated depreciation, that are central to incentivising behavioural changes towards low-carbon solutions stimulate an investment in RE (Chen *et al.*, 2018; Cox, 2016; Qadir *et al.*, 2021; Steyn *et al.*, 2021).

2. Key considerations when designing the ideal financial instruments and tax incentives for renewable energy

The design of an incentive is fundamental in stimulating investment (Cox & Esterly, 2016; Cox, 2016; UNCTAD, 2023). Investment in the RE transition is significantly influenced by a well-crafted regulatory environment (Abdmouleh *et al.*, 2015; IEA, 2024).

3. Feed-in tariff

Efficient contract design provides businesses with investment stability (Abdmouleh *et al.*, 2015; Cox & Esterly, 2016; 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; Guild, 2019; Mousavian *et al.*, 2020; United Nations, 2023). De Jager, *et al.* (2008) and Wiser *et al.*, (1997) state that the FIT policy's long-term stability is one of its crucial components of its success. Price security and lower administrative costs are critical design considerations for FIT (Dong *et al.*, 2021; Haas *et al.*, 2007). The key design characteristics for FITs to attract investment require contracts to provide favourable grid access conditions (Lipp, 2007), investment stability guaranteed by a long-term duration (Sawin, 2004), and low administrative and regulatory barriers (Haas *et al.*, 2011; Keyuraphan *et al.*, 2012). The contract duration is a key factor for profitability (Komor & Bazilian, 2005). 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 (Aguirre & Ibikunle, 2014; Guild, 2019; Jenner *et al.*, 2013; Mousavian *et al.*, 2020). 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).

Good design characteristics of a FIT include being easy to understand and simple to use, with set rates, and transparent capacity targets (Guild, 2019). NERSA (2009) asserts that a FIT policy must be easy to administer. A budget cap and uniformity in policy are also essential components of policy design (Couture *et al.*, 2010). 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 (Cox & Esterly, 2016; Guild, 2019). 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). An additional design component is a geographically specific FIT policy (Dong *et al.*, 2021). 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 could be incorporated timeously.

4. Net metering

Since the critical aspect for a successful NM policy is the tariff, the tariff ought to be appropriately designed to be both cost-reflective and non-discriminatory. It is necessary to consider the rate that is used, i.e., whether it is the main retail rate or the cost avoidance 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. Retail rate is the commonly used rate by the power utility to its customers (Revesz & Unel, 2016). The export rate must be established at a level that does not result in higher tariff charges than the costs that are saved (Revesz & Unel, 2016). The export tariff should be high enough to cover the production costs and must be adequate to encourage investment in RE. The tariff must remain low enough to not add to the total cost of electricity (SARS, 2023). Grid-tied compliance, universal applicability to all generation, and clear tariffs are requirements (SARS, 2023). The rate and grid guarantee by the utility company are critical and should be considered before implementing NM agreements since the grid is used as a virtual battery for NM purposes (Abdmouleh *et al.*, 2015). Additionally, the duration is another factor to consider 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). Long carry over provisions should be considered if they add value (Martinot & Sawin, 2005). The NM policy should set a different storage size allowed for a home and a business is another consideration (Revesz & Unel, 2016). Consider the exit strategy of the net metering policy for the effectiveness of net metering tool, as the industry matures.

Tax incentive design and management

This section outlines the main elements that should be considered when designing tax incentives to encourage investment and growth. The starting point in designing tax policy is to consider the goals of the tax system (UNEP, 2018). An essential step in designing an incentive is to make sure it is intended to achieve higher-level goals (Cox, 2016; Lantz & Doris, 2009) and explain the way in which an incentive reduces taxes (OECD, 2022) and also consider the availability of public sector resources, consumer preferences, and a larger financial infrastructure (Nortje, 2009). The goals and objectives of the tax system must also be considered (Cox, 2016). Furthermore,

South Africa's financial instruments and tax incentives need to align with optimal policy. The principles of good tax policy are transparency, efficiency, fairness, simplicity, neutrality, cost effectiveness and ease of administration (Avi-Yonah & Sartori, 2011; Brunori, 2016; OECD, 2014; Shome, 2021). For example, the vertical equity principle states that a person should pay more taxes in proportion to their income (Slemrod & Bakija, 2017). A tax that applies uniformly to all taxpayers is considered fair and a simple tax is one that is easy to understand and comply with (Nichols 2005; OECD, 2014; Shome, 2021). A consideration must be made in advance to determine the communities or populations that could gain the most from specific incentives. For example, an incentive program might be designed to target lower-income communities with limited access to finance (Cox, 2016). This consideration could include an exit strategy detailing that as soon as a reasonable number of low-income businesses have accessed or utilised the incentive then this incentive could be reduced or stopped. Furthermore, the exit strategy of a tax incentive must be considered in advance, for example, as the industry matures, tax incentives may be decreased and or stopped (Martinot & Sawin, 2005; Nortje, 2009).

