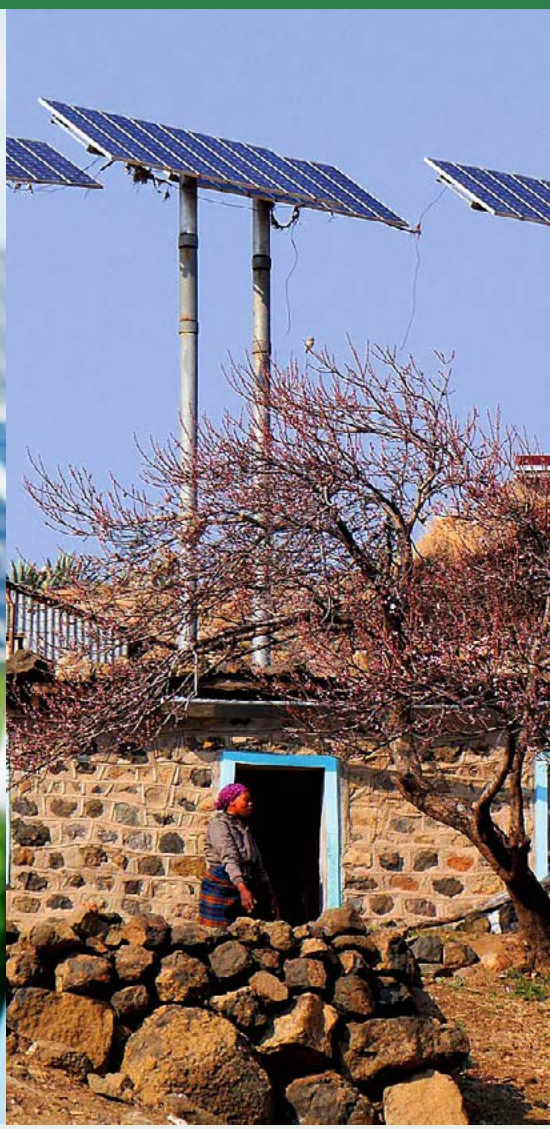
Potential for Green Banks & National Climate Change Funds in Africa

Scoping Report



AFRICAN DEVELOPMENT BANK GROUP

CIF CLIMATE INVESTMENT FUNDS

Study conducted by the Coalition for Green Capital

CGC

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Abbreviations

(Country-specific abbreviations are noted directly in the text)

$ – US Dollars

AFB – Agence Française de Développement

AFDB – African Development Bank

BCEAO – Central Bank of West African States

BGFA – Beyond the Greid Fund Africa

CFF – Climate Finance Facility

CGC – Coalition for Green Capital

CIF – Climate Investment Funds

CSA – Climate Smart Agriculture

DBSA – Development Bank of Southern Africa

DFI – Development Finance Institution

DFID – UK Department for International Development, now the Foreign, Commonwealth & Development Office (FCDO)

ECOWAS – Economic Community of West African States

EIB – European Investment Bank

ERP – Energy Related Products

ESS – Environmental & Social Safeguards

FONERWA – Rwanda Green Fund

GB – Green Bank

GBN – Green Bank Network

GCF Green Climate Fund

GDP – Gross Domestic Product

GEF – Global Environment Fund

GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit

ICT – Information & Computer Technologies

IMF – International Monetary Fund

IPP – Independent Power Producer

KFW – German state-owned development bank

MCC – Millennium Challenge Corporation

MDB – Multilateral Development Bank

MRV – Monitoring, Verification & Reporting

MSME – Micro, Small & Medium Enterprises

MW – Mega Watts

NCCF – National Climate Change Fund

NDB – National Development Bank

NDC – Nationally Determined Contributions

NDF – Nordic Development Fund

NFV – National Financing Vehicle

NPL – Non-Performing Loans

PPA – Power Purchase Agreement

PPF – Project Preparation Facility

RE – Renewable Energy

REDD+ – Reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries

REEEP – Renewable Energy and Energy Efficiency Partnership

SCF – Strategic Climate Fund

SDG – Sustainable Development Goals

SIDA – Swedish International Development Cooperation Agency

SME – Small & Medium Enterprises

SUNREF – AFD Green Credit line: Sustainable Use of Natural Resources and Energy Finance

UNDP – United Nations Development Program

UNEP – United Nations Environment Program

WAEMU – West African Economic and Monetary Union

1 | Executive Summary

The goal of this project is to explore and understand the potential for "Green Investment Banks" and National Climate Change Funds (NCCFs) to increase the capacity of African countries to access and mobilize climate finance in support of implementing NDCs and related national climate and development goals. This initiative includes a high-level assessment of current market conditions, identification of potential climate investment-related market barriers and constraints, an indicative view of market opportunities in key climate sectors, and broad recommendations on the potential for how Green Banks and National Climate Change Funds can be applied to mobilize climate finance and scale-up private climate-related investment. The potential for attracting new sources of catalytic funds into African countries including, but not limited to resources from the Green Climate Fund is also addressed.

Green Banks and National Climate Change Funds can play an important role in mobilizing finance to support low-carbon, climate-resilient development by raising and blending capital to finance local climate infrastructure while also driving an increase in private investment. For countries to better access investment and fully engage the private sector, the climate finance system must reorient toward national financial capacity that is able to channel capital to projects and markets where it is needed most. When paired with effective grant programs through National Climate Change Funds (NCCF), and strong enabling environments and policies, locally-based Green Banks are powerful tools to address market needs, understand local risk and drive private investment. By creating and capitalizing such vehicles from a mix of domestic and international sources, countries can mobilize funds from diaspora, development finance institutions, national financial institutions, private investors, asset managers, sovereign wealth funds, and more.

In response to climate investment needs, there are many innovative climate-finance initiatives emerging across Africa that are focused on attracting private sector climate-resilient investments. These initiatives reduce risk and incentivize private sector investments in mitigation projects by promoting improved policies, enabling environments, and market-based interventions. However, bringing investment to scale through mobilizing international and national climate resources remains a significant challenge. Few countries have an effective climate-finance strategy in place to support implementation of NDCs in both mitigation and adaptation. Barriers to accessing increased investment flows include adequate policy and regulatory frameworks, knowledge of and access to the full range of climate funds and finance, limited green lending capacity at commercial banks, high risk perception, high cost of capital, high transactions costs, local financiers preferences for large-ticket projects or government treasuries, constraints on sovereign debt, lack of market-specific financial products that can address risk and unlock the flow of private investment, investment-grade strategies focused on expanding energy access to off-grid rural areas and more.

Project Partners & Acknowledgements

This project is sponsored by the African Development Bank (AfDB) in partnership with the Climate Investment Funds (CIF), who have joined together to explore the potential for National Climate Change Funds and Green Banks to scale up climate finance in Africa. The AfDB commissioned the Coalition for Green Capital (CGC), an NGO focused on formation and implementation of the Green Bank model.

Project Methodology & Approach

The methodology and approach used for this study are designed to a) raise awareness about National Climate Change Funds (NCCF) and Green Banks (GB) and b) explore initial market conditions and high-level

recommendations towards Green Bank and NCCF formation in the six study countries, located in Africa.

The six countries selected to participate in this study include the following, as based on application of project selection criteria and approval for country participation from national representatives:

- **GHANA**
- **ZAMBIA**
- **UGANDA**
- **TUNISIA**
- **MOZAMBIQUE**
- **BENIN**

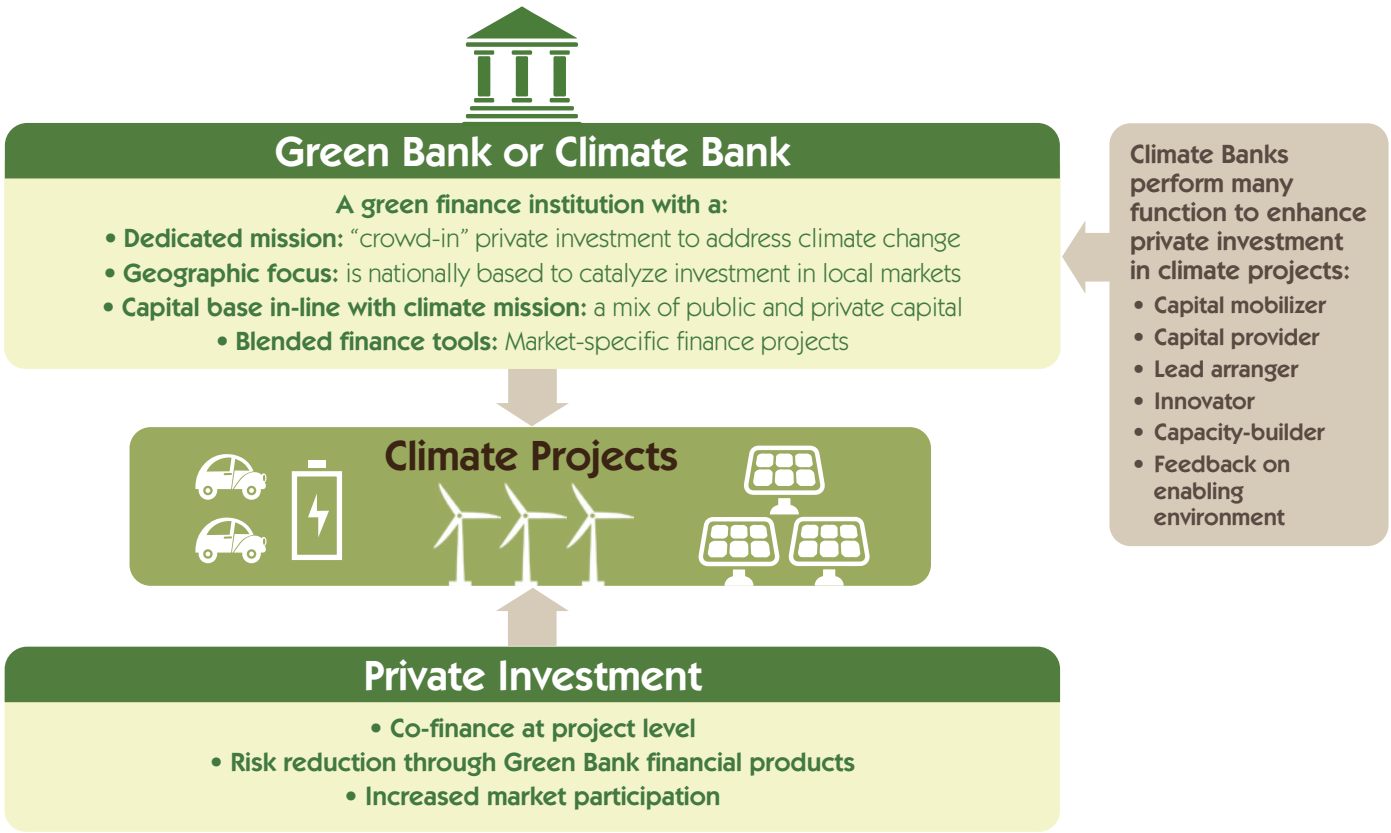
Green Banks & National Climate Change Funds

Structured as either new institutions or adaptations of existing institutions, Green Banks are designed to address market gaps and strengthen national ownership of climate finance. Green Banks move problem-solving and agency to the national level, empowering developing countries to better access international financial resources while attracting private capital to green projects from foreign and domestic sources. As catalytic facilities, they are designed to "crowd in" and increase private investment in low-carbon and climate-resilient projects. Green Banks typically use a blended finance approach, with capitalization coming from a variety of public and private sources, including bilateral donors, climate funds and national treasuries.

In developing economies, Green Banks can be most effective when paired with national Green Funds to provide integrated access to an effective combination of grants and finance, suited to local market conditions. This approach is being developed in Rwanda through an integration of their existing Green Fund with a new Green Bank, and was also demonstrated by the addition of a Climate Finance Facility on the Green Bank model in South Africa to complement their existing Green Fund.

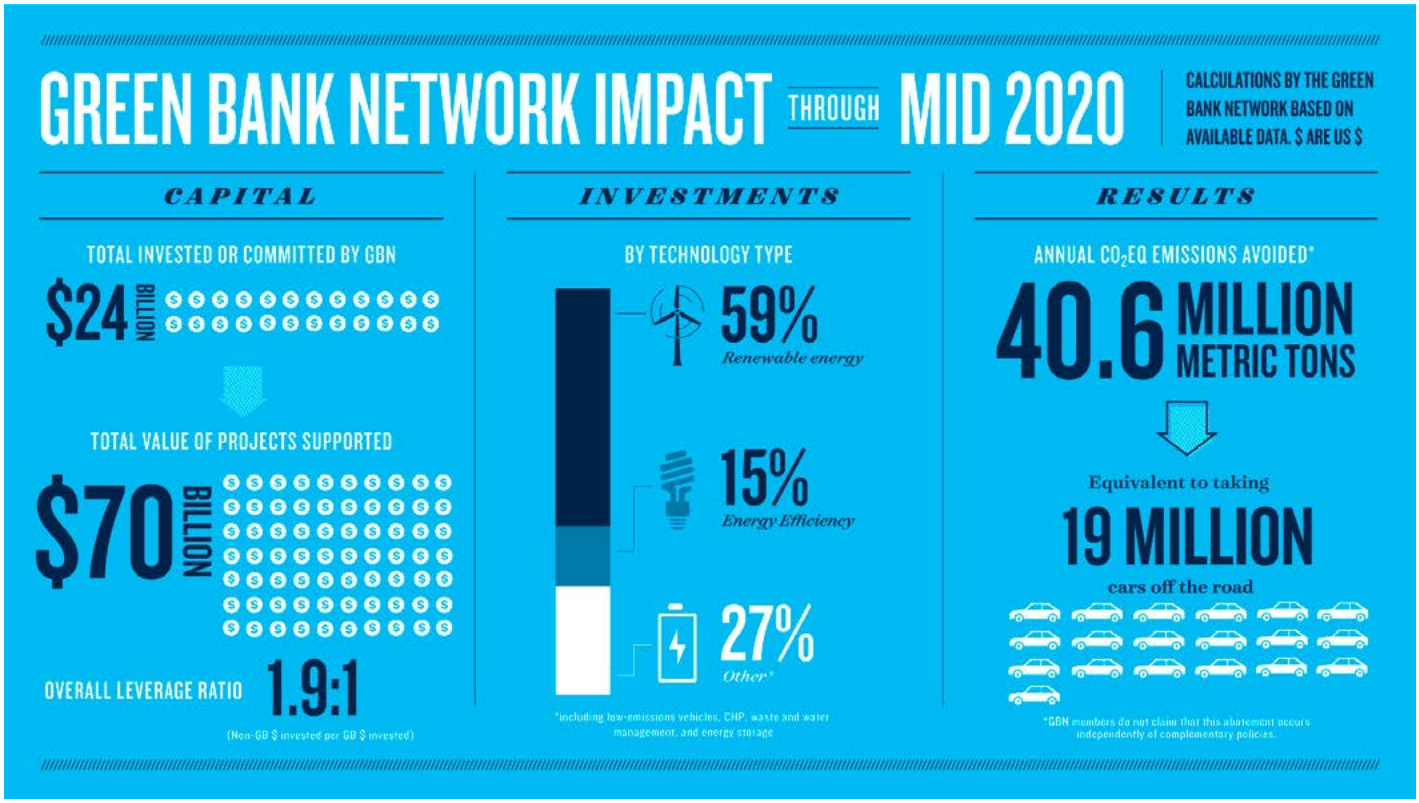
Green Banks have proven successful at driving clean energy investment and there are an increasing number of Green Banks and similar entities in development around the world. Collectively these institutions have financed billions of dollars of low-carbon projects with innovative financing structures, leveraging multiple private dollars per

Green Banks are country-driven, nationally-based catalytic finance facilities designed to mobilize private investment



public dollar of financing. To date, the founding members of the Green Bank Network[1] have leveraged $24 billion in public capital to finance more than $70 billion in clean energy projects. This investment has flowed into a range of clean energy technologies including solar, offshore wind, and building efficiency, which have resulted in 25 million tonnes of avoided CO_2 emissions annually.

Green Bank Impact[2]



Country Recommendations

This report provides a detailed overview of the market context and potential for a Green Bank and/or National Climate Change Fund to support climate investment and national climate goals for each of the six study countries. Broad recommendations for each country are provided below followed by summary conclusions and recommendations for the study as a whole.

Zambia

Despite significant financial challenges in Zambia, including recent default on sovereign debt, there is strong interest in a Green Bank and/or NCCF to support both the Climate Smart Agriculture and energy sectors in Zambia. Given the large need for green investment in Zambia for both development and climate objectives, and the progress made via existing initiatives, there is a good potential for a Green Bank and/or NCCF if structured properly with the existing institutional players.

The most promising focus within the agriculture sector lies in broader dissemination and longer-term adoption of Climate Smart Agriculture (CSA), specifically efficient irrigation systems. With funding from the international development community or climate funds, patient capital can be directed to encourage greater participation by leveraging various tools such as the provision of direct loans, credit enhancements in the form of guarantees, funding for technical assistance and capacity building programs, or wholesale funding to local intermediaries.

Green financing initiatives will have the greatest impact in the energy sector if used to address project preparation,

1 Green Bank Members: UK Green Investment Bank, Clean Energy Finance Corporation of Australia, Green Technology Financing Scheme of Malaysia, Green Finance Organization of Japan, Connecticut Green Bank, New York Green Bank

2 Green Bank Network – Annual Member Impact Metrics

capacity building, reduction of project financing costs, and risk mitigation for the variety of system risks experienced by commercial lenders or private developers.

The energy and agriculture sectors in Zambia are in need of external support, and a mix of green finance and grant funding are important parts of the solution. The country is going through a volatile period and additive program support needs to be timed and assessed carefully. For the past 3–5 years, development of renewable energy initiatives have been constrained due to off-taker risk for large power generation initiatives, making it important to address financial sustainability in parallel with efforts to drive green initiatives.

In-country partners such as DBZ, IDC, REA and possibly ERB have been identified as potential host institutions for a Green Bank/NCCF, based on a detailed institutional capacity assessment. In addition, the Zambia Off-Grid Task Force would be a relevant partner focused on a holistic view of the off-grid sector, including both public and private stakeholders. Each of these organizations are developing different but complementary project pipelines that tackle the issues surrounding rural electrification and economic growth, including growing and strengthening the agriculture sector. Climate smart agriculture is an early stage of development in Zambia, therefore grant funding or green financing should be focused on scaling up CSA practices and implementing larger demonstration projects to build track record and scale in the sector. In addition, Zambia is in the process of considering a climate change fund in the context of emerging climate legislation which creates an opportunity to coordinate across initiatives.

