# Belt and Road Initiative (BRI) and Sustainable Development: The Role of Chinese Renewable Energy Investments in East Africa’s Economic Growth

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# Introduction

# Background

The Belt and Road Initiative (BRI), launched in 2013, has evolved from a focus on hard infrastructure (ports, railways, highways) to an emphasis on sustainable development projects, including renewable energy ventures. In recent years, China has signaled a strategic shift toward “small and beautiful” BRI projects that are greener and less financially risky, aligning with global climate goals and host country needs. A landmark moment was President Xi Jinping’s 2021 pledge that China *“will not build new coal-fired power projects abroad,”* instead stepping up support for green and low-carbon energy in developing countries. This policy pivot has catalyzed a surge in Chinese investments in renewable energy across BRI participant nations. Notably, African countries received about US$21.7 billion in BRI deals in 2023 alone, with a significant portion directed to renewable energy initiatives. Such trends underscore the BRI’s transition toward facilitating clean energy infrastructure as a core component of China’s overseas engagement.

East Africa illustrates both the urgent need for renewable energy investment and the potential impact of China’s involvement. The region faces a substantial energy access gap: for example, only 45% of Ethiopia’s population has access to electricity (including off-grid solutions), and Tanzania’s electrification rate is around 37%, well below the sub-Saharan African. In many East African countries, traditional biomass (firewood, charcoal) still accounts for the majority of energy consumption *e.g.*, biomass represents roughly 90% of Tanzania’s total energy use, highlighting the reliance on unsustainable sources. While Kenya has made rapid progress (achieving about 75% access by 2018 through aggressive grid expansion, the broader region continues to grapple with electricity shortages, intermittent supply, and high costs. This energy deficit poses a barrier to economic growth and social development, impeding everything from industrial productivity to education and healthcare services. Addressing East Africa’s energy gap requires substantial investment in generation capacity and grid infrastructure, particularly through clean and renewable sources that can both meet demand and align with climate sustainability goals.

China has emerged as a pivotal partner in bridging East Africa’s energy infrastructure gap, leveraging the BRI framework to finance and construct large-scale renewable energy projects. Through concessional loans, foreign direct investment (FDI), and engineering expertise, Chinese enterprises and banks are funding solar parks, wind farms, and hydropower stations across the region. These investments are strategic for both sides: East African nations gain much-needed capital and technology to harness their vast solar and wind resources, while China strengthens diplomatic ties and creates overseas opportunities for its renewable energy companies. Over the past decade, Chinese investment in Africa’s energy sector reportedly increased tenfold. Even during the COVID-19 pandemic lull, green energy engagement under BRI rebounded in 2022, Chinese-backed solar, wind, and hydro projects in BRI countries grew by 50%, reaching about $2.7 billion in investment and $5.3 billion in construction contracts. East Africa has been a major beneficiary of this trend, given its political alignment with BRI and immense renewable potential. The stage is thus set to examine how these Chinese renewable energy investments are influencing East Africa’s economic trajectory. This introduction has framed the context of the BRI’s shift toward renewables and underscored East Africa’s energy challenges alongside China’s role. The remainder of this manuscript will assess the impact of Chinese renewable energy investments on East African economic growth, following a structured analysis of recent literature, data, case studies, and policy implications.

# Literature Review BRI, Renewable Energy, and Economic Growth

The intersection of BRI investments, renewable energy development, and economic growth in Africa has attracted growing scholarly attention in the past few years. Overall, existing studies suggest that infrastructure investment including energy infrastructure can significantly spur economic growth in developing countries. For instance, a panel data analysis by Mlambo (2022) covering 15 African states (2000–2017) found that *“China’s efforts in developing infrastructure are translating into economic growth”*. The study provides evidence of a positive relationship between Chinese infrastructure loans and GDP growth in Africa, indicating that, in general, Chinese-financed projects have been beneficial to recipient economies. This aligns with the broader development literature which posits that improved infrastructure (roads, power supply, etc.) lowers costs and raises productivity,

thereby boosting growth. However, much of this earlier research did not distinguish between traditional infrastructure and sustainable, renewable energy projects, nor did it focus on specific sub- regions like East Africa. The unique characteristics of renewable energy investments – such as their contribution to energy access, sustainability, and technology transfer warrant a more focused examination.

