COMMON MARKET FOR EASTERN AND SOUTHERN AFRICA

Terms of Reference

Capacity Building for Gender and Infrastructure Statistics in Transition States (GIS-TSF)

Estimating Investment Needs for the Power Sector in the African Countries and Preparation of Analytical Reports on the "State of Countries' Energy Sector"

1. Background

Access to reliable and affordable electricity remains one of the most binding constraints on development across Africa's fragile and conflict-affected states. The continent-wide evidence is stark: in 2021, over 625 million people, or 41 percent of African households, lacked access to electricity, with the rural unelectrified share reaching 61 percent. While overall electrification has advanced steadily, the share of connected households in Sub-Saharan Africa rose from 25.7 percent in 2000 to 50.6 percent in 2020, this progress has been highly uneven, and most African countries remain off track to achieve universal access by 2030. Fragile and low-income states, many of which combine weak institutional capacity with acute infrastructure deficits, are disproportionately represented among those furthest from this goal.

Electricity demand on the continent also remains structurally low. Pre-pandemic per capita consumption stood at roughly 477 kWh per year in 2019, about one-fifteenth of the OECD average, a figure that masks even lower consumption levels in fragile settings where insecurity, displacement, and limited industrial activity depress both demand and the incentive for supply-side investment. National and regional grids across the continent are similarly under strain: many countries suffer from undersupply and poor supply quality that impedes economic growth, and isolated national grids carry higher operating risk and cost, conditions that are compounded in fragile states by weak utility governance, degraded infrastructure, and constrained access for maintenance and expansion in insecure areas.

On the supply side, installed generation capacity across Africa remains modest relative to need, and more than 70 percent of installed utility-scale generation capacity is still fossil-fuel based, even as the continent holds substantial untapped renewable potential. Fragile states typically enter this transition from a weaker starting position, smaller grids, thinner generation portfolios, and less capacity to absorb the capital-intensive, long-horizon investments that renewable and interconnection projects require. Compounding this, African power systems are increasingly exposed to climate change, including shifting rainfall patterns that undermine hydropower reliability, a

vulnerability that is often most severe in states where climate shocks intersect with conflict, weak early-warning systems, and limited fiscal buffers.

The 2023–2030 AfDB/COMESA continental study estimated that meeting universal access and demand growth across Africa would require approximately USD 454 billion, or USD 64 billion annually, under a least-cost expansion pathway a figure that already substantially exceeds documented historical investment flows. That study's own methodology explicitly distinguishes a category of "fragile low-income countries" from other income groupings when modelling demand growth and access expansion assumptions, in recognition of the fact that fragility systematically alters both the trajectory of electricity demand and the feasibility of standard investment and financing models. This distinction underscores the need for a dedicated, fragility-focused study: the barriers to closing the access and investment gap in these states political instability, constrained private capital mobilization, weaker regulatory and utility institutions, and heightened exposure to climate and conflict shocks are qualitatively different from those facing more stable middle- and low-income economies, and warrant analysis and policy responses tailored to those conditions.

This study therefore seeks to build on the continental evidence base to examine, specifically for fragile states, the scale of investment needs, the structural barriers to mobilizing that investment, and the enablers institutional, regulatory, and financial that could support a more resilient and inclusive power sector expansion pathway.

2. Objectives

The overall objective of this study is to estimate the power sector investment needs of Africa's fragile and conflict-affected states towards 2030, and to identify the structural barriers and enablers specific to fragile contexts that shape the feasibility of closing the access and investment gap.

The consultancy has the following specific objectives:

a) To support the estimation of country-level power sector investment needs through the application and further development of a robust mathematical programming model;

b) To support the preparation of analytical reports on the “State of the Energy Sector in Transition States in Africa,” drawing on available data, model results, and relevant sector indicators; and

c) To undertake a regional diagnostic of the power sector, identifying key infrastructure gaps, investment priorities, regional disparities and opportunities for enhanced regional integration and cross-border power trade.

3. Scope of activities

3.1 Inception, Analytical Framework and Research Questions

The Consultant shall initiate the assignment in consultation with AfDB and COMESA, review previous AIKP investment-needs work, methodologies, data architecture and available datasets, and define the key policy and analytical questions. The inception phase shall establish the geographic coverage, modelling horizon, scenarios, sensitivity analyses, reporting structure and web dissemination requirements, culminating in an Inception.