Ghana

There is significant opportunity in Ghana for a Green Bank or NCCF, particularly to target and support renewable energy integration across the energy and industrial sectors. Furthermore, with the impact of climate variability on agriculture – one of Ghana's most important sectors – a Green Bank or NCCF could provide critical support to developing a more climate resilient sector.

Despite the fact that Ghana is in a unique position relative to its continental peers with excess power capacity, the country is exposed to climate variability affecting the capacity of hydropower plants, and anticipated increases in electricity demand imply that the current 'excess power capacity' will be short-lived. Given the anticipated impacts of climate change on Ghana's energy sector and the macroeconomy more broadly, the government has a near-term opportunity to be proactive in a transition to a clean energy economy. The integration of renewable energy to stabilize the supply of electricity will also support the government's vision of building a larger domestic manufacturing sector.

There are numerous challenges that contribute to the slow uptake of renewable energy development in Ghana. Some of the issues in the sector include high cost of financing, lack of access to longer-term finance alternatives, lack of or insufficient incentives such as tax rebates, grid connection constraints and lack of grid capacity, volatility of the local currency, technical knowledge limitations to operate and maintain renewable energy technologies.[3]

Potential market interventions to consider for Ghana's energy sector (in the context of a deeper market analysis and concept development) include: targeted financial products to reduce risk, concessional capital and extended tenor, changes in co-financing requirements, technical assistance, and a Project Preparation Facility.

The agriculture sector is also a priority for green investment as one of Ghana's larger GDP drivers, a key employer in the country, and a critical source of foreign exchange generated from exports. However, agriculture and land use change generate a sizeable portion of the country's GHG emissions and the sector is extremely vulnerable to climate change. Although the country's government has tried to support farmers with access to credit, and inputs and outputs, a large resource gap still exists. Access to financing and to appropriate financial products represents the biggest challenge including: Financing needs are too small for conventional lenders or commercial banks, risk profile of agricultural borrowers, particularly farmers, are considered too risky, agriculture as a sector is perceived to generate low returns or as unprofitable, high interest rates, and time lapse between CSA adoption and realization of benefit is seen as long and risky by farmers.

Potential host or partner institutions for a Green Bank or NCCF program are explored in the report, and include players such as the Ghana Infrastructure Investment Fund (created in 2014) and the potential new National

3 https://link.springer.com/article/10.1007/s10708-019-10132-z?shared-article-renderer

Development Bank, which has been under discussion by the government starting in 2020. Regardless of the institutional form, a new climate finance initiative will require significant new technical capacity skills and lending capital to have maximum impact. The new National Development Bank presents the opportunity to create an institution that is fit-for-purpose and aligned to both the economic and climate needs of the country from the outset.

Benin

Based on a high-level view of market dynamics, existing policy and regulatory initiatives, and the suite of potential interventions identified, the energy sector in Benin is considered a strong candidate for support from a Green Bank and a National Climate Change Fund program. In terms of the energy sector, the country's dependence on neighboring nations for imported oil results in the energy supply being expensive and potentially unreliable. In addition, the weak electricity infrastructure results in relatively high losses across transmission and distribution systems. Integrating a greater proportion of renewables into the energy mix could result in large energy cost reductions over the medium to long term, would contribute to greater energy independence, and would allow Benin to prepare for anticipated energy demand spikes while ensuring progress towards achieving climate targets. A Green Bank/NCCF initiative would be well positioned to address energy sector challenges ranging from inadequate funding to lack of technical expertise and capacity.

Benin's agriculture sector also surfaces as having significant potential for leveraged investment. With the government's focus on building a climate resilient agricultural sector, two specific areas have been identified in the National Adaptation Programme of Action (NAPA) as priorities: (i) the promotion and integration of renewable energy, and (ii) the adoption of improved irrigation, including efficient irrigation systems. Furthermore, through the country's strategic agriculture development plan (PSDSA), CSA practices have already been identified as a key intervention by government – providing further scope for a green finance facility or NCCF to complement existing national targets and goals. Through the various development plans that the government of Benin has adopted to help transition the agricultural sector to a more climate resilient state, the greatest current gap is the lack of financing alternatives and technical knowledge. Several development partner-funded programs have helped to conduct preliminary studies on suitable solutions but fall short of identifying appropriate financing mechanisms.

The government has established a number of policies, frameworks, and rolled out incentives to provide for an improved enabling environment in key climate sectors. Some of the constraints that a Green Bank and NCCF could assist to alleviate include:

- Injection of concessional capital to reduce the cost of funding for local banks;
- Provision of technical assistance and capacity building for off-grid renewable energy projects, and CSA practices;
- Establish a project preparation facility to support early stage projects and small local developers to scale to a size that is commercially bankable; and
- Long tenor financing that could be on-lent through either a new financing entity or an existing organization.

Several existing institutions in Benin work on channeling green finance toward projects, which could be explored for potential role as a host or partner for a Green bank or NCCF program. These include the National Fund for Environment and Climate (FNEC), the rural electrification agency (ABERME), or leading commercial banks like Ecobank or Coris Bank.

Tunisia

Despite the obstacles presented by the structure of the fossil-fuel based domestic electricity market, Tunisia has significant potential for renewable energy deployment across the country, especially from wind and solar resources. While renewables currently do not play a significant role in Tunisia's electricity mix, their importance could grow in the coming years, especially if renewable energy projects are developed with the purpose of creating more jobs to tackle the country's unemployment challenge.[4, 5] With a relatively high urbanization rate, Tunisia's green cities sector is also a potential priority for the capacity of a Green Bank or NCCF to help catalyze investment and support sustainable growth. Both sectors have gained some traction in recent years as development partners and multilateral development banks have provided financial and non-financial support, and involved a variety of different stakeholders.

4 Phillipe Trape AfDB Economist interview, Sept 4, 2020

5 Hela Cheikhrouhou interview, October 19, 2020

With Tunisia's fiscal constraints, identifying sources of co-financing from the government to seed any new Green Bank initiative will likely be challenging. As seen in other countries, one option for raising capital is for the government to issue bonds to raise the needed funding. However, in light of the country's recent sovereign credit rating downgrade and growing debt levels and budget deficits, access to financing with amenable terms is potentially not a strong option in the near term . Alternative structures will need to be explored to cope with this specific circumstance.

The Tunisian government has made efforts in recent years to provide clarity and guidance on development priorities and related targets. There are various opportunities across the country's energy sector and its green cities agenda for a Green Bank and a NCCF to accelerate the rate of sustainable development. Interventions focusing on project preparation, tailored products including bridge financing, concessional financing, and guarantee mechanisms in the energy sector have been identified as having the strongest potential. In terms of the green cities plan, a NCCF and Green Bank are likely to be most impactful in terms of supporting municipalities with the technical assistance and capacity building support required to reform policies and improve strategic planning. On the financing side, concessional loans or grants will likely be the most effective intervention given the limited resources of most municipalities and limited borrowing capacity.

In terms of potential host or partner institutions, several options are identified, including the Energy Transition Fund (FTE), which currently is a grant focused institution but could be expanded to offer financing, as well as a new initiative for a Renewable Energy Fund (REF) that could include funds from the Caisse des Dépôts et Consignations (CDC), the national utility (STEG) and the African Development Bank.

Uganda

Uganda is currently exploring the creation of a climate-dedicated National Financing Vehicle (NFV) as an innovative mechanism to mobilize both national and international climate finance resources directed to high impact climate action. The creation of an NFV is aligned with the Government of Uganda's national planning objectives and green growth development goals as current investment trajectories are not on track to meet these goals, particularly from the private sector. The low carbon-sector currently faces a substantial investment gap, with related implications for economic growth.

A Uganda climate-focused NFV will require a flexible structure that can attract both domestic and international climate finance. Additionally, it would require a special relationship with the Government of Uganda designed to increase private sector investments in the local low-carbon market. An integrated approach (with both grants and finance) is required to unlock investment in green projects in Uganda. Grants will continue to be required to support project preparation and some market subsidization, and finance is essential to bring markets to scale and mobilize private investment.

Following these insights, and based upon a "decision-tree" type options analysis conducted for the UNDP and Government of Uganda, the National Development Bank (UDBL) has been identified as the most viable option to host a Uganda climate-focused NFV. This path would leverage a strong existing national institution and is based on a balance of strategic concerns and consideration of local context. Based on these findings, the Government of Uganda is working with UNDP to commission a feasibility study, to design and structure the proposed NFV to mobilize climate green financing to through a partnership with a local financial institution. Strengthening the institutional capacity of the Uganda National Development Bank to mobilize climate finance resources and offer affordable and appropriate financing solutions to green projects could help the country recover from the COVID-19 economic crisis and build opportunities for green growth. Additionally, Uganda would benefit from a climate-dedicated NFV to achieve national climate ambitions and related targets as established in Uganda's Vision 2040, National Development Plan (NDPIII) and Nationally Determined Contributions (NDC). It is also important to note that, despite these opportunities, Uganda faces a number of challenges related to mobilizing domestic and international financing for infrastructure and actually implementing these projects.

Mozambique

Both a Green Bank and a National Climate Change Fund could prove useful for Mozambique. With current market dynamics, a catalytic green finance facility seems most appropriate for the clean energy sector to address the financing challenges for both off-grid solutions and grid connected projects. Off-grid areas will still need additional

support to improve the operating and enabling environment, but given the progress made to date, the need for a green finance facility to accelerate such progress in the near term is clear.
Grant funding through a NCCF is applicable to both the energy and agriculture sectors. Within energy, grant funding will be helpful for the poorest regions or districts across the country where the tariff gap to develop commercially viable projects is largest. For the agriculture sector (with a specific focus on the adoption of CSA practices), grant funding should be the primary tool used to develop the sector from the ground up. The few programs that have been implemented to date provide a good base from which to launch complementary initiatives, but the amounts of grant funding that have been directed to this area to date remain relatively small in scale.

In summary, Mozambique is still in relatively early stages of growth in the clean energy, electrification and agriculture sectors. As such, the focus should be on incubating new models and addressing risks that are common to early stage projects in the near term, vs launching a full-fledged green bank program. Some of the key constraints that can be addressed through the establishment of a catalytic green finance facility and/or NCCF include:

- Injection of concessional capital to reduce the cost of funding for local banks;
- Provision of technical assistance and capacity building for renewable energy projects (grid connected and off-grid), and to develop more technical knowledge of sustainable farming practices including the adoption of CSA;
- Support for risk mitigation mechanisms, such as guarantee structures, aggregation structures for smaller projects, and/or micro-loan products that can stimulate private sector participation; and to
- Establish a project preparation facility to support early stage projects and small local developers to scale to a size that is commercially bankable.

Mozambique currently has several development partner-funded programs focused on climate and clean energy, and there is significant potential to partner with and scale the levels of investment in these sectors with local partners. In this context, several institutions exist that could serve as potential host or partners of any green bank or NCCF program, including the National Sustainable Development Fund (FNDS) and the National Energy Fund (FUNAE). Mozambique also faces key challenges related to mobilizing domestic and international financing for infrastructure and related capacity constraints as required to effectively implement such projects.

Summary Conclusions and Recommendations

The high level scoping and market view provided through this project indicate that a combination of Green Banks adjacent to National Climate Change Funds have strong potential to help scale private investment in support of national climate and sustainable development goals in the six study countries. A combination of green grant programs alongside catalytic climate finance facilities focused on the low-carbon and sustainable development sectors has potential to support expanded private sector participation and more effectively mobilize support from global development partner institutions.
Two sectors stand out as consistent priorities across the study countries including ***renewable energy*** and ***climate smart agriculture***. Green cities infrastructure is another potential priority sector, particularly in Tunisia. An in-depth market analysis to determine the scale and nature of investment needs across these sectors and to identify project pipelines would be the next step towards fleshing out the nature of market barriers and specific market interventions, financial products, and related grant supports that are needed in each to unlock private investment and leverage climate investment.

Based on this initial assessment of country needs, objectives and institutional capacities, it appears that near-term Green Bank and NCCF exploration would be appropriate in Ghana, Tunisia, Zambia, Uganda, and Benin. In Mozambique, based on the existing programs and work to date, it seems best to start with forming a National Climate Change Fund to provide initial grant capacity and then to potentially grow into an expanded green finance capacity. In all countries, an in-depth market and institutional analysis would be required to flesh out application of this model and define country-specific approaches. In all countries, key issues such as capitalization potential, debt sustainability and interaction with existing program and institutions will need to be addressed.

Exploration of new climate finance capacity should be integrated with existing programs, including the potential expansion of existing National Climate Change Funds or other grant programs where they exist. Based on the

market analysis here, it is clear that scaling finance is critical to meeting investment targets, but that grants remain an essential complement to financing, regardless of a country's level of development. In addition, it is recommended that potential Green Banks in the six countries be integrated with an effective project preparation support, including via the creation of a Project Preparation Facility (PPF). Robust project pipelines and properly structured projects will be essential to effectively utilize any additional financing capacity.

The typical next steps towards Green Bank exploration and development include the following major components. It is important to note that all of these actions need to be gender-responsive to ensure that Green banks and NCCFs are gender-inclusive, where women and men are equally represented at all position levels.

1. Conduct an in-country mission to identify a lead champion for a new climate finance initiative and the intended host institution.
2. Conduct an in-depth market analysis to identify and quantify the project pipeline for a new Green Bank/ Climate Finance Facility and/or a complementary NCCF across all priority sectors.
3. Define and develop the structure for a proposed Green Bank and/or NCCF, including host (or incorporation if needed), governance and business plan
4. Define and develop the structure of the necessary project preparation facility (or the interface with an existing PPF)
5. Identify and engage with potential co-capitalization partners
6. Define the indicative structure of an AfDB loan to provide initial capitalization of the Green Bank alongside an initial loan from the Green Climate Fund.

Green Banks, NCCFs & Economic Recovery

COVID-19 presents an unprecedented challenge to Africa and the global community. A first wave response clearly needs to focus on the urgent need for direct aid, debt-relief, and emergency measures to address the immediate public health and economic crisis that is facing all developing countries.

As we look towards what will be needed to progress from emergency aid relief to medium-to-longer term measures to build resiliency and re-grow developing economies, the role of catalytic, innovative finance capacity to support sustainable infrastructure and social investment through mobilizing public and private resources will be essential.

Green Banks and National Climate Change Funds are well positioned to fill this role and support economic recovery and job growth through the re-building of green development sectors such as agriculture, renewable energy, and green cities.

Green Banks (alongside NCCFs) are designed to catalyze green investment with a focus on blended finance and crowding-in private investment through financial instruments designed to serve projects that are commercially viable – but not yet bankable – in the green sector. Green Banks alongside NCCFs can support economic recovery and expansion due to the COVID-19 pandemic in several ways:

- **Reduce Risk** – Green Banks are purpose-built to understand and address investment risk in a time of rapidly changing market conditions.
- **Build National Capacity** – Green Banks and related Project Preparation Facilities are designed to build the green lending capacity of local financial institutions and the ability of project developers to bring forward bankable and commercially viable projects.
- **Drive Growth** –The low carbon-sector faces a substantial investment gap which, if addressed, can be a powerful source of new economic growth in this critical period.
- **Increase Access to Financial Resources** – The catalytic investment model offered through Green Banks adjacent to NCCFs can increase access to resources from climate funds and development partners based on application of a blended finance approach

7. Engage in the Funding Proposal process with GCF or other partners to co-capitalize a new Green Bank via the AfDBs role as an Accredited Entity
8. Eventual capitalization, formation and operationalization of the new Green Bank(s)

To advance these recommendations into action requires country-driven leadership and commitment combined with a pool of technical assistance funding to support market assessment and Green Bank/NCCF design and execution. It also required the partnership of a suitable GCF Accredited Entity – a role that naturally fits with the capacity and interest of the AfDB.

Systemic Approach

There is an opportunity to support Green Bank development at scale in Africa, tailored to country-specific market dynamics, existing funding and financing programs, and through an understanding of investment gaps and opportunities. Green Bank formation rests upon three core elements:

1. Identifying a well-positioned host institution and appropriate structure
2. Securing affordable seed capitalization from sources with investment objectives that well matched to the catalytic Green Bank model alongside grant funding for project preparation needs
3. Securing up-front grant funding for Green Bank/NCCF design and structuring work

To date, Green Bank formation has required a time and labor intensive process on a country-by-country basis. Barriers and challenges have included:

- Lack of direct-access accredited entities to provide climate-oriented loans and equity to capitalize Green Banks and NCCFs
- One-off efforts to secure technical support grants for Green Banks design and structuring and actual seed capitalization
- A lack of clarity on replicable institutional approaches to bring the catalytic climate finance model to scale.
- Lack of information on project pipelines and the financial interventions that could bring the green sector more quickly to scale.

Green Bank and NCCF development also requires gender-responsive data for the financial sector concerning employment in financial institutions and for gender inclusiveness concerning design of and access to specific financial products.

Working with an umbrella local development finance institution such as AfDB, in coordination with other international development partners, presents an opportunity to coordinate across these challenges and build systemic capacity. By “bundling” several Green Bank initiatives together, into systemic multi-country initiatives could allow for better access to: (1) technical assistance support for design and structuring work; (2) coordinated and facilitated capitalization via a combined application to the Green Climate Fund through an Accredited Entity, and/or to other sources of capital from development finance institutions or other Climate Funds; and (3) development of replicable Green Bank financial products and/or NCCF grant programs designed to meet common needs in priority sectors across multiple countries with similar market challenges.

Overall, on both the individual country level, and at a systemic multi-country level, the Green Bank model, adjacent to National Climate Change Funds holds tremendous potential to build country driven, gender inclusive capacity to advance climate investment in support of national green growth and climate objectives.

2 | Project Overview and Introduction

Project Goals

The goal of this project is to explore and understand the potential for "Green Investment Banks" and National Climate Change Funds (NCCFs) to increase the capacity of African countries to access and mobilize climate finance in support of implementing NDCs and related national climate goals. This initiative includes a high-level assessment of current market conditions, identification of potential climate investment-related market barriers and constraints, an indicative view of market opportunities in key climate sectors, and broad recommendations on the potential for how Green Banks and National Climate Change Funds can be applied to mobilize climate finance and scale-up private climate-related investment. The potential for attracting new sources of catalytic funds into African countries including, but not limited to resources from the Green Climate Fund is also addressed.