Recent studies have begun exploring the specific role of Chinese renewable energy investments in Africa’s development, revealing both opportunities and gaps. Wen et al. (2024), in an article published in *Energy Policy*, examine Chinese investments and energy independence in Africa. They find that Chinese energy investments are *“significantly associated with increased access to sustainable electricity”* and can potentially enhance the energy self-sufficiency of many African countries. In other words, Chinese-funded projects in renewables (solar panels, wind farms, etc.) help African nations reduce their reliance on imported fuels and expand domestic power generation capacity, which is a critical step toward both energy security and broader economic development. This is corroborated by reporting from Xinhua, which highlights that many African communities are now leveraging affordable Chinese solar technology to electrify rural villages. Improved energy access can have a cascading positive impact on growth by enabling new businesses, extending productive hours, and improving human capital outcomes (education, health via electrified facilities), aligning with Sustainable Development Goal 7 (affordable and clean energy).

On the other hand, some research emphasizes that the quality and local integration of Chinese renewable projects determine how much host economies truly benefit. Lema et al. (2021) investigated three large Chinese-backed renewable projects (in hydro, wind, and solar) in sub-Saharan Africa and introduced the notion of *“bounded benefits.”* They observed that while these projects did create some local jobs, supplier linkages, and training opportunities, the extent of these co-benefits was quite limited. Chinese renewable energy investments often follow an “enclave” model characterized by turnkey project delivery, imported technology, and even foreign labor which can restrict knowledge transfer and local value addition. Lema et al. caution against overly optimistic expectations, noting that without proactive policies by host governments, the local economic spillovers (e.g. development of local industry around renewables) remain modest. This finding highlights a gap in the literature:

while many studies document the physical and financial scale of Chinese investments, fewer assess how to maximize long-term developmental impacts such as capacity building and employment in the renewable energy sector.

There is also a body of literature examining environmental and sustainability aspects of the BRI in Africa, which indirectly links to economic outcomes. Some analyses argue that if BRI investments are steered toward renewables, they can yield environmental benefits and support sustainable growth in African countries. For example, a recent study on East African countries suggests that expanding BRI cooperation in clean energy projects *“offers significant environmental benefits and promotes sustainable development”* in the region. This implies that Chinese-backed renewable energy can help decouple growth from carbon emissions, contributing to cleaner development pathways. Conversely, other commentators have raised concerns about debt sustainability and governance, warning that without proper oversight, even green projects could lead to financial burdens or environmental trade-offs if not aligned with local needs. The mixed record of earlier BRI projects – some of which faced criticism for weak transparency or limited community consultation – underscores the need for research on governance frameworks that ensure mutual benefits.

# Methodology Research Design and Econometric Model

To assess the impact of Chinese renewable energy investments on East Africa’s economic growth, we employed a mixed-methods approach. The core of our analysis is a Panel data regression model, covering five East African countries over the period 2010–2023. The countries included Kenya, Ethiopia, Tanzania, Uganda, and Rwanda, are all participants in the BRI and have received Chinese investment in renewable energy projects. Panel data analysis is well-suited for this study because it allows us to observe variations across countries and over time, helping isolate the effect of renewable energy investment on economic performance while controlling for country-specific factors. The econometric specification can be summarized as follows:

