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Designing Scalable Energy Sustainability Indices for Policy Monitoring in African States

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Abstract

This paper proposes a comprehensive framework for the development of scalable energy sustainability indices tailored to the policy and governance needs of African states. Recognizing the limitations of existing global indices in capturing regional diversity, institutional realities, and data disparities, the study advances a multidimensional model built around four thematic pillars: energy access, affordability, renewability, and resilience. The framework outlines clear methodological pathways for indicator selection, normalization, weighting, and aggregation, emphasizing transparency, flexibility, and policy relevance. In doing so, it enables national governments to monitor progress, identify performance gaps, and align energy planning with broader sustainable development objectives. The paper further discusses the institutional considerations necessary for successful index adoption, including integration into national statistical and planning systems, enhancement of energy data infrastructure, and the cultivation of technical capacity across key agencies. Feedback mechanisms are explored to demonstrate how the index can actively inform policy cycles, fiscal decisions, and regulatory reforms. Critical reflections address data limitations, methodological trade-offs, and challenges related to institutional uptake. Finally, the paper outlines future pathways for index refinement, regional benchmarking, sub-national adaptation, and strategic linkage with climate finance instruments. The result is a practical and adaptable tool designed to support evidence-based energy governance in a rapidly evolving African energy landscape.

Keywords: Energy Sustainability, Policy Monitoring, Composite Index Design, Africa, Energy Governance, Sustainable Development

1. Introduction

1.1 Background and Motivation

Africa's energy landscape is defined by a complex mix of resource abundance and persistent energy poverty [1]. Despite being rich in renewable energy sources such as solar, hydro, and wind, nearly 6 00 million people across the continent still lack access to reliable electricity [2, 3]. The challenge is especially acute in rural and peri-urban communities, where grid extension remains economically and logistically difficult. As population growth and urbanization accelerate, energy demand is expected to rise sharply, placing even greater pressure on governments to expand access while ensuring environmental sustainability. Meeting this challenge requires tools that not only track progress but also guide strategic decisions [4, 5].

At the same time, African states are increasingly being drawn into global climate dialogues and environmental accountability frameworks. Many countries on the continent have ratified international agreements such as the Paris Climate Accord and have committed to nationally determined contributions that prioritize clean energy development [6]. These global expectations are pressing, yet domestic policy tools often lag behind. There is a growing need for localized, quantifiable measures that can support both internal planning and international reporting obligations [7, 8].

In this context, the motivation for developing scalable energy sustainability indices is clear. While global indices exist, they rarely capture the full socioeconomic realities and infrastructural constraints of African countries [9]. A well-designed, context-sensitive index would enable policy actors to understand trade-offs, prioritize investments, and track the effectiveness of sustainability interventions. It would also empower regional organizations and donors to harmonize their efforts, allocate resources more strategically, and ensure that no country is left behind in the energy transition [10].

1.2 Problem Statement

Although numerous global frameworks attempt to measure energy sustainability, few offer the flexibility and contextual relevance required for African states. Tools like the Energy Trilemma Index or the Sustainable Development Goal 7 indicators, while valuable, often fail to reflect local disparities in data availability, governance structures, and energy market conditions [11]. These limitations become even more pronounced when attempting to translate index outputs into actionable national or regional policy decisions. As a result, policymakers are often left without a robust, data-driven compass to steer their energy planning and investment priorities [12].

Furthermore, energy sustainability in Africa is not a uniform challenge; it varies significantly from country to country and even within regions. Some states struggle with electricity generation, while others face acute challenges in transmission, distribution, or affordability. Existing indices, designed with global benchmarking in mind, tend to obscure these nuanced dynamics [1, 13]. This lack of granularity makes it difficult to develop targeted policy interventions or monitor the incremental gains of reforms. Without a scalable tool that can be calibrated to reflect national and sub-national realities, there is a significant risk that well-intentioned energy strategies will miss their mark [14].

Another critical issue lies in the operational disconnect between index frameworks and institutional policy cycles. Many governments rely heavily on donor reporting mechanisms or macroeconomic models that do not integrate well with sustainability metrics. This gap reduces the practical utility of existing tools and undermines long-term accountability. Therefore, the absence of a policy-responsive, adaptable, and scalable sustainability index tailored to Africa's specific conditions constitutes a major impediment to effective energy governance.

