

Tax Incentives and Green Energy Investment in Migori County, Kenya

Okello Joseph Ogutu^{1*}, Peter Magero², Ronald Bonuke³

^{1,2}Department of Tax and Customs Administration, Kenya School of Revenue Administration

³Department of Marketing and Management Science, School of Business and Economics,
Moi University

Corresponding email: okelloogutu@gmail.com

Accepted: 23 September 2025 || Published: 06 November 2025

Abstract

Kenya has made notable progress in renewable energy, with over 75% of its electricity generated from geothermal, hydro, wind, and solar sources; however, the spread of green energy investments remains uneven across counties. In Migori County, despite abundant solar exposure, perennial rivers, and proximity to Lake Victoria, renewable energy investments have remained relatively low, raising concerns about the adequacy of fiscal incentives in stimulating local projects. This study assessed the effect of tax incentives on green energy investment in Migori County, focusing on the influence of green bonds and value-added tax (VAT) exemptions. The study adopted an explanatory research design, considered appropriate for examining the causal connections between tax incentives and green energy investments in Migori County. The target population comprised 540 stakeholders actively involved in green energy development, namely investors, financial institutions, government tax policy officials, and energy sector experts, from which a stratified random sample of 230 respondents was drawn. Primary data were collected through structured questionnaires administered via drop-and-pick and online methods, while analysis involved descriptive statistics, correlation, and multiple linear regression. Regression analysis revealed that tax incentives had a statistically significant and positive effect on green energy investment: VAT exemptions ($\beta = 0.296$, $p = 0.001$) and green bonds ($\beta = 0.251$, $p = 0.003$). The study concluded that tax incentives play a vital role in promoting renewable energy in devolved units such as Migori County and recommended simplification of tax exemption procedures, enhanced investor awareness, and stronger implementation of fiscal policies.

Keywords: *Tax Incentives, Green bonds, Value Added Tax (VAT), Green Energy Investment, Migori County*

How to Cite: Ogutu, O. J., Magero, P., & Bonuke, R. (2025). Tax Incentives and Green Energy Investment in Migori County, Kenya. *Journal of Finance and Accounting*, 5(8), 18-30.

1. Introduction

Globally, the transition to green energy has gained momentum as countries respond to the urgent challenges of climate change, energy insecurity, and environmental decline. International agreements, particularly the Paris Accord, have compelled nations to commit to ambitious emission-reduction targets while scaling up the adoption of clean energy sources (UNFCCC, 2015). In pursuit of these commitments, governments increasingly employ tax incentives as deliberate policy tools to attract investment into the green energy sector. Such fiscal measures, including investment tax credits, accelerated depreciation, and feed-in tariffs, have proven successful in mobilizing large-scale financing in countries such as the United States, China, and Germany (IEA, 2023; OECD, 2022). These mechanisms not only reduce the high upfront costs of projects but also improve their long-term economic viability.

Across Africa, green energy is becoming central to sustainable development and resilience to climate risks. The African Union's Agenda 2063 highlights clean energy as a driver of inclusive economic transformation and reduced dependence on fossil fuels (African Union, 2020). Several African states have adopted fiscal strategies to attract private sector participation. South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), for instance, combines competitive bidding with tax incentives, unlocking investments worth more than USD 14 billion (World Bank, 2022). Likewise, Ethiopia and Morocco have utilized tax holidays, duty waivers, and preferential tariffs to stimulate green energy expansion (AfDB, 2023).

Kenya has placed green energy at the core of its economic and environmental agenda. Currently, geothermal, solar, wind, and hydropower sources account for more than 80% of the national electricity supply (KenGen, 2022). To encourage further investment, the government has introduced fiscal incentives such as value-added tax (VAT) exemptions on equipment, income tax holidays for Independent Power Producers (IPPs), and accelerated depreciation allowances for green projects (National Treasury, 2023). The launch of the Kenya Green Bond Programme in 2017 has also widened financing opportunities for sustainable projects (CMA, 2022). While these interventions have supported sectoral growth, investments remain concentrated in urban and more developed regions, creating disparities in access to clean energy solutions.

Migori County illustrates these inequalities. Despite having significant green energy potential, particularly in solar and micro-hydro resources, energy access is still limited. A majority of households rely on charcoal, firewood, and kerosene, which worsen environmental degradation and cause health risks (KNBS, 2020; Omondi, 2021). Although national tax incentives are theoretically accessible across all counties, their effectiveness in Migori has been constrained by infrastructural gaps, low investor awareness, and challenges in policy implementation (Ngugi & Njiru, 2022).