GDP\_Growth 𝑖𝑡 = 𝛽0 + 𝛽1 RenewableFDI 𝑖𝑡 + 𝛽2 RenewableCapacity 𝑖𝑡 +

𝛽3 Governance 𝑖𝑡 + 𝜇𝑖 + 𝜀𝑖𝑡,

where *i* indexes the country and *t* indexes the year. GDP\_Growth (annual % growth in real GDP) is the dependent variable indicating economic growth. The key independent variables are Renewable FDI (annual foreign direct investment inflows from China into renewable energy, in USD millions) and Total Renewable Capacity (the total installed renewable energy capacity in the country, in megawatts, combining solar and wind). We include Governance Score as a control variable to account for the institutional context this is an index (drawn from World Bank governance indicators) reflecting political stability and regulatory quality, on which higher values indicate better governance. Country fixed effects (represented by μ\_i) are incorporated to control for unobserved heterogeneity such as geography or historical factors unique to each nation, and the error term ε\_it captures idiosyncratic shocks. By using a fixed-effects (within) estimator, we focus on within-country variations, effectively examining how changes in investment and capacity relate to changes in growth, net of country-specific constants.

The data for Renewable FDI were compiled from national investment reports and cross- verified with Chinese sources (such as MOFCOM and the AEI China Global Investment tracker) to specifically capture investments in solar, wind, and other renewable projects under the BRI framework. Renewable Capacity data (solar PV and wind installations) were obtained from the International Renewable Energy Agency (IRENA) and national energy agencies, providing yearly installed capacity figures. The Governance Score is an average of selected World Governance Indicators (such as Government Effectiveness and Regulatory Quality) normalized on a 0–1 scale for ease of interpretation.

# Case Study Approach

In addition to the quantitative analysis, we incorporated a qualitative case study approach focusing on two emblematic renewable energy projects: *Kenya’s Garissa Solar Power Plant* and *Ethiopia’s Adama Wind Farms*. These cases were selected because they are flagship projects of Chinese investment in East African renewable energy, exemplifying the BRI’s on-the-ground impact. The Garissa solar farm (50 MW) and the Adama wind farms (Adama I: 51 MW, Adama II: 153 MW)

both became operational in the last decade and have been cited in policy discussions as milestones for sustainable energy in the region. For each case, we reviewed project documents, news releases, and prior studies to gather information on project financing, implementation, outcomes, and any reported socio-economic impacts. Key metrics examined included the number of jobs created during construction and operation, improvements in local electricity access or reliability, and any links to broader economic activities (such as industrial parks or new businesses enabled by the power supply).

By using case studies, we aim to contextualize the statistical findings from the panel regression. The econometric model might tell us if renewable investment correlates with growth, but the case studies help explain how and why such investments translate (or do not translate) into tangible economic benefits. For example, the Kenyan solar plant case provides insight into how adding renewable generation capacity affects local communities and businesses, while the Ethiopian wind farms illustrate the role of governance and local participation, given Ethiopia’s deliberate efforts to involve local labor and use the electricity for industrial development. We treat these case studies as illustrative rather than as formal proofs; their purpose is to enrich the analysis with concrete examples, shedding light on mechanisms and nuances that GDP numbers alone might mask.

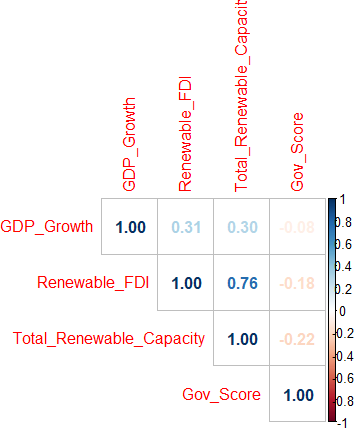
# Results & Discussion Econometric Findings: Renewable Investments and GDP Growth

The panel regression results reveal several notable relationships between renewable energy investments and economic growth in East Africa.

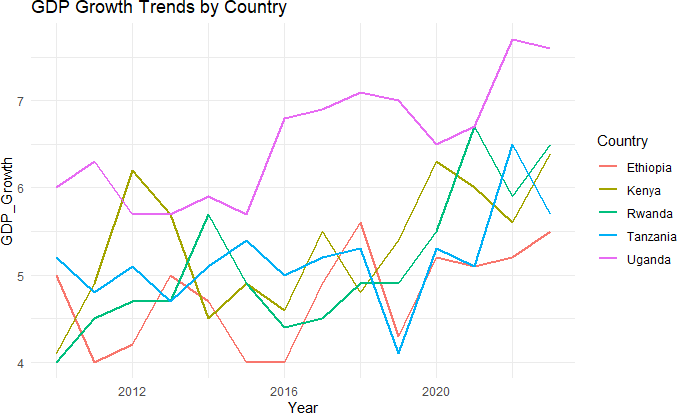
Hausman Test

data: GDP\_Growth ~ Renewable\_FDI + Total\_Renewable\_Capacity + Gov\_Score chisq = 0.083727, df = 2, p-value = 0.959