1.3 Research Objectives and Approach

The primary objective of this research is to design a scalable, multidimensional energy sustainability index that can support effective policy monitoring in African states. Unlike conventional indices, the proposed framework aims to balance technical robustness with practical applicability, ensuring it can be both analytically rigorous and politically useful. It seeks to align measurement with policy intent by integrating diverse indicators across access, reliability, environmental impact, affordability, and governance dimensions, while allowing for adjustments based on country-specific realities. This adaptability is essential to promote meaningful comparisons over time and across geographies without sacrificing local relevance.

To achieve this, the index design draws on interdisciplinary principles, combining elements from environmental economics, energy systems engineering, and public policy analysis. Key steps involve the selection of core thematic dimensions, identification of measurable and policy-relevant indicators, normalization of disparate data types, and the aggregation of sub-indices into a single composite score. Weighting strategies will be informed by both expert consultation and data-driven sensitivity analysis to ensure the index reflects priority areas in African energy transitions. A modular design is prioritized to accommodate data variability and evolving policy targets.

Additionally, the research emphasizes institutional usability. The index is intended to serve not merely as an academic construct but as a living tool that can be embedded within national planning units, ministries of energy, and regional energy bodies. It is designed to inform decision-making processes, guide budget allocations, and support regular monitoring and evaluation cycles. By grounding the framework in practical policy workflows, the index stands to improve accountability, promote coordination among stakeholders, and foster a culture of evidence-based energy governance across the continent.

2. Conceptual Foundations

2.1 Defining Energy Sustainability

Energy sustainability refers to the long-term viability of energy systems to meet current demands without compromising the ability of future generations to meet theirs. At its core, it rests on three interdependent pillars: environmental integrity, social equity, and energy security [15]. Environmental integrity emphasizes the minimization of ecological harm, particularly through the reduction of greenhouse gas emissions, land degradation, and water pollution. It demands a transition from fossil fuel dependence to cleaner, renewable sources that have a lower environmental footprint [16, 17].

Social equity, on the other hand, highlights the imperative that all citizens, regardless of geography or income level, have fair and reliable access to energy services. This includes not only residential electricity but also energy for schools, clinics, small businesses, and local industries [18]. In Africa, where over half the population still lacks access to electricity, ensuring equity is both a development priority and a moral obligation. An energy system that leaves large swaths of the population behind cannot be considered sustainable [19, 20].

Energy security encompasses the reliability and resilience of supply chains. It addresses the risks of system failure due to infrastructure limitations, market volatility, or geopolitical disruptions. For African states, this dimension is particularly relevant given heavy reliance on imported fuels, unstable grids, and underinvestment in critical infrastructure. A sustainable energy framework must therefore ensure consistent, affordable, and sovereign access to energy resources [21, 22].

Together, these three pillars provide a conceptual map for assessing energy sustainability. Any comprehensive index must balance and measure these aspects to be truly meaningful. When effectively operationalized, this triad can support nations in managing their energy transitions while safeguarding development goals, environmental stewardship, and social cohesion.

2.2 Review of Existing Index Models

Several global indices have been developed to monitor energy performance, but many face limitations when applied to the African context. One of the most referenced models is the World Energy Council's Energy Trilemma Index, which evaluates countries based on energy security, equity, and environmental sustainability [23]. While conceptually sound, this model tends to privilege countries with well-established infrastructure and data systems, thus disadvantaging less-developed nations that may be making significant progress relative to their capacity. Its methodology often lacks the flexibility to adjust for disparities in data quality and access across African states [24].

Another example is the Energy Indicators for Sustainable Development (EISD) developed by the IAEA and other international agencies. It proposes a broad set of indicators ranging from resource availability to macroeconomic impacts. While comprehensive, the EISD framework is highly data-intensive, making it difficult to implement in countries with limited statistical capacity or inconsistent data flows. Moreover, many of its economic and technological indicators may not be fully relevant or feasible in rural African contexts where informal energy systems dominate [23, 25].

Additionally, indices like REN21's Global Status Report and the Sustainable Development Goal 7 tracker focus on renewable energy uptake and access. However, these tools often lack the institutional lens needed to support national-level policy design and monitoring. They also tend to offer descriptive statistics without integrating them into a cohesive evaluative structure. As such, they are more useful for global benchmarking than for domestic planning [26, 27].

