@#&OPS~Doctype~OPS^blank@pidaprcoverpage#doctemplate

Project Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 16-May-2024 | Report No: PIDIA00478

Public Disclosure Authorized

BASIC INFORMATION

A. Basic Project Data

Project Beneficiary(ies)	Region	Operation ID	Operation Name
Botswana	EASTERN AND SOUTHERN AFRICA	P181221	Renewable Energy Support and Access Accelerator Project
Financing Instrument	**Estimated Appraisal Date**	**Estimated Approval Date**	**Practice Area (Lead)**
Investment Project Financing (IPF)	20-May-2024	11-Jul-2024	Energy & Extractives
Borrower(s)	**Implementing Agency**		
Republic of Botswana	Botswana Power Corporation		

Proposed Development Objective(s)

To enable renewable energy grid integration in Botswana and improve electricity service in selected rural areas of the country

Components

Grid upgrades to enable integration and management of variable renewable energy
Local transmission and distribution network upgrades to support rural electrification
Project Management and Technical Assistance to support deployment of variable renewable energy

PROJECT FINANCING DATA (US$, Millions)

Maximizing Finance for Development

Is this an MFD-Enabling Project (MFD-EP)?	Yes
Is this project Private Capital Enabling (PCE)?	Yes

SUMMARY

Total Operation Cost	**122.00**
Total Financing	**122.00**
of which IBRD/IDA	**88.00**
Financing Gap	**0.00**

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	88.00

Non-World Bank Group Financing

Trust Funds	34.00
Green Climate Fund	34.00

Environmental And Social Risk Classification

Substantial

Decision

The review did authorize the team to appraise and negotiate

Other Decision (as needed)

N.A

B. Introduction and Context

Country Context

1. **Botswana was one of the world's fastest-growing economies, thanks to good management of its natural resources, robust public investment, and political stability.** Botswana is a large, sparsely populated, land-locked country. Between its independence in 1966 and the late 1990s, its average annual Gross Domestic Product (GDP) and GDP per capita growth was at above 10 and 7 percent, respectively[1]. Its significant mineral wealth, prudent macroeconomic policies and robust institutions helped Botswana become an Upper-middle-Income Country (UMIC) in 2004, with aspirations to be a high-income country by 2036[2]. Botswana has maintained stability and repeatedly ranked among the top African performers across many governance indicators.

2. **Despite the strong growth record, Botswana's traditional growth model has since shown its structural limitation.** The economy remains dependent on mineral resources and large public sector. Productivity is low and job creation is limited. Exports have not diversified across different sectors of the economy. Notably, mining represented 53 percent of GDP in 1989 and only 13.6 percent in 2019, but diamonds still dominate Botswana's exports. Among the structural challenges to the existing model is its inability to diversify beyond non-tradable sectors as demand for and investment

[1] World Bank Open Data. https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG?locations=BW
[2] Vision 2036 for Botswana. https://www.statsbots.org.bw/sites/default/files/documents/Visionpercent202036.pdf

in these continues to be encouraged and financed by public and mineral resources. As a result, sectoral diversification policies have not succeeded in building competitive non-mining sectors.

3. **Botswana remains among the top ten most unequal countries in the world (Gini coefficient of 0.53 in 2015[3]) and poverty remains high given its income level, which dampens its growth potential.** Compared to other UMIC countries, Botswana's poverty rates remain high. Despite significant declines in poverty also under the UMIC poverty line (US$6.85 per person per day) since 2002/03, the poverty rate at this higher line increased from 60.4 percent to 63.5 between 2009/10 and 2015/16[4]. A sustained reduction in poverty and inequality will require progress on diversification and a focus on private-sector job creation. Social interventions will need to better target the most vulnerable members of society.

4. **Gender equality and women's empowerment in Botswana have improved over the past 20 years, but inequality remains a pressing concern.** Botswana has made significant strides towards equal treatment of women under the law. It is ranked 64 out of 146 in the 2023 Global Gender Gap Index and is among the countries that have closed at least 70 percent of its gender gaps[5]. However, important gender gaps remain including low levels of women's political representation in the National Assembly (only 11 percent of seats held by women), significant gender gap in labor force participation (56.5 percent women vs 63.3 percent men), and high rates of Gender-Based Violence (GBV) (37 percent of women). Barriers still remain such as female-owned and led businesses in Botswana e.g., the lack of credibility with male interlocutors, clients, or investors as a key barrier to their business development.