Consider the goals and objectives of the tax system. 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 fairness. For example, the government's efforts to advance a specific economic objective are typically used to justify tax incentives; and if this objective is significant enough, it may offset the unfairness and complexity concerns the incentive raises (Cox, 2016; OECD, 2022; UNEP, 2018). 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 (Blake, 2022). 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). Consider the present laws and initiatives that can prevent incentives from working, e.g. subsidies for fossil fuels and how possible incentives might add value to the market and avoid any possible market distortions.

5. South Africa’s financial instruments and tax incentive landscape

South Africa has various challenges pertaining to the advancement of RE. One of these challenges is that investment in renewable energy transition is expensive because of the high initial capital expenses associated with many RE sources (Dippenaar, 2018; Purwandani & Michaud, 2021). Secondly, 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; 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 (COSATU, 2022) (South Africa, 2019). Thirdly, South Africa has not sufficiently developed RET (Falchetta *et al.,* 2022). 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). Dippenaar (2018) study found that many businesses lacked awareness on how to apply for the tax incentives. Furthermore, the tax reduction from the incentive are not adequate to engender a change in behaviour 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. A further challenge is the high cost of compliance since fulfilling the prerequisites for several tax incentives is regarded as being unduly challenging, costly, and onerous (Engelbrecht & Hassan, 2024). Globally various jurisdictions have implemented a range of tax incentives and financial instruments include feed-in tariff (FIT), environmental taxes such as carbon taxes, net metering (NM) and other tax incentives.

6. Feed-in Tariff

FITs are employed 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; Mousavian, 2020). FITs are the most widely used form of RE financial instrument. They are imposed by governments to reward companies that generate electricity from RE (Dong *et al.*, 2021; REN21, 2023; IEA, 2022). 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 businesses to invest, is the fundamental economic idea underlying a FIT (Azimoh *et al.*, 2017; NERSA, 2009; Odeku *et al.*, 2011; Pegels & Lütkenhorst, 2014). FIT was first introduced in South Africa in 2009 by National Energy Regulator of South Africa (NERSA) (NERSA, 2009; Odeku *et al.*, 2011). The goal of the FIT was to give South Africa a chance to step up the deployment of RE and support the industry's continued expansion domestically, regionally, and globally as well as ensuring financial sustainability for businesses involved in REG (NERSA, 2009; Odeku *et al.*, 2011).

NERSA proposed low tariff rates subject to yearly degression with annual tariff reductions and fixed prices for 15 years (NERSA, 2009). The duration of 15 years meant that when compared to the projected capital lifespans of 25–30 years for renewable energy investments in NERSA's original documents, the investment planning timeframe was short (Pegels & Lütkenhorst, 2014). Investors therefore raised concerns based on the difference between the investment timeframe and the capital life span of RE projects. After investors raised their concerns, 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 (Pegels & Lütkenhorst, 2014). The FIT programme was never implemented, despite these two changes (Pegels & Lütkenhorst, 2014). Critics attributed the program's failure to policy ambiguity created by tariff rate volatility, bureaucratic hold-ups, and inconsistent statements and assertions from various government departments (Pegels & Lütkenhorst, 2014). South Africa attempted to achieve its goal of providing clean energy and reducing GHG emissions as well as providing sufficient and stable electricity with FITs, but it was unsuccessful since it did not adhere to the country's public procurement regulations (Azimoh *et al.*, 2017). In conclusion the challenges of a low tariff, ambiguity as a result of tariff rate volatility, short duration of 15 to 20 years which is less than the capital investment period, and inconsistent statements from various government departments and delays of new guidelines results are posing challenges with the implementation of a successful FIT policy.