The shortcomings of these models point to a critical gap: there is no index that simultaneously accommodates Africa's unique challenges, supports internal policy cycles, and ensures meaningful comparison across countries. Addressing this gap requires a hybrid model, one that retains global best practices but is fundamentally restructured for regional relevance, adaptability, and usability.

2.3 Criteria for Effective Index Design

The success of any energy sustainability index hinges on the thoughtful selection of design criteria that ensure the model is both technically credible and practically useful. One of the foremost attributes is transparency. The logic behind indicator selection, weighting, and aggregation must be clearly documented and easily interpretable by policymakers, researchers, and stakeholders. Without transparency, the index loses credibility and becomes susceptible to misuse or misinterpretation [28].

Measurability is equally important. Indicators must be grounded in data that is regularly available, reliable, and verifiable. This is particularly critical in Africa, where statistical infrastructure varies widely between countries. Indicators that require high-frequency data or complex modeling may undermine implementation and comparability. Instead, the index should rely on metrics that are observable, well-defined, and feasible to collect through existing national or regional systems [29].

A third essential criterion is scalability. The index must be flexible enough to function at different levels, national, sub-national, and regional, without losing analytical value. Scalability allows the index to support decentralized energy planning, which is crucial in countries with federal systems or wide geographic disparities. It also means the framework must tolerate variations in data availability while offering a common structure for progressive enhancement over time.

Lastly, the index must demonstrate policy relevance. Indicators should be aligned with national development goals, energy strategies, and climate commitments. They should also be actionable, meaning that a change in the index score corresponds to a specific policy response or investment decision. By adhering to these core criteria, the index becomes more than a diagnostic tool; it becomes an engine for strategic decision-making and sustainable transformation.

3. Index Design Framework

3.1 Thematic Dimensions and Indicators

The foundation of an effective energy sustainability index lies in its thematic architecture. At a minimum, the framework must reflect four core dimensions: access, affordability, renewability, and resilience. Each captures a different facet of sustainability, ensuring that the index does not privilege one aspect at the expense of others. Energy access relates to the percentage of the population with a reliable and continuous electricity supply, disaggregated by urban and rural areas. Indicators here may include household electrification rates, average daily supply hours, and the share of public institutions (such as schools and clinics) connected to energy infrastructure [26, 30].

Affordability represents a critical socioeconomic concern. In many African countries, energy costs form a significant portion of household income, disproportionately affecting low-income populations. A representative indicator could be the ratio of average electricity tariffs to household income quintiles. Similarly, affordability can be measured through the prevalence of energy subsidies, connection costs for first-time users, or energy expenditure as a share of GDP per capita. These indicators allow policymakers to track economic equity in access and target subsidy reforms more effectively.

The renewability dimension focuses on the proportion of energy derived from clean sources such as hydro, solar, wind, and bioenergy. While many African states are naturally endowed with renewable potential, actual uptake varies significantly. Indicators in this category may include the share of renewables in the national energy mix, installed renewable capacity per capita, or trends in renewable energy investment. Importantly, renewability metrics should capture both generation and consumption levels to assess sustainability holistically [31, 32].

Resilience emphasizes the system's ability to withstand and recover from disruptions, whether due to natural disasters, political instability, or infrastructure failures. Relevant indicators could include grid stability metrics (e.g., frequency of outages), reserve margins in generation capacity, and the degree of decentralization in the energy system. Additional metrics might measure climate-adaptive infrastructure, such as flood-resilient substations or backup generation in critical facilities. When integrated, these dimensions offer a comprehensive yet context-sensitive platform for evaluating national energy systems [33].

3.2 Indicator Weighting and Normalization

Assigning appropriate weights to indicators is one of the most critical steps in index construction, as it directly shapes how scores are interpreted and compared. Several approaches are commonly used: equal weighting, expert judgment, and statistical techniques such as principal component analysis (PCA). Equal weighting ensures simplicity and transparency, which is particularly beneficial when communicating results to policymakers. However, it may underrepresent dimensions that are contextually more pressing, such as energy access in underserved regions. Expert-driven weighting, derived through structured consultations or Delphi methods, can help prioritize indicators based on strategic importance, though it may introduce subjectivity if not rigorously validated.