3.2 AIKP Data Assessment, Validation and Modelling Database

The Consultant shall assess, validate and consolidate the AIKP energy database, covering demand and access, generation, transmission, and economic and financial data. Key inputs shall document sources, reference years, units, assumptions, transformations and quality status, clearly distinguishing observed, derived and estimated data.

3.3 Electricity Demand and Electrification Scenarios

The Consultant shall develop electricity demand projections based on consumption, GDP, population, urbanization, access, suppressed demand, industrialization and efficiency trends, covering three scenarios: Reference/Current Policies, Accelerated Access and Development, and High Ambition/Universal Access.

3.4 Power-System Investment Needs Modelling

The Consultant shall apply an agreed optimization model, preferably based on PyPSA or an equivalent open platform, to estimate generation, transmission, storage and related investment requirements under alternative demand, technology, fuel-price and regional-integration assumptions, producing country, regional and continental results.

3.5 Scenario and Sensitivity Analysis

The Consultant shall assess the sensitivity of investment needs to changes in electricity access, economic growth, renewable-energy deployment, regional integration, storage, technology costs, fuel prices, carbon constraints, climate resilience and energy efficiency, identifying the principal drivers of investment requirements.

3.6 Investment Financing and Funding Gap Analysis

The Consultant shall estimate annual and cumulative investment requirements, disaggregate CAPEX by infrastructure segment, assess financing requirements and indicative financing gaps, and identify potential roles for public, private and concessional financing.

3.7 AIKP Energy Sector Analytical Reports

The Consultant shall prepare analytical products at **continental, regional and country levels**, including an Africa Energy Sector and Power Investment Outlook, five regional diagnostics for Central, Eastern, Northern, Southern and Western Africa, and selected country reports covering sector performance, investment and financing needs, gaps, scenarios and policy recommendations.

3.8 Reproducibility, Documentation and Knowledge Management

The Consultant shall provide complete model, data, methodological and reproducibility packages, including source code, databases, metadata, assumptions, equations, scripts and documentation necessary to reproduce and update the principal results.

4. Deliverables

Deliverable 1 – Inception Report and Analytical Framework
Inception Report covering the methodology, analytical framework, data requirements, modelling approach, scenarios, work plan and reporting arrangements.

Deliverable 2 – Validated Database and Modelling Framework
Validated and documented AIKP energy database, demand and electrification scenarios, and operational power-system investment-needs model, including methodological documentation and assumptions.

Deliverable 3 – Investment Needs, Financing and Scenario Analysis
Country, regional and continental investment-needs estimates, including scenario and sensitivity analysis, financing requirements and gaps, and geospatial analysis.

Deliverable 4 – Energy Sector Analytical Reports
Africa Energy Sector and Power Investment Outlook, five regional diagnostic reports, agreed country reports, and web-ready analytical outputs including indicators, maps, tables and charts.

Deliverable 5 – Final Technical and Knowledge-Transfer Package
Final model, databases, source code, documentation and reproducibility materials, together with training, knowledge-transfer materials and final validated outputs.

5. Selection Method

Quality & Cost Based Selection (QCBS).

6. Required Qualifications & Experience

Experience of the Firm

The Firm should have the following experience:

a) Familiarity with concept of public finance and statistics; and
b) Experience with infrastructure sectors and solid knowledge of public budget processes and finances as well as experience in employing these types of data to construct mathematical models.

Qualification and experience of the Team

The proposed team should consistt of a Team Leader and a minimum of one (1) support Expert/s.
The Team Leader will have the following qualifications and experience:

a. At least a master's degree or its equivalent in Economics or Statistics or a related field with a strong background in infrastructure concepts.
b. Familiarity with concept of public finance will be an advantage.
c. Preferably a minimum of 7 years relevant working experience related to infrastructure sectors and/or statistics is needed.
d. Openness to sharing information and keeping people informed; as well as very strong communications skills, both oral and written.
e. Experience with infrastructure sectors and solid knowledge of public budget processes and finances as well as experience in employing these types of data to construct mathematical models.
f. Ability to deliver on time and even when under pressure; and
g. Excellent skills in using Microsoft Excel, Word, and other office tools.

7. Duration of the Assignment

The GIS-TSF Project will hire the services of the firm to perform the activities indicated above for a period of four months.