

# Financing Africa's Energy Infrastructure: Assessing Investment Gaps and Economic Implications

*Prepared by the African Energy Research Unit*

# CERTIFICATION PAGE

This report is certified as an original research work conducted by African Energy Research (AER) in accordance with approved research standards, methodologies, and ethical guidelines.

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## DECLARATION

This research report has not been submitted to any other institution for any purpose and all sources of data and references have been duly acknowledged.

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## LIST OF ACRONYMS & ABBREVIATIONS

AfDB	African Development Bank
AESTAP	Africa Energy Sector Technical Assistance Program
CIF	Climate Investment Funds
COP	Conference of the Parties
DRE	Decentralized Renewable Energy
ERI	Electricity Regulatory Index
GDP	Gross Domestic Product
GCF	Green Climate Fund
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
MDB	Multilateral Development Bank
PPP	Public Private Partnership
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SDG	Sustainable Development Goal
SDG7	Sustainable Development Goal 7 (Affordable and Clean Energy)
SEFA	Sustainable Energy Fund for Africa
SEforALL	Sustainable Energy for All
T&D	Transmission and Distribution
UN	United Nations
WACC	Weighted Average Cost of Capital

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## EXECUTIVE SUMMARY

Africa's energy infrastructure deficit remains one of the continent's most pressing development challenges, despite its vast renewable and fossil fuel resource base. Approximately 600 million people in Africa still lack access to electricity, while nearly 900 million lack access to clean cooking solutions. These deficits continue to constrain industrial growth, healthcare delivery, education, employment creation, and overall economic transformation.

This report examines the scale of Africa's energy infrastructure financing gap, the economic consequences of underinvestment, and the most viable mechanisms for mobilizing capital to meet future demand. Using secondary data from international institutions such as the World Bank, African Development Bank (AfDB), International Energy Agency (IEA), and IRENA, the study combines quantitative investment-gap analysis with qualitative assessment of financing models and policy frameworks.

Findings show that Africa requires between \$110 billion and \$200 billion annually to achieve Sustainable Development Goal 7 and broader energy transition objectives, compared with current annual investment flows of about \$90 billion. Specifically, universal electricity access by 2030 requires around \$55 billion annually, yet only about \$10 billion is currently directed toward access expansion. The largest financing shortfalls exist in transmission and distribution networks, decentralized off-grid systems, and clean cooking infrastructure.

The report further reveals that private investment remains concentrated in a few relatively mature markets such as South Africa, Morocco, Kenya, and Ghana, while many African countries continue to struggle with weak utilities, non-cost-reflective tariffs, regulatory uncertainty, sovereign risk, and currency volatility. These factors reduce project bankability and raise the cost of capital.

However, promising financing mechanisms are emerging. Blended finance facilities such as the Sustainable Energy Fund for Africa (SEFA), climate finance platforms, public-private partnerships, and the World Bank/AfDB Mission 300 initiative demonstrate that well-structured interventions can mobilize significant resources and accelerate electrification. Yet current volumes remain far below required levels.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to Africa's Energy Infrastructure Landscape

Africa stands at a critical juncture in its energy development trajectory. Despite possessing abundant renewable and fossil fuel resources, the continent remains the most energy-poor region globally, with approximately 600 million people lacking access to electricity, representing nearly half of the world's unelectrified population (World Bank, 2024). This energy deficit represents not merely a technical challenge but a fundamental constraint on economic transformation, human development, and climate resilience.

The continent's energy infrastructure landscape is characterized by stark disparities. While North Africa and South Africa maintain relatively developed power systems with high electrification rates, sub-Saharan Africa faces acute deficits. Approximately 60% of people in sub-Saharan Africa still lack electricity access, and the transport sector reflects similar underdevelopment, with only 25% of roads paved (Clyde & Co, 2024). These infrastructure gaps limit intra-continental trade to just 17% of Africa's total trade, significantly below the potential enabled by the African Continental Free Trade Area.

The scale of the challenge is immense. According to the African Development Bank, Africa requires between \$130 and \$170 billion annually in infrastructure investment, with a financing gap ranging between \$67.6 and \$107.5 billion per year (World Bank, 2024). The energy sector constitutes a substantial portion of this gap, with the African Development Bank estimating that approximately \$200 billion annually is required through 2030 to achieve Sustainable Development Goal 7 (affordable, reliable, sustainable, and modern energy for all) (Africa Energy Portal, 2025).

### 1.2 Electricity Access Challenges and Growing Energy Demand

The electricity access challenge in Africa is multidimensional. Beyond the binary metric of grid connection, energy poverty encompasses reliability, affordability, and

quality of supply. Even among connected households, many experience frequent outages, voltage fluctuations, and prohibitive costs that limit productive use. The World Bank estimates that closing Africa's infrastructure gap could increase GDP growth rates by up to 2% annually and reduce poverty by 25% in many regions (Clyde & Co, 2024).

Demographic pressures compound these challenges. Africa is experiencing the world's largest and fastest demographic shift, with the working-age population projected to grow by more than 600 million over the next quarter century (World Bank, 2025). Urbanization is accelerating simultaneously, with two out of three Africans expected to reside in urban areas by 2050. Research indicates that a 10% increase in urbanization can raise electricity consumption by nearly 4% (African Union, 2025). This dual dynamic of population growth and urbanization will drive unprecedented energy demand, requiring substantial infrastructure expansion merely to maintain current access rates, let alone achieve universal coverage.

The economic implications of energy poverty are severe. Businesses across the continent cite unreliable power supply as a primary constraint to investment and expansion. The manufacturing sector, in particular, faces significant productivity losses due to grid instability, often resorting to expensive diesel generators that erode competitiveness. Healthcare facilities struggle to maintain cold chains for vaccines or operate essential medical equipment, while educational institutions cannot power digital learning tools.

### **1.3 Research Problem and Investment-Development Nexus**

The central research problem addressed in this report is the persistent gap between Africa's energy infrastructure requirements and available financing mechanisms. Despite decades of international commitment and multiple financing initiatives, investment flows remain insufficient to meet the continent's energy needs. Current investment levels in energy access stand at approximately \$10 billion annually far below the \$55 billion required each year to achieve universal energy access by 2030, with two-thirds of this requirement concentrated in sub-Saharan Africa (IEA, 2024).

This investment gap has widened in recent years. Energy access investment has decreased approximately 75% from pre-COVID-19 levels, though this decline partially reflects rapid progress in large economies achieving near-universal access (IEA, 2024). However, for Africa, the trend is concerning. The continent currently accounts for only 3% of global energy investment and a mere 2% (approximately \$40 billion) of global clean energy spending in 2024 significantly less than India's or Latin America's \$70 billion each, and far behind China's \$675 billion (Africa Energy Portal, 2025).

The financing challenge is structural rather than merely quantitative. African governments face rising debt sustainability concerns, limiting their capacity for public investment. Private capital, constrained by affordability limitations and perceived risks, can cover only a small share of energy access financing needs. Official development assistance for energy projects in Africa has remained static over the past decade, despite the escalating urgency of the climate and development agendas (IEA, 2024).