Normalization is equally important because indicators are typically measured in diverse units, percentages, absolute values, ratios, or monetary terms. Without normalization, aggregation would be mathematically invalid and conceptually misleading [34]. The min-max normalization technique, which scales all values between 0 and 1 based on observed extremes, is particularly useful for ensuring comparability across countries and years. An alternative approach is z-score normalization, which centers each indicator around the mean and expresses it in standard deviations. This method is more sensitive to outliers and is suitable when underlying distributions are approximately normal [35, 36].

A hybrid normalization scheme may be ideal for balancing sensitivity and simplicity. For example, min-max scaling can be used for indicators with well-defined bounds, such as electrification rates (0–100%), while z-scores may be applied to open-ended metrics like per capita renewable capacity. It is also important to document the choice of directionality, whether higher values signify better or worse performance, and apply consistent logic across all indicators [37].

Finally, the weighting and normalization strategy must be tested for robustness. This involves running sensitivity analyses to see how index scores change with different weighting schemes. If an index is highly volatile under slight methodological adjustments, its reliability for long-term monitoring is compromised. Therefore, methodological stability must be a guiding principle. A transparent record of decisions, underlying assumptions, and mathematical formulas should accompany the index to foster trust, replication, and continuous refinement by future users [38, 39].

3.3 Aggregation and Composite Index Construction

Once indicators are weighted and normalized, the next step is aggregation into a composite score. This process combines multiple indicators across dimensions into a single numerical value that can be easily tracked over time or compared across countries. Two primary aggregation methods are typically used: the arithmetic mean and the geometric mean [40]. The arithmetic mean treats all indicators as additive, assuming that high performance in one area can compensate for low performance in another. This compensability is intuitive but can be problematic when trade-offs should not be allowed, such as excelling in renewables while failing in affordability [41].

In contrast, the geometric mean reduces compensability by penalizing imbalance across indicators. If one indicator is near zero, the entire composite score is significantly pulled down, even if other dimensions perform well. This method encourages more balanced progress and can highlight underperforming areas. For sustainability indices, where multidimensional integrity is crucial, the geometric mean often provides a more accurate reflection of system resilience. However, it is computationally more complex and less intuitive to interpret for non-technical audiences [42].

Another consideration in aggregation is dimensional weighting. If indicators within a dimension are averaged first, followed by dimension-level aggregation, the index structure becomes more transparent and hierarchical. This layered aggregation allows policymakers to focus on thematic sub-indices (e.g., access or affordability) without losing sight of the overall picture. It also permits targeted reforms without overhauling the entire index [43]. Ultimately, the aggregation method should align with the index's policy purpose. If the goal is to support targeted budgeting or performance benchmarking, a geometric mean approach with thematic sub-scores may be ideal. If the aim is communication and public engagement, the arithmetic mean might offer greater accessibility. In either case, clear documentation, visual tools, and user guidance are essential to interpret the final composite scores meaningfully and to link them back to specific policy levers or investment strategies.

4. Policy Integration and Implementation

4.1 Institutional Alignment and Ownership

The successful adoption of an energy sustainability index depends largely on how well it is embedded within the institutional frameworks responsible for national planning and monitoring. Integration into the operations of statistical agencies, energy ministries, and regulatory commissions is not merely procedural; it is foundational. These institutions serve as the custodians of data and policy coordination; without their direct involvement, even the most sophisticated index risks remain underutilized. Anchoring the index within existing reporting systems ensures continuity, accountability, and alignment with broader governance objectives [44, 45].

Ownership is equally vital. For the index to become more than a technical tool, it must be embraced by policymakers as a credible source of insight. This requires a process of co-design or validation involving key government departments, regional economic communities, and national utilities. By engaging institutional stakeholders early and consistently, the index can evolve with local priorities and benefit from sustained political buy-in. When ownership is strong, the index is more likely to influence actual decision-making processes rather than sit idle in academic or donor reports [46, 47].

Furthermore, alignment with national development plans and energy master plans strengthens the practical relevance of the index. It can be directly linked to performance targets, used in medium-term expenditure frameworks, or adopted as part of national indicator dashboards. This alignment allows the index to function not just as an analytical framework but as a policy instrument that influences everything from rural electrification initiatives to renewable energy procurement.

Lastly, institutional alignment also paves the way for regional coherence. As many African countries participate in cross-border energy initiatives or economic unions, integrating the index into regional platforms such as the African Union's Programme for Infrastructure Development in Africa (PIDA) or the African Energy Commission (AFREC) can promote benchmarking and coordinated action. This broader institutional anchoring enhances the index's influence and durability across multiple layers of governance [48, 49].

