Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 30-Aug-2023 | Report No: PID192

BASIC INFORMATION

A. Basic Project Data

Project Beneficiary(ies)	Operation ID	Operation Name	
Kenya, Kenya, Kenya	P180465	Kenya Green and Resilient Expansion of Energy (GREEN) Program Phase 2	
Region	Estimated Appraisal Date	Estimated Approval Date	Practice Area (Lead)
EASTERN AND SOUTHERN AFRICA	05-Oct-2023	16-Nov-2023	Energy & Extractives
Financing Instrument	Borrower(s)	Implementing Agency	
Investment Project Financing (IPF)	The National Treasury	Kenya Electricity Transmission Company Limited (KETRACO)	

Proposed Development Objective(s)

To facilitate increased import of renewable energy and increased capacity of Kenya system to absorb intermittent renewable energy.

PROJECT FINANCING DATA (US$, Millions)

Maximizing Finance for Development

Is this an MFD-Enabling Project (MFD-EP)?

Is this project Private Capital Enabling (PCE)? Yes

SUMMARY

Total Operation Cost	**202.00**
Total Financing	**202.00**
of which IBRD/IDA	**153.50**
Financing Gap	**0.00**

DETAILS

World Bank Group Financing

International Development Association (IDA)	153.50
of which IDA Recommitted	97.00

IDA Credit	153.50
Non-World Bank Group Financing	
Trust Funds	48.50
Green Climate Fund	48.50

Environmental and Social Risk Classification	Concept Review Decision
Substantial	The review did authorize the preparation to continue

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **The Kenya GREEN Program MPA was approved by the World Bank Board on June 15, 2023, for a total financing envelope of IDA US$930 million.** The overall financing envelope is estimated at US$1.05 billion including other financing sources. At the time of approval of the parent MPA, the first phase was approved for an amount of US$ 400 million as a hybrid program for results (PforR) focusing on the financial and operational improvement of Kenya Power & Lighting Company PLC (KPLC) to help it revert to a financially sustainable path towards universal access to electricity. The proposed second phase of the MPA is for an amount of US$ 202 million and will be implemented by Kenya Electricity Transmission Company Limited (KETRACO) as an Investment Project Financing (IPF) to finance critical investments needed in grid stability equipment (STATCOM and battery storage) and a 400kV substation to increase system resilience in Kenya, which will facilitate increasing imports of cleaner and cheaper energy from Ethiopia, absorption of a larger share of intermittent renewable energy (solar and wind) in the Kenya system, and energy trade between Tanzania and Ethiopia through the Kenya system.

2. **Kenya's economy continues to recover from the COVID-19 pandemic, however, shocks from global commodity markets and the regional drought are challenging the broad-based rebound.** The greater Horn of Africa has experienced its longest drought in four decades. This regional drought has led to a contraction in Kenya's agriculture performance, increased food prices, and a rise in food insecurity, most severely in rural areas. At the global level, disruption in supply chains due to the Russian invasion of Ukraine and higher commodity prices including fuel, fertilizer, and food, deteriorated Kenya's inflation, but also increased the import bill. Kenya's inflation rose from 5.4 percent in January 2022 to 7.9 percent in June 2022 and 9.1 percent in December 2022, above the Central Bank's upper bound target of 7.5 percent. To mitigate the impact of rising inflation, the government responded by tightening monetary policy and introducing subsidies on fuel, electricity, and maize flour. However, since September 2022, the government completely withdrew maize flour and petrol price subsidies but retained subsidies on diesel and kerosene

prices, as well as on fertilizer.

3. **While Kenya has very low GHG emissions, it is highly vulnerable to the impacts of climate change. Kenya accounts for only 0.1 percent of global emissions but is ranked 143 out of 188 countries in terms of its vulnerability to climate change impact (a lower ranking means greater vulnerability**). According to climate projections, the increase in mean annual temperature in Kenya is projected to be between 1°C and 2°C by the 2050s and by up to 5°C by 2100. Climate and disaster risk screening indicates that Kenya has a high risk of river, urban and coastal floods, landslides, volcanoes, and wildfires, which will add further stress to Kenya's climate vulnerability. An increase in the frequency and severity of extreme weather events would inflict a heavy toll on human lives and welfare, with a high risk of damage to the country's scarce and valuable human and natural capital. The poorest, most marginalized, and most vulnerable households and communities will be hit the hardest, as income and health shocks will drive them deeper into poverty. Infrastructure assets including electricity transmission and distribution networks can be vulnerable to both chronic and acute climate hazards. According to the World Bank's Lifelines report, the cost of disruption to the power sector due to natural shocks in Kenya was about 1.14 percent of GDP in 2019.