#### **1.4 Research Aim and Objectives**

This research aims to provide a comprehensive assessment of Africa's energy infrastructure financing landscape, analyzing the magnitude of investment gaps, evaluating economic implications of underinvestment, and identifying viable financing mechanisms to meet future energy demand and development objectives.

The specific objectives are:

1. To quantify the current investment gap across Africa's energy sector value chain, including generation, transmission, distribution, and off-grid systems
2. To evaluate the economic consequences of persistent energy infrastructure deficits on GDP growth, industrial development, and human capital formation
3. To assess the effectiveness of existing financing mechanisms, including public investment, private capital flows, multilateral development financing, and climate finance
4. To identify structural barriers constraining energy infrastructure investment, including regulatory, institutional, and market-related factors
5. To develop policy recommendations for scaling financing flows and improving investment effectiveness

### **1.5 Significance of the Study**

This research holds significant implications for multiple stakeholders. For policymakers, it provides evidence-based analysis of financing requirements and policy levers to accelerate energy access. For investors and financial institutions, it offers assessment of market opportunities, risk factors, and mechanisms to improve investment returns. For development institutions, it evaluates the effectiveness of current financing approaches and identifies opportunities for enhanced impact.

The timing of this research is particularly relevant. The April 2024 launch of Mission 300, a partnership between the World Bank Group and African Development Bank to connect 300 million Africans to electricity by 2030, has catalyzed unprecedented political commitment and financing pledges exceeding \$50 billion (World Bank, 2025). The subsequent endorsement of National Energy Compacts by 29 countries provides a concrete framework for assessing progress and identifying implementation challenges.

## CHAPTER TWO

# CONCEPTUAL FRAMEWORK

### 2.1 Conceptualizing Energy Infrastructure Financing

Energy infrastructure financing encompasses the mobilization and allocation of capital for the development, maintenance, and operation of physical assets that produce, transmit, and distribute energy services. In the African context, this definition extends beyond traditional grid infrastructure to include decentralized renewable energy systems, clean cooking solutions, and cross-border transmission networks that enable regional power trade.

The financing challenge is fundamentally about risk allocation and return generation. Energy infrastructure projects typically exhibit high upfront capital requirements, long asset lifespans, and revenue streams dependent on policy stability and macroeconomic conditions. In Africa, these characteristics interact with sovereign risk, currency volatility, and limited domestic capital markets to create a challenging investment environment.

The concept of "bankability" is central to understanding financing constraints. A project is considered bankable when its risk-return profile meets investor requirements, typically necessitating predictable revenue streams, enforceable contracts, and credible off-takers. In many African markets, the absence of creditworthy utilities and non-cost-reflective tariffs undermines bankability, requiring innovative structuring and risk mitigation mechanisms (GET.transform, 2025).

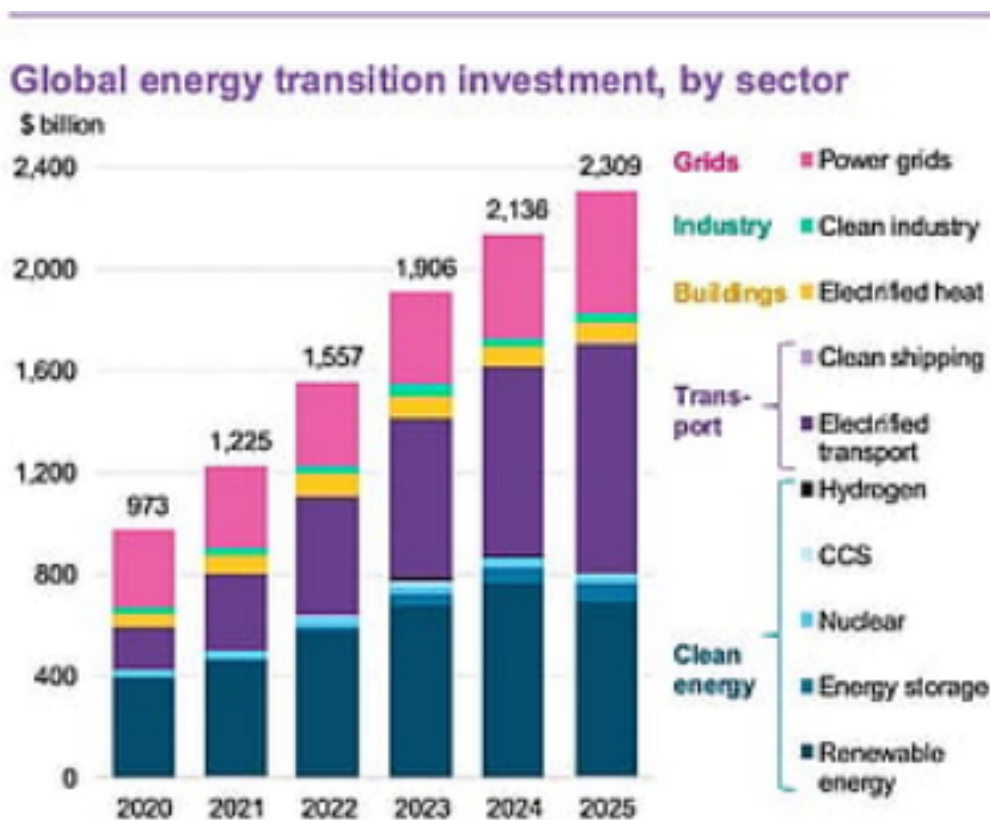
### 2.2 Africa's Energy Investment Requirements: Evidence from International Institutions

Recent analyses from major development institutions converge on the scale of Africa's energy investment needs. The International Energy Agency's World Energy Outlook 2024 estimates that achieving universal energy access by 2030 requires approximately \$55 billion annually in upfront investment, with sub-Saharan Africa requiring two-thirds of this total (IEA, 2024). This represents less than 2% of current global annual energy spending, suggesting that the challenge is not global resource scarcity but allocation priorities and delivery mechanisms.

The African Development Bank's Ten-Year Strategy (2024-2033) estimates that Africa requires approximately \$200 billion annually through 2030 to achieve SDG7 goals alone (Africa Energy Portal, 2025). This figure substantially exceeds current investment levels of approximately \$90 billion annually, indicating a need to more than double energy sector financing.

The World Bank Group has committed \$30 billion in public sector investment to connect 250 million people through Mission 300, while the African Development Bank targets an additional 50 million connections (World Bank, 2024). These commitments, while substantial, represent only a portion of the total financing required, emphasizing the need for private capital mobilization and domestic resource mobilization.

## 2.3 Global Energy Infrastructure Financing Trends



Source: BloombergNEF. Note: CCS refers to carbon capture and storage.

Global energy transition finance reached a record \$2.4 trillion in 2024, representing a 20% increase from the 2022-2023 average (Guardian Nigeria, 2025). However, distribution remains highly unequal. Advanced economies and China together

accounted for approximately 90% of all transition finance, while sub-Saharan Africa received only 2.3% (approximately \$18 billion) despite possessing vast renewable potential.

Renewable energy attracted \$807 billion globally in 2024, up 22% year-on-year, with solar photovoltaic investment surging 49% to \$554 billion (Guardian Nigeria, 2025). Battery storage investment increased 73% to \$54 billion, reflecting the growing importance of grid flexibility. However, these global trends have not translated proportionally to African markets, where investment growth has lagged despite the continent's exceptional solar and wind resources.