4.2 Data Infrastructure and Capacity Needs

A robust data infrastructure is a cornerstone for the operationalization of any sustainability index. In many African states, however, the capacity to systematically collect, verify, and manage energy-related data remains limited. Key metrics such as rural electrification rates, grid reliability, renewable energy generation, and energy affordability are often estimated through sparse surveys or outdated records. This data gap undermines both the accuracy and the credibility of any resulting index, particularly if it is meant to inform high-stakes policy decisions or international reporting obligations [50].

To address this, countries must invest in strengthening their statistical systems, particularly those tied to energy ministries, national bureaus of statistics, and public utilities. Establishing standardized data collection protocols, harmonized across time and geography, is essential to ensure the index remains consistent and comparable. For example, methodologies for calculating electricity access must be aligned across regions and definitions (e.g., connection vs. actual supply). Similarly, energy cost indicators should reflect both nominal tariffs and hidden affordability constraints such as upfront connection fees or fuel scarcity.

Capacity building is another non-negotiable element. Technical personnel responsible for energy data management require training in modern analytical tools, data governance frameworks, and open data practices. Cross-sector collaboration between ICT departments, energy planning units, and statistical officers is necessary to enable efficient data sharing and validation. In some cases, integrating geospatial and remote sensing data, especially for access and infrastructure mapping, can greatly enhance the granularity and timeliness of information [51, 52].

Ultimately, data infrastructure must be treated not as a side project but as a strategic national asset. Establishing energy observatories or digital dashboards within ministries can provide real-time access to relevant indicators and improve public sector responsiveness. International support can play a role, but domestic ownership of data systems is key to long-term sustainability. The more reliable and comprehensive the underlying data, the more powerful the index becomes as a policy tool for African governments.

4.3 Policy Feedback Mechanisms

An effective sustainability index should not function as a static reporting tool; it must become an active component of the policy feedback loop. By design, the index is positioned to track energy system performance over time, revealing trends, gaps, and emerging priorities. When embedded into policy cycles, it can guide iterative planning, inform corrective actions, and shape long-term strategies. For this to happen, the index must be routinely consulted during planning, budgeting, and review processes across all levels of government.

Budgetary allocation is one of the most tangible touchpoints for integration. The index can serve as a performance-based budgeting tool, where improved scores in specific dimensions (e.g., rural access or renewable integration) unlock targeted funding or signal readiness for scale-up. Conversely, low performance in critical areas may trigger enhanced oversight, reallocation of resources, or targeted technical assistance. In this way, the index becomes a fiscal instrument that aligns national investment priorities with sustainability goals [53].

Regulatory frameworks also benefit from structured feedback. Regulators can use index results to revise tariff structures, update service quality benchmarks, or identify regions in need of targeted subsidies. For instance, if affordability scores deteriorate in a specific region despite grid expansion, this may indicate a need for social protection measures or pricing reforms. The dynamic nature of the index ensures that it reflects real-world conditions and can be used to test the effectiveness of policy interventions in near real-time.

Lastly, the index can promote accountability and transparency. Public dashboards or periodic scorecards derived from the index can be shared with citizens, civil society, and the private sector. This not only builds trust in government efforts but also encourages stakeholder participation in energy governance. Over time, feedback mechanisms built into the index can foster a data culture where evidence-based policymaking becomes the norm rather than the exception, driving a more inclusive, resilient, and sustainable energy future [54].

5. Conclusion

5.1 Summary of Key Contributions

This paper has presented a structured, policy-oriented framework for designing energy sustainability indices that are scalable, contextually adaptable, and institutionally relevant for African states. The rationale behind the proposed index stems from a pressing need: African countries are navigating a complex intersection of energy poverty, infrastructural limitations, and global environmental commitments without adequate tools to measure and manage sustainability transitions. Existing indices, while valuable in global contexts, often lack the flexibility and specificity required to reflect Africa's unique challenges and opportunities. This work contributes to bridging that gap by offering a tailored approach grounded in regional realities.

The index framework is built around four thematic dimensions, access, affordability, renewability, and resilience, each selected for its relevance to sustainable energy governance in the continent. By identifying measurable indicators within each domain and proposing rigorous methods for normalization, weighting, and aggregation, the index provides a robust analytical structure that can serve both national and regional needs. Emphasis has been placed on transparency, usability, and policy alignment, ensuring that the tool is not only technically sound but also politically meaningful and operationally feasible.