alternative hypothesis: one model is inconsistent

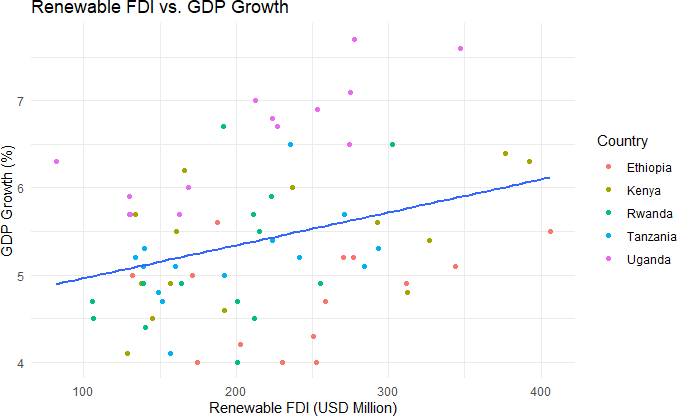


The table summarizes the key coefficients: Renewable FDI has a positive but small coefficient (β₁ ≈ 0.002) that is not statistically significant at conventional levels, Total Renewable Capacity has a positive and significant coefficient (β₂ ≈ 0.002, p < 0.01), and Governance Score carries a large positive coefficient (β₃ ≈ 41.27, p < 0.01). The model’s R² (~0.63 adjusted) suggests that roughly two- thirds of the within-country variance in GDP growth is explained by these factors and fixed effects.

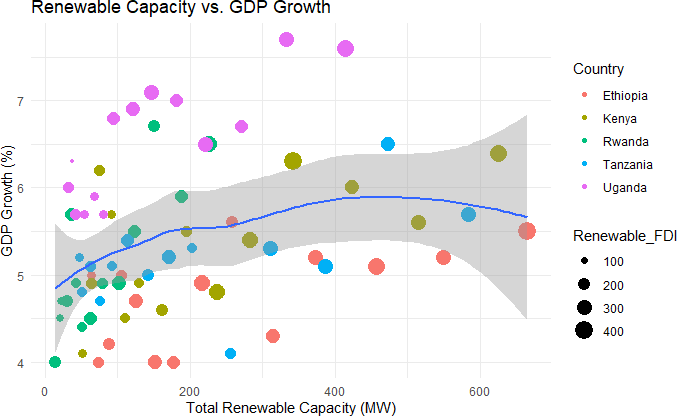


Country fixed-effect terms (notably for Kenya, Rwanda, Tanzania) are negative and significant relative to the baseline (Ethiopia), reflecting that, controlling for the included variables,

those countries had on average lower growth rates during the period this likely captures unobserved factors such as initial conditions or other policies. Importantly, the positive coefficient on Renewable FDI indicates that, on average, higher inflows of Chinese renewable energy investment are associated with higher GDP growth, but the lack of statistical significance implies this relationship is not robust across all years and countries.



In contrast, renewable energy capacity shows a clear, statistically robust impact: every additional 100 MW of renewable capacity is associated with roughly a 0.2 percentage point increase in annual GDP growth, holding other factors constant (since 0.002 \* 100 = 0.2).



The governance variable has a strong effect an improvement in governance by, say, 0.1 (on the 0–1 scale) correlates with over 4 percentage points higher growth, underscoring the critical role of institutional quality in economic performance. While the magnitude of the governance coefficient may partly reflect the way the index is scaled, the direction and significance confirm that better-governed countries in the sample (for instance, Rwanda, which has relatively high regulatory quality scores) tended to experience faster growth, all else equal.