The slowing pace of renewable investment growth globally down to 7.3% in 2024 from 32% in 2023 raises concerns about achieving the tripling of renewable capacity by 2030 agreed at COP28 (Guardian Nigeria, 2025). For Africa, this global deceleration threatens to further marginalize the continent in competition for limited clean energy investment flows.

## **2.4 Investment Models and Financing Mechanisms**

### **2.4.1 Public Financing and State-Owned Utilities**

Traditional public sector financing has dominated African energy infrastructure development, primarily through state-owned utilities and government budget allocations. However, this model faces severe constraints. Fiscal pressures, exacerbated by post-pandemic debt burdens and rising external debt service (now exceeding 2% of GDP in sub-Saharan Africa), limit government capacity for infrastructure investment (World Bank, 2025). The number of countries in or at high risk of debt distress has nearly tripled from eight in 2014 to twenty-three in 2025.

State-owned utilities across the continent face financial instability characterized by operational inefficiencies, transmission and distribution losses often exceeding 20%, and inability to collect revenues. These weaknesses make utilities unreliable off-takers for independent power producers, requiring government guarantees that further strain sovereign balance sheets (GET.transform, 2025).

### **2.4.2 Private Investment and Independent Power Producers**

Private sector participation in African power generation has expanded significantly over the past decade, particularly through Independent Power Producer (IPP) frameworks. Countries such as South Africa, Morocco, Kenya, and Ghana have successfully procured significant renewable capacity through competitive tendering processes. However, private investment remains concentrated in relatively mature markets with established regulatory frameworks.

The IPP model faces structural challenges in many African countries. Non-cost-reflective tariffs, maintained to ensure affordability, prevent utilities from generating reliable revenue streams needed to honor power purchase agreements. Financial instability among state utilities, delays in payments to IPPs, and lack of creditworthy off-takers significantly increase financial risks, leading to higher risk premiums and increased costs of capital (GET.transform, 2025).

### **2.4.3 Public-Private Partnerships (PPPs)**

Public-Private Partnerships offer potential to combine public sector development mandates with private sector efficiency and capital. The Africa Infrastructure Fellowship Program, launched by the World Bank in 2018, has trained 70 professionals from 31 African countries in PPP procurement and delivery, reflecting growing recognition of this model's importance (World Bank, 2024).

However, PPP implementation in African energy sectors has been limited by institutional capacity constraints, complex procurement processes, and misalignment between public and private risk appetites. Successful PPPs require transparent regulatory frameworks, credible off-takers, and mechanisms to address currency and political risks—conditions that remain absent in many markets.

### **2.4.4 Blended Finance and Concessional Capital**

Blended finance structures, which combine concessional public or philanthropic capital with commercial investment to improve risk-return profiles, have emerged as critical mechanisms for African energy infrastructure. The Sustainable Energy Fund for

Africa (SEFA), hosted by the African Development Bank, exemplifies this approach. In 2024, SEFA approved \$108 million across 14 projects, leveraging approximately \$13 billion in co-investment and targeting 840 MW of new renewable capacity and 1.5 million new connections (AfDB, 2024).

SEFA's expansion to include eleven donors, with Japan joining as the newest contributor in 2024, demonstrates the scalability of blended finance approaches. The fund's focus on "Green Baseload" (utility-scale renewables), "Green Mini-Grids," and energy efficiency addresses critical gaps in the market. Projects approved in 2024 include innovative structures such as the first SEFA-funded green line of credit with Diamond Trust Bank in Kenya, demonstrating the potential for local currency financing mechanisms (AfDB, 2024).

#### **2.4.5 Climate Finance and International Development Assistance**

Climate finance represents an increasingly important source of energy infrastructure funding. The African Development Bank allocated \$5.5 billion to climate finance in 2024, representing 49% of total approvals, with 56% directed toward adaptation and 44% toward mitigation (AfDB, 2025). The Bank is on track to meet its \$25 billion climate finance target for 2020-2025, having reached \$19.5 billion (78%) by end-2024.

The Climate Investment Funds (CIF), with pledged amounts exceeding \$12.5 billion globally, have supported 45 projects in Africa through the African Development Bank, deploying \$1.06 billion in CIF resources and mobilizing an additional \$2.3 billion in co-financing (AfDB, 2025). The 2024 launch of the CIF Capital Market Mechanism, with a \$500 million bond issuance on the London Stock Exchange, demonstrates innovative approaches to scaling climate finance through capital markets.

However, climate finance flows to Africa remain insufficient relative to needs and global allocations. The continent, despite contributing minimally to historical emissions and facing disproportionate climate impacts, receives a fraction of global climate finance. The new collective quantified goal on climate finance agreed at COP29 could potentially redirect greater flows to African energy infrastructure, though implementation mechanisms remain under development.

## 2.5 Policy and Institutional Frameworks

The effectiveness of energy infrastructure financing depends critically on policy and regulatory environments. The African Development Bank's Electricity Regulatory Index (ERI) for Africa provides a diagnostic tool for assessing regulatory frameworks across 43 countries. The 2024 ERI reveals persistent gaps in regulatory substance, particularly regarding tariff methodologies, licensing frameworks for cross-border projects, and renewable energy regulations (AfDB, 2024).

Key regulatory challenges include:

- **Cost-Reflective Tariffs:** By 2021, cost-of-service-based pricing was under discussion or in place in only 24 African countries. Non-cost-reflective tariffs undermine utility financial sustainability and deter private investment (AfDB, 2024).
- **Regional Integration:** Regional power pools offer potential for economies of scale and resource optimization, but regulatory harmonization remains limited. The West African Power Pool has achieved grid synchronization for 12 countries and established the Information and Coordination Centre in Benin, but market utilization remains at only 25% of capacity. The Central African Power Pool lacks a dedicated regional regulatory authority, constraining cross-border trade (AfDB, 2024).
- **Mini-Grid Regulation:** While countries such as Nigeria and Kenya have implemented clear mini-grid licensing frameworks, regulatory uncertainty and high capital costs continue to limit scale in other regions. Standardized technical and operational guidelines remain underdeveloped (AfDB, 2024).

## 2.6 Financing Constraints and Risk Factors

### 2.6.1 Sovereign Risk and Debt Sustainability

Rising external debt burdens constrain African governments' capacity to provide sovereign guarantees or direct public investment. External debt service has more than doubled over the past decade, reaching 2% of GDP in 2024 (World Bank, 2025). The number of countries in or at high risk of debt distress has increased dramatically, limiting fiscal space for infrastructure investment.

### **2.6.2 Currency Risk and Local Capital Markets**

The predominance of hard currency (USD/EUR) financing for African infrastructure creates significant currency mismatches. Revenue streams are typically denominated in local currency, while debt service obligations are in foreign currency, exposing projects to exchange rate volatility. The African Development Bank has proposed innovative currency convertibility mechanisms leveraging natural resource endowments to address this challenge (Africa Energy Portal, 2025).

Local capital markets remain underdeveloped in most African countries, limiting domestic financing options. Institutional investors such as pension funds and insurance companies face regulatory constraints on infrastructure investment and lack suitable investment vehicles.