Moreover, the paper has outlined a clear implementation strategy. It highlights the importance of integrating the index into the workflows of national statistical agencies, energy ministries, and regional planning institutions. These institutional entry points ensure that the index supports real-time decision-making, long-term monitoring, and cross-border collaboration. As a result, the framework has potential not only as a measurement instrument but also as a driver of energy reform and governance innovation.

In summary, this paper offers a comprehensive contribution to both the academic and policy communities concerned with energy sustainability in Africa. It provides a model that balances technical precision with contextual relevance and aims to empower governments with the information and structure needed to pursue inclusive and resilient energy transitions. The proposed index is not an end in itself but a starting point for meaningful engagement, planning, and accountability in Africa's evolving energy landscape.

5.2 Limitations and Critical Reflections

While the proposed index framework presents a strong foundation for policy monitoring, several limitations must be acknowledged. Chief among them is the issue of data quality and availability. Many African countries lack consistent and timely data on key energy indicators, especially at sub-national levels. In some cases, data may be outdated, incomplete, or collected using varying definitions and methodologies, which poses a challenge to cross-country comparability and trend analysis. These data limitations may lead to misrepresentation of national performance or mask regional disparities within countries.

In addition, methodological decisions regarding indicator selection, weighting, and aggregation inevitably involve trade-offs. While the framework attempts to balance simplicity with analytical rigor, some level of subjectivity is inherent in any composite index. For instance, assigning weights based on expert judgment may reflect policy priorities but can also introduce bias. Similarly, the choice of normalization method may disproportionately influence scores, especially in countries with extreme values or limited data coverage. These methodological constraints must be transparently documented and regularly reviewed to safeguard the index's credibility.

Another important reflection concerns institutional readiness. While the index is designed to be implementable, the degree to which it can be adopted depends on institutional capacity, political will, and inter-agency coordination. In countries where energy governance structures are fragmented or under-resourced, the uptake of such an index may be limited. There is also a risk that the index could be viewed as a compliance exercise rather than a developmental tool unless there is clear alignment with national planning frameworks and incentives for policy responsiveness.

Finally, the dynamic nature of energy systems means that any index must evolve over time. New challenges, such as energy transition risks, climate vulnerability, and disruptive technologies, will require periodic revisions to indicators and methodologies. Thus, while the current framework offers a strong starting point, it should not be viewed as static. Flexibility, stakeholder engagement, and iterative refinement will be essential to ensure the index remains relevant and impactful as Africa's energy landscape continues to change.

5.3 Pathways for Future Development

Building on the foundation established in this paper, several promising directions exist for future development of the index framework. One immediate avenue is the creation of regional benchmarking tools that allow for comparative assessments across African countries and economic blocs. By doing so, countries can identify peer learning opportunities, share best practices, and align energy strategies within regional cooperation platforms such as ECOWAS, EAC, or SADC. These benchmarks can also serve as a basis for regional funding allocation, technical support, or performance-based investments coordinated by regional development banks.

Another priority is the adaptation of the index to sub-national contexts. Many African countries exhibit significant internal diversity in energy access, affordability, and infrastructure quality. Designing decentralized versions of the index for provinces, municipalities, or utility zones would enable more granular planning and highlight intra-national disparities. This could empower local governments with tools to advocate for targeted resources and design customized interventions. Geospatial integration, using satellite imagery and smart metering data, could further enhance the accuracy and relevance of sub-national monitoring efforts.

There is also strong potential to link the index to climate finance and sustainable development funding mechanisms. As global climate finance institutions increasingly prioritize measurable outcomes, the index could serve as a standardized tool to demonstrate progress toward clean energy targets and justify access to grants, loans, or carbon market participation. Embedding the index into national climate reporting (e.g., NDCs or Green Growth Strategies) would also enhance its strategic role in international climate diplomacy.

Lastly, long-term success will depend on continuous institutional collaboration and iterative refinement. Establishing technical working groups across countries, facilitated by continental institutions such as the African Union or AfDB, could ensure that the index remains dynamic, evidence-based, and fit for evolving policy environments. Regular methodological reviews, pilot testing in diverse national settings, and integration with digital governance platforms can help solidify the index's role as a transformative tool in Africa's sustainable energy future.

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