Sectoral and Institutional Context

4. **Government's goal of universal access to clean, adequate, affordable, and reliable electricity is critically dependent on a robust transmission system to connect the main generation sources** (geothermal, hydro, and wind) in the central rift valley and eastern part of the country to the major load centers and also to allow for greater connectivity to the regional hydropower resources. The transmission system experiences challenges of capacity, poor voltage control and the risk of grid instability and cascading outages. This is as a result of power transferred via long transmission lines and inadequate reactive power supply in some regions. Particularly, the load centers in the western and coastal regions are far from the supply sources and the central node of the system (Suswa substation through which almost 50 percent of the energy flows through). Local generation, based on high-cost fossil fuel, is deployed selectively to minimize voltage instability during peak periods at the Coast. Replacement of the fossil fuel-based generation is a critical element to reducing the cost of supply in Kenya, which is high in terms of regional standard impeding the competitiveness of Kenyan industries. In Western Kenya, limited imports from Uganda and fossil fuel-based generation at Muhoroni are used to support voltage stability in the area. Some key transmission lines to Western Kenya have recently been completed and a 400kV substation at Mariakani in the Coastal region is expected to be commissioned by end of 2023 to increase supply from renewable sources to these regions. However, these investments alone will not fully address the power quality challenges in these regions particularly considering the expected increased supply from intermittent renewable energy (solar and wind) in the future.

5. **With the commissioning of the Kenya-Ethiopia Interconnector, supported under the Bank-financed Eastern Electricity Highway Project (EEHP, P126579), Kenya now, has access to one of the least-cost sources of firm renewable energy**[1] complementing domestic sources to meet demand, while providing the country with the backbone network for participating in the regional power trade through the Eastern Africa Power Pool (EAPP). As a first of its kind in Sub-Saharan Africa, this interconnection is a flagship of power trade in the EAPP region and provides a key part of the infrastructure needed to connect the EAPP to the South African Power Pool (SAPP). While the interconnection has a transfer capacity of up to 2,000MW, transmission system constraints in Kenya currently limit offtake to 200MW and urgent investments are therefore needed to address reactive power deficiencies and increase transfer capacity

[1] The price of the imports is comparable to Kenya's geothermal developed through public funding, lower than the PPA prices under the FiT policy, and significantly lower than the PPA prices of the thermal plants.

to enable Kenya system to reap full benefits from the interconnection.

6. **Recognizing the potential benefits, governments in Eastern Africa[2] have committed significant investments in developing physical transmission infrastructure that will lay the foundations for power trade in the region.** In addition to the recently commissioned Ethiopia-Kenya interconnector, six key transmission corridors are under construction (Kenya-Uganda, Uganda-Rwanda, Rwanda- Burundi, Rwanda-DRC, Kenya-Tanzania and Tanzania-Zambia), which together with other planned interconnectors will result in all thirteen Eastern Africa Power Pool (EAPP) member countries being interconnected, allowing power flow from Egypt in the north to Tanzania in the south. In the medium to long term, there are opportunities for trade with the Southern African Power Pool (SAPP) through the Tanzania-Zambia interconnector in the south. Greater regional integration will allow the region to better harness and integrate significant amount of renewable energy resources (hydro, geothermal, wind, solar) by offering greater system inertia and balancing support to absorb the unexpected variations in the output of VRE plants. The operation of the regional interconnectors however needs a robust, secure and reliable transmission grid in Kenya. The proposed Project will also support grid investments to facilitate neighboring Tanzania to access hydropower resources of Ethiopia through the Kenya- Tanzania interconnector.

7. **The investments proposed under the second phase will help address some of the transmission system constraints to allow for increased share of renewable energy towards achieving the Government goal of 100 percent clean energy by 2030.** These include urgent investments grid stability equipment (STATCOM and battery storage) and a 400kV substation needed to enable Kenya to reap the full benefits of the Ethiopia-Kenya interconnector and enable energy trade between Tanzania and Ethiopia through the Kenya system. The proposed support will also include prefeasibility studies for competitive auction for solar with an aim to increase the share of intermittent renewable energy at affordable prices. A competitive auction for solar and wind is expected in the next 2-3 years once the existing pipeline is fully streamlined and additional capacity needs are confirmed. In addition, the proposed support will include investments for battery energy storage systems (BESS) to bridge peaking capacity gaps as well as primary reserves for frequency regulation while reducing the need to vent geothermal steam during hours of low demand. The Bank is supporting a study to identify optimal levels and implementation arrangements of BESS in the Kenyan power system. A pilot project on BESS will need to be undertaken with public funding as the first step towards scaling up BESS by leveraging private sector participation.