### **2.6.3 Regulatory Uncertainty and Political Risk**

Frequent policy shifts, unclear licensing procedures, and absence of coherent market structures create unpredictable investment climates. Political risk, including expropriation concerns and contract repudiation, elevates required returns and limits investment horizons. The World Bank Group's Unified Guarantee Platform provides political, credit, and market risk coverage, but uptake remains limited by complexity and cost (IFC, 2025).

## **2.7 Knowledge Gaps and Research Contribution**

Existing literature on African energy infrastructure financing exhibits several gaps. First, analyses often focus on generation capacity while neglecting transmission, distribution, and demand-side investments essential for service delivery. Second, assessments of financing needs frequently rely on aggregate figures without sufficient disaggregation by technology, geography, or income level, limiting operational guidance for investors and policymakers. Third, evaluations of financing mechanism effectiveness often lack rigorous counterfactual analysis, making it difficult to attribute outcomes to specific interventions.

This research contributes to addressing these gaps by providing integrated analysis across the energy value chain, disaggregating investment requirements by subsector and region, and evaluating financing mechanisms within the context of current policy initiatives, particularly Mission 300 and National Energy Compacts.



# CHAPTER THREE

## METHODOLOGY

### 3.1 Research Design and Analytical Approach

This study employs a mixed-methods research design combining quantitative analysis of investment flows and economic indicators with qualitative assessment of policy frameworks and financing mechanisms. The analytical approach is structured around three pillars: (1) quantitative assessment of investment gaps using secondary data from international institutions; (2) economic impact analysis examining relationships between energy infrastructure and development outcomes; and (3) evaluative analysis of financing mechanisms based on documented case studies and portfolio performance.

The research adopts a policy-relevant orientation, prioritizing actionable insights for practitioners over theoretical contributions. This aligns with the report's target audience of policymakers, investors, and development practitioners requiring evidence-based guidance for decision-making.

### 3.2 Data Sources and Datasets

The analysis relies primarily on secondary data from authoritative international institutions:

- Energy Statistics and Investment Data:
  - International Energy Agency (IEA) World Energy Outlook 2024 and Africa Energy Outlook
  - International Renewable Energy Agency (IRENA) Global Landscape of Energy Transition Finance 2025
  - African Development Bank Annual Development Effectiveness Review 2025 and sector reports
  - World Bank Africa's Pulse and infrastructure financing databases
  - Sustainable Energy for All (SEforALL) and Climate Policy Initiative tracking data
- Economic and Development Indicators:
  - African Development Bank African Economic Outlook 2024

- World Bank World Development Indicators and Global Economic Prospects
- International Monetary Fund Regional Economic Outlooks
- United Nations Economic Commission for Africa publications
- Financing and Policy Data:
  - African Development Bank Sustainable Energy Fund for Africa Annual Report 2024
  - World Bank Mission 300 progress tracking and Energy Compact documentation
  - Climate Investment Funds annual reporting
  - Electricity Regulatory Index for Africa 2024

### **3.3 Analytical Methods**

#### **3.3.1 Investment Gap Analysis**

Investment gaps are calculated as the difference between estimated requirements for universal energy access and SDG7 achievement and current investment flows. Requirements are derived from IEA scenario analysis (Stated Policies Scenario and Sustainable Development Scenario) and African Development Bank estimates. Current flows are compiled from IRENA, CPI, and development institution reporting.

Gap analysis is disaggregated by:

- Subsector (generation, transmission, distribution, off-grid, clean cooking)
- Technology (solar PV, wind, hydro, geothermal, fossil fuel, battery storage)
- Geography (North Africa, West Africa, East Africa, Central Africa, Southern Africa)
- Income level (low-income, lower-middle-income, upper-middle-income countries)

#### **3.3.2 Economic Impact Assessment**

Economic implications are assessed through:

- Correlation analysis between electrification rates and GDP per capita growth
- Sectoral productivity analysis examining energy infrastructure impacts on manufacturing, agriculture, and services
- Employment effect estimation based on infrastructure investment multipliers
- Fiscal impact assessment examining utility financial performance and government subsidy burdens

### 3.3.3 Financing Mechanism Evaluation

Effectiveness of financing mechanisms is evaluated using:

- Portfolio performance data from development finance institutions
- Leverage ratios (co-financing mobilized per unit of concessional capital)
- Outcome metrics (connections delivered, capacity added, emissions reduced)
- Comparative case study analysis of successful and failed projects

### 3.4 Key Assumptions

The analysis proceeds under several key assumptions:

1. Continued Policy Commitment: The analysis assumes that current political commitment to Mission 300 and National Energy Compacts persists, with participating countries implementing pledged reforms.
2. Macroeconomic Stability: Projections assume no severe continent-wide economic crises, though individual country variations are acknowledged.
3. Technology Cost Trajectories: Renewable energy cost assumptions follow IEA learning curve projections, with continued declines in solar PV and battery storage costs.
4. Population Growth: Demographic projections follow UN medium-variant scenarios, with urbanization rates consistent with historical trends.

## CHAPTER FOUR

### DATA PRESENTATION ANALYSIS

#### 4.1 Current Status of Africa's Energy Infrastructure

##### 4.1.1 Power Generation and Installed Capacity

Africa's total installed power generation capacity remains significantly below global averages on a per capita basis. The continent's power system is characterized by aging infrastructure, with many countries relying on diesel generators and outdated thermal plants for baseload power. South Africa dominates the continent's generation capacity, though its system has experienced severe reliability crises in recent years.

Renewable energy deployment, while growing, remains limited. In 2024, Africa installed just 1.6% of the world's new renewable capacity, a figure grossly disproportionate to its resource potential and energy needs (IRENA, 2025). Solar PV and wind dominate new capacity additions, but hydropower remains the largest renewable source in many countries.

Table 1: Africa's Share of Global Clean Energy Investment (2024)

Metric	Africa Investment	Global Total Investment	Africa's Share
Clean Energy Investment	\$18 billion	\$2.4 trillion	<b>0.75%</b>
Renewable Energy Investment	~\$8 billion	\$807 billion	<b>~1%</b>
Solar PV Investment	~\$3 billion	\$554 billion	<b>~0.5%</b>
Battery Storage Investment	~\$0.5 billion	\$54 billion	<b>~0.9%</b>

Source: IRENA and Climate Policy Initiative (2025)

### **4.1.2 Transmission and Distribution Networks**

Transmission infrastructure deficits constrain the utilization of generation capacity and limit regional power trade. Many countries lack adequate high-voltage transmission to connect remote renewable resources to load centers. Distribution networks suffer from high technical and commercial losses, often exceeding 30% in some utilities, compared to best-practice benchmarks of 10-15%.

Regional interconnection projects have advanced in some corridors. The West African Power Pool achieved synchronization of 12 national grids in 2023, and the North Core Interconnection linking Nigeria, Niger, Benin, and Burkina Faso is nearing completion. However, Central and East African regions lag in transmission integration.