7. Net metering

NM is employed to regulate the power purchase and offer support for a guaranteed RE market and is benchmarked as an efficient instrument to upscale REG (Abdmouleh *et al.*, 2015; Mousavian *et al.*, 2020). The legislation governing NM policy has not yet been finalised in South Africa. The information provided by National Treasury and the South African Revenue Service (SARS) is dependent on the final legislative decisions made by various statutory bodies and government agencies such as Parliament, SARS and NERSA, and as such the contents of the draft bill may change. A NM is intended to reimburse owners of distributed energy producing installations for any excess power that is exported to the utility grid (Azimoh *et al.*, 2017). The grid serves as a virtual battery for storing the excess energy because of its large capacity (SARS, 2023). NM affords businesses generating surplus electricity to export extra energy onto the grid in return for kWh and/or financial credits (Poullikkas *et al.*, 2013; Revesz, & Unel, 2016). Any business would be permitted to implement and use the NM instrument provided it complies with NERSA regulations and would be required to obtain the necessary licences or registrations (SARS, 2023). An essential component of NM's success is its export tariff, which in the case of South

Africa is authorised by NERSA (SARS, 2023). The business will be credited for the excess energy that is exported to the grid using the export tariff. Currently the challenge with the NM policy in South Africa is that the policy is not finalised yet and the contents might change due to various inputs and the change in Parliament post the 29 May 2024 South African national elections.

8. Tax Incentives

A full or partial exemption from qualified taxable income is offered via tax exemptions (Celani *et al.*, 2022). The CIT rates set below the regular rate are known as reduced tax 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. Capital allowances have the potential to expedite the write-off of capital expenditure value from taxable income, up to 100 percent of incurred expenses, also known as acceleration, or they may exceed 100 percent of acquisition cost. For instance, enabling businesses to write off 150 percent of the cost of a new machine could fall under this category. Deductions for current capital expenses from the total amount of taxes owed are known as tax credits. The capital allowances provided by the *Income Tax Act* 58 of 1962 (Republic of South Africa, 1962) increase the likelihood that RE projects will be included in the energy solution (South Africa, 2023). 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 percent in the first year for solar PV energy of less than 1 megawatt (MW); roads and fencing utilized in the production of electricity are eligible for capital allowances under section 12U of the Income Tax Act (Republic of South Africa, 1962). Tax incentives are used to attract local or foreign investment capital (Davis Tax Committee, 2018).

Section 12BA of the Income Tax Act (Republic of South Africa, 1962) offers an accelerated allowance for renewable energy tax incentive. This tax incentive is intended to accelerate private investment and help address the energy crisis. Investments in RE projects that are put into operation for the first time on or after 1 March 2023, but before 1 March 2025, are eligible for this additional tax incentive in terms of section 12BA. Under section 12BA, a 125 percent capital allowance in the first year for qualifying capital expenditure in relation to any RE project is available to any taxpayer' conducting trade including businesses under the enhanced RE tax incentive. There is no cap on generation capacity during the two-year window period. The two-year window period is a short period not allowing businesses, especially small businesses, adequate time to access and utilise this tax incentive. The challenge is that given the incentive's limited two-year duration, if proves successful and more businesses rush to utilise this incentive, it may lead to a surge in the demand for solar PV panels in South Africa, driving up the costs, and therefore nullifying the benefit (Engelbrecht & Hassan, 2024; Majola & Langerman, 2023). The price increase for the solar photovoltaic (PV) panels would impact smaller businesses more. Furthermore, although South Africa provides a tax credit for rooftop solar for enterprises, a challenge facing this section 12B 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. 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 taxpayers 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 feed-in tariffs and net metering, whereby private power producers would be permitted to feed in excess energy through input-in tariffs (BusinessTech, 2023). The new bill, Integrated Resource Plan 2023 which was published for public comments during January 2024, alluded that storage issues might be resolved by the complementary relationship between Smart Grid systems, energy storage and non-dispatchable RE technologies based on wind and solar PV (DMRE, 2024). However, the contents of this bill might change as there is a different parliament since the May 2024 South African national elections.

A study by Dippenaar (2018) revealed that not all businesses have claimed the tax incentives or plan to do so in the future, despite the fact that some of them have RE related to projects. Even though the South African government has attempted to cater for businesses who may not have the funds to invest in the solar panels by providing the Energy Bounce-Back Loan Guarantee Scheme whereby loans will be accessible through participating banks, Development Finance Institutions and non-bank SME finance providers, some small businesses do not have their affairs in order to access such financing facilities. In conclusion, NERSA's new fee structure determination method is another challenge (BusinessTech, 2023). The contents of the Integrated Resource Plan 2023 might change because of the new Government of National Unit post the general elections in May 2024, the short duration of section 12BA ending 1 March 2025 and the lack of import duty concession for equipment imported for RE are still a challenge in South Africa. The other challenges are the onerous and complex tax incentives.