Relationship to CPF

8. **WBG's Africa Regional Integration and Cooperation Assistance Strategy (FY21-FY23) acknowledges that "achieving energy access by 2030 is one of the foremost goals of the WBG in Africa" and emphasizes the importance of harmonizing policy and regulations to create a regional market for distributed renewable energy, increase levels of cross-border power trade, and lower the cost of energy while improving affordability.** The proposed Project will allow Kenya to increase its import of cheaper and renewable energy from Ethiopia and facilitate integration of larger share of intermittent renewable energy. The proposed intervention will also enable Tanzania to access hydropower

2 Eastern Africa includes the thirteen Eastern Africa Power Pool (EAPP) member countries (Burundi, Djibouti, Democratic Republic of the Congo (DRC), Egypt, Ethiopia, Kenya, Libya, Rwanda, Somalia, Sudan, South Sudan, Uganda, Tanzania) and one EAPP prospective country (Eritrea) – a total of fourteen countries.

resources of Ethiopia through the Kenya-Tanzania interconnector[3].

9. **The Program relevance to the CPF remains unchanged.** The proposed Program is aligned with the Kenya Country Partnership Framework (CPF) FY2023-2028. The overarching goal of the CPF is to support Kenya's Vision 2030 of transformation into a middle-income economy that achieves inclusivity and resilience. The three higher-level outcomes of the CPF are: i) faster and more equitable labor productivity and income growth; ii) greater equity in service delivery outcomes; and iii) greater resilience and sustainability of Kenya's natural. By supporting cheaper and clean energy options for Kenya, the proposed intervention will contribute to the higher-level outcomes of income growth and sustainable equity in service delivery outcomes. Consistent with one of the priority focus areas of the CPF, the proposed operation leverages climate financing (GCF) in support of renewable energy development in Kenya.

10. **The proposed Project will help to strengthen an enabling environment for greater private sector participation in development of renewable energy in Kenya.** Building on gains to be made under the first phase of the MPA and from previous Bank-supported policy reforms under the budget support operations, Phase 2 of the MPA will support preparation of feasibility studies and preparatory work for launch of successful competitive auctions for solar development. The auctions for the financing, development and operation of solar plants by private sector are expected to be launched in the next 2-3 years. The Bank may also provide credit enhancement instruments for bankability of the IPP transactions. The second phase of the MPA program is therefore, aligned with the WBG's Maximizing Finance for Development by strengthening the enabling framework for private sector participation in renewable energy generation development.

11. **The proposed Project is aligned with the World Bank Group Gender Strategy. The 2016–2023 WBG Gender Strategy underlines key gender gaps and promotion of gender equality**. In particular, it emphasizes improving human endowments, removing constraints on increased female participation in the labor market including in Science, Technology, Engineering, and Math (STEM) fields, and enhancing women's voice through strategically supporting female participation in leadership and decision-making positions in the energy sector. The project design will include targeted interventions to improve female employment and career growth opportunities in the transmission utility.

C. Proposed Development Objective(s)

To facilitate increased import of renewable energy and increased capacity of Kenya system to absorb intermittent renewable energy.

Key Results (From PCN)

12. The key outcome indicators proposed to measure achievement of the PDO are:
    a) increased import of electricity by Kenya through the Kenya-Ethiopia interconnector; and
    b) capacity of the Kenya system to absorb increased amount (MW) of intermittent renewable energy
    c) number of major voltage dips incidences reduced

[3] Ethiopia CPF (2018-2022) has increased access to reliable energy supply one of the objectives under Focus Area 1: Structural and Economic Transformation through Increased Productivity. Under this objective, support towards Government of Ethiopia's efforts at exporting energy to neighboring countries is prioritized for increasing Ethiopia power sector revenues.