### **4.1.3 Off-Grid and Mini-Grid Systems**

Decentralized renewable energy (DRE) systems, including mini-grids and solar home systems, have emerged as critical channels for rural electrification. Mini-grids remain the most cost-effective solution for isolated areas, typically utilizing solar, wind, biomass, or small hydro resources.

Kenya and Nigeria have established clear regulatory frameworks for mini-grid development, reducing barriers to entry and encouraging private investment. However, scale remains limited by high upfront capital costs, regulatory uncertainty in many markets, and challenges in establishing viable revenue models for dispersed, low-consumption rural populations.

### **4.1.4 Clean Cooking Infrastructure**

Clean cooking remains the most neglected dimension of Africa's energy access challenge. Approximately 900 million Africans lack access to clean cooking solutions, relying on biomass, charcoal, or coal with severe health and environmental consequences. The IEA Summit for Clean Cooking in Africa (May 2024) secured \$2.2 billion in pledges, supplementing the African Development Bank's \$2 billion commitment at COP28 (IEA, 2024). However, this remains far below estimated requirements of \$4-8 billion annually.

## 4.2 Investment Requirements and Gap Analysis

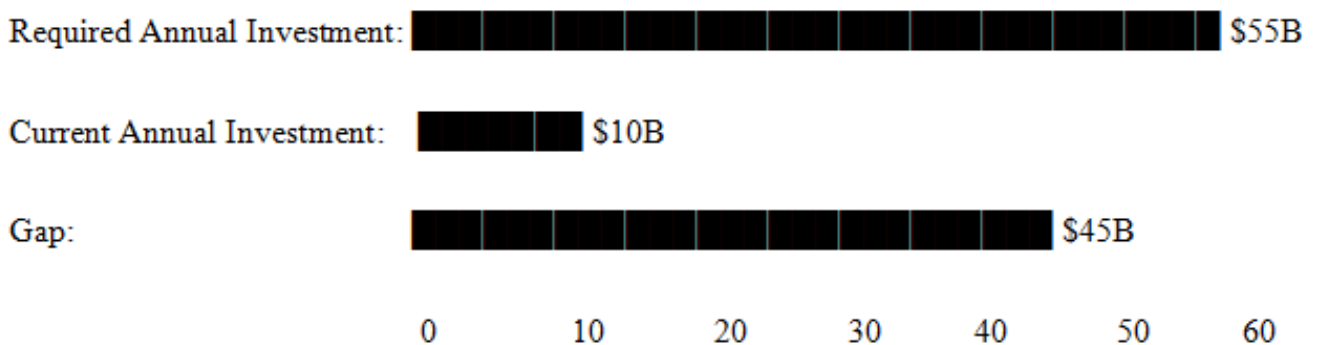
### 4.2.1 Universal Energy Access Investment Needs

Achieving universal energy access by 2030 requires approximately \$55 billion annually in upfront investment, according to IEA analysis (IEA, 2024). Two-thirds of this requirement (\$36-37 billion annually) is concentrated in sub-Saharan Africa. This figure encompasses:

- Grid extension and densification: \$20-25 billion annually
- Mini-grid deployment: \$10-12 billion annually
- Solar home systems: \$8-10 billion annually
- Clean cooking solutions: \$4-8 billion annually

Current investment levels of approximately \$10 billion annually represent less than 20% of required funding, creating an annual gap of \$45 billion.

Figure 1: Annual Investment Requirements vs. Current Flows for Energy Access (\$ Billion)



Source: IEA World Energy Outlook 2024

### 4.2.2 SDG7 and Energy Transition Investment Needs

The African Development Bank estimates that achieving SDG7 goals (universal access to affordable, reliable, sustainable modern energy) requires approximately \$200 billion annually through 2030 (Africa Energy Portal, 2025). This broader figure includes:

- Power sector investment: \$120-140 billion annually (generation, transmission, distribution)
- Energy access (off-grid): \$40-50 billion annually
- Clean cooking: \$8-10 billion annually
- Energy efficiency: \$10-15 billion annually

Current total energy investment in Africa is approximately \$90 billion annually, indicating a gap of \$110 billion annually to achieve SDG7 targets.

### **4.2.3 Regional Disaggregation of Investment Gaps**

Investment requirements vary significantly across regions:

**West Africa:** Requires approximately \$25-30 billion annually, with Nigeria accounting for nearly half. The region's relatively advanced regional power pool and IPP frameworks create favorable conditions for investment, though utility financial weakness remains a constraint.

**East Africa:** Requires \$20-25 billion annually, driven by rapid demand growth in Ethiopia, Kenya, and Tanzania. Strong renewable resources (geothermal, wind, solar) attract private investment, but transmission infrastructure lags.

**Southern Africa:** Requires \$15-20 billion annually, dominated by South Africa's system modernization and just energy transition requirements. The region has the highest existing capacity but faces severe reliability challenges and coal dependence.

**Central Africa:** Requires \$10-15 billion annually, with the lowest baseline access rates (averaging below 35%). Abundant hydropower potential (particularly DRC) is constrained by transmission deficits and institutional capacity limitations.

**North Africa:** Requires \$10-15 billion annually, primarily for renewable energy expansion and grid modernization. The region has the highest access rates but faces pressure to transition away from fossil fuel subsidies.

## **4.3 Financing Flows and Sources**

### **4.3.1 Public Sector Investment**

African governments remain the largest source of energy infrastructure financing, primarily through state-owned utilities and budget allocations. However, fiscal constraints limit growth in public investment. The share of government budgets allocated to energy infrastructure has declined in many countries as debt service consumes increasing revenue shares.

Multilateral development banks have scaled up commitments. The World Bank Group has committed \$30 billion for Mission 300, while the African Development Bank approved a record \$11 billion in new operations for 2024, including \$5.5 billion for climate finance (AfDB, 2025). However, disbursement often lags commitment due to project preparation bottlenecks and procurement challenges.

#### **4.3.2 Private Capital Flows**

Private investment in African energy infrastructure remains concentrated in utility-scale renewable generation, particularly in markets with established IPP frameworks. South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has attracted over \$20 billion since inception, though recent rounds have faced delays and grid connection constraints.

International private capital flows to African energy have declined from pre-pandemic peaks, reflecting both global risk aversion and country-specific concerns. Portfolio investment in African energy stocks and bonds remains minimal, with the continent largely excluded from global clean energy investment indices.

#### **4.3.3 Climate Finance and Concessional Flows**

Climate finance flows to African energy totaled approximately \$18 billion in 2024, representing a modest increase from previous years but remaining a fraction of global flows (Guardian Nigeria, 2025). The Green Climate Fund, Climate Investment Funds, and bilateral climate finance (particularly from Germany, UK, and France) provide concessional capital, but allocation processes are often slow and fragmented.

The Mission 300 initiative has catalyzed significant new commitments. The January 2025 Dar es Salaam Energy Summit secured over \$50 billion in financing pledges from the African Development Bank, World Bank Group, Islamic Development Bank, Asian Infrastructure Investment Bank, and bilateral partners (AfDB, 2025). However, these commitments span multiple years and include existing pipeline projects, limiting the net additionality.