Green Banks and National Climate Change Funds can play an important role in mobilizing finance to support low-carbon, climate-resilient development by raising and blending capital to finance local climate infrastructure while also driving an increase in private investment. For countries to better access climate finance and fully engage the private sector, the climate finance system must reorient toward national financial capacity that is able to channel capital to projects and markets where it is needed most. When paired with effective grant programs through National Climate Change Funds (NCCF), and strong enabling environments and policies, locally-based Green Banks are powerful tools to address market needs, understand local risk and drive private investment. By creating and capitalizing such vehicles from a mix of domestic and international sources, countries can mobilize funds from diaspora, national financial institutions, private investors, asset managers, sovereign wealth funds, and more. These vehicles and funds can support the implementation of Nationally Determined Contributions (NDCs), CIF Investment Plans, CIF Strategic Plans for Climate Resilience and NDCs, and progress towards Sustainable Development Goals (SDGs). As noted by Dr. Anthony Nyong, AfDB Director Climate Change and Green Growth, "Green Financing Vehicles are increasingly recognized as a powerful instrument to mobilize private sector capital for low carbon and climate resilient development. Their ability to access even limited amounts of local currency finance presents significant opportunities to manage risk, attract concessional finance from climate funds and crowd in private sector finance. We are excited to work with the team from CGC and look forward to presenting progress reports at the Green Bank Summit in 2020 and COP26."

Project Context

Although Africa's has contributed only 3–4% of total global carbon emissions, the continent remains among the world's most vulnerable regions to the effects of climate change.[1] With temperature increases already on record, sub-Saharan Africa is experiencing more intense and more frequent climate extremes. Impacts include increasing droughts, heat waves, and crop failures and extreme flooding. The resulting decline in food production, shortage of clean drinking water, flooding of coastal cities, impacts on natural ecosystems and biodiversity, and spread of disease such as malaria have profound implications for countries across the continent. It is also important to note that across Africa, women among the more vulnerable groups of those affected by climate change due to gender inequality and related issues. Climate change is a major threat to

1 Our World in Data: https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#:~:text=Africa%20and%20South%20America%20are,to%20international%20aviation%20and%20shipping

sustainable development, and will impact all aspects of economic growth and efforts to reduce poverty.

Given the severe implications of climate change for Africa, governments across the continent endorsed the historic 2015 Paris Climate Accord, and have set ambitious commitments through their Nationally Determined Contributions (NDCs) towards climate adaptation and mitigation. The level of investment needed to achieve these commitments is subject to debate, but estimates of Africa's climate adaptation costs alone, due to past emissions, are between $7–15 billion annually by 2020. On a 2°C pathway adaptation costs could reach $35 billion per year and on a 3.5–4°C pathway the cost of adaptation for Africa could reach $50 billion per year by 2050.[2]

Overall, it is estimated that climate change presents a $3 trillion investment opportunity in Africa by 2030.[3] To bridge this climate investment gap to meet NDC commitments, significant climate finance and resource mobilization well beyond current levels of public and/or private climate investment is required. Public sector funding from development partners and through climate funds is essential, but bringing climate investment to scale will require engaging the private sector and leveraging significant private capital through equity, loans, and/or project finance across all climate-related sectors.

In response to these needs, there are many innovative climate-finance initiatives emerging across Africa that are focused on attracting private sector climate-resilient investments. These initiatives reduce risk and incentivize private sector investments in mitigation projects by promoting improved policies, enabling environments, and market-based interventions. (Specific programs are referenced in the country-specific chapters of this report.) However, bringing climate finance to scale through mobilizing international and national climate resources remains a significant challenge. Few countries have an effective climate-finance strategy in place to support implementation of aggressive NDCs in both mitigation and adaptation. Barriers to accessing climate finance include adequate policy and regulatory frameworks, knowledge of and access to the full range of climate funds and finance, limited green lending capacity at commercial banks, constraints on sovereign debt, lack of market-specific financial products that can address risk and unlock the flow of private investment, strategies focused on expanding energy access to off-grid rural areas, lack of gender-responsive policies, and more.

Project Partners & Acknowledgements

This project is sponsored by the AfDB in partnership with the Climate Investment Funds (CIF), who have joined together to explore the potential for National Climate Change Funds and Green Banks to scale up climate finance in Africa. The AfDB commissioned the Coalition for Green Capital (CGC), an NGO focused on formation and implementation of the Green Bank model.

- **The African Development Bank** (AfDB) is a leading development institution on the continent, focused on promoting economic development and poverty reduction. It engages with the full range and complexity of development challenges in Africa. The Bank has integrated operations, lending directly from the public and private sectors through a variety of instruments. The Climate Change and Green Growth Department assists Country Programs / Departments to manage the Bank Group's energy operations in Regional Member Countries (RMCs). Climate change and environmental issues are addressed by incorporating them into the Bank Group supported operations and giving them the visibility required.

  This project was conducted under the guidance of Mr. Gareth Phillips, AfDB Manager PECG1. Additional input and assistance was provided by the Directors, Managers and staff of the following AfDB Country Offices, Departments and Divisions:

  - Climate Change and Green Growth
  - Financial Sector Development
  - Country Offices of Mozambique, Zambia, Benin, Uganda, Ghana, Tunisia

- **The Climate Investment Funds** (CIF) have identified the AfDB as an implementing agency. Established in 2008 as one of the largest fast-tracked climate financing instruments in the world, the $8.3 billion CIF gives developing countries worldwide an urgently needed jump-start toward achieving low-carbon and climate-resilient development. The CIF provides developing countries with grants, concessional loans,

2 Africa's Adaptation Gap, Technical Report, Climate-change impacts, adaptation challenges and costs for Africa. AMCEN, UNEP, Climate Analytics

3 Climate Policy Initiative, AfDB Climate Finance Day, COP24. 2018.

risk mitigation instruments, and equity that leverage significant financing from the private sector, multilateral development banks, (MDBs) and other sources.

The Climate Investment Funds include four key programs:

- Clean Technology Fund (CTF)
- Forest Investment Program (FIP)
- Pilot Program Climate Resilience (PPCR)
- Scaling Up Renewable Energy Program (SREP)

- **The Coalition for Green Capital** CGC has formed Green Banks in the US and in Africa, is currently leading efforts to form a new National Climate Bank in the US, serves as the Co-Secretariat to the global Green Bank Network, supported the Development Bank of Southern Africa (DBSA) in forming the Southern Africa Climate Finance Facility, is in the process of designing and launching a Green Bank in Rwanda, and supports numerous other Green Bank and climate finance facility efforts around the world. CGC's approach to Green Bank formation is grounded in the understanding that the specific structure of local Green Banks – whether formed via a new purpose-built entity or as an adaptation of an existing institution – should be determined based on local market considerations, policy environments and institutional capacity. While finance is inherently global, capital deployment is local. CGC believes there is no one-size-fits-all for Green Bank design and that approaches must be tailored to specific market conditions and country-driven priorities.

The CGC project team on this study includes:

- Andrea Colnes – Director of Global Green Bank Development
- Rob Youngs – Director, International Programs
- Sidonie Gwet – Program Director, Africa
- Jennifer Louie – Consulting finance professional
- Leo Luo – Project consultant
- Wagane Diouf – Medina Finance

Project Methodology & Approach

The methodology and approach used for this study are designed to a) raise awareness about National Climate Change Funds (NCCF) and Green Banks (GB) and b) explore initial market conditions and high-level recommendations towards Green Bank and NCCF formation in the six study countries, located in Sub-Saharan Africa.

NCCF and GBs are considered complementary strategies towards building national capacity to mobilize domestic and international finance in support of low carbon and climate resilient investment. This AfDB/CIF Knowledge Product will contribute significantly to efforts to create institutions that can access finance for the implementation of programmatic activities in SCF countries.

PROJECT COMPONENTS: The project includes two major components:

1) Prepare a Knowledge Product

The knowledge product will frame the strengths and weaknesses of the Green Bank and/or National Climate Change Fund models in a range of countries in Africa. The knowledge product will have two broad components:

- It will describe relevant institutional infrastructure and define the steps required to design, form, capitalize and launch Green Banks and/or to establish an NCCF, including fiscal, legal and regulatory options. It will also provide examples of how existing GBs or NCCF have raised and leveraged finance both in Africa and elsewhere.

- The knowledge product will provide a high-level summary of key market barriers, opportunities and the most effective focus for a new Green Bank and/or NCCF to help drive low-carbon investment in each of the six project countries. This information will be based on a combination of desk research and stakeholder outreach around the following topics:
  - Market dynamics, market barriers and opportunities by sector (energy, water, agriculture, waste, urban development)
  - National development and climate-related goals, policies and initiatives
  - Project pipeline potential, by sector
  - Capacity considerations and constraints in the commercial sector and the public sector
  - Key stakeholders relevant to driving low-carbon investment

The knowledge product will be crafted in the context of a gender-responsive focus, and it is noted that country-specific Green Bank and NCCF initiatives will require gender assessments and related action plans.

2) Convene a 3-day South-South Knowledge Exchange Workshop

An interactive and dynamic knowledge exchange workshop will be convened with all participating countries to 1) build awareness of the Green Bank / NCCF models, 2) identify opportunities for specific country-led Green Bank / NCCF projects, 3) establish relationships to develop these opportunities, 4) identify specific action steps to advance potential Green Bank and NCCF initiatives on the continent.

PROJECT METHODOLOGY: To implement these elements, the following methodology was applied:

1. Country Selection Criteria

To support selection of the six participating study countries the following criteria were applied. Using these criteria, the group of study countries were selected to represent a *range of geographies* and *levels of economic development*. They also include countries that have the capacity and/or conditions that are consistent with forming new catalytic green finance initiatives and or national climate change funds based on potential project pipeline and market opportunities.

The project was designed to apply to CIF/SCF Eligible Countries. The Climate Investment Funds lists 23 countries as currently receiving funding from the Strategic Climate Fund (SCF). Those countries include: Benin, Burkina Faso, Cameroon, Congo Republic, Cote D'Ivoire, Democratic Republic of Congo, Ethiopia, Gambia, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Tanzania, Tunisia, Uganda, Zambia.

→ Country Criteria

1. Strategic Climate Fund (SCF) countries, as defined by the Climate Investment Funds secretariat.
2. Countries with a positive investment climate (or growing government efforts to foster a positive investment climate) for priority green sectors. This might include:
   a. Established national energy plans and goals (including renewable energy targets)
   b. Stable and positive regulatory environment, with strong market signals
   c. Emerging banking sector and/or capital markets (local, regional or international) with sufficient potential to engage for increased private investment
4. Countries with reasonable potential for a pipeline of "investable" projects
5. Countries with developed National Climate Plans and green development goals and targets
6. Countries with reasonable economic and political stability and favorable investment climate in green sectors
7. Countries with an identified credible and capable national champion(s), and/or an identified host institution to work with
8. Countries with reasonable level of positive engagement with bi-lateral aid agencies, DFIs and other donors in green sectors

→ Other Characteristics

In addition to the criteria noted above, attention was given to the following characteristics intended to support the inclusion of a range of size and economic characteristics from a range of countries

1. Close attention to selecting a group of countries that represent a diversity of potential approaches to creating and capitalizing NCCFs/Green Banks in the region.
2. Countries that represent both small and larger economies.
3. A mix of countries that include a diversity of faster growing economies as well as slower growth countries.
4. A balance of countries that already have established NCCFs (e.g. Benin, Mali, Rwanda and Ethiopia) and those that do not (e.g. Cote D'Ivoire or Tunisia).

2. Country Engagement

Once study countries were identified based on application of the criteria as noted above, direct outreach was conducted to national parties of interest and jurisdiction (either through the Ministry of Finance, GCF Focal Point, or related climate offices and officials), to seek their direct approval for participation in this study.

3. Country Outreach and Research

The study focused on engagement of carefully selected country stakeholders to help identify key market barriers, opportunities and the most effective focus for a new Green Bank and/or NCCF to help drive low-carbon investment. Due to COVID 19 related travel constraints, outreach to stakeholders was conducted remotely, via video and phone interviews.

Stakeholder groups identified and interviewed in each country included the following. In general, approximately 15–25 stakeholders were interviewed in each study country.

- Project developers (across sectors including energy, agriculture, forestry, water, green cities, etc.)
- Government ministries (Environment, Energy, Finance)
- Commercial banks, National Development Banks, Central Banks, and asset managers
- National planning entities
- Technical partners
- DFIs and donor entities
- National Development Banks and partners

Stakeholder interviews were organized around exploring the following areas of information:

- Market dynamics, market barriers and opportunities by sector (energy, water, agriculture, waste, urban development)
- National development and climate-related goals, policies and initiatives
- Project pipeline potential, by sector
- Capacity considerations and constraints in the commercial sector and the public sector
- Key stakeholders relevant to driving low-carbon investment

4. Report and Recommendations

The central output of this project is this knowledge product, intended to frame the strengths and weaknesses of the Green Bank and/or National Climate Change Fund models in the selected study countries. It provides a high-level view of market opportunity and needs, and frames the potential for Green Bank or NCCF formation in these countries. The report describes the characteristics of suitable (new or existing) institutions as potential hosts for a Green Bank or NCCF and a high-level view of potential capital sources for these climate finance institutions.

The report also presents a "Green Bank Checklist as a framework and guide for determining if a Green Bank and/or Green Fund is a fit with the capacity and market conditions in selected countries. This framework addresses the following factors:

- Identifying local champions
- Identifying effective host institutions and/or the viability of creating a new GB / NCCF institution
- Building adequate project pipeline of where Green Bank / NCCF could initially focus
- Identifying the most compelling market focus for Green Bank / NCCF activity
- Identifying an appropriate mix of public/private capitalization, based on market need
- Ensuring that Green Banks crowd in vs. crowd out private investment
- Engaging commercial finance partners
- Identifying early supporters from the donor and DFI community

5. Interactive Knowledge Exchange Workshop

Once conditions related to COVID 19 allow, the AfDB will invite participating countries to convene an interactive and dynamic knowledge exchange workshop to 1) build awareness of the Green Bank / NCCF models, 2) identify opportunities for specific country-led GB/NCCF projects, 3) establish relationships to develop these opportunities, 4) identify specific action steps to advance potential Green Bank and NCCF initiatives on the continent including gender-responsive institutional design. This workshop will have an action-oriented focus specifically designed to spark the process of Green Bank and NCCF formation in selected countries. The workshop will also explore institutional capacity building for development of Green Banks and NCCFs within each country.

6. Present the Knowledge Product at International Climate Events

Again, once conditions related to COVID 19 allow, the findings of this study will be presented at an international climate event and an African climate event to engage international and African countries in exploring application of the Green Bank / NCCF model and to solicit input to inform action-related recommendations. Given the anticipate path through the current global pandemic, it is anticipated that the international venue will be COP26 in late fall of 2021. The African venue remains to be determined.

3 | Project Countries

The six countries selected to participate in this study are noted below, as based on application of the selection criteria described above and specific approval for country participation as secured via the following national representatives:

GHANA

ZAMBIA

UGANDA

TUNISIA

MOZAMBIQUE

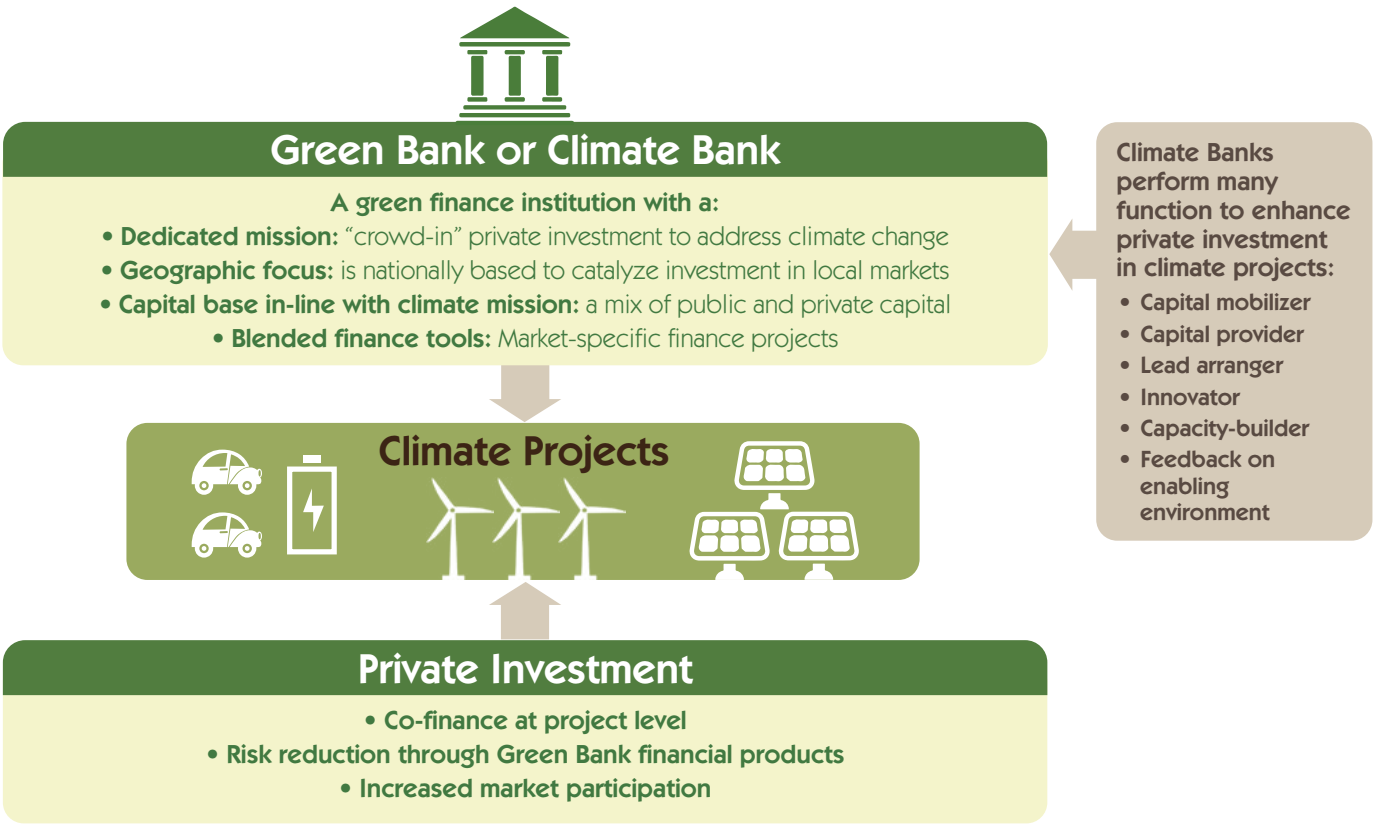
BENIN

Detailed information on each participating country is provided in the country-specific narrative section of this report.