There is growing recognition that tailored county-level fiscal interventions could better stimulate green energy uptake in underserved regions such as Migori. Tools like VAT exemptions, investment deductions, and accelerated depreciation can reduce risks, increase returns, and enhance project bankability. However, limited evidence exists on how such incentives influence investment decisions at the county level. This study, therefore, evaluates the role of tax incentives in promoting green energy investment in Migori County, while identifying institutional and policy challenges that limit their impact. The findings aim to

provide practical recommendations for refining fiscal policy to align with Kenya's clean energy transition agenda and the African Union's vision, while also addressing persistent inequities in grassroots energy access (Mutua, 2022; Mwangi & Kiptoo, 2023).

1.1 Problem Statement

Kenya has made commendable progress in the development of green energy, with more than 75 percent of its electricity generated from geothermal, hydro, wind, and solar resources (KNEP, 2021). Despite these gains, the distribution of green energy investments across counties remains uneven. Migori County, though endowed with high solar irradiation, perennial rivers that could support small hydropower, and substantial biomass resources, contributes less than 1.5 percent of national green energy investments (Kenya Investment Authority, 2022). This underrepresentation raises concern about why a county with vast renewable resources is lagging in the clean energy transition.

The Government of Kenya has rolled out several tax incentives to stimulate private sector participation in green energy, including value-added tax (VAT) exemptions, import duty waivers, accelerated depreciation, and investment deductions (National Treasury, 2023). However, uptake of these incentives in Migori has been extremely low. Between 2021 and 2023, Kenya Revenue Authority data shows that only two claims for green energy tax incentives were made from Migori, compared to over 200 nationally (KRA, 2023). This limited utilization suggests the existence of barriers such as inadequate investor awareness, bureaucratic challenges, poor infrastructure, or weak policy enforcement at the county level.

Moreover, most studies on tax incentives and green energy investment in Kenya have concentrated on national or urban contexts, while rural counties like Migori with unique socio-economic and institutional conditions have received little scholarly focus. This lack of localized evidence makes it difficult for policymakers to design county-specific fiscal strategies that effectively address investment challenges. As a result, it remains unclear to what extent tax incentives influence green energy investment in Migori County. This study, therefore, seeks to fill this gap by examining the effect of green bonds and VAT exemptions on green energy projects in Migori County, to provide evidence-based guidance for policy and practice to foster inclusive and sustainable energy development.

1.2 Research Objectives

- i. To assess the influence of green bonds on green energy investment in Migori County.
- ii. To examine the effect of Value Added Tax (VAT) exemptions on green energy investment in Migori County.

1.3 Research Hypotheses

H₀₁: Green bonds have no significant impact on green energy investment in Migori County, Kenya.

H₀₂: Value Added Tax (VAT) exemptions have no significant effect on green energy investment in Migori County, Kenya.

2. Literature Review

2.1 Theoretical Review

2.1.1 Ecological Modernization Theory

Developed in the 1980s by scholars such as Joseph Huber (1982), Maarten Hajer (1995), and Arthur Mol (1996), Ecological Modernization Theory (EMT) argues that economic growth and environmental sustainability are not inherently incompatible. Instead, through technological innovation, institutional reform, and regulatory support, modernization can achieve both ecological protection and economic efficiency (Jorgenson, 2022).

For Migori County, EMT provides a framework for understanding how green energy contributes to local development objectives. With a growing population and limited grid connectivity, decentralized technologies such as solar mini-grids, micro-hydro plants, and biogas systems align with EMT principles by offering clean, scalable, and affordable solutions (Okello, 2022). These technologies not only reduce dependence on traditional fuels but also create jobs, enhance livelihoods, and conserve the environment.

From this perspective, tax incentives become strategic tools for advancing ecological modernization. By encouraging private investment in renewable energy, fiscal policies can accelerate structural transitions toward a low-carbon economy. This aligns with Kenya's Vision 2030 and global commitments like the Sustainable Development Goals (particularly SDGs 7 and 13), reinforcing the role of fiscal policy in fostering sustainable energy transitions at the county level.