#### 4.3.4 Blended Finance Mobilization

Blended finance mechanisms demonstrate significant leverage potential. The Sustainable Energy Fund for Africa's \$308 million portfolio is projected to mobilize approximately \$13 billion in co-investment by 2030, representing a leverage ratio of over 40:1 (AfDB, 2024). SEFA's 2024 approvals of \$108 million across 14 projects are expected to generate 840 MW of renewable capacity, 1.5 million connections, and 176,000 jobs.

Table 2: SEFA 2024 Approved Projects and Expected Impact

Project Type	Countries	SEFA Investment (US\$ Million)	Expected Capacity (MW)	Expected Connections Impact
<b>Green Baseload (Solar/Wind)</b>	Chad, Burkina Faso, Zambia, Mozambique	43.5	840	Grid-based electricity supply
<b>Green Mini-Grids</b>	Ethiopia, Multinational	18	Distributed systems	1.5 million connections
<b>Energy Efficiency / Access</b>	Nigeria, Kenya, Multinational	46.5	N/A	Clean cooking and energy efficiency
<b>Total</b>	<b>14 Projects (across multiple countries)</b>	<b>108</b>	<b>840+ MW</b>	<b>1.5 million+ connections</b>

Source: SEFA Annual Report 2024

#### 4.4 Investment Gap Analysis by Subsector

##### 4.4.1 Power Generation

The generation investment gap is most acute for renewable energy deployment. While Africa possesses exceptional solar (over 10,000 GW technical potential) and wind resources, installed renewable capacity (excluding large hydro) remains below 5% of potential. The gap reflects:

High cost of capital: African renewable projects face weighted average cost of capital (WACC) 2-3 times higher than developed markets, eroding competitiveness despite excellent resource profiles.

- Grid integration constraints: Limited transmission capacity and grid stability concerns deter variable renewable deployment in many markets.

- Procurement capacity: Limited institutional capacity for competitive tendering and contract negotiation delays project development.

#### **4.4.2 Transmission and Distribution**

Transmission and distribution (T&D) investment is the most underfinanced segment of the energy value chain. While generation projects attract private and international capital through IPP structures, T&D typically requires public or concessional financing due to lower returns and higher perceived risks.

The African Development Bank estimates that transmission infrastructure requires \$40-50 billion annually, while current investment is approximately \$10-15 billion. Distribution network rehabilitation and expansion face similar gaps. The absence of creditworthy off-takers and non-cost-reflective tariffs prevent utility self-financing of T&D upgrades.

#### **4.4.3 Off-Grid and Decentralized Solutions**

Off-grid investment flows have declined significantly from peak levels in the mid-2010s, when pay-as-you-go solar home systems attracted substantial venture capital. Market consolidation, currency devaluations, and concerns about over-indebtedness among rural customers have reduced investor appetite.

Mini-grid deployment remains below potential despite cost competitiveness for rural electrification. The World Bank's Distributed Renewable Energy Scale-Up initiative and programs like Kenya's Last Mile Connectivity Project demonstrate viable models, but scale remains limited by capital constraints and regulatory complexity.

#### 4.4.4 Clean Cooking

The clean cooking investment gap is the most severe relative to current flows. With requirements of \$4-8 billion annually and current investment below \$1 billion, the gap exceeds 80%. This reflects the fundamentally different nature of clean cooking markets, characterized by consumer product distribution rather than infrastructure investment—and the limited commercial viability of clean cooking solutions for the poorest households.

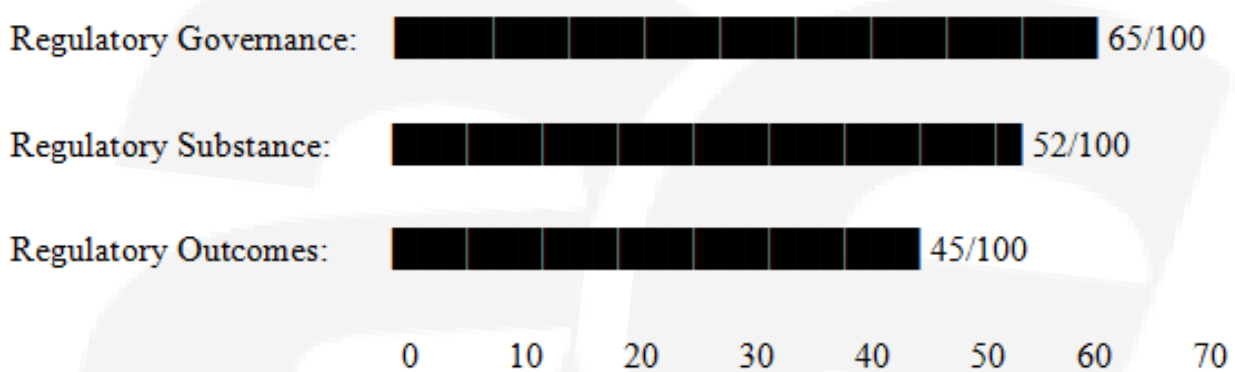
#### 4.5 Barriers to Energy Infrastructure Investment

##### 4.5.1 Regulatory and Institutional Barriers

The Electricity Regulatory Index 2024 reveals persistent weaknesses in regulatory frameworks across 43 assessed countries. While governance scores (legal and institutional setup) are relatively strong, substance scores (policy implementation) and outcome scores (utility performance) lag significantly. Key regulatory barriers include:

- Non-cost-reflective tariffs: Prevalent in over 60% of assessed countries, undermining utility financial sustainability
- Weak regional harmonization: Only ECOWAS and EAPP have implemented regional licensing processes
- Limited enforcement capacity: Regulatory bodies often lack technical capacity to monitor service quality and enforce standards

Figure 2: ERI 2024 Performance by Component (Average Scores)



Source: Electricity Regulatory Index for Africa 2024

#### 4.5.2 Financial and Market Barriers

Utility Creditworthiness: Financial instability among state utilities represents the primary barrier to private generation investment. Payment delays to IPPs, accumulated arrears, and lack of transparent revenue management create unacceptable counterparty risk without sovereign guarantees.

- Currency Risk: The predominance of hard currency financing for projects generating local currency revenues creates structural currency mismatches. Recent currency devaluations in Egypt, Nigeria, Angola, and other major economies have severely impacted project economics and deterred new investment.
- Limited Local Capital Markets: Domestic institutional investors (pension funds, insurance companies) face regulatory and capacity constraints limiting infrastructure investment. Local currency bond markets remain shallow, with limited tenors and liquidity for infrastructure financing.

#### 4.5.3 Political and Macro-Economic Barriers

Political risk, including expropriation, contract repudiation, and arbitrary regulatory changes, elevates required returns and limits investment horizons. The number of countries in or at high risk of debt distress (23 countries in 2025) constrains sovereign guarantee capacity and increases perceived country risk.

Macroeconomic volatility, including inflation volatility and exchange rate instability, complicates long-term project planning and financing. Recent global monetary tightening has increased debt service costs and reduced capital flows to emerging markets, with disproportionate impact on African economies.

# CHAPTER FIVE

## DISCUSSION, CONCLUSIONS AND POLICY RECOMMENDATIONS

### 5.1 Discussion of Major Findings

#### 5.1.1 The Scale and Structure of Investment Gaps

The analysis confirms that Africa's energy infrastructure investment gap is substantial and structural, requiring \$110-200 billion annually depending on target definitions, against current flows of approximately \$90 billion. However, the gap is not merely quantitative but qualitative investment is misaligned with the continent's needs and potential.