4 | Introduction to the Green Bank/ Catalytic Green Finance Facility Model

Climate change must be addressed with bold and innovative solutions designed to deploy new technologies rapidly and at scale. Green Banks are specifically intended to address this need by raising and blending capital to finance local climate infrastructure while catalyzing a sharp increase in private investment. For countries to better access climate finance and fully engage the private sector, the climate finance system must reorient toward national financial capacity that is able to channel capital to projects and markets where it is needed most. When paired with effective grant programs through National Climate Change Funds (NCCF), and strong enabling environments and policies, locally-based Green Banks are powerful tools to address market needs, understand local risk and drive private investment. Structured as either new institutions or adaptations of existing institutions, Green Banks are designed to address market gaps and strengthen national ownership of climate finance. Green Banks move problem-solving and agency to the national level, empowering developing countries to better access international financial resources while attracting private capital to green projects from foreign and domestic sources. As catalytic facilities, they are designed to "crowd in" and increase private investment in low-carbon and climate-resilient projects. Green Banks typically use a blended finance approach, with capitalization coming from a variety of public and private sources,

Green Banks are country-driven, nationally-based catalytic finance facilities designed to mobilize private investment



including bilateral donors, climate funds and national treasuries.

In developing economies, Green Banks can be most effective when paired with national Green Funds to provide integrated access to an effective combination of grants and finance, suited to local market conditions. This approach is being developed in Rwanda through an integration of their existing Green Fund with a new Green Bank, and was also demonstrated by the addition of a Climate Finance Facility on the Green Bank model in South Africa to complement their existing Green Fund. In each of these cases, the Green Bank provides innovative green financing products adjacent to a Green Fund or NCCF which provides complimentary grants to support project preparation, reduction of early stage project costs, or other grant-based strategies to support project development and bankability.

However, while Green Banks – structured as either new institutions or adaptations of existing institutions – can strengthen national ownership of climate finance, there is no one size fits all recipe for their formation. As locally-embedded country-driven institutions, Green Banks or similar catalytic climate finance facilities have to be designed to fit the specific conditions of local markets. While they can draw lessons from initiatives in similar economies, it is important to recognize that the application of the GB model in high-income OECD countries like the UK (with sophisticated finance capacity and large pools of local capital) is generally not a fit with the needs of emerging markets. In all cases, a critical element of Green Bank design includes mission-specific investment criteria and related monitoring, evaluation and reporting to ensure consistency with green and climate-related investment objectives.

In developing countries, Green Banks have to be designed to complement existing development finance capacity and, where they exist, the role of National Development Banks. It is also more common that Green Banks in developing countries are formed alongside or as part of an existing host institution – which raises the need to ensure a dedicated mandate and specific value-added market focus. The need to address capacity constraints, develop project pipeline, expand the green financing capacity of the commercial financial sector, and address significant barriers to private investment all point towards the need for tailor-made approaches to meet the market needs in developing countries. Also, unlike many OECD countries, the role of grants in many low-income countries' green sectors will continue to be critically important. It is worth noting that in CGC's Green Banks projects in both South Africa and Rwanda, a critical component was maintaining and working closely with grant-based capital or "project preparation facility" funds to complement financing activities, and provide project developers the needed "full suite" of support to projects in incipient green sectors.
Finally, it is important for developing countries to approach structuring Green Banks in ways that meet the requirements of international capitalization through Climate Funds and/or donor institutions, which all come with different priorities.

Green Banks (also referred to as Climate Finance Facilities), provide financing in various forms, targeting commercially viable clean energy technologies, that for a host of rea- sons cannot attract debt at a cost of capital or tenor that allows customers to move forward with projects. Green Banks fill market gaps, and pair their capital with private investors to "crowd-in" capital and make clean energy markets more efficient. Green Banks are self-sustaining facilities, meaning they provide their capital at a cost commensurate with risk and sufficient to generate revenue to operate the facility on a break-even basis.

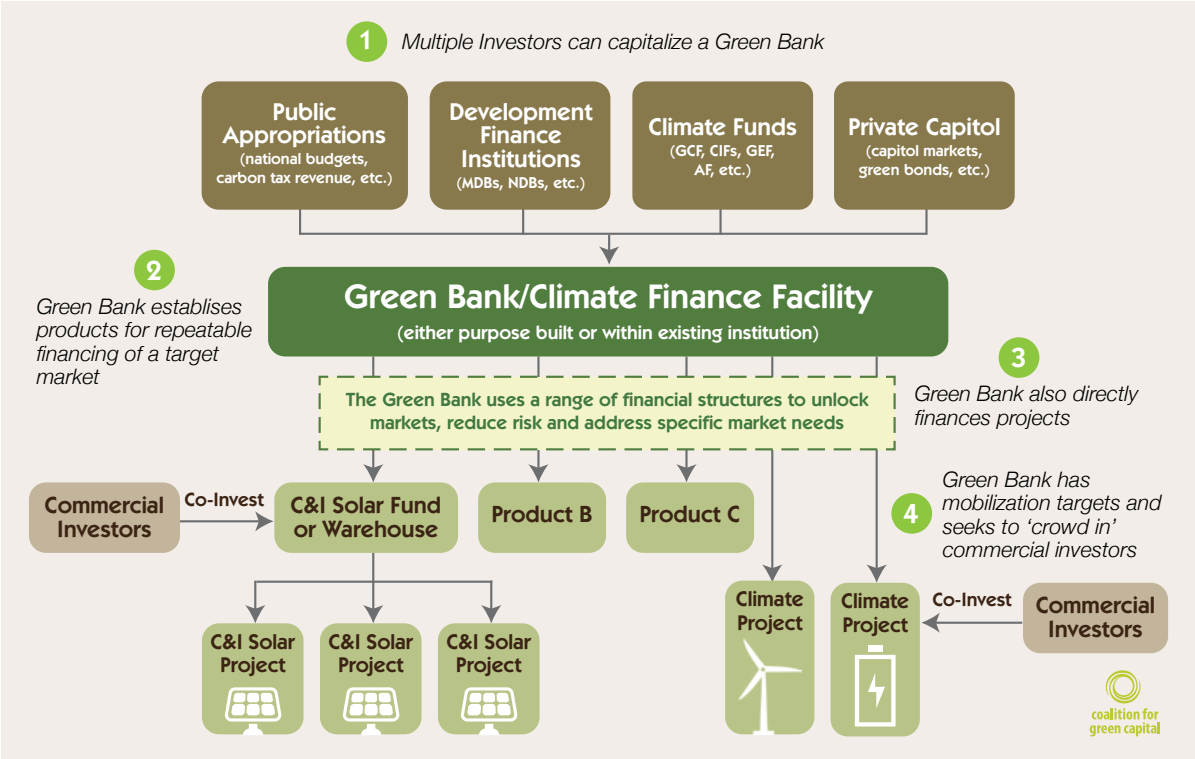
Key elements of the Green Bank/CFF model include:

- Focused institutions, created to mitigate and adapt to climate change
- Use of blended finance to de-risk and catalyze private investment with innovative funding structures
- Use of debt, warehousing, credit-enhancing and related instruments to enable cost-effective long-term sustainable financing
- Designed to support commercially viable and sustainable projects, that are gender-inclusive
- Complement existing funders and programs
- Market-oriented and flexible adjusting offerings, products and partnership structures to suit the project needs.

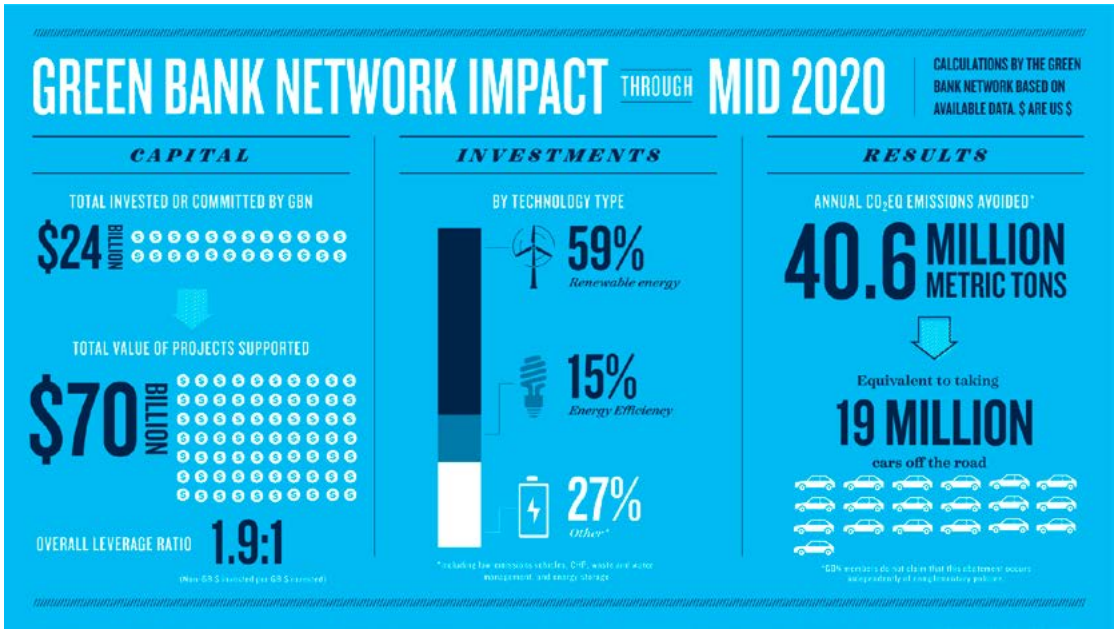
Green Banks have proven successful at driving clean energy investment and there are an increasing number of Green Banks and similar entities in development around the world. Collectively these institutions have financed billions of dollars of clean energy projects with innovative financing structures, leveraging multiple private dollars per public dollar of financing. To date, the founding members of the Green Bank Network have leveraged $24 billion

in public capital to finance more than $70 billion in clean energy and low-carbon projects.[4] This investment has flowed into a range of clean energy technologies including solar, offshore wind, and building efficiency, which have resulted in 40 million tonnes (MT) of avoided CO_2 emissions annually.

Green banks/climate finance facilities as nationally-based catalytic finance institutions designed to mobilize private investment



Green Bank Impact[5]



4 Green Bank Members: UK Green Investment Bank, Clean Energy Finance Corporation of Australia, Green Technology Financing Scheme of Malaysia, Green Finance Organization of Japan, Connecticut Green Bank, New York Green Bank

5 Green Bank Network – Annual Member Impact Metrics

GREEN BANK CASE STUDY #1:

Southern Africa / DBSAClimate Finance Facility

JUNE 2019

EXECUTIVE SUMMARY

The Development Bank of Southern Africa's (DBSA) Climate Finance Facility (CFF) is a specialized lending facility designed to increase private investment in climate-related infrastructure projects in the Southern African Development Community (SADC) region, which faces significant climate mitigation and adaptation challenges. The CFF is the first time the "green bank" model has been applied to an emerging market. Green banks are public, quasi-public, or non-profit entities established specifically to facilitate private investment into low-carbon, climate-resilient infrastructure. This landmark facility offers significant proof-of-concept value to middle- and low-income countries seeking to scale up the private investment required to meet commitments laid out under the Paris Agreement.

The CFF will deploy capital to fill market gaps and crowd in private investment, targeting projects that are commercially viable but cannot attract market-rate capital from local commercial banks at scale without credit enhancement. The Facility will start by utilizing two main credit enhancement instruments: (i) long-term subordinated debt and (ii) tenor extension. The CFF will prioritize investment opportunities based on target country needs and priorities identified in Nationally Determined Contributions (NDCs) under the Paris Agreement and to meet the United Nations Sustainable Development Goals (SDG) goals. The CFF will primarily target South Africa as well as other Rand-based countries, including Namibia, Lesotho, and Eswatini. The CFF raised an initial $110 million, with DBSA and the Green Climate Fund (GCF) as the two anchor funders.

The structuring and launch of the CFF offers insights for other practitioners developing or investing in green banks, including the importance of specialized partners when replicating existing models in new markets, leveraging local institutional infrastructure, early and continuous engagement with target co-investors, and approaches to ensure additionality of financing activities.

SYNOPSIS

The Climate Finance Facility is the recipient of Convergence Design Funding

Host	Development Bank of Southern Africa (DBSA)
Mandate	To incentivize private investment in low-carbon and climate-resilient infrastructure and catalyze greater overall climate-related investment in the four Rand-based economies in the Southern African region, including South Africa, Namibia, Lesotho, and Eswatini.
Anchor funders	Development Bank of Southern Africa (DBSA) and Green Climate Fund (GCF)
Initial Size	$110M / 2 Billion Rand
Capital structure	• DBSA contributed $55M 15 yr loan and GCF contributed $55M 15 yr loan through DBSA as an accredited entity of the GCF • DBSA and GCF each contributed $0.6M grant for set-up costs
Fees	No management fee charged by DBSA
Operations	Launched in February 2019; lifespan of 20 years with ~5-year implementation period
Key design partners	Coalition for Green Capital (CGC), GreenCape, ClimateWorks Foundation, Convergence
Eligible projects	Infrastructure projects and businesses that mitigate or adapt to climate change, including off-grid power, mini-grid solar, urban distributed solar farms, energy and water efficiency
Countries	South Africa, Namibia, Lesotho, Eswatini
Investment size & instruments	Size: $5M to $10M Instruments: Long-term subordinated debt, credit enhancement including tenor extension (up to 15 yrs)
Target leverage	1:5 (one Rand from CFF mobilizes five Rand from private investors/banks), recognizing that leverage ratios will vary considerably from project to project
Expected impact	Avoidance of ~30 million tonnes of CO2 equivalent during lifetime of program, save ~23K jobs through water systems installation, 400K+ indirect beneficiaries

GREEN BANK EXAMPLE #2

Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly in July 2011, as the first Green Bank in the United States. The Connecticut Green Bank supports the Connecticut Governor's and Legislature's energy strategy to achieve cleaner, less expensive, and more reliable sources of energy while creating jobs and supporting local economic development. The Connecticut Green Bank evolved from the Connecticut Clean Energy Fund, which was given a broader mandate in 2011 to become the Connecticut Green Bank.[6] The Connecticut Green Bank is quasi-public and its board of directors is composed of both government officials and independent directors.

The Connecticut Green Bank's mission is to confront climate change and provide all of society a healthier and more prosperous future by increasing and accelerating the flow of private capital into markets that energize the green economy.

The Connecticut Green Bank works with private-sector investors to create low-cost, long-term sustainable financing to maximize the use of public funds. Investment sectors for the Green Bank include green energy measures in the residential (single and multi-family), commercial, industrial, institutional and infrastructure sectors.

Since its inception, the Connecticut Green Bank and its private investment partners have deployed over $1.9 billion in capital for clean energy projects across the state. Projects recorded through fiscal year 2019 show that for every $1 of public funds committed by the Green Bank, an additional $6 in private investment occurred in the economy.[7]

In 2019, the Connecticut Green Bank used $36 million in public funds to catalyze over $427 million in total investment in the state. A few highlights from 2019 include the issuance of a solar Asset Backed Security (ABS) which securitized the income from long-term purchase contracts with the utilities for Solar Home Renewable Energy Credits (SHRECs) for Renewable Portfolio Standard (RPS) compliance. Connecticut Green Bank also established a new source of capital for Eversource's Small Business Energy Advantage (SBEA) program, where the Green Bank and Amalgamated Bank provided $55 million to extend zero interest loans to small businesses and lowered the cost of capital for the state's ratepayers.[8]

Connecticut Green Bank also oversees the state's Commercial Property Assessed Clean Energy (C-PACE) program, which as of 2019 has completed more than 300 projects state-wide.

6 https://www.ctgreenbank.com/about-us/
7 https://www.ctgreenbank.com/about-us/
8 https://greenbankconsortium.org/annual-industry-report

GREEN BANK EXAMPLE #3

Clean Energy Finance Corporation, Australia

The Clean Energy Finance Corporation (CEFC) is an Australian Government-owned Green Bank that was established in 2013 to facilitate increased flows of finance into the clean energy sector.

With an initial capitalization of ten billion Australian dollars, the CEFC is responsible for investing in clean energy projects on behalf of the Australian Government. The CEFC investment objective is to catalyze and leverage an increased flow of funds for the commercialization and deployment of renewable energy, energy efficiency and low-emissions technologies. The CEFC invests to lead the market, operating with commercial rigor to address some of Australia's toughest emissions challenges – in agriculture, energy generation and storage, infrastructure, property, transport and waste.[9] The CEFC does not provide grants but rather lends at risk-adjusted terms at, or as close as possible to, commercial markets rates. In addition to applying commercial rigor when making its investments, the CEFC is directed to target a benchmark rate of return on its portfolio. The CEFC achieves its objectives through the prudent application of capital, in adherence with its risk management framework, its Investment Mandate and the investment policies issued by the CEFC Board.

The CEFC's portfolio includes projects across the Australian economy, benefitting a diverse range of businesses, large and small. The CEFC also manages several sub-funds, supporting innovative start-up companies through the Clean Energy Innovation Fund and investing in the development of Australia's hydrogen potential through the Advancing Hydrogen Fund.

In 2019–20 every CEFC dollar invested was matched by more than $3 in investment from private sector capital. Since inception, every $1 of CEFC finance has been matched by more than $2.30 from the private sector.

While the CEFC focuses on offering finance (e.g. debt and equity), this institution also works closely with an adjacent Australian government-sponsored grant provider: the Australian Renewable Energy Agency (ARENA). In 2012, CEFC was created via legislation as part of broader legislative package that also created ARENA.[10] CEFC operates as a Green Bank, providing finance to the local market, while ARENA operates as a separate government-owned agency that deploys grants and other market assistance. CEFC is governed by an independent board – completely separate from ARENA's governance board – but the two entities enjoy a close relationship as two flagship programs supporting clean energy in Australia. ARENA and CEFC have collaborated on initiatives, and have sometimes supported the same project when grants and financing were both required to get the project off the ground.[11] Importantly, the separate balance sheets and identities have allowed CEFC and ARENA to pursue their respective (and complementary) missions in a clear way, with market actors understanding what kinds of support they can expect from each institution.

9 https://www.cefc.com.au/who-we-are/about-us/

10 Clean Energy Finance Corporation Act 2012, https://www.legislation.gov.au/Details/C2017C00265

11 PV Magazine (2012) "Canadian Solar secures non-recourse finance for 47MW projects in Australia." https://www.pv-magazine.com/2017/05/03/canadian-solar-secures-non-recourse-finance-for-47-mw-projects-in-australia/

GREEN BANK EXAMPLE #4

Rwanda Green Investment Facility (Under development)

Rwanda is highly vulnerable to climate change both in terms of mitigation and adaptation with serious consequences for agriculture, health and livelihoods. To tackle this challenge, Rwanda has set ambitious climate and development goals to achieve low-carbon emission while creating economic social impact and job creation. Furthermore, as Rwanda works to address the challenges created by the Covid-19 economic crisis, strategies beyond near-term emergency aid relief will be needed to move toward long- re-growth of Rwanda's developing economy. Leaders in Rwanda have identified the critical role of catalytic, innovative finance to support infrastructure and social investment, and sustainable growth.