9. Design challenges of financial instruments and tax incentives in South Africa

2. Feed-in tariffs

The FIT policy as introduced by NERSA proposed low tariff rates subject to yearly degression, with annual tariff reductions and fixed prices for 15 years (NERSA, 2009). The FIT introduced in 2009 by NERSA has short time frames and had bureaucratic hold-ups. The FIT policy had ambiguity created by the tariff rate volatility (Pegels & Lütkenhorst, 2014). The duration of 15 years meant that when compared to the projected capital lifespans of 25–30 years for renewable energy investments in NERSA's original documents, the investment planning timeframe was short (Pegels & Lütkenhorst, 2014). After investors raised their concerns about the short duration of 15 years and lower tariffs, tariffs were increased, and the guaranteed period was extended from 15 to 20 (Pegels & Lütkenhorst, 2014). In conclusion the challenges of a low tariff, ambiguity because of tariff rate volatility, short duration of 15 to 20 years which is less than the capital investment period, and inconsistent statements from various government entities such as NERSA, National Treasury and Eskom and delays of new guidelines results are posing challenges with the implementation of a successful FIT policy (Pegels & Lütkenhorst, 2014).

3. Net metering

Only a draft of NM is available (SARS, 2023), however, not meeting the standards of an effective NM policy as outlined in 4.2. The draft policy 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.

4. Tax incentives

Tax incentives are complex and onerous. Tax incentives are not easy to claim and have high cost of compliance. Tax incentives are difficult to comply with and businesses do not know how to apply to access the tax incentives (Dippenaar, 2018; Foster-Pedley & Hertzog, 2006). There is poor and inadequate education of the tax incentives. There are multiple government agencies dealing with incentives providing inconsistent information (Dippenaar, 2018). Section 12BA of the Income Tax Act (Republic of South Africa, 1962) offers an accelerated allowance for renewable energy tax incentive. This tax incentive is intended to accelerate private investment and help address the energy crisis. Investments in RE projects that are put into operation for the first time on or after 1 March 2023, but before 1 March 2025, are eligible for this additional tax incentive in terms of section 12BA. Under section 12BA, a 125 percent capital allowance in the first year for qualifying capital expenditure in relation to any RE project is available to any taxpayer' conducting trade including businesses under the enhanced RE tax incentive. The design duration of two-years is a short period not allowing businesses, especially small businesses, adequate time to access and utilise this tax incentive.

The challenge is that given the incentive's limited two-year duration, if proves successful and more businesses rush to utilise this incentive, it may lead to a surge in the demand for solar PV panels in South Africa, driving up the costs, and therefore nullifying the benefit (Engelbrecht, & Hassan, 2024; Majola & Langerman, 2023). The price increase for the solar photovoltaic (PV) panels would impact smaller businesses more. Furthermore, although South Africa provides a tax credit for rooftop solar for enterprises, a challenge facing this section 12B 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. This is contrary to the intention of the National Treasury as the higher capacity tax will discourage investment in RE (BusinessTech, 2023). 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 taxpayers to increase their solar usage.

5. Conclusion and Recommendations

South Africa's RE financial and tax incentives policy is ineffective in encouraging adoption and upscale to REG. Proper design of RE financial instruments and tax incentives as well as implementation thereof is required to reduce reliance on fossil fuels as they are heavily associated with pollution and destruction of the environment as well as not providing the much-needed energy security. This will assist industries to avoid further temperature increases from them and the emission of GHG that advance climate change. RE financial instruments and tax incentives which are simple and easy to administer need to be designed to attract businesses to upscale RE. Develop RE financial instruments and tax incentives with lower administration costs to adequately encourage investment in RE. Furthermore, awareness and education about the RE financial and tax instruments is needed for businesses in order to attract them to adopt REG as well as to utilise, uptake and access available financial and tax incentives to accelerate the adoption. There is no one size-fits-all approach to establishing design of financial instruments and tax incentives that are required to stimulate and incentivise the business to participate in REG.

References

Abdmouleh, Z., Alammari, R. A., & Gastli, A. (2015). Review of policies encouraging renewable energy integration & best practices. *Renewable and Sustainable Energy Reviews*, 45:249-262. doi.org/10.1016/j.rser.2015.01.035.

Aguirre, M., & Ibikunle, G. (2014). Determinants of renewable energy growth: A global sample analysis. *Energy Policy*, 69:374-384. doi.org/10.1016/j.enpol.2014.02.036.

Akinbami, O.M., Oke, S.R., & Bodunrin, M.O., (2021). The state of renewable energy development in South Africa: An overview. *Alexandria Engineering Journal*, 60(6):5077-5093. doi.org/10.1016/j.aej.2021.03.065.