2.2 Empirical Review

2.2.1 Green Bonds and Green Energy Investments

Flammer (2021), in *Corporate Green Bonds and Sustainable Investments*, examined the association between issuing green bonds and increased allocations to sustainability projects. Drawing on econometric analyses, the study demonstrated that firms engaging in green bond financing expanded their environmental investments. However, while the study affirmed the global potential of green bonds, it did not consider localized contexts such as rural counties. This study thus extended the debate by assessing their relevance to Migori's green energy initiatives. Similarly, Tang and Zhang (2020), in their U.S.-focused panel study, established that firms issuing green bonds dedicated roughly 15% more resources to green energy projects compared to non-issuers. Although this confirmed their utility in influencing investment behavior, the findings were confined to developed economies. The current study bridged this limitation by situating the analysis within Kenya's rural counties.

Adebayo (2021), using a mixed-methods case study in Nigeria, found that green bonds supported long-term financing of solar mini-grids. Yet, the study failed to integrate other fiscal incentives, such as VAT reliefs or tax credits. The present research responded to this omission by examining green bonds alongside other fiscal tools in Migori.

Lindenberg (2020), investigating South Africa, highlighted that transparent regulatory frameworks boosted investor trust and mobilized large-scale financing through green bonds. Nevertheless, accessibility for SMEs remained constrained. The present research considered how tax incentives could enhance access for smaller actors in rural Migori.

Mwangi (2022), surveying East African investors, reported optimism about green bonds but also policy uncertainty that deterred uptake. Building on this, the current study analyzed how integrating tax incentives could stabilize investor confidence at the county level. Mutuku and Kimani (2023) revealed that county-level adoption of green bonds in Kenya attracted institutional investors and improved project completion. Their work underscored the significance of policy clarity and transparency—factors directly relevant to Migori. Similarly, Kamau and Otieno (2023) noted that weak regulatory capacity slowed bond adoption, a finding that this study addressed by recommending county-specific fiscal adjustments.

2.2.2 VAT Exemptions and Green Energy Investments

Aldy and Pizer (2019) investigated VAT exemptions in Europe and North America and showed a 20% rise in solar and wind investments where such measures were in place. Although empirically robust, their work lacked applicability to decentralized fiscal environments. The present study localized its framework to Kenya's county setting.

In China, Wang et al. (2022) concluded that VAT exemptions significantly cut costs and drew private investment. However, their centralized governance context contrasts with devolved units like Migori. This study addressed this governance variation by exploring VAT's role under Kenya's county structures.

The International Renewable Energy Agency (IRENA, 2023) emphasized globally that VAT exemptions reduce upfront costs and stimulate adoption by households and SMEs. Yet, findings were generalized across regions. This research sharpened the focus by testing outcomes within Migori County.

Kimani and Wambua (2022) confirmed that VAT incentives reduce costs in Sub-Saharan Africa but observed enforcement inconsistencies. This study extended its analysis by identifying how similar bottlenecks emerge in Migori.

Bwire and Nyakundi (2023) compared Kenya, Uganda, and Tanzania, concluding that VAT exemptions improved solar affordability but were undermined by weak inter-agency coordination. The present study analyzed such coordination between Migori County and national revenue bodies.

Kenyan studies (e.g., Ochieng & Kamau, 2022; Mwangi & Otieno, 2023; Omondi & Njeri, 2023) echoed concerns over administrative inefficiencies, limited investor awareness, and delayed approvals. This research contributed fresh evidence from Migori investors to show how these obstacles hinder VAT effectiveness.

The Kenya Revenue Authority (KRA, 2022) similarly acknowledged that while VAT incentives reduce costs, awareness gaps persist. The current study contextualized this evidence by suggesting county-level outreach and capacity-building measures.

2.3 Conceptual Framework

A conceptual framework serves as both an analytical and visual tool that clarifies the interaction among the variables under study. As noted by Orodho (2019), such a framework establishes the logical linkages between independent and dependent variables, thereby providing direction for the research and ensuring consistency between objectives, methodology, and data analysis. In this study, the framework was designed to demonstrate how tax incentives influence decisions on green energy investment in Migori County.