The Rwanda Green Investment Facility (RGIF) will utilize a Green Bank approach to catalyze green investment and NDC targets while supporting sustainable development goals. The RGIF will utilize a blended finance approach by providing financial instruments (grants, debt, credit enhancements e.g. sub-debt, guarantees) to projects that are commercially viable – but not yet bankable – in the green sector.

The RGIF will serve the following objectives:

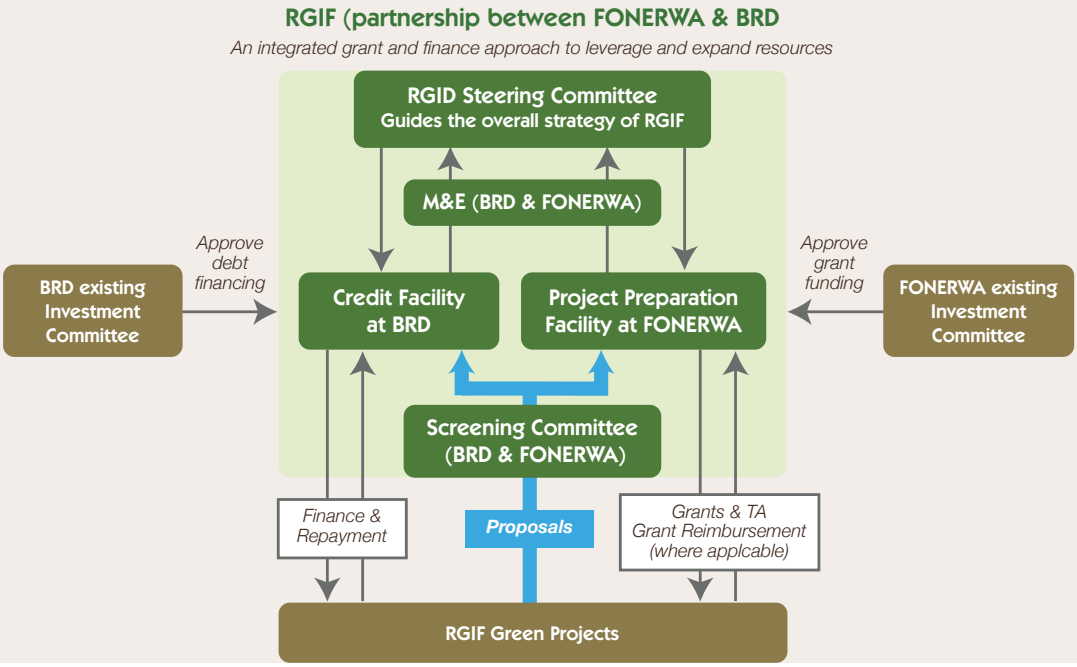
- Address local market gaps to facilitate flow of private investment through financial tools,
- Strengthen Rwanda's ownership of climate finance through a dedicated green finance facility
- Build green finance capacity of local banks through innovation, risk mitigation, deal arrangement.

Specifically, RGIF will be composed of two windows working in an integrated approach:

1. A Credit Facility embedded within the Development Bank of Rwanda (BRD) offering direct loans as well as credit lines to the commercial banks, and
2. A Project Preparation Facility at the Rwanda Green Fund (FONERWA) offering grants and reimbursable grants to increase the bankability of projects.

The African Development Bank is working closely with the government of Rwanda to design and structure the RGIF and is serving as the GCF Accredited Entity partner to Rwanda in efforts to secure seed capitalization for the RGIF. The UNDP and Nordic Development Fund have provided essential technical support for design and structing of the new climate finance facility.

RGIF Partnership Structure (Proposed)



5 | Introduction to National Climate Change Funds

A National Climate Change Fund (NCCF), also known as a National Climate Fund or a Green Fund, is an institution that can help direct finance towards climate change projects and programs that best fit a country's national context. According to an UNDP guidebook on NCCFs, these institutions have four key climate finance goals:[12]

1. Collect and distribute funds to climate change activities that promote national priorities. The value added of a NCCF is its ability to attract a variety of funding sources, such as public, private, multilateral, bilateral, and other innovative sources.
2. Facilitate the blending of its multiple sources of capital in a coordinated and streamlined way to further catalyze more resources to support action on climate change. This allows for the coordination of national public and private sources of capital alongside the global climate finance system.
3. Coordinate country-wide climate change activities. The benefit of a NCCF is its connection to achieving national interests, integrating climate change objectives into the local contexts alongside poverty reduction, gender equality and sustainable development goals.
4. Support other existing national institutions that drive development and climate change policies, thanks to a NCCF's dedicated focus and expertise on developing project proposals, managing funding, implementing projects, and monitoring and reporting the results.

NCCFs are usually established under national-level jurisdiction. While many such institutions may not explicitly call themselves NCCFs, they would fall under this category as long as they perform services that support the aforementioned climate finance goals. Although NCCFs cannot solve the gap in climate finance alone, they play a critical role in extending grants and concessional financing to better catalyze funding from the private sector, especially in developing countries.

NCCFs already exist on the ground in the African context. Two prominent examples are the Rwanda Green Fund (FONERWA Rwanda) and the Green Fund of South Africa. FONERWA Rwanda has capitalization from both domestic commitments and international donors, such as the UK's DFID (now known as FCDO) and UNDP.[13,14] This fund has invested around $40 million in 35 projects in Rwanda through several different investment products, including grants, innovation investments, and credit lines.[15] In order to crowd in private finance, FONERWA requires private companies to match a certain percentage of the grants and loans received.[16] On the other hand, the Green Fund of South Africa is managed by the Development Bank of Southern Africa (DBSA), with an initial allocation of ZAR 800 million over three years from South Africa's Ministry of Finance.[17] The Green Fund focuses on three different sectors, namely the low carbon economy, green cities and towns, and environmental and natural resources management.[18] The Fund supports these sectors using a combination of grants, concessional loans, and equity positions, all of which meant to spur project development, research

12 https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Change/Capacity%20Development/Blending_Climate_Finance_Through_National_Climate_Funds.pdf

13 https://unfccc.int/climate-action/momentum-for-change/financing-for-climate-friendly-investment/rwanda-green-fund-fonerwa

14 http://www.fonerwa.org/about

15 https://unfccc.int/climate-action/momentum-for-change/financing-for-climate-friendly-investment/rwanda-green-fund-fonerwa

16 https://unfccc.int/climate-action/momentum-for-change/financing-for-climate-friendly-investment/rwanda-green-fund-fonerwa

17 https://www.researchgate.net/publication/264865181_The_Green_Fund_of_South_Africa_Origins_establishment_and_first_lessons

18 https://www.researchgate.net/publication/264865181_The_Green_Fund_of_South_Africa_Origins_establishment_and_first_lessons

for the green economy, and capacity-building.[19] These funds demonstrate that NCCFs already have a track record of operating in African countries, and their lessons can be applied to other countries around the continent.

Among the six African countries participating in this study, several have institutions that serve as NCCFs, as listed below. While some are specifically dedicated to green initiatives, others have a broader mandate that is folded under rural electrification goals.

- **BENIN:** Fonds d'Électrification Rurale (Rural Electrification Fund), under the jurisdiction of the Rural Electrification Agency (ABERME)
- **GHANA:** No dedicated green fund
- **MOZAMBIQUE:** Fundo National de Energia (FUNAE)
- **TUNISIA:** Fonds de Transition Énergétique (Energy Transition Fund – FTE)
- **UGANDA:** Uganda Energy Capitalization Credit Company (UECCC)
- **ZAMBIA:** Rural Electrification Fund, under the jurisdiction of the Rural Electrification Authority (REA)

Grant funding through NCCFs is almost always a necessary complement to the work of Green Banks with regard to catalyzing further investment into climate change initiatives. In many projects, initial grant funding is required to lower upfront project costs and bring them to commercial bankability. In addition, both institutions can provide zero-to-low-cost financing for climate change projects, as well as capacity building support. However, funding from a NCCF is not geared towards delivering financial return, especially given their focus on using grant instruments to support green projects. By contrast, Green Banks utilize low-cost public capital to build a pipeline of investable projects that can then engage private financing. In this way, Green Banks can recycle capital as compared to Green Funds which typically require ongoing funding to continue operations. It is possible, however, for NCCFs to evolve into Green Banks or to merge with a new catalytic finance facility to integrate grant funding into a pipeline of investable green projects.

19 https://www.researchgate.net/publication/264865181_The_Green_Fund_of_South_Africa_Origins_establishment_and_first_lessons

6 | Profiles of Green Bank/NCCF potential in six selected project countries

ZAMBIA

I. COUNTRY OVERVIEW

Zambia seeks to diversify its economic and industrial structure to meet its development goal of becoming a "prosperous middle-income nation," as stated in its National Long-Term Vision 2030 (Vision 2030). However, Zambia faces mounting challenges due to a difficult macroeconomic situation for 2021 and beyond, as a result of lower global copper prices, an ongoing drought, severe debt distress, and a weak currency.

According to the World Bank, Zambia grew at an average rate of 3.5% per year between 2015 and 2018. This rate of growth declined to 1.7% in 2019, mainly driven by weak international copper demand.[20] As the COVID 19 pandemic suppresses global economic activity, this negative shock will further weaken Zambia's copper mining and agriculture-based economy.[21] Zambia also suffered from a two-year drought that started in 2017 – most likely stemming from prolonged dry seasons and reduced rainfall during the wet season, both linked to climate change.[22] Given that agriculture sector employs 56% of Zambia's labor force, the drought has far reaching implications for the country's economy with additional challenges in terms of maintaining incomes and domestic consumption.[23, 24]

These difficult macroeconomic conditions are further complicated by Zambia's high debt levels. According to the World Bank, Zambia's fiscal deficit for 2019 was 10.9% of GDP, yet the government is slated to continue running deficits past 2022.[25] The level of anticipated spending further increases Zambia's debt-to-GDP ratio, which may is forecast to grow to 92.5% by 2022. [26, 27] Debt service consumed 46% of domestic revenues in 2019 an increase from the year prior as a result of the depreciating local currency (the Kwacha, ZMW).[28] The implication is that Zambia has reduced capacity to take on additional sovereign debt in the near-term, a key inhibitor for achieving the Vision 2030 development goals.[29, 30] Zambia's debt issues were further exacerbated by the effects of the COVID pandemic and depressed copper demand, as the country defaulted on its foreign debt in late November 2020 after bondholders rejected its request for an interest payment delay.[31]

20 https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=ZM

21 https://oec.world/en/visualize/tree_map/hs92/export/zmb/all/show/2017/

22 https://www.reuters.com/article/us-zambia-electricity/zambias-power-supply-deficit-worsens-as-water-levels-ink-idUSKBN1YG1DZ#:~:text=2%20copper%20producer%20has%20seen,season%20caused%20by%20climate%20change.

23 https://www.nordeatrade.com/en/explore-new-market/zambia/economical-context?vider_sticky=oui

24 http://pubdocs.worldbank.org/en/248071492188177315/mpo-zmb.pdf

25 http://pubdocs.worldbank.org/en/248071492188177315/mpo-zmb.pdf

26 Government data for 2019 has not been made publicly available yet at the time that this report was produced.

27 http://pubdocs.worldbank.org/en/248071492188177315/mpo-zmb.pdf

28 http://pubdocs.worldbank.org/en/248071492188177315/mpo-zmb.pdf

29 https://www.afdb.org/en/countries-southern-africa-zambia/zambia-economic-outlook

30 https://www.centralbanknews.info/2020/05/zambia-cuts-rate-as-country-faces-1st.html

31 https://www.cnbc.com/2020/11/23/zambia-becomes-africas-first-coronavirus-era-default-what-happens-now.html

Development Goals, NDCs, and Financial Context

Despite these economic challenges, Zambia still aims to maintain a strong pace of development. Zambia's population stood at 17.81 million in 2019, and is still growing (albeit at a slightly slower rate in recent years).[32] Although only 44% of the population lives in urban areas, this share is rising.[33] Increased urbanization may translate into greater need for electrification, industrialization, and urban services (e.g. transportation). To address these anticipated needs, Zambia's Seventh National Development Plan outlines a path for the country to build a diversified and resilient economy by 2021. Specific measures are highlighted such as reducing overdependence on the extractive sector, increasing agricultural exports, reducing poverty by increasing energy access and creating more jobs, and reducing the risk of droughts affecting overall economic output.[34]

For a sustainable future, Zambia will need to balance its development goals with its climate goals. As of 2017, Zambia over 90% of Zambia's emissions came from land use, land use change and forestry (LULUCF), due to the countries low electrification rates and high levels of subsistence farming.[35] Emissions from energy are expected to grow as Zambia's economy diversifies and citizens gain increased access to electricity.

According to Zambia's Nationally Determined Contribution (NDC) to the 2015 Paris Agreement, Zambia pledged to reduce its carbon emissions by 25% and up to 47% (dependent on the level of international support and financing received) from 2010 levels (using 2MT of CO_2 as a baseline) by 2030.[36, 37] These climate goals and Zambia's development plans may appear at odds, especially if the country's pursuit of economic diversification leads to a reliance on fossil fuels for electricity (especially in rural areas) or increased deforestation for agriculture and urbanization. Nevertheless, efforts to develop distributed hydro and solar renewable energy capacity (particularly for off-grid solutions), climate-smart agriculture practices, and green urbanization policies may help Zambia achieve green and sustainable growth.

Zambia lacks capacity to finance the necessary solutions, especially on the private sector side. Although Zambia has made great strides in improving its business environment, Zambia's banking system presents challenges for the private sector to access affordable credit. The banking system in Zambia faces pressure from a rising non-performing loan (NPL) ratio, driven by slower GDP growth. The average NPL ratio stood at 11%, but this figure may deteriorate further as 41% of banks recorded an increase in NPLs in 2018.[38] A greater number of outstanding loans amid slowing economic growth could result in more NPLs and stress the ability of Zambia's banking sector to provide affordable credit, especially for risker projects in off-grid energy, climate-smart agriculture, and green urbanization.[39]

Attractive rates of return on government bonds have also diverted capital away from private sector projects that require financing. Yields on government securities surged in 2017 and 2018. Rates for Treasury bills and government bonds rose from 15.38% and 18.56%, respectively, to 21.30% and 20.12% in 2018 alone.[40] These securities could compete with project financing if the economic slowdown reduces the banking sector's willingness to lend to the private sector. Coupled with the relative illiquidity and small size of Zambia's capital markets, private sector solutions for green and sustainable growth face multiple hurdles in accessing affordable financing.

The government's ability to assuage the situation is also limited. The Central Bank's accommodative monetary policy has been less effective than hoped. Even during "good" years when the overnight lending rates were lowered to 16.25% and statutory reserve ratios were relaxed to 8% in 2018, private credit markets remained relatively shallow as NPLs were high at 12.4% (above the prudential threshold).

32 https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ZM
33 https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=ZM
34 https://www.sdgphilanthropy.org/system/files/2019-02/7th-National-Development-Plan-Zambia.pdf
35 https://ourworldindata.org/co2/country/zambia?country=~ZMB
36 https://www.iea.org/countries/zambia
37 https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Zambia%20First/FINAL+ZAMBIA%27S+INDC_1.pdf
38 https://www.pwc.com/zm/en/assets/pdf/zambia-banking-non-banking-industry-report2018-04.2019.pdf
39 https://www.pwc.com/zm/en/assets/pdf/zambia-banking-non-banking-industry-report2018-04.2019.pdf
40 https://www.pwc.com/zm/en/assets/pdf/zambia-banking-non-banking-industry-report2018-04.2019.pdf

Hence, banks retreated by locking up funds in risk-free government securities.[41]

Aside from local banks and capital markets, entities such as the Industrial Development Company (IDC) and the Development Bank of Zambia (DBZ) could serve as sources of early-stage capital for renewable energy projects or companies with green assets. Both entities are public finance institutions that provide affordable and patient financing to important projects with development impacts and have mandates to crowd-in public and private sector finance into key industries, particularly electricity infrastructure. The portfolio composition and target project sizes of the IDC is typically focused on larger scale infrastructure projects, whereby the entity serves as a majority stake equity investor. In comparison, the DBZ's portfolio consists of deals worth $3 million and higher, as its investment objectives are often driven by the mandates of development organizations that have partnered with DBZ and hence have their own specific investment guidelines.

Although both of these entities provide support to the fledging ecosystem of green projects in Zambia, there are still financing gaps, particularly in the priority sectors that are discussed later in this report. Furthermore, even the aggregated financing provided by the IDC and DBZ will be insufficient to address all of Zambia's funding requirements for off-grid energy, climate smart agriculture, and green urbanization solutions, in the context of its national development plans and objectives.

Energy Context

According to the IEA, biomass and waste represented 75% of Zambia's primary energy supply in 2017, with oil providing 12%, hydropower at 9%, coal at 4%, and non-hydro renewables at less than 1%.[42] The dominance of biomass reflects the fact that most of Zambia's heating, cooking, and lighting needs are met by direct burning of wood fuel and other sources of biomass, as opposed to through the use of electric power or gas. Only 31% of Zambia's population was connected to the electric grid as of 2018.[43] This deficit is especially prominent in rural areas, where only 4% of Zambia's rural population had access to electricity (compared to 67% of its urban population).[44]

The opportunity to address the energy sector in Zambia becomes even more pertinent when considering the country's development goals to enhance economic diversity and resilience. Zambia has suffered from an electricity shortage for several years, which continues unabated. As hydropower represents 85% of Zambia's electric generation capacity, Zambia today faces a power supply gap of 810MW of electric generation capacity given the ongoing drought's negative effect on water levels at its hydroelectric dams. [45, 46] This electricity shortage not only forces Zambia to import power from South Africa at premium prices, but also hinders economic activity.[47] Both effects leave the country vulnerable to economic shocks.

The country has the potential to address its power supply issues and achieve energy independence through the use of renewable energy. Zambia's northern region is well suited for mini-hydro due to the relative abundance of rainfall, while strong solar irradiance in the southern regions makes solar a strong potential source of new generation capacity.[48], [49] While Zambia has geothermal potential, the sector faces many challenges including high development costs and long timeframes associated with exploitation activities. Given this dynamic, geothermal project development has not been included in the scope of this report. Zambia's total installed generation capacity is 2,785MW. The country's target for 2021 is to increase installed capacity to 3,000MW and to have 3,525MW of installed capacity by 2030.[50] Zambia's ambitious energy

41 https://www.boz.zm/Zambanker-June-2018.pdf

42 https://www.iea.org/data-and-statistics?country=ZAMBIA&fuel=Energy%20supply&indicator=Total%20primary%20energy%20supply%20(TPES)%20by%20source

43 https://www.usaid.gov/powerafrica/zambia#:~:text=ENERGY%20SECTOR%20OVERVIEW&text=National%20access%20to%20electricity%20averages,for%20all%20Zambians%20by%202030.