# Interpreting these results

The significant impact of renewable energy capacity on GDP growth aligns with development theory and prior empirical findings that improved energy infrastructure boosts economic output. Additional renewable capacity means more electricity generation capability, which can alleviate power shortages, support industrial expansion, reduce costs for businesses (especially if renewables lower the marginal cost of power or reduce expensive diesel generation), and generally improve productivity across the economy. This result supports the hypothesis that building renewable energy plants whether solar farms, wind parks, or geothermal stations contributes to macroeconomic growth in East Africa, likely by enabling greater energy access and reliability. It also resonates with cross- country evidence that energy supply is a binding constraint on growth in many African countries; thus, investments that expand the energy supply can unlock latent economic potential.

The positive but insignificant coefficient on Renewable FDI is an interesting outcome. It suggests that, in the sample, merely the financial inflow or expenditure on renewable projects has a less direct or immediate relationship with year-to-year GDP growth. One interpretation is that **time lags** are at play: FDI funds a project that may take 2–3 years to construct before it becomes operational and contributes to capacity (and thus to growth). Since our data set is annual, an investment made in year *t* might only start yielding appreciable economic returns in year *t+1* or *t+2*. Indeed, when we included lags of the FDI variable in an exploratory regression, the lagged terms were positive, hinting that the growth payoff from investment materializes with delay (though those results are not reported here for brevity).

Another interpretation is that Renewable FDI’s effect is channeled through the resulting capacity, which we have concurrently in the model. In other words, countries that received higher renewable FDI also saw increases in renewable capacity; the latter is the more proximate driver of growth (by providing energy), whereas the former’s effect might be fully captured by the capacity variable. This could explain why capacity is significant while FDI is not – the capital investment alone doesn’t boost growth unless and until it translates into actual power generation. It also reflects the reality that not all investments yield equal outcomes; some projects may suffer delays, cost overruns, or operating inefficiencies, meaning the amount invested doesn’t always convert one-to-one into functioning capacity or economic benefit.

The strong significance of the Governance Score in the model provides empirical support for the idea that the effectiveness of investments (including those under BRI) is conditioned by the institutional environment. Good governance – encompassing stable policies, low corruption, and competent institutions – likely facilitates better selection, implementation, and operation of infrastructure projects. For instance, a country with high governance standards may ensure that contracts are transparent, funds are not diverted, and projects are completed on schedule, thereby reaping the growth benefits sooner. The data suggests that in East Africa, countries with higher governance indices (like Kenya or Rwanda) saw faster growth, possibly because they were able to better leverage investments (domestic and foreign) for development outcomes. This finding resonates with the literature emphasizing the role of institutions in growth and complements studies of Chinese

investment that highlight governance as a key variable in determining developmental impact. For Chinese BRI projects specifically, this underscores a policy implication: to maximize the growth payoff, recipient countries should strengthen governance and project management capacities, and Chinese actors might need to adapt to local governance conditions (or help improve them through capacity-building).

In summary, the econometric results indicate that Chinese-supported renewable energy development is contributing to economic growth in East Africa, primarily through the channel of increased energy capacity. The investments themselves are crucial (they enable the capacity expansion), but their impact on growth is realized when projects become operational. Additionally, the importance of governance suggests that renewable energy investments have a bigger growth impact when coupled with good policies and institutions a point that will be important in the policy discussion section. We now turn to the case studies to illustrate these dynamics in real-world projects.