5. **While Botswana has low Green House Gas (GHG) emissions, it is highly vulnerable to the impacts of climate change.** Botswana has a semi-arid climate and has seen cyclic droughts caused by erratic rainfall. It is highly prone to river and urban floods, water scarcity, and wildfires.[6] It is in the top three countries in Sub-Saharan Africa that are expecting an average temperature increase from 2.9 to 3.8 degrees Celsius by 2100.[7] Infrastructure assets, including electricity transmission and distribution networks, can be vulnerable to both chronic and acute climate hazards. Increased temperatures are likely to threaten cooling capacities of power generating stations with potential to impact generation and transmission. Botswana's per capita emissions are about 2.27 mtCO2e relative to a global average of 4.47 tCO2e per person. The energy sector accounts for 87 percent of total Green House Gas (GHG) emissions (excluding land use, land use change, and forestry).

Sectoral and Institutional Context

6. **Reliable power is critical to Botswana's sustainable development and GoB is stepping up efforts in rehabilitation of general transmission and distribution infrastructure.** The Botswana Power Corporation (BPC) network extends over long distances which results in high transmission and distribution losses at a system average of 15.35percent[8] as of 2021. Furthermore, the current power deficit in the region has had a huge impact on villages along the borders which have traditionally been serviced from cross-border supply. The major load shedding issues currently widespread in South Africa, is impacting the level of service in these bordering villages on the Botswana side. Since 2019, BPC has initiated multiple programs to enhance the Transmission and Distribution (T&D) network performance in terms of reliability, security, quality of supply and ability to cope with the load growth. Despite the ongoing efforts, power

[3] Botswana Poverty and Equity Brief April 2024, https://www.worldbank.org/en/topic/poverty/publication/poverty-and-equity-briefs
[4] Ibid
[5] World Economic Forum (WEF). 2022. Global Gender Gap Index. Available at: https://www3.weforum.org/docs/WEF_GGGR_2022.pdf
[6] Think Hazard. Available here: https://thinkhazard.org/en/report/35-botswana
[7] IMF Article IV, 2019.
[8] BPC Annual Report 2022. https://www.bpc.bw/about-bpc/annual-reports

delivery challenges remain with several load shedding incidents in 2024, possibly linked to the troubled performance of the South African grid.

7. **Botswana faces major power generation constraints, suffering from a supply deficit due to underperformance of Morupule B coal-fired power station** Nearly all of Botswana's electricity is currently generated from fossil fuel-based sources, with coal accounting for over 97 percent of total electricity generation in the country[9]. Total installed capacity is 892 MW against peak demand of 627 MW in 2021. Two coal-fired stations, the 132 MW Morupule A and the 600 MW Morupule B account for a majority of Botswana's electricity generation. Botswana also has diesel plants – 90 MW Orapa and 70 MW Matshelagabedi to support peaking power[10]. However, the rolling 5-year average (2018-2022) of domestic generation only accounted for about 62 percent of total power supply[11]. Continued operational challenges at Morupule B have led to the plant operating below its capacity. The country's reliance on the Morupule coal power plant, which is currently undergoing major remedial work, poses a significant risk of concentrated and unreliable power supply, forcing the country to rely on electricity imports from South Africa[12]. Out of energy security concerns, coal generation is still considered by the country with a new power plant (300MW) under development and a potential additional 300MW in negotiation with selected Independent Power Producer (IPP) taking it to 600MW.

8. **On the other side, to enhance energy security, Botswana has started ambitious efforts to develop its vast RE resources for both domestic use and exports.** Botswana has excellent solar and wind resources with a complementary profile, which presents a promising source of clean and affordable electricity for the country. The GoB endorsed Vision 2036 and the National Energy Policy[13] in 2021 focusing on diversifying domestic electricity production by using RE sources. According to its Vision 2036, GoB plans to increase the RE share in its generation mix to 50 percent by 2036. This approach has been translated into the adoption of a revised Integrated Resource Plan (IRP) in 2022, which aims at fast-tracking contribution of RE from a target of 15 percent to a revised target of at least 30 percent and becoming a net exporter by year 2030. The GoB targets approximatively 1GW of solar and wind in operation in the country by 2030 supported by 140 MW of Battery Energy Storage Systems (BESS) to facilitate the integration of variable renewable energy (VRE) and their use for both domestic needs and export. The first wave of 335MW solar IPPs is already at different stage of implementation with expected Commercial Operation Dates (COD) between 2025 and 2026.