44 https://www.usaid.gov/powerafrica/zambia#:~:text=ENERGY%20SECTOR%20OVERVIEW&text=National%20access%20to%20electricity%20averages,for%20all%20Zambians%20by%202030.

45 https://www.reuters.com/article/us-zambia-electricity/zambias-power-supply-deficit-worsens-as-water-levels-sink-idUSKBN1YG1DZ#:~:text=2%20copper%20producer%20has%20seen,season%20caused%20by%20climate%20change.

46 https://www.reuters.com/article/us-zambia-electricity/zambias-power-supply-deficit-worsens-as-water-levels-sink-idUSKBN1YG1DZ#:~:text=2%20copper%20producer%20has%20seen,season%20caused%20by%20climate%20change.

47 African Power magazine – Issue 404, 21 November, 2019

48 Virunga Power interview, 5.28.2020

49 https://www.get-invest.eu/wp-content/uploads/2019/06/GETinvest-Market-Insights_ZMB_Mini-grid_-Guide_2019.pdf

50 https://www.wartsila.com/twentyfour7/energy/zambia-in-new-light

targets highlight the potential for a broader green finance program to promote renewable energy, particularly solar and mini-hydro in select regions.

The country aims to achieve 90% urban electrification and 51% rural electrification by 2030 in order to aid poverty reduction efforts.[51] Zambia has also set a target of 15% non-hydro renewable energy penetration in its electricity mix by 2030 as part of its economic diversification and resilience campaign.[52] Other targets include reducing the share of wood fuel (firewood and charcoal) in the national energy mix to 40% by 2030, while increasing the share of electricity in cooking to 25% by 2021.[53, 54]

The majority of the country's population reside in rural areas (approximately 55%) but are unevenly distributed across the country. Hence, solar mini-grids, mini-hydro, and solar home systems (SHS) are the most suitable energy solutions to help bridge the electricity gap in these areas. According to geospatial data from Power Africa, Zambia must provide off-grid solutions to 66% of unelectrified households in order to meet its energy access goals on a least-cost basis.[55]

Multiple players in Zambia cooperate towards implementation of these energy-related goals:

- The Ministry of Energy sets high level policy and strategy for the sector, in coordination with other Ministries including the Ministry of Finance and the Ministry of National Development Planning.
- ZESCO is the national vertically integrated utility and a state-owned company that controls the vast majority of Zambia's generation assets, as well as all of the transmission and distribution infrastructure.
- The Energy Regulation Board (ERB) is the main regulator, and oversees tariff setting and other matters.
- The Rural Electrification Authority (REA) is an important player with its mandate to support the provision of electricity infrastructure to rural areas. REA's goal is to increase rural electricity access from 3% to 51% by 2030, through the utilization of locally appropriate rural electrification technological options. One of REA's key roles is developing and implementing the Rural Electrification Master Plan (REMP). The latest REMP was released in 2009, outlining an estimated investment need of 4.4 trillion Zambian Kwacha (c. $1.1 billion) over the 2008 to 2030 period.

REA performs its role through three channels. The REA works to mobilize donor and development partner funds to support rural electrification. It also encourages private sector participation in rural electrification through provision of subsidies where possible. Finally, the REA supports competitive bidding, community mobilization, and financing project preparation studies for rural electrification. Outside of donor money, the REA finances its efforts through Zambia's Rural Electrification Fund (REF) which was first launched in 1994 but has struggled to achieve its rural electrification goals. REA took over the REF to improve its management in 2004.[56] According to the latest REMP from 2009, the REF budget was approximately 11.3 billion Kwacha (c. $630,000).[57] The REF's budget is primarily derived from a 3% levy on ZESCO retail customer bills, along with funding from development partners.[58]

In terms of legislation, two new laws were enacted as part of the government's recent responses to challenges in the electricity sector – the Electricity Act No. 11 of 2019 (Electricity Act) and the Energy Regulation Act No. 12 of 2019 (Energy Regulation Act). These acts were enacted into law in December 2019 and came into effect in February 2020. The Electricity Act is designed to liberalize the electricity market and allow more IPPs to participate, including via "wheeling" across the grid. This Act also gives more authority to ERB in terms of overseeing IPPs and wheeling, including oversight to ensure "a regular, efficient, coordinated and economical supply of electricity and facilitate universal access to electricity supply."[59] While the Electricity Act is still in its early stages, it has the potential to enable more IPPs to enter the market.

51 https://www.res4africa.org/wp-content/uploads/2019/07/Zambia-Position-Papers-1.pdf

52 https://www.seforall.org/stories-of-success/guest-blog-how-zambia-plans-to-deliver-new-electricity-to-millions#:~:text=Vision%202030%20seeks%20to%20increase,to%2051%20percent%20by%202030.&text=Government%20and%20industry%20know%20this,of%20the%20country's%20electricity%20mix.

53 https://www.mndp.gov.zm/?wpfb_dl=89

54 https://www.sdgphilanthropy.org/system/files/2019-02/Final%207NDP%20Implementation%20Plan%20-%209%20April_2018.pdf

55 https://medium.com/@PowerAfrica/the-powerful-impact-of-geospatial-data-in-planning-zambias-power-sector-a89be0807bbe

56 REMP 2009

57 REMP 2009

58 https://info.undp.org/docs/pdc/Documents/CHN/ProDoc%20-%2091277.pdf

59 THE ELECTRICITY BILL, 2019 http://www.parliament.gov.zm/sites/default/files/documents/bills/The%20Electricity%20Bill%202019%2C%20NAB%2016.pdf

Zambia is also engaging in a wide array of development partner-led programs to support clean energy installation, including some focused on mobilizing the private sector. One such program is the Beyond the Grid Fund for Zambia (BGFZ), which is an initiative of the Government of Sweden in collaboration with the US Power Africa initiative, REEEP and local partners. BGFZ primarily targets addressing framework conditions of off-grid energy markets, lowering barriers to entry at scale for the private sector, catalyzing investment and economic activity, and maximizing development and climate impacts per unit of public financing spent.[60] BGFZ aims to bring modern energy services to at least 167,000 households – translating to one million Zambians – by 2021. At the core of BGFZ is a 20 million EUR results-based "social impact procurement" fund. This fund deploys grant financing to eligible projects, but functions like traditional public procurement processes – with strict guidelines on eligibility, submission of tenders from potential awardees, and specific deployment and delivery schedules. The fund mainly focuses on bringing prices down on solar home systems as well as mini-grids.

Initiatives focused on on-grid electricity include the REFiT plan and its accompanying GET-FiT Zambia program, as well as Scaling Solar Zambia and AfricaGreenCo. All of these programs are meant to support an increase in electricity generation or access for Zambia in order to spur economic development. However, institutional and market barriers have limited realization of the full potential of these programs. In particular, the noted financial challenges at ZESCO and the Zambian government have presented barriers to scaling up private solutions to achieve Zambia's energy and development goals.

The REFiT plan serves as Zambia's primary private sector renewable energy deployment plan for on-grid generation.[61] This plan sets a goal of installing 100MW of solar and 100MW of mini-hydro power, through projects with a maximum capacity of 20MW each. The REFiT plan employs reverse auctions for project procurement and arranges power purchase agreements (PPAs) with ZESCO as the off-taker. REFiT is implemented by the GET-FiT program.[62] Funded by the German development bank KfW, GET-FiT provides financial and technical assistance to private renewable energy developers, in particular managing the reverse auctions, extending partial credit guarantees in collaboration with the African Trade Insurance (ATI) to protect against contract termination risks and liquidity risks, and offering viability gap funding that boosts tariff prices to more attractive levels. Thanks to these credit guarantees that boosted confidence in the market, the GET-FiT program has already installed 120MW of solar capacity across Zambia as of 2019 and is working on the mini-hydro portion of the program.

However, one of the biggest challenges faced by REFiT is the distressed financial situation of ZESCO. In 2018, ZESCO reported losses of 2.8 billion Kwacha (c. $263 million), which further increased ZESCO's reliance on government subsidies and debt issuance.[63] Due to years of selling electricity at subsidized prices, ZESCO lacks a strong financial foundation to be a reliable off-taker. Although Zambia has increased electricity prices by 75% in 2018, followed by a 200% increase for residential users and 49% for commercial users in 2019, ZESCO still faces a steep climb towards improving its financial position in order to sign PPAs at higher costs as required by some IPPs.[64] Conversely, the higher tariffs required to strengthen ZESCO financial position are unaffordable to much of Zambia's population.[65] Even though the new Electricity Act allows for private producers to sell their power directly to consumers while only using ZESCO's grid as a "wheeling" tool, the tariffs charged by IPPs can still be considerably higher than what ZESCO charges.[66] Coupled with the increasing price of renewable energy imports due to depreciation of the Kwacha, investing in grid-connected renewable energy projects still faces significant challenges in recouping costs, even with the credit support mechanisms provided by the GET-FiT program.[67]

Given the current financial difficulties associated with relying on ZESCO as an off-taker, mini-grids and off-grid

60 https://www.bgfz.org

61 https://webcache.googleusercontent.com/search?q=cache:wdXHu68vk1gJ:https://www.moe.gov.zm/download/strategic_plans/The-Renewable-Energy-Feed-in-Tariff-REFiT-Strategy-2017.pdf+&cd=5&hl=en&ct=clnk&gl=us

62 https://www.getfit-zambia.org/about-get-fit

63 ZESCO CORPORATE WEBSITE – https://www.zesco.co.zm/ourBusiness/financialStatement

64 https://cuts-lusaka.org/pdf/policy-brief-targeting-residential-electricity-subsidies-in-zambia.pdf

65 ZESCO interview 6.10.2020

66 ZESCO interview 6.10.2020

67 Zanaco interview 6.4.2020

capacity emerges as potential solutions to help meet Zambia's economic development and energy access goals. By providing power to rural villages for both residential and commercial uses (e.g. agri-processing and treatment plants in rural communities), off-grid renewable energy solutions can facilitate the growth of local businesses, including cash-crop industries supported by IDC Zambia, such as palm oil, eucalyptus, and cashews.[68] For example, an off-grid mini-hydro project in Zambia's northern region at Zangamina has helped power small businesses, schools, and hospitals in the rural community, resulting in notable local economic growth.[69]

Off-grid renewable energy can also help with the transition away from biomass and diesel in the country's energy mix, as well as increase farm productivity. This allows for more time for education by reducing the need to collect biomass and by providing power for lighting and electric appliance charging.[70] Finally, siting more mini-hydro at run-of-the-river sites in Zambia's northern regions may lower the effects of decreased rainfall, as these regions are generally less prone to drought. Coupled with solar solutions, off-grid projects can help build Zambia's climate resilience against lower water levels at its large hydroelectric dams. Although the country is already engaging with mini-grid/off-grid support facilities that supply grants, such as the Beyond the Grid Fund for Zambia and the Off-Grid Energy Access Fund, additional support is needed to scale-up private sector investment in support of Zambia's economic development goals.

Climate Smart Agriculture and Forestry Context

The climate-smart agriculture (CSA) and forestry sectors present opportunities to advance Zambia's economic growth and diversification. Zambia's major agricultural products include cattle, cassava, vegetables, soybeans, sugarcane, tobacco, cotton, and maize, with the latter four representing the major export crops.[71] Most of these food crops e.g. cassava, millet, sorghum, and maize are grown by 600,000 smallholder farmers, while 2,500 large-scale farms and plantations mostly focus on cash crops e.g. cotton, sugarcane, and tobacco.[72] Although these large-scale farms cultivate 22% of all cropped land, the prevalence of smallholder farmers means that most of Zambia's agricultural sector revolves around subsistence farming.

With less than 30% of arable land currently irrigated, a significant amount of Zambia's crops are reliant on rainfall and are vulnerable to drought, especially maize.[73] As a result, Zambia's Seventh National Development Plan emphasizes the importance of developing a more diversified and drought-resilient export-oriented agriculture sector.[74] Given the significant role of smallholder farmers in Zambia, crop diversification and efficient irrigation would not only help improve climate resilience, but also help improve economic returns, especially for the poorest farmers.[75] On the forestry front, the rate of deforestation in Zambia stands at 250,000–300,000 hectares/year, primarily driven by the production of charcoal for energy consumption and for commercial farming.[76]

Zambia's Seventh National Development Plan lists multiple targets for climate-smart agriculture and forestry, including 90% of farmers planting drought-resistant crops, at least 20% of farmers employing irrigation practices, and putting three million ha of land under forest management plans.[77] The primary policymakers in these sectors are the Ministry of Agriculture and the Forestry Department in the Ministry of Lands and Natural Resources, with support from the Ministry of National Development Planning. Although the Ministry of Agriculture is working on a forthcoming Climate-Smart Agriculture Strategy Framework that aims to increase productivity, enhance resilience, and reduce/remove carbon emissions, Zambia still lacks clear policies that could help achieve its CSA goals.[78] Zambia's smallholder farmers are the least likely to diversify their crops due to their inability to overcome information and market entry barriers, especially if they are unable to

68 Zambia IDC interview 6.5.2020
69 Virunga Power interview 5.28.2020
70 https://ieeexplore.ieee.org/document/8095664
71 https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Agricultural%20Economic%20Fact%20Sheet_Pretoria_Zambia_10-5-2015.pdf
72 http://www.fao.org/3/a-i4157e.pdf
73 http://www.fao.org/3/a-i4157e.pdf
74 https://www.sdgphilanthropy.org/system/files/2019-02/Final%207NDP%20Implementation%20Plan%20-%209%20April_2018.pdf
75 http://www.fao.org/3/a-i7762e.pdf
76 https://info.undp.org/docs/pdc/Documents/ZMB/Zambia%20REDD+%20Strategy%20%28FINAL%20ed.%29%20%282%29.pdf
77 https://www.sdgphilanthropy.org/system/files/2019-02/Final%207NDP%20Implementation%20Plan%20-%209%20April_2018.pdf
78 https://openknowledge.worldbank.org/handle/10986/31383

see immediate economic benefits from diverting scarce land away from subsistence farming.[79] Although building climate resilience through crop diversification and efficient irrigation contributes to Zambia's development goals, many of its smallholder farmers lack the tools and support to take new risks or pursue new ventures.

Similar issues affect forest management. Although Zambia's Forest Policy 2014 and the Forest Act 2015 encourage more sustainable forest management by engaging local communities and regulating forest land conversion, weak governance plus low enforcement capacities in the forestry sector hinder efforts to reduce the current rate of deforestation.[80, 81]

While the government of Zambia has continued to allocate funding as liberally as possible to support the agricultural sector, some areas have received less than adequate attention and financial support, such as the broader promotion of CSA (beyond just conservation agriculture and agroforestry). The challenge going forward for the government will be to determine how they maximize the positive impacts of their funding. One area under review is ongoing support to programs like Zambia's Farmer Input Support Program (FISP) and the Food Reserve Agency (FRA). These government-backed programs extended subsidies for fertilizers and maize price stabilization, respectively. Yet mounting evidence suggests that these programs have not achieved their agricultural diversification and productivity goals.[82] Thus, a study by the Indaba Agricultural Policy Research Institute recommends that these two programs be scaled back and the funding redirected towards social cash transfers and expanded programs that provide direct food support to women and children.[83]

Overall, Zambia does not yet have sufficiently robust financing mechanisms to support the implementation of either CSA initiatives or better forest management, especially in comparison to the wide array of resources available for its clean energy and off-grid electrification efforts.

Green Urbanization and Clean Transportation Context

Although Zambia is undergoing a process of urbanization as its economy develops, the main policymaking entities in this sector – the Ministry of Local Government and Housing and the Ministry of Transport and Communication – do not have robust policy programs for green urbanization or clean transportation. Current urbanization trends forecast 58% of Zambia's total population residing in urban areas by 2050.[84] But even at current urbanization levels, car ownership rates are rising to the point where Zambian cities are experiencing congestion and lower air quality.[85] A UNEP report highlights that ineffective urban planning and weak legal and policy framework have resulted in under-investment in urban infrastructure, resulting in inadequate access to housing, and efficient transport services, among others.[86]

Although Zambia's Seventh National Development Plan identifies the need for low-carbon, efficient mass transit systems, the plan does not identify any concrete funds or tangible policy support devoted to this goal.[87] The primary urbanization and clean transportation strategy consists of a Non-Motorized Transport Strategy that revolves around making Zambian cities safer and more attractive for pedestrians and cyclists, as well as reducing the need for personal vehicular transport.[88] Although private sector activities in clean transport are limited, one Zambian firm – Amilak Investments – imports electric vehicles (albeit only a limited numberso far), and aims to establish Zambia as a light-duty EV manufacturing hub for Africa.[89] While there is not much momentum for private investment in green urbanization or clean transport at the moment, this situation may change as the country continues to develop and urbanize, and as additional regulatory or policy support is dedicated toward the sector. As Zambia only has ten years left to achieve its Vision 2030 development goals, strategies for green urbanization and clean transportation

79 http://www.fao.org/3/a-i7762e.pdf
80 http://documents1.worldbank.org/curated/en/571651580133910005/pdf/Zambia-Country-Forest-Note-Towards-a-Sustainable-Way-of-Managing-Forest.pdf
81 http://documents1.worldbank.org/curated/en/571651580133910005/pdf/Zambia-Country-Forest-Note-Towards-a-Sustainable-Way-of-Managing-Forest.pdf
82 http://www.renapri.org/wp-content/uploads/2017/03/Smart_subsidies_IAPRI_PolicyAdvisory_Mar2017.pdf
83 http://www.renapri.org/wp-content/uploads/2017/03/Smart_subsidies_IAPRI_PolicyAdvisory_Mar2017.pdf
84 https://www.theigc.org/blog/urbanising-zambia-tackling-bad-contagion/#:~:text=The%20rapid%20pace%20of%20urbanisation,of%20almost%205%25%20since%202000.
85 http://www.airqualityandmobility.org/STR/Zambia_NMTStrategyfinal.pdf
86 http://www.airqualityandmobility.org/STR/Zambia_NMTStrategyfinal.pdf
87 https://www.sdgphilanthropy.org/system/files/2019-02/Final%207NDP%20Implementation%20Plan%20-%209%20April_2018.pdf
88 http://www.airqualityandmobility.org/STR/Zambia_NMTStrategyfinal.pdf
89 https://www.lusakatimes.com/2018/10/16/electric-cars-to-be-launched-in-zambia-by-december/

are crucial as more Zambians move into cities and as the economy diversifies.