Current investment overemphasizes utility-scale generation in relatively mature markets while underfunding transmission, distribution, and decentralized solutions essential for universal access. The concentration of private investment in a handful of countries (South Africa, Morocco, Kenya, Ghana) leaves the majority of the continent underserved. Clean cooking, despite affecting nearly one billion people, receives marginal financing attention.

The gap analysis reveals that achieving universal energy access by 2030, while technically feasible, requires a tripling of current investment flows and significant reallocation toward access-focused interventions. The \$55 billion annual requirement for universal access represents less than 2% of global energy spending, suggesting that the constraint is political prioritization and delivery capacity rather than global resource scarcity.

#### 5.1.2 Economic Implications of Underinvestment

Energy infrastructure deficits impose severe economic costs that compound over time. The World Bank estimates that closing Africa's infrastructure gap could increase GDP growth by up to 2% annually (Clyde & Co, 2024). Conversely, persistent underinvestment constrains growth in multiple channels:

- **Industrial Competitiveness:** Unreliable power supply forces firms to invest in backup generation, raising effective energy costs by 50-100% compared to grid power. This undermines manufacturing competitiveness and deters foreign direct investment in energy-intensive sectors.
- **Agricultural Productivity:** Lack of reliable power limits cold chain development, agricultural processing, and irrigation, constraining value addition in a sector employing 60% of the workforce.
- **Human Capital Development:** Energy poverty affects education (limiting study hours and digital access) and health (compromising vaccine cold chains and medical equipment operation), with long-term productivity implications.
- **Employment Creation:** Infrastructure investment generates substantial employment—estimated at 110,000-150,000 jobs per \$1 billion invested—while energy access enables enterprise development and job creation in downstream sectors (Clyde & Co, 2024).

The economic case for accelerated investment is compelling yet financing constraints persist. This paradox reflects market failures positive externalities from energy access are not captured in private returns, and institutional weaknesses that elevate risk perceptions and required returns.

### **5.1.3 Financing Mechanism Effectiveness**

The evaluation of financing mechanisms reveals that blended finance structures demonstrate the highest leverage ratios and development impact per unit of concessional capital. SEFA's model of combining technical assistance, concessional debt, and equity investments to improve project bankability has proven effective in mobilizing private capital at scale.

However, blended finance remains limited by donor resource constraints and the complexity of structuring transactions. The \$108 million approved by SEFA in 2024, while a record, represents less than 0.5% of annual investment requirements. Scaling blended finance to meet the investment gap would require order-of-magnitude increases in concessional capital deployment.

Public-private partnerships show promise but remain limited by institutional capacity constraints and misalignment between public development objectives and private return requirements. Successful PPPs require extensive preparation, transparent procurement, and credible off-takers—conditions absent in many African markets. Climate finance flows, while growing, remain insufficient and poorly aligned with Africa's priorities. The predominance of mitigation-focused finance (44% of AfDB climate finance) relative to adaptation (56%) reflects global climate agendas, but Africa's immediate needs require greater emphasis on resilience and access.

## **5.2 Role of Development Institutions and Private Investors**

### **5.2.1 Multilateral Development Banks**

The World Bank Group and African Development Bank have demonstrated expanded ambition through Mission 300, committing over \$50 billion in financing. However, the translation of commitments into disbursements and connections remains the critical challenge. The World Bank Group reports having connected 21 million people between July 2023 and February 2025, with projects under implementation targeting nearly 100 million (World Bank, 2025).

Development banks play essential roles beyond financing:

- Technical assistance: Supporting project preparation, regulatory reform, and institutional capacity building
- Risk mitigation: Providing guarantees and insurance products that improve project bankability
- Standard setting: Establishing procurement standards, environmental safeguards, and best practice frameworks
- Coordination: Aligning donor and government efforts through initiatives like Mission 300

The African Development Bank's creation of Compact Delivery and Monitoring Units (CDMUs) through the AESTAP program represents an innovative approach to addressing implementation bottlenecks. The \$3.9 million Phase II technical assistance project approved in January 2026 will support 13 countries in translating National Energy Compacts into actual connections (AfDB, 2026).

## 5.2.2 Private Sector Investors

Private sector participation is essential given the scale of investment requirements relative to public and concessional resources. However, current private investment is concentrated in utility-scale generation in mature markets, leaving significant gaps in transmission, distribution, and access.

The IFC and World Bank Group are deploying innovative instruments to address perceived risks:

- Patient equity: Long-term capital vehicles for distributed renewable energy companies
- Local currency financing: Loans in domestic currency to mitigate exchange rate risk
- De-risking instruments: Guarantees covering political, credit, and market risks through the Unified Guarantee Platform (IFC, 2025)

Private investment mobilization requires improved project pipelines, with bankable projects ready for investment. The Africa Investment Forum and similar platforms are working to develop investment-ready project pipelines, but preparation capacity remains a binding constraint.

## 5.3 Policy Recommendations

### 5.3.1 Recommendations for Governments and Regulators

#### 1. Accelerate Regulatory Reform to Improve Investment Climate

Governments must prioritize regulatory reforms that enhance project bankability. The ERI 2024 framework provides a diagnostic tool for identifying specific gaps. Priority reforms include:

- Implementing cost-reflective tariffs with targeted protection for vulnerable households through lifeline rates rather than across-the-board subsidies
- Establishing independent, well-resourced regulatory authorities with clear mandates and protection from political interference
- Developing standardized licensing frameworks for mini-grids and distributed generation to reduce regulatory uncertainty
- Harmonizing technical standards and grid codes at regional level to facilitate cross-border trade and economies of scale

## 2. Strengthen Utility Financial Sustainability

State-owned utilities require fundamental restructuring to become creditworthy off-takers. This includes:

- Implementing revenue protection measures to reduce commercial losses and improve collection rates
- Ring-fencing transmission revenues to ensure infrastructure maintenance and expansion
- Introducing performance-based management contracts and, where necessary, private sector participation in distribution
- Transparent revenue management systems that build investor confidence

## 3. Develop National Energy Compacts with Concrete Implementation Plans

The National Energy Compact model developed under Mission 300 provides a template for coordinated action. Compacts should include:

- Quantified targets for access expansion, renewable deployment, and utility performance
- Specific policy commitments with timelines and responsible institutions
- Investment plans identifying public and private financing requirements and sources
- Monitoring frameworks with transparent reporting on progress and obstacles

## 4. Enhance Domestic Resource Mobilization

African governments must increase domestic financing contributions through:

- Rationalizing fossil fuel subsidies, with protection for vulnerable households, to free fiscal space for infrastructure investment
- Developing local capital markets through pension fund and insurance regulatory reforms enabling infrastructure investment
- Implementing innovative taxation mechanisms, such as carbon pricing or levies on mobile money transactions, to generate dedicated energy access funding
- Improving public investment management to reduce waste and corruption in infrastructure spending

### 5.3.2 Recommendations for Development Institutions

#### 1. Scale Blended Finance Facilities

Development institutions should significantly expand blended finance capacity:

- Increase concessional capital allocations to facilities like SEFA, targeting \$500 million annually in concessional commitments to mobilize \$20+ billion in co-investment
- Develop sector-specific facilities targeting underserved segments (transmission, mini-grids, clean cooking)
- Simplify approval processes to reduce transaction costs and time-to-disbursement
- Establish first-loss provisions that genuinely absorb risk rather than merely signaling commitment

#### 2. Enhance Technical Assistance for Implementation

The bottleneck in energy access is increasingly implementation capacity rather than financing availability. Development institutions should:

- Scale technical assistance for project preparation, targeting 100+ investment-ready projects annually
- Support regulatory reform through embedded advisory services and capacity building
- Fund Compact Delivery and Monitoring Units in all Mission 300 countries to coordinate implementation
- Develop standardized documentation and procurement frameworks to reduce transaction costs

#### 3. Improve Coordination and Reduce Fragmentation

The proliferation of energy access initiatives risks duplication and coordination failures. Development institutions should:

- Align all financing behind National Energy Compact priorities, with government leadership in setting agendas
- Establish clear division of labor between institutions based on comparative advantages

- Develop harmonized reporting frameworks to enable aggregation of results and identification of gaps-

- Coordinate policy dialogue to present consistent messages to governments on reform priorities

#### 4. Expand Climate Finance for Energy Access

Climate finance architecture must better serve Africa's energy access needs:

- Increase adaptation finance allocations for resilient energy infrastructure
- Develop methodologies for crediting emissions reductions from clean cooking and off-grid electrification to enable carbon finance flows
- Streamline access procedures for African countries to Green Climate Fund and other climate finance sources
- Ensure that just energy transition partnerships include significant components for access expansion, not merely generation transition

### 5.3.3 Recommendations for Private Investors

#### 1. Develop Local Currency Financing Solutions

Currency risk remains a primary constraint on private investment. Investors and development institutions should collaborate to:

- Expand local currency lending through guarantees and hedging instruments
- Develop local currency bond markets for infrastructure financing
- Structure projects with natural hedges (export revenues, dollar-indexed tariffs) where feasible
- Accept lower returns in local currency than hard currency to reflect reduced systemic risk

#### 2. Invest in Early-Stage Project Development

The shortage of bankable projects is a binding constraint. Private investors should:

- Support project preparation facilities that develop investment-ready pipelines
- Accept higher development risk in exchange for development rights or first-mover advantages

- Partner with local developers to build indigenous project development capacity
- Utilize blended finance structures that de-risk early-stage development

### 3. Embrace Distributed and Off-Grid Opportunities

While utility-scale generation attracts most private capital, distributed solutions offer significant opportunities:

- Invest in mini-grid platforms that aggregate projects into scalable portfolios
- Support pay-as-you-go solar companies with working capital and consumer finance solutions
- Develop productive use applications that increase rural energy demand and project viability
- Partner with development institutions to demonstrate commercial viability of underserved segments

## 5.3.4 Innovative Financing Mechanisms

### 1. Carbon-Linked Finance for Energy Access

Carbon markets present underutilized potential for energy access financing. The UN Economic Commission for Africa projects \$82 billion annually in potential carbon market revenues (RSIS International, 2025). Mechanisms to realize this potential include:

- Developing methodologies for crediting emissions reductions from clean cooking and distributed renewables
- Establishing Africa Carbon Markets Initiative targets to increase credit production 19-fold by 2030
- Creating advance market commitments, such as the UAE's \$450 million pledge for African carbon credits, to provide revenue certainty
- Ensuring equitable benefit sharing with local communities and project developers

### 2. Natural Resource-Linked Financing

The African Development Bank's proposal for currency convertibility mechanisms leveraging natural resource endowments offers innovative potential (Africa Energy Portal, 2025). Such mechanisms could:

- Provide currency hedging for infrastructure projects backed by commodity export revenues
- Create structured finance products linking energy infrastructure repayment to resource production
- Mobilize resource-backed financing for transmission and other public goods infrastructure

### 3. Results-Based Financing

Linking financing to verified outcomes (connections delivered, service quality achieved) can improve efficiency and accountability:

- Expand results-based financing for energy access, with payments triggered by verified connections
- Develop standardized metrics for service quality and reliability to enable performance-based contracts
- Utilize digital monitoring and verification technologies to reduce transaction costs of results-based approaches

### 4. Regional Infrastructure Funds

Cross-border infrastructure requires regional financing mechanisms:

- Establish regional transmission infrastructure funds with equity contributions from multiple countries
- Develop regional power purchase agreements that aggregate demand and improve creditworthiness
- Create regional regulatory institutions with enforcement capacity for cross-border projects

## 5.5 Conclusion

Financing Africa's energy infrastructure represents both a critical development challenge and an unprecedented investment opportunity. The investment gap \$110-200 billion annually against current flows of \$90 billion is substantial but bridgeable with coordinated action. The \$55 billion

required annually for universal energy access represents less than 2% of global energy spending, emphasizing that the constraint is political will and delivery capacity rather than global resource limitations.

The economic implications of persistent underinvestment are severe, constraining GDP growth by up to 2% annually and limiting industrial development, agricultural productivity, and human capital formation. Conversely, accelerated investment offers transformative potential—creating 110,000-150,000 jobs per billion dollars invested, enabling enterprise development, and improving health and education outcomes.

The financing mechanisms to bridge the gap exist but require significant scaling. Blended finance has demonstrated leverage ratios exceeding 40:1, but current volumes remain a fraction of requirements. Development institutions have committed unprecedented resources through Mission 300, but disbursement and implementation capacity must match ambition. Private investment can scale significantly with improved regulatory environments and risk mitigation instruments.

The path forward requires simultaneous action across multiple fronts: regulatory reform to improve investment climates, utility restructuring to create creditworthy off-takers, scaled blended finance to mobilize private capital, and enhanced technical assistance to build implementation capacity. National Energy Compacts provide a framework for coordinating these actions, with 29 countries already committed to concrete reform and investment plans.

The window for achieving universal energy access by 2030 is narrowing but remains open. Success requires the international community to treat African energy infrastructure with the urgency and scale that the challenge demands, recognizing that energy access is foundational to all other development objectives. The Mission 300 initiative has created momentum; sustaining and accelerating this momentum is the critical priority for the coming years.

## Endnotes

1. Investment requirement estimates vary across institutions due to differences in scope (generation only vs. full value chain), target definitions (access vs. SDG7), and methodology (bottom-up engineering estimates vs. top-down macroeconomic modeling). This report presents ranges to reflect this uncertainty.
2. Pre-COVID investment levels in energy access were elevated by large-scale programs in India and Indonesia that have since achieved near-universal access, explaining part of the apparent decline in African investment.
3. Currency convertibility mechanisms remain conceptual; the African Development Bank is developing detailed operational frameworks expected in 2025.
4. The 29 countries having endorsed National Energy Compacts as of September 2025 represent approximately 80% of Africa's unelectrified population.
5. Leverage ratios for blended finance vary significantly by project type, with mini-grid and off-grid investments typically showing higher ratios than utility-scale generation due to greater perceived risk and need for concessional capital.

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