Avi-Yonah, R.S., & Sartori, N. (2011). US Subpart F legislative proposals: A comparative perspective. *University of Michigan Public Law Working Paper No. 264*. doi.org/10.2139/ssrn.1991966.

Azimoh, C. L., Dzobo, O., & Mbohwa, C. (2017). Investigation of net metering as a tool for increasing electricity access in developing countries. *IEEE Electrical Power and Energy Conference*, *Saskatoon, October 22-25. IEEE. 1-6*. doi.org/10.1109/EPEC.2017.8286187.

Banerjee, S.G., Moreno, F.A., Sinton, J., Primiani, T., & Seong, J. (2017). *Regulatory indicators for sustainable energy* [online]. Washington, D.C: World Bank Group. Retrieved from: http://documents.worldbank.org/curated/en/538181487106403375/Regulatory-indicators-for-sustainable-energy-a-global-scorecard-for-policy-makers.

Blake, W.I. (2022). A comparative analysis of tax incentives for investors in SMEs between South Africa and selected G20 countries. *MCom (Taxation) thesis. North-West University, Potchefstroom*. http://hdl.handle.net/10394/39392.

Brunori, D. (2016). *State tax policy: A primer*. 4th Edition. London: Rowman & Littlefield.

6). *State tax policy: A primer*. 4th Edition. London: Rowman & Littlefield.

BusinessTech., (2023). *Two big problems for rooftop solar in South Africa* [online]. BusinessTech. Retrieved from: https://businesstech.co.za/news/energy/717858/two-big-problems-for-rooftop-solar-in-south-africa/

Celani, A., Dressler, L., & Wermelinger, M. (2022). Building an Investment Tax Incentives database: Methodology and initial findings for 36 developing countries. *OECD Working Papers on International Investment*, 2022/01. Paris: OECD Publishing. doi.org/10.1787/18151957.

Chen, D., Harris, P.A., & Zolt, E.M. (2018). *Design and assessment of tax incentives in developing countries: Selected issues and a country experience* [online]. New York: United Nations. Retrieved from: https://financing.desa.un.org/document/design-and-assessment-tax-incentives-developing-countries

Congress of South African Trade Unions (COSATU). (2022). Just Transition [Online]. South Africa: The Congress of South African Trade Unions. Retrieved from http://mediadon.co.za/wp-content/uploads/2022/04/COSATU-Just-Transition-Blueprint-Full-version.pdf

Couture, T.D., Cory, K., Kreycik, C., & Williams, E. (2010). Policymaker's guide to feed-in tariff policy design. National Renewable Energy Lab. doi.org/10.2172/984987.

Cox, S. (2016). Financial incentives to enable clean energy deployment: Policy overview and good practices. *National Renewable Energy Lab*. doi.org/10.2172/1239887.

Davis Tax Committee. 2018. Report on the feasibility of a Wealth Tax in South Africa for the Minister of Finance [online]. Retrieved from: 20180329 Final DTC Wealth Tax Report - To Minister.pdf (taxcom.org.za)

Cox, S., & Esterly, S. (2016). Feed-in tariffs: Good practices and design considerations (No. NREL/TP-6A20-65503). *National Renewable Energy Lab. (NREL), Golden, CO (United States)*. https://doi.org/10.2172/1236677