II. PRIORITY SECTORS

Based on the factors described above, two key sectors in Zambia have been identified as prime targets for green finance solutions: (i) Energy and (ii) Climate Smart Agriculture. The selection of these sectors was based on the set of analytical criteria applied to each of the six countries considered in this report:

- Sectors with significant potential to reduce CO_2 emissions and have the potential to support the continued efforts of the country's progress towards meeting NDCs and SDG commitments;
- Sectors where project pipeline seems to have potential, contingent on further market analysis;
- Sectors that are a significant direct or indirect contributor to the country's Gross Domestic Product (GDP); and
- Sectors where a financing gap exists within the market that could be served by catalytic green capital to make progress towards the country's NDCs and development goals.

As noted earlier, the energy and agriculture sectors are key strategic areas identified by the Government of Zambia, which can propel economic growth. Both are connected either directly or indirectly to improved livelihoods and to the country's NDCs. From a climate change perspective, these two sectors also happen to be the largest contributors to Zambia's greenhouse gas emissions and hence present a meaningful opportunity for climate finance. A green finance facility or NCCF, with a clear mandate to accelerate Zambia's transition to a green economy, has the opportunity to provide technical assistance, capacity building, access to affordable financing solutions, and de-risking mechanisms – all of which address key constraints for these critical sectors.

Energy as a Priority Sector

Although the overall electricity shortage problem is significant, the notable amounts of existing financing from IFIs, ODA, and even Zambia's own IDC that already targets large-scale or utility-scale projects, make rural electrification the most important energy sub-sector to focus on.[90]

Rural electrification in Zambia remains significantly underfunded. Given the financial state of ZESCO, it is unlikely that the situation will change unless there is external intervention. REA continues to face challenges in accessing funding to implement the REMP, which envisions both the extension of the grid and off-grid systems as solutions for rural areas. With REMP's estimated financing requirement of 4.4 trillion Kwacha (c. $1.1 billion), or $50 million annually between 2008–2030, the REA requires continual support from a diverse group of partners to mobilize resources and investments in Zambia. This situation is exacerbated by the fact that rural areas are sparsely populated, therefore are less likely to be prioritized for any near-term grid expansion plans, as these areas are less commercially appealing for utilities.

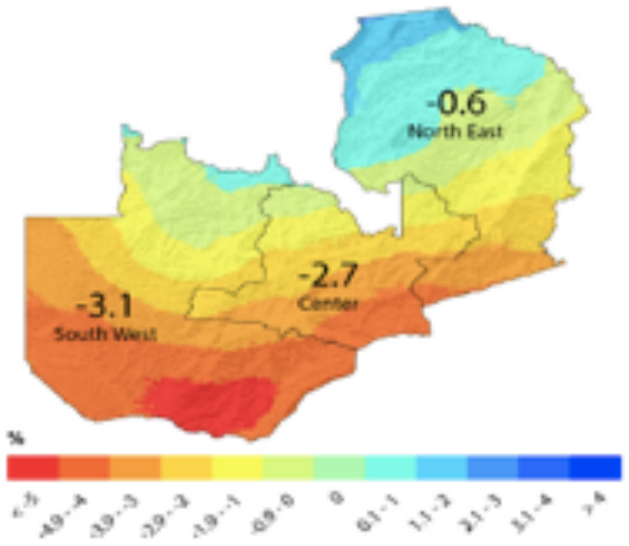
The off-grid energy sub-sector in Zambia is primed for decentralized solar mini-grids and mini-hydro power projects. As the country has already experienced severe multi-year droughts that are reflective of an observed longer-term decrease in rainfall patterns, Zambia should focus efforts in the immediate term on diversifying its energy mix to reduce reliance on large-scale hydro power alone.[91]

Examples of productive use cases have become more prevalent, highlighted by projects financed or supported by REA and the IDC in recent years. When productive use is integrated into new power system designs there is an opportunity for energy projects to add value beyond electrification. Some ongoing initiatives are highlighted in later sections of this report and hold promise for future direction.

90 On-grid projects greater than 50MW

91 "Mean annual rainfall over Zambia has decreased by an average rate of 1.9mm per month (2.3%) per decade since 1960"; mainly driven by a 3.5% decline in rainfall during the country's annual wet season.

Changes In Total Precipitation (%)



Source: CSA Zambia Profile, Projected change in Temperature and Precipitation in Zambia by 2050

Complications & Opportunities in the Energy Sector

Several factors have constrained the sector's growth including:

- Institutional weaknesses;
- Sovereign fiscal constraints and economic dependencies; and
- Poorly structured regulatory frameworks.

- **Institutional Weakness** – ZESCO's weak financial position contributes to the country's inability to maintain existing transmission and distribution networks (also causing capacity lags).[92] It has caused severe headwinds for network upgrades and grid expansion, and has reduced private sector interest given ZESCO's role as the main counterparty power off-taker in the country.

  The Government of Zambia has initiated two specific changes to support a more suitable business environment for IPPs, although this remains a work in progress. The first was the passage of the Electricity Act of 2019, which allowed for IPPs to enter the electricity market through PPAs with non-state off-takers. The second was the government's implementation of new tariff rates for electricity.

  While these rate adjustments will not result in an immediate rebalancing of the historical financial issues for the power utility, they illustrate the government's willingness to utilize different levers to open up the electricity market and enact market stabilizing policies. Tariff increases could have implications for affordability of electricity access and support to any government agency should take this into consideration.

- **Sovereign Fiscal Constraints and Economic Dependencies** – The state of the country's main electricity utility is to some extent a reflection of deeper financial resource constraints at the national level. The high debt to GDP levels in Zambia is an indicator and determinant of the country's ability to borrow to fund new infrastructure. Without debt restructuring, which the government is currently pursuing, Zambia will continue to face constraints that have deep economic effects. Debt issuance constraints may also have an impact on the structure of any potential new Green Bank or national climate change fund, as it is typical that host governments are a capital contributor to any such initiative. In Zambia's case, the likelihood of sovereign financial contribution appears to be weak.

  In addition to high external debt levels, the country's significant reliance on extractive activities as the predominant means for securing foreign exchange has resulted in two main issues. First, the Zambian economy is exposed to the volatility of the global commodity markets and the price of copper. Secondly, this vulnerability exacerbates the country's macroeconomic situation and negatively effects the value of the Kwacha. This depreciation results in rising sovereign debt levels as hard currency denominated debt becomes more expensive, straining the government's ability to service debt obligations. It also increases the cost of imported goods, including materials and equipment needed for critical infrastructure. The brunt of these effects is felt by the government (through their procurement mechanisms), private developers and their project returns, and by the electricity end-user as these costs are passed down the value chain.

  Since almost all renewable energy projects will be priced in USD, the volatility of the Kwacha relative to any hard currency has important consequences for the design of a green finance facility. The decline in

92 https://www.usaid.gov/powerafrica/zambia

the global market price for copper (57%) over the last decade from highs of $4.57 per pound (in January 2011) to lows of $1.94 per pound (in January 2016), illustrates the country's vulnerability to accessing foreign exchange along with the importance of access to secure funding denominated in local currency for any new sovereign debt.[93] An alternative to this could be a low-cost loan in hard currency with a market-rate hedge in place, which could potentially reduce the cost of funds. If currency hedge costs are supported by a development-focused guarantee program as part of the green bank or green facility's funding design, this has the potential to bring costs down even further. Short of a guarantee product being made available by climate fund partners or by other development partners, highly concessional financing may be sufficient enough to change the project economics for financing partners in-country.

- **Poorly Structured Regulatory Frameworks** – The lack of clear regulatory frameworks and policies for the off-grid energy sector has created uncertainty for private sector developers. One existing initiative that could be leveraged in this regard is the implementation work being carried out by the Renewable Energy and Energy Efficiency Partnership (REEEP) through the Beyond the Grid Fund for Africa (BGFA) program. It is recommended that any green financing program seek to integrate learnings from this program to contribute to additional efforts of establishing an enabling environment for off-grid solutions. The BGFA program intends to share any resulting information from the program through the Platforms for Market Change, which will be used to inform investment decisions and policymaking.[94]

- **Off-Grid Sub-sector Focus** – The off-grid energy sub-sector should be the primary focus of a new green financing initiative given the size of the gap between the current state of rural electrification and the government's development objectives. But with the complexity of the constraints outlined, there is suggestive evidence that direct financial support and technical assistance to the broader sector, which includes support of on-grid renewable energy projects, will be beneficial.

Technical support to commercial banks is an example of an intervention that could target rural electrification renewable energy projects as well as have wider benefits for the energy sector. Interviews with stakeholders have indicated that local financial institutions need technical support to fully develop green lending capacity. The technical support required varies from enhancing credit policies and underwriting standards to capacity building to enable banks in Zambia to integrate environmental risks (including the effects of climate change) into their transaction assessments. Although training and capacity building may initially be targeted to accelerate development of decentralized mini-grids, the experience gained can be applied to other renewable energy projects and have an amplified effect for the sector.

Beyond a primary focus on off-grid energy, there is also the risk that even currently on-grid connected communities might experience future electricity shortages. This is driven by ZESCO's lack of financial capacity to maintain the grid infrastructure. Hence, in addition to off-grid solutions for new generation capacity, some portion of any new financing should be directed to improve the electricity infrastructure, namely upgrading the grid to reduce transmission losses (recorded at 17% as of 2017) and to facilitate the connection of new renewable energy projects that are developed in the future.

Potential Interventions for the Energy Sector

Green financing initiatives will have the greatest impact if used to address project preparation, capacity building, reduction of project financing costs, and risk mitigation for the variety of system risks experienced by commercial lenders or private developers.

- **Project Preparation** – Some of the aforementioned complications in green investment could be addressed through the establishment of a project preparation facility (PPF). Such a facility should be used to support commercial banks as well as private sector developers. Any project preparation facility should include grant support to advance renewable energy projects from the feasibility phase to a point where the projects are considered commercially bankable. This also means that any PPF should have an intentional role as a

93 https://tradingeconomics.com/commodity/copper

94 https://www.reeep.org/bgfz

coordinating facilitator between commercial banks, concessionary financiers and project developers, whereby transparency on requirements for financing are clear and are agreed in advance to the greatest extent possible. A dedicated tranche of funding for feasibility studies is strongly needed in the market; no other program currently provides this type of financial support.

- **Capacity Building** – Whether integrated within the activities of a PPF or not, there is a wide market gap in technical knowledge and capacity within the existing commercial banks' organizational structures for the underwriting of renewable project financing transactions. Training has been highlighted by stakeholders as a critical aspect to enhance and bolster the renewable energy sector growth. Without training there it is possible that even if new financing was put in place, uptake from private sector financiers would still be low and hence could stifle any progress.

- **Risk Reduction** – Project financing requires long tenor loans (preferably greater than seven years), than what many local commercial banks are currently willing to offer. This is driven by some of the reasons highlighted earlier in the report, but is also affected by the current macroeconomic state of Zambia, where banks struggle with high cost of funding (Overnight Lending Facility (OLF) rates were at 28% as of March 2020).[95] With this market dynamic, concessional capital is considered a requirement in order to stimulate the economy and the private credit markets. The high OLF rate coupled with the fact that government treasuries are paying 28.25% for 364-day treasury bills and 33% for 10-year government bonds, further disincentivizes banks to extend credit to the private markets.[96] Accounting standard changes in 2018 required financial institutions to transition to IASB 9 for recognition of expected credit losses. This policy change has also deterred banks from lending, especially in the current high non-performing loan environment prevalent across the banking sector.

  A significant reduction in cost of funds and a guarantee program to backstop any renewable energy project risks are highly recommended. Without these interventions it is unlikely that banks will shift funds from the higher yielding government securities to the private sector. Access to credit and financial inclusion have been long-standing problems in the country and are not tied to any one sector. Any guarantee program or risk mitigation/credit support will serve a dual function: (i) it could minimize collateral requirements of financial institutions and (ii) if structured correctly it could reduce any loan loss provisioning for the banks that will book the loan on balance sheet. Most banks in Zambia require a minimum of 100% collateralization of any loan value. The DBZ requires 125% collateral cover for any loan underwritten. The existing lending terms make it challenging for small or local developers to access the capital that is needed to develop renewable energy projects. Furthermore, in circumstances where equity partners may be sought as opposed to debt financing, these same smaller developers continue to struggle.

  An example of one type of guarantee needed is for off-grid solutions, such as SHS distributors or mini-grid developers, whereby the purchasers of the power are individual households. The guarantee should be designed to mitigate end-user credit risk. The greater promotion and integration of pre-paid meters could be a potential substitute or complement to these credit guarantees, as these meters would provide banks a level of assurance on project cash flows.

Taking into account the above needs for credit support and technical support in the energy sector, a Green Bank or a catalytic green finance facility could be a valuable and timely strategy for Zambia to effectively address local market challenges in the renewable energy sector (with a focus on the off-grid sector, especially the financing constraints and complexities highlighted around project preparation, capacity building, reduction of project financing costs, and risk mitigation for the variety of risks experienced by commercial lenders or private developers.

Potential Green Bank Host Institutions

Given the various fiscal constraints Zambia faces regarding launch of a new Green Bank or national climate change fund, it is recommended that any new initiative be integrated into an existing government institution or initiative. Ideally, the partnering institution should have an existing mandate for infrastructure lending or project finance that is consistent with a focus on green and

95 https://www.boz.zm/Zambanker-March-2020.pdf

96 http://www.worldgovernmentbonds.com/country/zambia/

climate-related investment. The government of Zambia and the Ministry of National Development Planning have already begun engaging in g a process to scope the potential for a potential Green Bank or NCCF.

From an initial scoping of the current financial institution landscape in Zambia, the candidates that emerge as potential partner institutions for a green finance facility are the Development Bank of Zambia, and/or the Industrial Development Corporation (Zambia). Relative to the national market, these institutions have the most experience in finance and in relevant green sectors. Specific capacity building, training programs, and a mission-driven mandate for the new unit focused on building green and climate-related investment capacity will be an essential element of creating an effective Green Bank or national climate change fund initiative.

- **Development Bank of Zambia** – The DBZ's shareholder structure appears to be somewhat more aligned with international capitalization, given that its shareholder base includes foreign bilateral and multilateral institutions. Furthermore, the organization has worked with large scale programs such as the renewable project that was financed in collaboration with UNIDO and the Rural Electrification Authority. In the pipeline, DBZ is working closely with the World Bank through their Electricity Service Access Project (ESAP) to map the potential for small solar home systems and mini-grids. The amount of any future credit line to be provided by the World Bank to fund such a pipeline is currently undetermined, but figures range from $2.5 million as a pilot with the potential to ramp up to $26.5 million. Of this total funding figure, $5.9 million is intended to specifically target rural electrification projects, whereby $3.4 million will be used for technical assistance and the remaining $2.5 million will fund direct loans to solar equipment companies and mini-grid developers. This component of the program is known as the Off-Grid Loan Facility. It is recommended that collaboration be sought with the World Bank or DBZ in preliminary Green Bank design stages to leverage any progress and results that may transpire from the Off-Grid Loan Facility, especially if a Green Bank could be complementary to this program.

  One of the other favorable aspects of DBZ as a potential partner institution is that they are in the process of securing accreditation with the Green Climate Fund. Achieving accreditation would facilitate funding from the GCF and other potential climate funds to rural renewable energy projects in the country.

- **Industrial Development Corporation** – The Industrial Development Corporation (Zambia) is a strong potential partner for any grid-connected renewable energy projects. The institution has an existing mandate that includes renewable energy and is focused on projects larger than 50MW. This mandate forms a unique complement to the DBZ target market segment. The greatest challenge cited by the IDC is identifying equity capital providers in project finance transactions; for grid-connected projects, the IDC has continued to play an active role as an equity investor but seeks financing partners who have appetite for minority equity stakes.

  Similar to the DBZ, the IDC has experience collaborating with multilateral development organizations, such as their support of an 88MW new solar power plant generation capacity project in 2017 through the World Bank's Scaling Solar Program. Following the end of the Scaling Solar Program, the IDC successfully launched the Alternative Renewable Energy Investment Program (AREIP), which to date has supported 400MW of new solar power generation capacity and a 130MW new wind turbine farm. The IDC has also taken action that leverages the Electricity Act of 2019 and curbs the historic ZESCO monopoly as the sole power off-taker in Zambia via an initiative with Africa GreenCo.

NCCF & Grant Funding

A national climate change fund typically focuses on providing grant funding towards technical assistance and/or deployment of grant funding to reduce costs for qualifying projects. Given the nature of market challenges identified through this report and the need for grant funding to complement project finance strategies, a NCCF is an important strategy to consider in Zambia.

The Rural Electrification Authority (REA) is a strong potential partner for a NCCF, given the organization's history of project facilitation and implementation in the rural electrification sub-sector. As mentioned earlier, REA's funding is generated from a mix of sources but is generally reliant on grant funding to conduct its work. With this dependency, it is not surprising to see slower than hoped progress in rural electrification. However, the agency has critical

experience already, which includes relationships that have been cultivated with leaders in rural areas since the REF's establishment in 1994. For this reason, it is recommended that further discussions be pursued with the REA to explore potential integration of a NCCF within their institution. Furthermore, the REA has recently added to its track record of renewable energy project development with the successful completion of a mini-hydro power station in 2019. Known as the Kasanjiku project, the mini-hydro power station is located in the North West Province of Zambia and is the first to be constructed in Mwinilunga. An estimated 12,000 people will benefit, including local public service providers.[97] This recent project highlights existing experience with mini-hydro power, which is crucial for the development of future projects.

Given REA's in house capacity and experience with project assessment and development, the entity was identified as a partner for the World Bank's Electricity Service Access Project (ESAP – for which DBP is serving as the financial intermediary). REA is involved specifically in the Off-Grid Smart Subsidy Program (OGSSP) component. There is opportunity for a NCCF within the existing scope of the program to provide further complementary support and to scale positive results. Five sites for projects have been selected thus far, with both hydro and solar projects already identified. However, wind projects have not commenced feasibility studies as they will require additional funding, but could be an interesting first area to explore.

In concert with a NCCF, enhanced project preparation capacity for Zambia's renewable energy market is seen as a critical need. Although REA, DBZ, and IDC have some internal project preparation capacity, there is a shortage of funding for the development of rural electrification projects. Potential existing approaches to filling this need include the model highlighted by the Ministry of Energy for a Project Preparation Grant (PPG), which is one component of a program presented to SREP, with co-financing from the Climate Investment Funds and AfDB.[98] In interviews, stakeholders have noted that given REA's funding model, additional grant funding that targets feasibility and project preparation activities is very much needed, especially if the funding is inclusive of training for staff and local counterparties.