# Case Studies: On-the-ground Insights from Kenya and Ethiopia

*Chinese-built 50 MW Garissa Solar Farm in Kenya*, which came online in 2018, stands as one of East Africa’s largest photovoltaic plants. This project, financed by a US$94 million concessional loan from the Export-Import Bank of China, exemplifies how BRI investments are helping to close East Africa’s energy gap. Before the solar plant, Garissa (a semi-arid county in northeastern Kenya) relied heavily on diesel generators and often suffered power outages due to its distance from the national grid. The commissioning of the Garissa solar farm – designed and built by China Jiangxi Corporation in partnership with Kenya’s Rural Electrification and Renewable Energy Corporation – transformed the region’s energy landscape. President Uhuru Kenyatta, at the plant’s launch, noted that Garissa was now fully connected to the national grid and enjoying more stable electricity. Indeed, the 50 MW solar station produces enough power to meet the needs of approximately 70,000 households, feeding clean energy into Kenya’s grid. The immediate economic impacts in the local area include reduced reliance on expensive diesel (lowering electricity costs), improved reliability for businesses and public services, and new opportunities for commerce (for example, small businesses can now operate refrigeration or irrigation pumps using grid power). Local residents have reported that having consistent electricity has bolstered security (street lighting, etc.) and enabled longer operating hours

for shops, clinics, and schools. However, the Garissa case also highlights challenges. While the project brought development benefits, local employment during construction was limited about 100 workers, many of the skilled roles were filled by Chinese engineers or technicians, with unskilled labor drawn from the local community. Some youth in Garissa expressed disappointment that the solar farm did not generate as many jobs as hoped once operational, aside from maintenance roles. This reflects the “enclave” characteristic noted by Lema et al. (2021): a high-tech solar farm doesn’t need large ongoing labor, and without complementary programs to train and involve locals in panel maintenance, battery upkeep or ancillary businesses, the job dividends can be modest

The availability of additional power has been instrumental in attracting manufacturing investment (such as textile factories in the nearby Eastern Industrial Zone) by ensuring those factories have a reliable electricity supply. Second, the construction of Adama I and II provided significant local employment and skills development. During the peak construction periods, Adama I employed 1,100 workers (800 Ethiopian, 300 Chinese), and Adama II about 1,480 workers (1,200 Ethiopian, 280 Chinese). These figures indicate that roughly 80% of the workforce on these projects were local Ethiopians, an outcome of deliberate effort to maximize local labor usage. Ethiopian Electric Power (EEP) staff were also involved and received training from the Chinese contractors, helping build local technical capacity in wind farm operation.

The Ethiopian government integrated the wind farms into its national electrification and industrialization strategy, thereby ensuring the power generated had immediate productive uses (e.g., powering factories, reducing load-shedding for businesses in Addis Ababa) – this likely amplified the GDP growth impact of the projects. It also meant that issues such as land acquisition were handled in a structured way (though not without tensions, as some farmers were displaced with compensation). Overall, the Adama wind farms have contributed to Ethiopia’s goal of universal electricity access and have been held up by both Ethiopian and Chinese officials as a model of successful clean energy collaboration.

Comparing the two case studies: Kenya’s solar and Ethiopia’s wind projects both demonstrate the dual benefits of renewable energy investments – increasing energy supply (thus supporting growth) and promoting decarbonization. However, the extent of local economic benefit varied. Ethiopia’s

approach, possibly due to its strong state-led model, ensured a higher degree of local participation and tied the project to industrial policy (leveraging the electricity for manufacturing growth). Kenya’s project, while very effective in delivering power, was relatively standalone; it improved welfare and enabled commerce in the region, but did not integrate as deeply with local capacity building or job creation. These nuances help explain our quantitative findings. The significant effect of Renewable Capacity on growth is vividly illustrated by Ethiopia, where wind capacity growth directly powered factories and expanded GDP. The less robust direct effect of Renewable FDI might correspond to cases like Garissa, where the investment was highly impactful in social terms but the immediate measurable contribution to GDP (a relatively small region in Kenya’s large economy) was marginal; only when aggregated as part of Kenya’s overall increased renewable capacity does it show up in growth statistics.