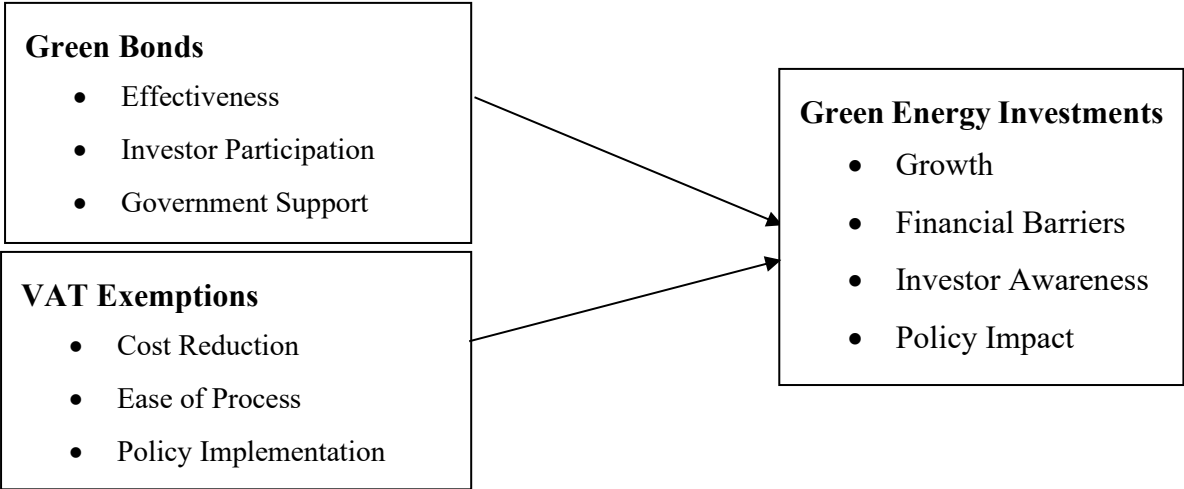


Figure 1: Conceptual Framework

Independent Variables

Dependent Variable

3. Methodology

The study adopted an explanatory research design, considered appropriate for examining the causal connections between tax incentives and green energy investments in Migori County. The target population comprised 540 stakeholders actively involved in green energy development, namely investors, financial institutions, government tax policy officials, and energy sector experts, from which a stratified random sample of 230 respondents was drawn. Primary data were collected through structured questionnaires administered via drop-and-pick and online methods, while analysis involved descriptive statistics and multiple regression analysis.

4. Results and Discussion

4.1 Descriptive Analysis

Descriptive analysis was employed to summarize the perceptions of respondents concerning the effectiveness of selected tax incentives in stimulating green energy investment in Migori County. In research, descriptive statistics are analytical techniques that allow data to be organized, summarized, and presented manner, thereby highlighting patterns and trends to inferential testing (Hair et al., 2021). The present study utilized responses collected through a structured questionnaire based on a five-point Likert scale, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

4.1.1 Green Bonds

Table 1: Green Bonds

Statement	Mean	SD	Minimum Mean (SD)	Maximum Mean (SD)
Green bonds effectively finance green energy projects.	3.79	1.12		3.79 (1.12)
Investor participation in green bond-funded projects is increasing.	3.40	1.22		
The government provides sufficient support for green bonds.	2.37	1.43	2.37 (1.43)	
Green bonds have contributed to increased green energy investments.	3.15	1.14		

The results in Table 1 indicate diverse perceptions among stakeholders regarding the role of green bonds in facilitating green energy investment in Migori County. The statement, “Green bonds effectively finance green energy projects,” obtained the highest mean of 3.79 (SD = 1.12). This suggests that while respondents generally recognized green bonds as a potentially useful financial instrument for green energy, the score being below the strong agreement threshold reflects only moderate confidence in their effectiveness.

Conversely, the lowest mean score of 2.37 (SD = 1.43) was reported for the statement, “The government provides sufficient support for green bonds.” This result demonstrates broad disagreement and considerable variability in perceptions, pointing to a lack of adequate government involvement or weak institutional support systems to operationalize green bond initiatives at the county level.

The item, “Green bonds have contributed to increased green energy investments,” yielded a moderate mean of 3.15 (SD = 1.14). Notably, 40.45 percent of respondents selected the neutral option, an indication of uncertainty possibly arising from limited awareness, minimal investor participation, or the relatively slow uptake of green bonds within the country. Similarly, the mean score of 3.40 (SD = 1.22) for investor participation reflected moderate agreement, albeit with varied opinions across respondents.

Overall, these findings highlight both opportunities and challenges in using green bonds to finance green energy transitions in Migori County. While stakeholders acknowledged their potential role, the lack of sufficient government support and limited investor engagement emerged as major constraints. This underscores the need for targeted policy interventions, enhanced public awareness, and strengthened institutional frameworks to expand the use of green bonds as a sustainable financing mechanism.