De Jager, D., Rathmann, M., Klessmann, C., Coenraads, R., Colamonico, C., & Buttazzoni, M. (2008). Policy instrument design to reduce financing costs in renewable energy technology projects. *PECSNL062979, International Energy Agency Implementing Agreement on Renewable Energy Technology Deployment*.
Retrieved from: http://www.ecofys.com/com/publications/documents/Report_policy_instrument_design_to_reduce_financing_costs_in_renewable_energy_technology_pro.pdf
Department of Mineral Resources and Energy. *Integrated Resource Plan* [Online] Retrieved from: https://cer.org.za/wp-content/uploads/2006/08/Draft-Integrated-Resource-Plan-2023-for-comment-4-Jan-2024.pdf
Dippenaar, M. (2018). The role of tax incentives in encouraging energy efficiency in the largest listed South African businesses. *South African Journal of Economic and Management Sciences*, *21(1):1-12*. doi.org/10.4102/sajems.v21i1.1723.
Dong, C., Zhou, R., & Li, J. (2021). Rushing for subsidies: The impact of feed-in tariffs on solar photovoltaic capacity development in China. *Applied Energy*, *281*, 116007.
https://doi.org/10.1016/j.apenergy.2020.116007
Dong, K., Wei, S., Liu, Y., & Zhao, J., (2023). How does energy poverty eradication promote common prosperity in China? The role of labor productivity. *Energy Policy*, *181*, 113698.
https://doi.org/10.1016/j.enpol.2023.113698
Engelbrecht, K.J.B., & Hassan, M. (2024). Solar photovoltaic panels tax rebate: Is the tax rebate the right tax incentive choice for South Africa? In: Moloi, T., George, B. (eds). Towards digitally transforming accounting and business processes. *ICAB 2023. Springer Proceedings in Business and Economics. Springer, Cham*. doi.org/10.1007/978-3-031-46177-4_11.
Falchetta, G., Michoud, B., Hafner, M., & Rother, M. (2022). Harnessing finance for a new era of decentralised electricity access: A review of private investment patterns and emerging business models. *Energy Research & Social Science, 90:102587*. doi.org/10.1016/j.erss.2022.102587.
Foster-Pedley, J., & Hertzog, H. 2006. Financing strategies for growth in the renewable energy industry in South Africa. Journal of Energy in Southern Africa, 17(4):57-64. doi.org/10.17159/2413-3051/2006/v17i4a3209.
Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I.A., Diedhiou, A., Djalante, R., Ebi, K.L., Engelbrecht, F., & Guiot, J. (2018). *Impacts of 1.5 C global warming on natural and human systems* [online]. Intergovernmental Panel on Climate Change. Retrieved from: https://www.ipcc.ch/sr15/
Jenner, S., Groba, F., & Indvik, J. (2013). Assessing the strength and effectiveness of renewable electricity feed-in tariffs in European Union countries. *Energy policy*, *52*, 385-401.
https://doi.org/10.1016/j.enpol.2012.09.046
Guild, J. (2019). Feed-in-tariffs and the politics of renewable energy in Indonesia and the Philippines. *Asia & the Pacific Policy Studies*, 6(3):417-431. doi.org/10.1002/app5.288.
Haas, R., Panzer, C., Resch, G., Ragwitz, M., Reece, G., & Held, A. (2011). A historical review of promotion strategies for electricity from renewable energy sources in EU countries. *Renewable and sustainable energy reviews*, *15*(2*), 1003-1034*.
https://doi.org/10.1016/j.rser.2010.11.015
IEA *see* International Energy Agency
International Energy Agency. (2024). *Electricity 2024: Analysis and forecast to 2026* [online]. Paris: IEA Publications. Available from: https://iea.blob.core.windows.net/assets/ddd078a8-422b-44a9-a668-52355f24133b/Electricity2024-Analysisandforecastto2026.pdf

International Renewable Energy Agency. 2022. *World Energy Transitions Outlook 2022: 1.5°C Pathway* [online]. Abu Dhabi: International Renewable Energy Agency. Available from: www.irena.org/publications

International Renewable Energy Agency. 2023. *World Energy Transitions Outlook 2023: 1.5°C Pathway* [online]. Abu Dhabi: International Renewable Energy Agency. Available from: https://www.irena.org/Publications/2023/Jun/World-Energy-Transitions-Outlook-2023

Keyuraphan, S., Thanarak, P., Ketjoy, N., & Rakwichian, W. (2012). Subsidy schemes of renewable energy policy for electricity generation in Thailand. *Procedia Engineering*, *32*, 440-448. https://doi.org/10.1016/j.proeng.2012.01.1291

Komor, P., & Bazilian, M. (2005). Renewable energy policy goals, programs, and technologies. *Energy Policy*, *33*(14), 1873-1881.
https://doi.org/10.1016/j.enpol.2004.03.003

Lantz, E., & Doris, E. (2009). *State clean energy practices: Renewable energy rebates*. Denver: National Renewable Energy Lab. doi.org/10.2172/950149.

Lipp, J. (2007). Lessons for effective renewable electricity policy from Denmark, Germany and the United Kingdom. *Energy policy*, *35*(11), 5481-5495.
https://doi.org/10.1016/j.enpol.2007.05.015.

Majola, C. M. D., & Langerman, K. E. (2023). Energy efficiency in the South African mining sector: A case study at a coal mine in Mpumalanga. *Journal of the Southern African Institute of Mining and Metallurgy*, *123*(9), 451-462.
http://dx.doi.org/10.17159/2411-9717/1788/2023.

Makamela, K.C., & Ramfol, R. (2023). A Comparative Analysis of South Africa's Carbon Pricing Policy in the Power and Energy-Intensive Industries. In ICABR Conference (pp. 817-834). Cham: Springer Nature Switzerland.