D. Concept Description

13. **The investments proposed under the second phase will help address some of the transmission system constraints to allow for increased share of renewable energy towards achieving the Government goal of 100 percent clean energy by 2030.** These include urgent investments needed to enable Kenya to reap the full benefits of the Ethiopia-Kenya interconnector (with a bi-directional transfer capacity of 2,000MW) and access one of the least-cost sources of firm renewable energy from Ethiopia to complement domestic sources to meet demand. However, the imports are limited to 200MW because large injection of power through the interconnector currently poses a significant risk of instability to grid stability and outages to the Kenya network (based on a study carried out by a consultant commissioned by KETRACO before the commissioning of the interconnector) To address the challenges, the study recommended installation of fast acting reactive power and voltage control devices (STATCOMs) at key substations in Kenya (Suswa and Rabai initially and two more in Western Kenya at a later stage).

14. The proposed support will also include feasibility studies for competitive auction for solar with an aim to increase the share of intermittent renewable energy at affordable prices. A competitive auction for solar and wind is expected in the next 2-3 years once the existing pipeline is fully streamlined and additional capacity needs are confirmed. In addition, the proposed support will include investments for battery energy storage systems (BESS). Grid-scale BESS are needed to bridge peaking capacity gaps as well as primary reserves for frequency regulation while reducing the need to vent geothermal steam during hours of low demand. The Bank is supporting a study to identify optimal levels and implementation arrangements of BESS in the Kenyan power system. A pilot project on BESS will need to be undertaken with public funding as the first step towards scaling up BESS by leveraging private sector participation.

15. The proposed Project will also support grid investments to facilitate neighboring Tanzania to access hydropower resources of Ethiopia through the Kenya- Tanzania interconnector. Construction of the 400kV Kenya-Tanzania interconnector, financed by the Africa Development Bank (AFDB), is expected to be completed in December 2023. KETRACO in Kenya and TANESCO in Tanzania are negotiating a wheeling agreement for such transfer of electricity to Tanzania from Ethiopia through Kenya. However, a new 400kV substation is needed in Kenya to allow for such power transfer through the Kenya system, which the proposed Project will support.

16. The proposed Project will support the following components:

17. **Installation of STATCOMS:** Includes installation of reactive power and voltage control equipment (STATCOM) at existing Suswa and Rabai substations[4] to improve the fault levels, increase voltage stability, allow for greater import of renewable energy from Ethiopia and transfer of more geothermal energy from Olkaria to the coastal region of Kenya[5] The technical designs and bidding documents for the STATCOMs have been prepared by a consultant financed under EEHP. The component will also finance project management and supervision consultants.

18. **Construction of a 400kV substation at Kimuka:** The proposed 400kV substation at Kimuka will enable integration of the Kenya- Tanzania interconnection[6]and Ethiopia-Kenya interconnector enabling Tanzania to access hydropower

[4]Suswa and Rabai substations are on land that is owned by KETRACO and KPLC, respectively.

[5] Installation of STATCOM at Suswa will enable safe operation of the Ethiopia-Kenya interconnector and larger power imports to Kenya from current 200MW to 400MW from end of 2025 in accordance with the Power Purchase Agreement (PPA) between Kenya Power (KPLC) and Ethiopian Electric Power (EEP). Installation of STATCOM at Rabai will also enable transfer of more geothermal energy from Olkaria to the coastal region, thereby reducing the dispatch from thermal plants.

[6] Construction of the 400kV Kenya-Tanzania interconnector, financed by the Africa Development Bank (AFDB), is expected to be completed in December 2023.

resources of Ethiopia. The substation will also increase transmission capacity of more renewable energy (geothermal, wind and imports) from supply sources at Olkaria and Suswa to major load centers of Nairobi and the Coast regions of Kenya. Technical designs and bidding documents for the proposed substation have been prepared by a consultant supported under EEHP. The proposed substation site is on a land owned by KETRACO. The component will also finance project management and supervision consultants.

19. **Utility-Scale Solar and Battery Energy Storage):** This support implementation of a pilot battery energy storage system (BESS), feasibility studies and preparatory work for competitive auctions for solar with funding support from GCF. Kenya is one of seven countries benefiting from GCF funding under the Sustainable Renewable Risk Mitigation Initiative (SMRI) with the objective of supporting Kenya to shift to low-emission sustainable development pathways and increase access to affordable, reliable, sustainable, modern energy to its populations. The funds were approved by the GCF Board in 2021 and are expected to be committed through approval of the World Bank's Board within three years (by March 2024). A BESS study is ongoing with support from the Bank to identify capacity, timeline and implementation arrangements for the BESS in the Kenyan power system. The study is expected to be completed by August 2023. The BESS are likely to be installed in existing substation locations belonging to KPLC and KETRACO and need for additional land is expected to be minimal. Preparatory activities for the solar auctions activities for a total capacity of about 100MW located in two or three sites [7] will include: (i) sector diagnostic study and assessment and preliminary project identification, selection and prioritization; and (ii) project prefeasibility studies. The determination of the project structure and actual auctions are expected to be supported with IDA funding (co-financed with GCF) under the third phase of the MPA.