9. **Regional integration is critical to Botswana's energy development as it is a priority for the country both from energy security and commercial opportunities perspective especially with projected excess power**. There are already significant exchanges of electricity in place supported by existing interconnectors with neighboring countries. Moreover, Botswana is a key partner in the Mega Solar Initiative, a partnership between the Governments of Botswana and Namibia, the African Development Bank (AfdB), the World Bank, the International Finance Corporation (IFC) and the African Union Development Agency-New Partnership for Africa's Development developed under USAID's Power Africa initiative. The Mega Solar initiative is expected to support large scale additions of dispatchable solar capacity in Botswana and Namibia to support domestic and regional demand for electricity.

[9] Majority of domestic generation and imports is coal based in 2021. Diesel source contributed 2.5 percent to emergency generation.
[10] BPC Annual Report, 2021
[11] *Generation and Distribution, STATS BRIEF, Statistics Botswana.*
[12] account for 38 percent of total supply, *Generation and Distribution, STATS BRIEF, Statistics Botswana*
[13] https://www.bera.co.bw/downloads/Nationalpercent20Energypercent20Policypercent20Finalpercent20Aprilpercent202021.pdf

10. **While progress on access to electricity has been slow, GoB is stepping up efforts to accelerate the pace towards universal access and address affordability issue.** At about 70 percent[14], national electrification is low by global standards and relative to Botswana's per capita income. Between 2010 and 2021, access to electricity in rural areas made little progress lingering around 25 percent[15], with most rural households not having access to electricity, majority of whom are low-income households. This situation has led to a stark disparity in energy access, hindering rural development, and perpetuating socioeconomic inequality. In 2010 the National Electricity Standard Connection Cost (NESC) was introduced[16] with a view to increase household connections to the grid and address affordability issue. Despite the subsidies within the NESC program, low-income people still struggle to afford a grid connection. Apart from the grid connection cost, people also struggle to afford wiring and electric device. More recently, the government announced a zero-cost connection policy taking into effect in April 2024[17].

11. **A coherent and effective policy framework and supporting mechanism backed by high quality data is needed to achieve universal electricity access at the lowest cost.** The major challenge the country faces in electricity access is the lack of coherent electricity access plans with a synchronized and comprehensive approach and a clear government plan to the access goals. The World Bank is in dialogue with the government to develop a geospatial least-cost electrification assessment to optimize expansion in Botswana through the year 2030 integrating technical, financing, and implementation planning. The work is expected to pave the way to a robust design and implementation of access programs and raise decision makers' awareness on the impact of digital transformation in providing solutions for its people without electricity.

12. **A transformation of power system and an electricity utility with enhanced operating efficiency will be critical to address challenges in electricity access and decarbonization, and to improve grid resilience.** GoB has given more policy attention to scale up investments in smarter and more resilient grids. BPC has started to plan its digital transformation strategy, including much higher levels of digitalization at scale across all grid domains, from generation to transmission and distribution to end-use. Digital technologies designed for BPC system will be instrumental to unlock essential system services required to integrate high shares of VRE. They can also provide solutions to leverage data flows, connectivity, and management across the whole electricity system. To unlock these digital opportunities, adequate planning, investment, and policy action are needed.

13. **The World Bank is taking a phased approach in its support to address the multifaceted sector issues highlighted above, starting with upgrading the grid for VRE integration and supporting rural electrification under the Renewable Energy Support and Access Accelerator project (the Project)**. The Project contributes to address sectoral challenges and lay the foundation for electrification and VRE integration through a suit of investments. Given the significant VRE commitments made under the IRP and Botswana's goal to move from net importer to net exporter, strengthening the national grid and enabling the integration and management of VRE is a key priority for the country. The Project is expected to enable BPC to integrate and manage the first pipeline of RE projects under development and construction through timely critical investments in order to manage their variability and dispatchability. Moreover, the country's first 50MW utility-owned BESS to be financed under the project is expected to lay the foundation leading to a significant pipeline of BESS in the country to integrate VRE. In addition, the Project will support the GoB to expedite its electrification program by improving reliability of electricity supply and strengthening the grid in the villages of

[14] SDG7 progress report 2023, https://trackingsdg7.esmap.org/downloads
[15] World Bank Open Data, https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=BW
[16] https://www.bpc.bw/national-electricity-standard-connection
[17] 2024 BUDGET SPEECH, Minister of Finance, Delivered to the National Assembly, 5th February 2024

Borolong area. Furthermore, the project will finance technical assistance to empower the key stakeholders in managing RE projects and will support project management to facilitate implementation.