Martinot, E., & Sawin, J. L. (2005). Renewables 2005: Global status report. *Washington, DC: Worldwatch Institute*. Retrieved from: http://www.martinot.info/Martinot_WREA2007.pdf

Meier, P., Vagliasindi, M., & Imran, M., 2014. *The design and sustainability of renewable energy incentives: an economic analysis*. Washington, DC: World Bank Publications. https://doi.org/10.1596/978-1-4648-0314-7.

Mousavian, H.M., Shakouri, G.H., Mashayekhi, A.N., & Kazemi, A. (2020). Does the short-term boost of renewable energies guarantee their stable long-term growth? Assessment of the dynamics of feed-in tariff policy. *Renewable Energy*, 159:1252-1268. doi.org/10.1016/j.renene.2020.06.068.

Nortje, D. (2009). A literature study of renewable energy tax incentives [online]. MCom dissertation. University of Pretoria, Pretoria. Retrieved from: https://www.proquest.com/dissertations-theses/literature-study-renewable-energy-tax-incentives/docview/2901810864/se-2?accountid=14648

Odeku, K. O., Meyer, E. L., Mireku, O., Letsoalo, J. L. H., & Trepagnier, P. C. (2011). Sustainable Development Law & Policy. *Sustainable Development Law & Policy*, *11*(2), 1-100.
Retrieved from: https://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1458&context=sdlp.

OECD *see* Organisation for Economic Development.

OECD/AUC/ATAF. (2023). *Revenue Statistics in Africa 2023* [online]. Paris: OECD Publishing. Available from: doi.org/10.1787/15bc5bc6-en-fr

Organisation for Economic Development. (2014). *Policy framework for investment user's toolkit – Chapter 5: Tax policy* [online]. Paris: OECD Publishing. Retrieved from: https://www.scribd.com/document/485901425/41890309-pdf

Organisation for Economic Development. (2018). *South Africa*. *OECD Economic Outlook, 2018(2)* [online]. Paris: OECD Publishing. Available from: doi.org/10.1787/eco_outlook-v2018-2-en

Organisation for Economic Development. (2022). *OECD Investment Tax Incentives Database* [online]. Paris: OECD Publishing. Retrieved from: www.oecd.org/investment/investment-policy/oecdinvestment-tax-incentives-database-2022-update-brochure.pdf

Owusu-Manu Mankata, L.M., Debrah, C., Edwards, D.J., & Martek, I. (2021). Mechanisms and challenges in financing renewable energy projects in sub-Saharan Africa: A Ghanaian perspective. *Journal of Financial Management of Property and Construction*, 26(3):319-336. doi.org/10.1108/JFMPC-03-2020-0014.

Pegels, A., & Lütkenhorst, W. (2014). Is Germany' s energy transition a case of successful green industrial policy? Contrasting wind and solar PV. *Energy Policy*, *74*, 522-534.
doi.org/10.1016/j.enpol.2014.06.031

Pierce, W.T., & Le Roux, M., (2023). *Statistics of utility-scale power generation in South Africa in 2022* [online]. Council for Scientific and Industrial Research (CSIR). Retrieved from: https://www.csir.co.za/csir-releases-statistics-on-power-generation-south-africa-2022

Poullikkas, A., Kourtis, G., & Hadjipaschalis, I. (2013). A review of net metering mechanism for electricity renewable energy sources. *International Journal of Energy and Environment*, 4(6):975-1002. Retrieved from: http://www.ijee.ieefoundation.org/vol4/issue6/IJEE_06_v4n6.pdf

Purwandani, J.A., & Michaud, G. (2021). What are the drivers and barriers for green business practice adoption for SMEs? *Environment Systems and Decisions*, 41(4):577–593. doi.org/10.1007/s10669-021-09821-3.

Qadir Al-Motairi, H., Tahir, F., & Al-Fagih, L., (2021). Incentives and strategies for financing the renewable energy transition: A review. *Energy Reports*, 7:3590-3606. https://doi.org/10.1016/j.egyr.2021.06.041.

Ramaphosa, M.C. (2019). *2019 State of the Nation Address* [online]. South African Government. Retrieved from: https://www.gov.za/speeches/president-cyril-ramaphosa-2019-state-nation-address-7-feb-2019-0000

REN21. (2023). *Renewables 2023 Global Status Report Collection, Global Overview* [online]. Paris: REN21 Secretariat. Retrieved from: http://www.ren21.net/gsr-2023

Revesz, R.L., & Unel, B. (2016). Managing the future of the electricity grid: Distributed generation and net metering. *Harvard Environmental Law Review*, 41(1):1-68. doi.org/10.2139/ssrn.2734911.