20. **Technical Assistance and Capacity Building:** This will support sector studies, capacity building, and training activities for sector development and to help sustain and enhance the policy, institutional, regulatory arrangements and reforms as well as gender and citizen engagement. The capacity building will also include training and activities to strengthen governance, management, safeguards management, procurement, technical and operation capacity of MOE, KETRACO, KPLC and the sector agencies including the regular (EPRA), KenGen, Geothermal Development Company (GDC), and Rural Electrification and Renewable Energy Corporation (REREC). The component will also support technical assistance focusing on twining arrangements for transmission engineers and placement of young professional engineers as part of a succession management program.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Area OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

[7] The solar auctions will be guided by Renewable Auction Policy and a competitive bidding strategy and framework prepared by MOE with Bank support in 2021.

The overall E&S risk rating for the Project is considered Substantial. This is premised on the fact that three of the proposed sub-projects sites are known, two of which (Suswa and Rabai) are brownfield environments with existing power infrastructure developments. One of the STATCOMs will be installed at the existing Suswa sub station in Narok, which was partly financed under the EEHP (P126571), and the other at existing Rabai substation. The Kimuka substation will be constructed at Ngong' on land owned by KETRACO. These sites have no onsite or proximal sensitive environmental and social receptors. The BESS will be installed largely on existing substations owned by KPLC or KETRACO and need for additional land is expected to be minimal if any. Expected environmental and social impacts will be typical, reversable, temporal in nature, site specific and ones that are well known to be managed by proper enforcement of ESMPs (noise, air, water and soil pollution from effluents, dust, and machines usage on the construction sites). Safety hazards related to normal civil, mechanical, structural and electrical works are expected, however, these too are manageable through enforcement of Construction Environmental and Social Management Plans (C-ESMPs) that will detail the safe working procedures to be adopted. There will be no impacts related to involuntary resettlement since the investments will be in existing facilities and are all fenced off. There are also no anticipated impacts on IPs. Potential social risks and impacts may range from SEA risk by project workers undertaking the prefeasibility studies, the installation of STATCOMs, construction of the substation and the pilot BESS to the subproject host communities and among themselves, labor influx of internal and external migrant workers into sub-project areas, child labor due to the temptation of children, especially from poor families to fall out of school to engage in the provision of services such as food vending to subproject workers, exclusion of some stakeholders, especially VMGs and other vulnerable individuals such as People with Disabilities (PWDs), minority clans, women, and youth, from meaningful consultations and participation in the decision-making processes, especially during the prefeasibility studies; or their exclusion from employment during construction of the substation, the BESS facility, and the installation of STATCOMs. To mitigate these risks, detailed E&S screening and assessment shall be conducted during appraisal stage to better understand their scope and magnitude and further recommend material measures and actions to be taken by the client/KETRACO to address the potential environmental and social risks and impacts. This will be detailed in the Environmental and Social Commitment Plan (ESCP) to be agreed on by the Client and the Bank. The ESCP will address the risks and impacts relating to mitigation of the environmental, health and safety risks identified and additional instruments and tools to be prepared including ESMPs, C-ESMPs etc. In addition, the social aspects will be addressed through a Stakeholder Engagement Plan (SEP), Labor Management Procedures (LMP) with clear statements/sections on child labor, employment of locals, and codes of conduct for project workers. Also, since the substation at Kimuka and the STATCOM at Suswa will be implemented in VMG areas, the LMP will clearly require KETRACO and their contractor to consider VMGs for unskilled and semiskilled labor employment. If necessary, a SEA/SH Management Plan, will also be prepared. Depending on the actual nature and magnitude of the risks and impacts that will be confirmed during preparation, these may be included in the ESCP. A Security Risk Management Plan may be considered prior to appraisal, if it is determined necessary during preparation given that the prefeasibility study activities will be implemented in security-prone areas. KETRACO will disclose the ESCP, and as applicable, the LMP, and SEP, before the appraisal.

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APPROVAL

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