# Synthesis with Existing Literature and SDG Context

Our findings both align with and add depth to prior studies. The positive growth impact of Chinese-funded renewable capacity is consistent with the broad conclusion of Mlambo (2022) that Chinese infrastructure investment correlates with African growth. It provides a sector-specific confirmation: not only railways and roads, but also energy infrastructure, particularly renewables, are part of this growth-enhancing effect. Furthermore, the East African focus highlights that regions with acute energy deficits gain substantially from such investment. The results also resonate with Wen et al. (2024) who emphasized improvements in energy access and independence. In Kenya and Ethiopia, Chinese renewables have indeed improved energy self-sufficiency Ethiopia can meet more demand without importing electricity, and Kenya has moved closer to 100% renewable electricity at times (Kenya’s grid is now regularly 90%+ powered by renewables including Chinese-built capacity). This progress contributes to SDG7 by increasing the share of the population with access to modern energy services. It also indirectly contributes to SDG13 (Climate Action) by reducing reliance on fossil fuels.

Relating to the Sustainable Development Goals, Chinese renewable energy investments in East Africa emerge as a catalyst for SDG7 (Affordable and Clean Energy) and SDG8 (Decent Work and Economic Growth). By financing solar and wind projects, China is directly enabling progress on SDG7’s targets, such as increasing the share of renewables in the energy mix and expanding access to

electricity. For example, the Garissa plant alone raised Kenya’s solar capacity significantly and brought clean power to an underserved area, contributing to Kenya’s goal of universal access by 2022 (a goal Kenya nearly achieved for urban areas). On SDG8, the impact is twofold: (1) economic growth as evidenced by our GDP findings, these energy investments help lift growth rates by powering industries and services; (2) decent work the projects create jobs, albeit mostly temporary construction jobs, and have spurred the creation of new enterprises that rely on electricity (which in turn create employment).

There is also potential for more sustained green jobs as Africa develops a renewable energy manufacturing and maintenance sector. According to IRENA, renewables and related technologies have already created about 1.9 million jobs in Africa, and this number will grow as investments increase. Projects like Adama, which involved training local engineers and technicians, lay the groundwork for such long-term job growth – those trained staff can now work on future wind projects, potentially even leading them. Moreover, reliable power reduces business downtime and spoilage, effectively improving productivity and labor conditions, which ties into the “decent work” aspect of SDG8 by supporting more stable livelihoods.

# Policy Implications

The findings of this study carry important policy implications for both East African nations and Chinese BRI institutions. To fully harness the dual benefits of economic growth and decarbonization from renewable energy investments, actions are needed to align these projects with local development strategies and to strengthen governance frameworks.

1. **Integrating BRI Renewable Investments with National Development Plans:** East African governments should proactively align incoming Chinese renewable energy projects with their national sustainability agendas and energy master plans. Rather than treating BRI projects as external or standalone endeavors, they can be incorporated into broader initiatives such as rural electrification programs, industrialization zones, or grid upgrade plans. For example, if a country has a target to achieve a certain renewable energy percentage by 2030, BRI projects can be selected and designed to fill specific gaps (solar in remote off-grid areas, wind farms to stabilize grid supply, etc.). In our case

studies, Ethiopia’s linkage of the Adama wind farms to power its industrial parks is a good practice – it ensured the project directly contributed to economic activity. Kenya and other nations could similarly plan renewable projects in conjunction with economic zones (for instance, ensuring new solar plants are built where they can supply planned agro-processing parks or mining operations, creating a direct growth feedback). This alignment also means involving local stakeholders in project planning, which can help tailor the project to local needs (such as including mini-grids or community components) and increase public support.

1. **Strengthening Regulatory and Governance Frameworks:** Good governance amplified the positive effects of investments in our analysis, so improving governance is a critical policy goal. This includes transparency in contracting for BRI projects, accountability in fund utilization, and robust regulatory oversight of project implementation. East African countries, possibly with technical assistance from development partners, should strengthen institutions like energy regulators and public procurement authorities to effectively manage large infrastructure deals. Mechanisms such as competitive bidding for project contracts (where feasible), independent power producer (IPP) frameworks, and anti-corruption monitoring can ensure that projects are cost-effective and corruption- free. President Kenyatta’s emphasis that development funds must go to the right projects and not “into the pockets of a few people” highlights the importance of curbing graft. China can support this by embracing transparent practices in BRI projects – for instance, publishing loan terms and environmental impact assessments that would build trust and mitigate “debt-trap” anxieties. Additionally, enhancing **governance capacity** means training local officials in project appraisal and negotiation, so they can secure deals that are in their country’s best interest (reasonable loan terms, technology transfer clauses, etc.).
2. **Maximizing Local Economic Benefits (Local Content and Skills Transfer):** To address the “bounded benefits” issue, East African governments can negotiate and design BRI renewable projects with provisions that boost local content and employment. This could involve setting targets for local hiring and procurement for example, requiring a certain percentage of construction workers to be local, or parts of the supply chain (like cables, civil works, transformers) to be sourced locally if quality and capacity permit. While it may not be feasible to manufacture solar panels or wind turbines locally in