C. Proposed Development Objective(s)

Development Objective(s) (From PAD)

To enable grid integration of renewable energy generation in Botswana and improve electricity service in selected areas of the country.

Key Results

14. The progress towards achieving the PDO will be measured by the following indicators:

(a) Volume of VRE enabled in the BPC transmission system[18] (in GWh/year)
(b) Annual average duration of power interruption in selected areas (in hours/year)

D. Project Description

15. The project is structured around three components: (i) grid upgrades to enable integration and management of VRE, (ii) local transmission and distribution (T&D) network upgrades to support rural electrification, and (iii) project management and TA to support VRE deployment. The project is expected to enable the utility BPC to integrate and manage the first large-scale pipeline of RE projects through critical investments to manage their variability and dispatchability as well as to support the GoB with rolling out its rural electrification program by financing the grid expansion to the villages in the Borolong area. In addition, the project will also finance technical assistance to empower the key stakeholders in managing renewable energy projects and will support project management to facilitate implementation.

16. **Component 1: Grid upgrades to enable integration and management of VRE (GCF loan US$30 million and IBRD loan US$ 72 million).** Subcomponent 1.1 will support (i) the design, supply, installation, commissioning, and operation and maintenance (O&M) of utility-scale BESS for an estimated capacity/energy of approximately 50MW/200MWh and (ii) the Owners Engineer, who will assist BPC in the supervision of the BESS construction and commissioning (Subcomponent 1.1). BESS has been identified as a priority investment under the IRP and has been confirmed as a critical investment by the ESMAP-funded VRE integration study needed when the first pipeline of Photovoltaic (PV) projects reach COD in 2026. Two main use cases have been identified: to provide operational reserves (and ancillary services) and to enable generation shifting. This first BESS in the country will provide critical services to the grid in particular contributing to cover primary and secondary reserve.

17. Sub-component 1.2 consists of the installation of Static *S*ynchronous Compensator (STATCOM), with the aim to increase their readiness for integration of VRE by maintaining steady voltage profile. The proposed STATCOMs are expected to enable the automatic control of the voltage within the permissible range in both normal and contingency operating conditions. Sub-component 1.3 consists of digital upgrades including upgrade of SCADA, mini-distribution control centers (MDCC) and Meter Data Management System (MDMS). The upgrade of SCADA will strengthen central command of the power plants and balance demand and generation enabling an efficient dispatch. This subcomponent will also finance the implementation of MDCC including the installation of needed upgrades on communication and

[18] The value of this indicator will be converted from GWh to GW to show the 'GW of renewable energy capacity enabled' as per the World Bank Group New Scorecard methodology.

remote control means at selected locations to manage those distribution network areas. The MDMS will support the monitoring of the smart meters, which is considered essential for demand monitoring to ensure grid stability as penetration of VRE generation increases. It will also enable demand side assessments and real time monitoring of loads for improvement of operation efficiency, maintenance and planning.

18. **Component 2. Local transmission and distribution (T&D) network upgrades to support rural electrification (US$16 million of which IBRD loan US$ 16 million).** The Component aims to increase reliability of power supply for existing and future customers in rural Borolong, by supplying them with reliable domestic power. BPC is currently in the process of expanding the national grid to absorb cross-border supplied customers. This component will strengthen the T&D network in the Borolong rural area through i) the construction of a 66 kV Transmission line from Lobatse to Mabule with two new 66/33 kV substations along the route. One substation will be at the end node in Mabule, and the other in Phitshane-Molopo. In addition, the Lobatse substation will be upgraded with two new transformers to enable the step-down from 132 to 66 kV and transfer of higher voltage electricity to the area. This will enable the nine cross-border villages[19] that are currently suffering from daily load-shedding to be transferred from Eskom to the domestic BPC network; ii) Construction of a 33 kV line from the proposed substation in Phitshane-Molopo to Hebron in the North-East, which complements the on-going expansion of the 33 kV infrastructure under BPC current business plan. Together with the Lobatse to Mabule 66 kV line, it will increase the redundancy of the network, consequently increasing reliability in that entire region. In addition, a 11 kV distribution line will also be constructed in the North-East of Phitshane-Molopo to connect the cross-border villages of Marojane and Mokatako, to close another circuit.

19. **Component 3: Project Management and TA to support VRE deployment (GCF grant US$ 4 million).** Component 3 is expected to play a key role in enabling private sector investments and in supporting the utility BPC to manage deployment of VRE. It will also help BPC enhance the gender equality and socio-economic benefits of its RE projects through a systematic approach.