4.1.2 VAT Exemptions

Table 2: VAT Exemption

Statement	Mean	SD	Minimum Mean (SD)	Maximum Mean (SD)
VAT exemptions lower the cost of renewable energy investments.	3.44	1.39		
The process of obtaining VAT exemptions is straightforward.	2.63	1.23	2.63 (1.23)	
The government effectively implements VAT exemption policies.	2.72	1.06		
VAT exemptions have increased investments in green energy.	3.61	1.20		3.61 (1.20)

Table 2 presents the descriptive statistics on respondents’ perceptions of VAT exemptions as a fiscal tool for promoting green energy investment in Migori County. The results indicated that VAT exemptions were generally viewed positively, though concerns were raised regarding their implementation. The item, “VAT exemptions have increased investments in green energy,” recorded the highest mean of 3.61 (SD = 1.20), demonstrating that most respondents agreed that these incentives play a role in stimulating investment in the sector. Likewise, the statement, “VAT exemptions lower the cost of green energy investments,” had a mean score of 3.44, suggesting that participants recognized VAT relief as an important mechanism for reducing initial capital requirements and improving affordability.

Despite these positive perceptions, respondents highlighted barriers related to accessibility and policy execution. The item, “The process of obtaining VAT exemptions is straightforward,” produced the lowest mean of 2.63 (SD = 1.23), reflecting perceptions of bureaucratic procedures and administrative challenges that may discourage investors. Similarly, the statement, “The government effectively implements VAT exemption policies,” attained a mean of 2.72 (SD = 1.06), with a majority of respondents reporting neutral views. This neutrality suggested possible gaps in policy awareness, insufficient outreach, or limited clarity regarding eligibility requirements.

In summary, while VAT exemptions were perceived as an effective measure for lowering costs and encouraging investment in green energy, their overall impact appeared to be constrained by administrative inefficiencies and weak communication channels. These results point to the need for simplified procedures, enhanced policy awareness, and stronger institutional support to ensure that VAT exemptions fully achieve their intended purpose of promoting sustainable energy development in Migori County. The subsequent section presents findings on accelerated depreciation as an additional fiscal incentive.

4.1.3 Green Energy Investment

Table 3: Green Energy Investment

Statement	Mean	SD	Minimum Mean (SD)	Maximum Mean (SD)
Green energy investments in Migori County are growing.	3.01	1.04		
Financial constraints limit the expansion of green energy.	3.00	1.45		
Investors are well-informed about green energy opportunities.	2.43	1.09	2.43 (1.09)	
Tax incentives have made green energy investments more attractive.	3.37	1.30		3.37 (1.30)

The findings in Table 3 illustrate mixed perceptions regarding the progress of green energy investment in Migori County. The statement “Tax incentives have made green energy investments more attractive” registered the highest mean of 3.37 (SD = 1.30), suggesting moderate agreement that fiscal incentives are beginning to stimulate investor interest in green energy. This reflects a growing recognition of the role of government policies in shaping investment decisions, although the effect is not yet strongly established.

By contrast, the statement “Green energy investments in Migori County are growing” recorded a near-neutral mean of 3.01 (SD = 1.04), with over half of respondents’ undecided. This outcome implies that while there is potential for expansion, stakeholders have not yet observed significant or widespread growth in local green energy projects.

Financial barriers also emerged as a notable concern. The item “Financial constraints limit the expansion of green energy” had a mean of 3.00 (SD = 1.45), reflecting divergent opinions, likely linked to differences in access to financing, credit facilities, and investor capacity. Meanwhile, the statement “Investors are well-informed about green energy opportunities” recorded the lowest mean of 2.43 (SD = 1.09), with nearly half of the respondents disagreeing. This highlights a substantial information and awareness gap, suggesting that many potential investors lack adequate knowledge of available opportunities, fiscal measures, or technical aspects of green energy.

Overall, the results suggest that although tax incentives are gradually enhancing the attractiveness of green energy, their impact is undermined by limited awareness, information gaps, and financial barriers. Addressing these challenges through targeted outreach, financial facilitation, and capacity-building programs would be critical to unlocking the full potential of green energy investment in Migori County.

4.2 Regression Analysis

Multiple linear regression was applied to evaluate the influence of tax incentives on Green Energy Investment in Migori County. This method was employed to assess the extent to which these tax incentives explain variations in investment behavior within the renewable energy sector.