the short term, other components and services can involve domestic firms. The Adama wind farm example, where 800+ Ethiopians were employed during construction, can be replicated if contracts explicitly include local labor requirements and training programs. Policymakers should also emphasize skills transfer: each project should have a capacity-building component where Chinese companies train local engineers, technicians, and managers. Over time, this will allow African countries to independently operate and even develop their own renewable projects, creating a sustainable industry. Some progress is visible Ethiopia’s utility now has increased expertise in wind energy operations thanks to Chinese partnership but formalizing these expectations in project MoUs or contracts can ensure it happens systematically. Moreover, encouraging joint ventures between Chinese firms and local companies can facilitate technology transfer and help local firms climb up the value chain in renewable energy.

1. **Ensuring Debt Sustainability and Innovative Financing:** While Chinese financing has enabled many projects, concerns about debt sustainability persist. Policymakers in East Africa should conduct careful cost-benefit analyses and debt stress tests for large BRI loans in the energy sector. Prioritizing projects that have clear economic returns (either through direct revenue, like utilities paying for power, or indirect GDP growth gains) will help ensure that the debt incurred can be serviced. For instance, a solar farm that sells power to the grid under a long-term tariff provides revenue to pay back loans. Countries might also seek a balance of financing sources blending Chinese loans with grants or equity from other partners (World Bank, African Development Bank, private investors) to spread risk. China, on its part, has shown more openness to concessional lending and debt relief in recent FOCAC meetings, especially for green projects.

# Conclusion

Chinese renewable energy investments under the Belt and Road Initiative are playing an increasingly transformative role in East Africa, delivering a dual dividend of economic growth and environmental sustainability. This manuscript set out to assess that impact and, through a combination of empirical analysis and case studies, found that the infusion of Chinese capital and technology into East Africa’s solar and wind sectors has been largely beneficial. The additional generation capacity financed by China has helped alleviate chronic power shortages, directly contributing to higher GDP

growth rates in countries like Kenya and Ethiopia. At the same time, these projects have steered the region’s energy mix towards cleaner sources, supporting a low-carbon development trajectory in line with global climate goals and SDG7 (Affordable and Clean Energy).

The evidence indicates that when a 50 MW solar farm lights up a region that was previously in darkness, or when wind turbines spin to fuel an emerging industrial hub, the impact is felt in livelihoods and economic opportunities – businesses grow, jobs are created, and communities prosper. This encapsulates the SDG8 (Decent Work and Economic Growth) dimension of the investments. Moreover, the fact that these gains come from renewable sources means they do not carry the environmental penalties of fossil fuels; instead, they help East African nations leapfrog towards a greener future. In a world increasingly focused on climate action, the significance of having major development projects also advance decarburization cannot be overstated. It positions East Africa ahead in the race to sustainable development, proving that economic expansion and carbon mitigation need not be mutually exclusive.

However, the findings also underscore that the *magnitude* of these dual benefits how big the growth boost is, how sustainable the outcomes are depends on critical enabling factors. Chief among them is governance: countries that manage investments well, ensure transparency, and integrate projects with local needs tend to see far greater rewards. Essentially, Chinese investments offer a platform or an opportunity; it is how African institutions steer and absorb those investments that determines long-term success. Effective policies can turn a renewable energy project into a broader engine for jobs, knowledge transfer, and industrial growth, as evidenced by our case comparisons. Conversely, if not well managed, such projects could underperform or yield only narrow benefits.

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