    Component 3 will finance the following activities:

    (a) **Subcomponent 1 – Project management: (US$ 0.5 million):** to support the implementation of the project by BPC as the Project Implementation Unit (PIU); and

    (b) **Subcomponent 2 – VRE deployment (US$ 3.5 million):** to support VRE deployment from various perspectives, including (i) technical studies on the management of VRE; (ii) review of the business model of the utility in the context of the opening up of private generation and regional trade opportunities, (iii) annual capacity building to empower the utility staff and (iv) systematic framework to incorporate socio-economic aspects in the design and implementation of the utility projects. Training, capacity building including south-south knowledge exchange, as well as consulting activities required for project implementation as the case may be will also be included to empower BPC technical staff and management. In addition, gender equality activities will also be supported under Subcomponent 2.

[19] Dikhukhung, Leporung, Mokatako, Phitshane-Molopo, Mabule, Mmakgori, Sekhutlane, Tshidilamolomo, Sedibeng

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

20. The overall environmental and social risk rating is Substantial. Environmental risk rating is Moderate and Social risk rating substantial. Potentially adverse social and environmental risks and impacts, is primarily associated with the physical civil works supported under Components 1 and 2. The key risks and impacts may be related to: (i) potential small to medium scale land acquisition and land easement arrangements to be assessed further and confirmed; (ii) social aspects of environmental impacts related to construction-related activities, including health and safety; (iii) temporary labor influx needed for construction activities, and associated Gender-Based Violence/ Sexual Exploitation and Abuse/ Sexual Harassment risks; and (iv) need for robust stakeholder engagement (including any vulnerable and/or disadvantaged groups), (v) loss of vegetation, (vi) soil and water pollution due to disposal and management of general and hazardous waste during the construction and batteries, (vii) nuisances related to air and noise emissions, and (ix) community health and safety. For environment, the risks and impacts are considered to be moderate to low in magnitude, reversible, site-specific and can be easily mitigated. The Borrower has a legal and regulatory framework in place for managing environmental risks and impacts, however lacks historical performance with implementation of ESF projects and has limited internal capacity to manage environmental risks. To mitigate the risks, the project will establish a PIU in BPC and MME with dedicated environmental specialist. Furthermore, funds allocated under Component 3 will support capacity building of PIU staff.

E. Implementation

Institutional and Implementation Arrangements

21. The Financing agreements for the project will be negotiated and concluded between the Ministry of Finance (MoF) on behalf of GoB and the World Bank (including as Executing Entity of the GCF). To facilitate the implementation of the Project, the recipient shall make the proceeds of the GCF and IBRD financing available to BPC under a subsidiary agreement between the recipient and BPC. BPC will be the implementing agency for the Project including GCF co-financed activities. BPC is the nationally designated utility for electricity generation, T&D, as well as purchase of electricity from IPPs in Botswana. Current licenses include the permission to generate, transmit, supply and trade electricity, including import and export of electricity. BPC is responsible for conducting feasibility studies, technical design, and procurement for transmission networks strengthening, as well as expanding electricity access. BPC is implementing similar electrification expansion activities under its rural electrification program. TA and capacity building under Component 3 is expected to be implemented by BPC.

22. BPC will establish a PIU dedicated for the implementation of the project, with all departments relevant to the Project mobilized and coordinated by senior staff who has adequate experience with reporting arrangements that ensure that senior management of BPC has visibility over the project. The senior staff will also coordinate all project activities and will be the main counterpart of the World Bank during project implementation. The PIU will be resourced with

adequate staff having skills in engineering, procurement, project management, accounting, legal, gender and environmental and social risks management.

CONTACT POINT

World Bank

Nadia Taobane
Senior Energy Specialist

Zijun Li
Energy Specialist

Borrower/Client/Recipient

Republic of Botswana
Seitebaleng Fologang
Director, Budget Analysis and Debt Management
skebakile@gov.bw

Implementing Agencies

Botswana Power Corporation
Mogomotsi Kebitseng
General Manager, Asset Management and Projects
maygilipj@bpc.bw

FOR MORE INFORMATION CONTACT

The World Bank
1818 H Street, NW
Washington, D.C. 20433
Telephone: (202) 473-1000
Web: http://www.worldbank.org/projects

APPROVAL

Task Team Leader(s):	Nadia Taobane, Zijun Li

Approved By

Practice Manager/Manager:	Yadviga Viktorivna Semikolenova	26-Apr-2024

Country Director:	Satu Kristiina Jyrintytar Kahkonen	16-May-2024