Table 4: Regression Coefficients Predictor

Regression Coefficients Predictor	Unstandardized B	Std. Error	Beta (β)	t-value	Sig. (p-value)
(Constant)	1.432	0.312	—	4.59	0.000
Green Bonds	0.273	0.089	0.251	3.07	0.003**
VAT Exemptions	0.315	0.094	0.296	3.35	0.001**

The regression results presented in Table 4 revealed that all the tax incentives significantly influenced green energy investment in Migori County. VAT Exemptions recorded the highest standardized beta coefficient ($\beta = 0.296$, $p = 0.001$), indicating its dominant role in stimulating investor participation through reduced upfront costs. Green Bonds had a significant positive effect ($\beta = 0.251$, $p = 0.003$) on green energy investment, suggesting their importance in mobilizing targeted financing for renewable projects. The regression constant (1.432) denoted the baseline level of green energy investment in the absence of fiscal incentives.

4.3 Hypothesis Testing

This section presents the results of hypothesis testing based on the multiple regression analysis. All hypotheses were tested at a 5% level of significance ($\alpha = 0.05$). The decision to reject or retain each null hypothesis was based on the comparison between the p-values of the regression coefficients and the significance threshold.

Table 5: Summary of Hypothesis Testing Results

Hypothesis	Variable	Coefficient (B)	Standardized Beta (β)	t-value	p-value	Decision at $\alpha = 0.05$	Conclusion
H ₀₁	Green Bonds	0.273	0.251	3.07	0.003	Reject H ₀₁	Significant positive effect
H ₀₂	VAT Exemptions	0.315	0.296	3.35	0.001	Reject H ₀₂	Strong, significant positive effect

VAT Exemptions emerged as the most influential factor ($B = 0.315$, $\beta = 0.296$, $t = 3.35$, $p = 0.001$), indicating that tax relief on renewable energy products plays a crucial role in reducing initial capital barriers and promoting investment. This finding is in line with Wanjiru and Otieno (2021), who reported that VAT relief significantly enhanced solar adoption in low-income communities.

Green Bonds also demonstrated a strong positive effect on Green Energy Investment ($B = 0.273$, $\beta = 0.251$, $t = 3.07$, $p = 0.003$), confirming their role as an effective instrument for mobilizing climate-aligned financing. This supports the observations of Mutuku and Kimani (2023), who noted that favorable policy frameworks enhance the ability of green bonds to channel funds into renewable energy projects.

5. Conclusion

The research concluded that fiscal incentives significantly and positively affect renewable energy investment in Migori County. VAT exemptions had the most influence as they directly lowered upfront costs. Green bonds also showed potential but required stronger policy support and market participation. Overall, limited investor awareness about available incentives emerged as a major constraint to their effectiveness.

6. Recommendations

To enhance the effectiveness of tax incentives in stimulating renewable energy investments in Migori County, several policy actions are recommended:

6.1 Simplify Access Procedures:

Lengthy bureaucratic processes and cumbersome documentation limit the full use of tax incentives. The Kenya Revenue Authority (KRA), working with the National Treasury and the County Department of Finance, should simplify and digitize application processes. Automated platforms and online clearance systems can reduce delays, limit discretion, and build investor confidence while curbing corruption.

6.2 Increase Investor Awareness:

The study revealed that many investors, especially SMEs and community groups, were unaware of existing tax incentives. The county government, in partnership with NGOs and development partners, should organize sensitization workshops, develop information toolkits, and conduct targeted rural outreach. These initiatives would demystify eligibility and application processes, encouraging greater uptake of incentives.

6.3 Strengthen Green Bond Uptake:

Although green bonds can provide long-term financing, uptake in Kenya remains limited. The government, in collaboration with financial institutions, should introduce credit guarantees, insurance mechanisms, and localized bond programs to reduce investor risk perceptions. Migori County could particularly benefit from green bonds tailored to support off-grid solar, small hydro, and other decentralized renewable projects.

6.4 Establish a County Incentive Desk:

A one-stop coordination desk should be set up at the county level to provide advisory services, process applications, and disseminate policy updates on tax incentives. Such a unit would

reduce investor burden, improve transparency, and create a more predictable investment environment attractive to local and foreign investors.

6.5 Build SME Capacity:

Given SMEs limited technical expertise, the county should conduct training programs on tax compliance and financial planning. This would expand local participation in renewable energy, generate jobs, and reduce fossil fuel reliance.

6.6 Showcase Success Stories:

The county should document and publicize successful renewable projects (e.g., solar mini-grids, biogas systems) to inspire investor confidence. Sharing such case studies through websites, exhibitions, and forums would highlight economic and social benefits, fostering replication and stronger community support.

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