Schmidt, T. S., Matsuo, T., & Michaelowa, A. (2017). Renewable energy policy as an enabler of fossil fuel subsidy reform? Applying a socio-technical perspective to the cases of South Africa and Tunisia. *Global Environmental Change*, *45*, 99-110.
https://doi.org/10.1016/j.gloenvcha.2017.05.004

Shi, H., Xu, H., Gao, W., Zhang, J., & Chang, M., (2022). The impact of energy poverty on agricultural productivity: The case of China. *Energy Policy*, *167*, 113020.
https://doi.org/10.1016/j.enpol.2022.113020.

Shome, P. (2021). Taxation history, theory, law and administration. Cham: Springer. doi.org/10.1007/978-3-030-68214-9.

Skovgaard, J., & Van Asselt, H. (2019). The politics of fossil fuel subsidies and their reform: Implications for climate change mitigation. Wiley Interdisciplinary Reviews: Climate Change, 10(4), e581. https://doi.org/10.1002/wcc.581

Slemrod, J., & Bakija, J. (2017). *Taxing ourselves: a citizen's guide to the debate over taxes*. 5th Edition. Cambridge, MA: MIT Press.

South Africa, (2019). Carbon Tax Act, No. 15 of 2019. Government Gazette Extraordinary, 29 May No. 58. Pretoria: Government Printing Works.

Retrieved from: https://www.sars.gov.za/customs-and-excise/excise/environmental-levy-products/carbon-tax/
South Africa. (1962). Income Tax Act, No. 58 of 1962. Government Gazette Extraordinary, 29 May No. 58. Pretoria: Government Printing Works.
South Africa. (1964). Customs and Excise Act, No. 91 of 1964. *Pretoria: Government Printing Works*. Retrieved from: https://www.gov.za/documents/customs-and-excise-act-31-jul-1964-0000.
South Africa. Department of Environment Affairs and Tourism. 2004. National Climate Change Response Strategy for South Africa [online]. Pretoria: Department of Environment Affairs and Tourism. Retrieved from: https://unfccc.int/sites/default/files/sem_sup3_south_africa.pdf.
South Africa. National Treasury. (2019). Draft explanatory memorandum on the draft income tax amendment bill. Pretoria: National Treasury [online]. Retrieved from: https://www.treasury.gov.za/public%20comments/2019BTDraftBills/2019%20Draft%20Explanatory%20Memorandum%20to%20the%202019%20Draft%20TLAB%20-%2021%20July%202019.pdf.
South Africa. National Treasury. 2023. Enhanced renewable energy incentive for businesses [online]. National Treasury. Retrieved from: https://www.treasury.gov.za/comm_media/press/2023/2023112001%20FAQ%20Enhanced%20renewable%20energy%20incentive%20for%20businesses.pdf.
South African Revenue Service (SARS). (2023). Draft Guide on the Tax Treatment of the Net-billing Tariff System for Excess Power Generated [online]. Retrieved from: https://www.sars.gov.za/wp-content/uploads/Legal/Drafts/Legal-LPrep-Drafts-2023-25-Draft-Guide-Tax-Treatment-of-the-NM-Tariff-System-for-Excess-Power-Generated.pdf.
Steyn, G., Tyler, E., Roff, A., Renaud, C., & Mgoduso, L. (2021). *The just transition transaction: A developing country coal power retirement mechanism* [online]. Cape Town: Meridian Economics. Retrieved from: https://api.semanticscholar.org/CorpusID:244919723
Thetard, S. (2013). Finally a tax rebate with the energy to change.
https://doi.org/10.1016/j.enpol.2020.111576.
UNCTAD *see* United Nations Conference on Trade and Development.
UNEP *see* United Nations Environment Programme.
United Nations Conference on Trade and Development., (2023). Investment policies for the energy transition: Incentives and disincentives [online]. Investment Policy Monitor, 26. Available from:
United Nations Environment Programme. (2018). The Emissions Gap Report 2018 [online]. Nairobi: United Nations Environment Programme. Retrieved from: https://www.unep.org/resources/emissions-gap-report-2018.
Wiser, R., Pickle, S., & Goldman, C. (1997). Renewable energy and restructuring: policy solutions for the financing dilemma. The Electricity Journal, 10(10), 65-75.
https://doi.org/10.1016/S1040-6190(97)80321-1.