Integration of productive use energy to support community livelihoods is a model that REA has already started to explore. REA's integration of solar technology into the construction of 2,000 hammer mills in 2015 is a good example of this model.[99] The hammer mills are used to produce maize flour, and consume approximately half of the electricity generated, the remainder of the solar power generated is distributed to the community. With a similar concept, mini-grids could be designed alongside the development of enterprises in a variety of sectors, which would have co-benefits of employment whilst also potentially reducing the electricity costs for local communities. More recently, as part of the REMP's implementation, REA continues to work towards the development of Rural Growth Centers (RGCs). REA has identified over 1,500 solar milling plant projects to be developed that integrate a 15kW solar powered generator serving predominantly the electricity needs for milling activities, but whereby excess power is distributed to the community.

Climate Smart Agriculture (CSA) as a Priority Sector

Climate Smart Agriculture aims to address three main goals, all of which answer to the green finance criteria as noted above. These include: (i) to "sustainably increase agricultural productivity and incomes;" (ii) to "adapt and build resilience to climate change;" and (iii) to "reduce and/or remove greenhouse gas emissions."[100] With the government's focus on the agricultural sector as an economic driver to support employment and ensure food security for the population of 18 million, there is an opportunity for a green finance facility to help promote the growth of the sector through an emphasis on CSA practices.

The Seventh National Development Plan and the National Agricultural Investment Plan (NAIP) highlight several important goals for the CSA sector including: expanding the hectarage of irrigated farmland; improving productivity through enhancing technology development; ensuring efficient water use; and expanding water-smart irrigation.

The Seventh National Development Plan promotes a diversified and export-oriented agriculture sector, with several programs that focus on improving productivity

97 https://constructionreviewonline.com/2019/10/construction-of-us-8-6m-mini-hydro-power-station-in-zambia-completed/

98 https://www.climateinvestmentfunds.org/sites/cif_enc/files/srep_invetment_plan_for_zambia.pdf

99 https://cleantechnica.com/2019/08/12/how-solar-power-finds-new-uses-in-rural-africa-the-solar-hammer-mill/

100 http://www.fao.org/climate-smart-agriculture/en/

through enhancing technology development. The program outputs include identifying appropriate CSA technologies and practices to be developed and disseminated, as captured in the following government plan (2016 baseline) in Table 3–2.

Water resource management is one of the components of the NAIP (2014–2018), focused on ensuring efficient water use and irrigation. The core focus and intended targets are to increase irrigated hectarage from 170,000 to 188,000 and to increase the percentage of farmers with access to irrigation for high value crops from 10% to 20%. The mechanisms through which the targets will be delivered include "strengthening a total of 750 Water Users Associations and rehabilitating and constructing new irrigation schemes that would result in bringing a total of 18,000 ha under various forms of irrigation (furrow, drip, sprinkler)." Multi-purpose dams and 50 weirs were planned for construction during the implementation period as well. The NAIP notes that their targets include the use of renewable energy pumps powered by solar, ram and windmills, which called for 1,900 renewable energy pumps in the five-year period.[101] Estimates at the time of the publication for these water efficiency components was $169.25 million. As the Government of Zambia works to finalize an updated NAIP for the next five-year period, collaboration with the relevant ministries is recommended to review progress made during the 2014–2018 period and to understand how any new Green Bank or NCCF program could complement new targets to be defined. A specific example of CSA that warrants further exploration for funding support is the introduction of efficient irrigation systems for existing farm areas. As noted earlier, only a fraction of the cultivated land is irrigated today. Given the fact that even staple crops such as maize are highly dependent on rainfall, the volatility of climate change and less reliable rain patterns in the future mean that investment today in sustainable irrigation practices could secure the long-term viability of the sector.

Water-efficient irrigation, such as drip irrigation, will not only support and conserve a valuable natural resource, but also has the potential to improve the productivity and crop yield of existing farm areas. By focusing on the improvement of existing farm areas, this could reduce deforestation rates in Zambia and contribute to the country's GHG emission reduction targets. Crop rotation, intercropping, and the introduction of new seed varieties are also important elements of CSA in Zambia. The adoption of CSA practices could be supported through a well-designed green finance facility that seeks to tackle issues of technical and capacity limitations, inadequate financing

Strategy 1: Improve Production and Productivity

Programmes	Programme Outputs	Output Indicator	Baseline	Plan Target	Target				
					2017	2018	2019	2020	2021
a) Productivity-enhancing technology development	Climate Smart Agriculture technologies and practices developed and disseminated	Number of Climate Smart Agriculture technologies and practices developed and disseminated	Crops: 2	16	2	4	3	3	4
			Livestock: 0	6	0	2	2	2	0
			Fisheries & Aquaculture: 4	4	0	1	1	1	1
			Agroforestry practices: 3	4	0	2	1	1	0
b) Farm block development	Standard farm blocks with climate proofed infrastructure developed and functional	Number of farm blocks with climate proofed infrastructure developed and operational	0	5	0	0	0	0	5
c) Irrigation Development	Land under irrigation increased	Hectares of land irrigated disaggregated by small & emergent & large-scale farmers	Small: 3,690	35,400	4,400	9,400	15,400	25,400	35,400
			Emergent & large scale: 75,345	100,000	80,000	85,000	90,000	95,000	100,000
		Number of irrigation infrastructures disaggregated by type (weirs, multi-purpose dams)	Weirs: 10	55	11	11	11	11	11
			Dams: 2000	35	7	7	7	7	7

Source: 7th NDP Plan

101 6.Zambia_investmentplan.pdf

or lack of access to appropriate financial products, and weak flows of inputs and outputs.

Complications & Opportunities for Climate Smart Agriculture

According to a World Bank analysis, CSA can increase crop yields up to 23%. However, the general low productivity of existing farming practices means that "these productivity increases are insufficient to avoid further expansion of agricultural land into forest land" – placing the country's climate commitments in jeopardy.[102] As such, careful consideration needs to be given to how CSA is integrated into existing agricultural systems. Beyond the identification of possible CSA alternatives for the country, several constraining sector-specific factors have been identified that should be scoped into the design of a new Green Bank or NCCF.

- **Funding and Finance Challenges** – Based on the Zambia National Agricultural Investment Plan, an overall financial gap (not specific to CSA) exists of approximately 2.98 billion Kwacha ($605.23 million), representing 22% of the total funding requirements.[103] The funding needs noted in the NAIP represent best estimates of what is required to "identify and prioritize key investment and policy changes in Zambia that are critical to enhancing the desired agricultural productivity growth."[104] The calculation made by the Ministry of Agriculture and Livestock assumes contributions by the private sector and beneficiaries. Under a scenario where these contributions do not happen, the gap increases by approximately 9.7%. The size of this funding gap illustrates the government's limited resources, which will need to be bolstered by international support and financing.

  In addition to challenges at the government level, access to finance for farmers remains an even greater obstacle, particularly for climate change and mitigation measures due to the medium-term time horizon that exists to realize any associated benefits – typically three to five years. Access to agricultural credit is further reduced by the fact that only 2% of smallholder farmers have formal titles to their farms, and few have alternative forms of collateral to pledge. This results in smallholders being financially excluded from access to affordable financing solutions, including access to long-term credit. Furthermore, the situation exposes many smallholder farmers to high interest rates or other unfavorable financing terms.

- **Implications of Budget Allocations** – With the high reliance that Government places on maize farming for food security and the related subsidies offered to support this crop, there is little incentive for farmers to adopt intercropping or crop rotation practices.[105] The country's Farmer Input Support Programme (FISP) and the Food Reserve Agency (FRA) are programs that were designed to support small-scale producers of the country's staple food crop, maize. The FISP distributes subsidized inputs to promote the production of maize and the FRA serves as a guaranteed buyer providing a minimum price to small-scale farmers for maize and other crops. To some extent, the FISP and FRA are supporting market dynamics that are not sustainable and may distort the sector. The use of funds to prop up the maize market accounted for an average of 79% of agricultural budgetary allocations between 2008 and 2016. It is important to consider that these funds could be more effectively allocated to support longer-term sustainability of the sector. The shift in budget allocation will require more capacity building to ensure that the benefits of sustainable farming practices are well understood by all key stakeholders and government decision makers.

  Under FISP, conservation agriculture is already integrated into program design as a prerequisite for eligibility of farming inputs. However, the monitoring and enforcement of conservation agriculture is weak. Furthermore, studies have found that adoption of CSA is low and that the bigger challenge is dis-adoption, which is reaching rates of 95%. Low adoption and high dis-adoption are exacerbated by low and laborious technologies, limited availability of labor-saving equipment, and limited knowledge and capacity of farmers to maintain the practices after initial support.

102 https://openknowledge.worldbank.org/handle/10986/31383

103 https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi15IeEkK_rAhXxc98KHeL3AsoQFjAAegQIAhAB&url=https%3A%2F%2Fwww.researchgate.net%2Fprofile%2FAnoop_Srivastava7%2Fpost%2FZambia_agricultural_sector%2Fattachment%2F59d655f979197b80779acf23%2FAS%253A527949026004992%25401502884264277%2Fdownload%2F6.%2BZambia_investment%2Bplan.pdf&usg=AOvVaw0q3CB7WzSW0L_5aW7njn7Z

104 NAIP 2014-2018

105 CSA Profile Zambia

Similar to conservation agriculture, agroforestry has been the other highly promoted CSA practice in Zambia, but adoption remains low due to high costs and low availability of seedlings. As noted earlier, farmers face great difficulty in enduring the longer transition periods that exist before benefits of improved productivity are recognized. Thus, farmers require more suitably designed financial products, such as transition capital.

- **High Upfront Costs Associated with CSA** – Similar to conventional renewable energy projects, implementing CSA can often have higher upfront costs (relative to business as usual) that require innovative financing solutions to bring down the cost of capital. While there are some opportunities for women and youth to access this type of CSA related funding through The National Youth Fund, these are still limited in scale.[106] Although the private sector has been involved in CSA related interventions, greater scale of these initiatives is required. (The Conservation Farming Unit (CFU) is one organization that has promoted conservation agriculture and agroforestry that involves the private sector.) Complementing these types of existing initiatives is considered one of the stronger potential angles to accelerate the implementation of more robust CSA plans.

- **Existing Initiatives Highlight Some Focus on CSA** –

  Several of the larger development partner institutions (including the FAO and UNDP) have been involved in helping the Government of Zambia build enabling environments for CSA implementation, including knowledge sharing, reviews of CSA investment plans, and formulation of strategic frameworks to promote CSA and identify potential funding sources. The UK's DFID program, Vuna, works on identifying and scaling new and existing CSA technologies, and supports the identification and development of financial services for smallholder investment in CSA. Other participating organizations include the Conservation Farming Unit (CFU), and Community Markets for Conservation (COMACO).

  Local organizations, such as Grassroots Trust, have established demonstration projects that integrate holistic management and landscape approach to CSA. The focus on low-input (regenerative) cropping enhances natural water cycles and nutrient flows to increase profitability and sustainability. This cropping practice also combines agroforestry, manure management and soil management – resulting in a twofold increase in average maize yields, according to the farmers. GHG emission reductions from the system design were not quantified. Nevertheless, significant gaps still remain when it comes to funding CSA-related technology development and dissemination, monitoring and evaluation, coordination of ongoing CSA efforts, as well as improved research systems to develop a stronger evidence base for CSA scale up.[107]

Potential Interventions in Climate Smart Agriculture

- **Increasing Awareness** – A key aspect to facilitating the flow of investment to CSA and particularly irrigation is to increase awareness amongst all key stakeholders of the opportunities, and costs and benefits. As described earlier, with the lengthy transition period and capital intensity that accompanies adopting CSA practices, traditional financing mechanisms will likely be inadequate. Furthermore, given the complexities noted around access to credit, blended finance with a large tranche of concessional funding is needed in order encourage greater capital flows from private investors.

- **Market-Specific Financial Products** – Financing is needed to improve access to inputs such as mechanized equipment or irrigation technology. These upfront costs are difficult for farmers to shoulder or finance through operational cash flows. Given the lack of assurance of such an investment's return, some form of incentive for banks and farmers is needed. Traditional commercial banks are unlikely to have the risk appetite of lending to smallholder farmers without some form of guarantee. In addition, affordable and flexible loan terms, which are not available from conventional financial institutions, could help to spur the market. With the susceptibility of the agriculture sector more generally, financial products that can consider the volatile cash flows of farmers should be explored. One such example of cash flow lending could include repayment schedules that are linked to

106 CSA Profile Zambia

107 Zambia CSA Profile

cost savings associated with the use of more efficient technologies or through a revenue share based on improved crop yields.

- **Technical Assistance and Capacity Building** – In addition to innovative financing solutions that can provide upfront, bridging, or transition capital to promote the adoption of CSA technologies, technical assistance and capacity building at all levels will be required. With the high CSA dis-adoption rate observed across the sector, the staying power of new practices is likely to be low without proper training and technical support. Any design of a program should include this type of funding support along with resources for monitoring and evaluation. A focus should be placed on training local cooperatives to become self-sufficient in managing new farming practices and technologies once they are adopted. Currently, technical support for equipment maintenance and application of new technologies is either not readily available or feeds dis-adoption, and can lead to distrust and higher hurdles for future programs to overcome.

Recommendations for Climate Smart Agriculture

- **Green Bank and Financing** – A dedicated Green Bank program could address the financing constraints and complexities highlighted for this sector around access to credit, limitations or hesitancy of financial institutions to extend credit, and lack of capacity of various actors to weigh benefits against an assessment of risk factors.

  In contrast to the financing focus that has been received by the renewable energy sector, coordination around mobilizing support and financing for CSA has been weak. As a result, immediate opportunities should be focused on greater funding for pilot projects as opposed to a fully scaled green finance program that addresses existing project pipeline. While both the DBZ and IDC do have an existing focus on agriculture, DBZ's current mandate and focus on smaller projects may be more amenable to integrating financing products and solutions for CSA adoption in rural areas. IDC's portfolio has mainly focused on investments in enterprises in markets such as agroforestry and sustainable forestry, as opposed to funding projects in the agriculture sector. In addition, given the size of projects financed by the IDC through its other portfolios, further investigation into the entity's general appetite to look at investing in smaller companies in the CSA space needs to be determined.

- **NCCF and Grant Funding** – An NCCF that focuses on promoting efficient irrigation technologies is where grant funding may have the greatest impact. Despite efforts to-date by development organizations and others to expand the adoption of CSA practices, there has been limited focus on actual project development and roll-out. Given the overlap that exists between the country's own targets for irrigated farmland and specific goals for increasing the integration of climate smart technologies in the agricultural sector, some of the push needed will have to come from external actors to move forward beyond discussions on policy and establishing enabling environments. Actors such as the World Bank and DFID UK have done a lot of the foundational work and education, and although more of this type of activity is needed, the focus of a NCCF should be on larger scale pilot projects. Grant funding of this nature should also target the exploration and feasibility of alternative types of market-based financing solutions to address the challenges noted earlier in the complications section around issues of risk and lack of appropriate agricultural credit products.

III. CONCLUSION

Zambia faces serious challenges for meeting its SDG and NDC goals, including serious constraints in its banking sector and sovereign borrowing. Despite these challenges, there is a strong need and clear potential for a Green Bank and/or NCCF to support both the Climate Smart Agriculture and energy sectors in Zambia.

A key challenge for any new Green Bank and/or NCCF will be raising capital, as debt issuance constraints will make it a challenge for Zambia (as the host government) to be a capital contributor to any such initiative. However, the potential for non-sovereign resources to capitalize a new green finance program can also be explored.

If funding limitations can be overcome, a promising focus within the agriculture sector lies in broader dissemination and longer-term adoption of CSA, specifically efficient irrigation systems. With funding from the international development community or climate funds, patient capital can be directed to encourage greater participation by

leveraging various tools such as the provision of direct loans, credit enhancements in the form of guarantees, funding for technical assistance and capacity building programs, or wholesale funding to local intermediaries. Green financing initiatives will have the greatest impact in the energy sector if used to address project preparation, capacity building, reduction of project financing costs, and risk mitigation for the variety of system risks experienced by commercial lenders or private developers.

The energy and agriculture sectors in Zambia are in need of external support, and a mix of green finance and grant funding are important parts of the solution. The country is going through a volatile period and additive program support needs to be timed and assessed carefully. As highlighted above, in-country partners such as DBZ, IDC, REA and the Ministry of National Development Planning have been identified as potential host institutions and partners for new program design. Each of these organizations are developing different but complementary project pipelines that tackle the issues surrounding rural electrification. Climate smart agriculture has its own challenges and is in earlier stages of development in Zambia, therefore any grant funding or green financing should be focused on scaling up CSA practices and implementing larger demonstration projects.

GHANA

I. COUNTRY OVERVIEW

Ghana is one of the fastest-growing economies in West Africa, due to a number of factors, including general political stability, relatively high ease of doing business compared to regional peers, and existence of natural resources including recent oil and natural gas discoveries.[108] Prior to COVID 19, Ghana experienced an estimated 7.1% GDP growth in 2019, which continued its multi-year growth trend.[109] The industrial sector (including oil and gas) was the main growth driver, delivering an average 10% annual growth between 2016-2019.[110] Although world oil prices are currently low, recent estimates show that Ghana's emergent oil and gas sector could double production by 2023, with the potential to reap additional tax revenues by better enforcing current legislation.[111] Another key economic driver is Ghana's agriculture sector. Although the industrial sector delivers stronger growth, Ghana relies on agriculture for 52% of employment, as well as for 40% of its export earnings.[112] Cash crops such as cocoa, oil palm, coffee, rubber, cotton, and tobacco are Ghana's primary agricultural export products.[113] Thus, Ghana's economy still revolves around the extraction and export of raw materials.

Nevertheless, Ghana faces macroeconomic headwinds in the form of high public debt and a high interest rate environment. According to the IMF, Ghana's debt-to-GDP ratio stood at 59% in 2018.[114] Years of funding high budget deficits through public borrowing has put Ghana at risk of debt distress.[115] These elevated debt levels have led to generally high interest rates from Ghana's central bank. The policy rate peaked at 26% in 2016, but has fallen since.[116] As of March 2020, Ghana's monetary policy rate is set at 14.5%, an 8-year low.[117]

Inflation and exchange rates also add to Ghana's macroeconomic pressures. While inflation has fallen from 17% in 2016 to 9.8% in 2018 – these inflation rates still negatively affect investment and lead to foreign currency exchange issues.[118] Ghana's national currency – the Cedi (GHS) – has consistently depreciated against the US dollar over the past 25 years, in part due to Ghana's persistent fiscal deficits and debt issues.[119] With these economic headwinds, and the emerging effects of COVID 19, Ghana may face difficulty in financing new projects to grow and diversify its economy – including green technologies such as renewable energy and climate smart agriculture.

In terms of economic planning, Ghana has adopted a 40-year long-term national development plan for 2018–2057, which is split into four 10-year medium term plans. This plan builds on the progress made under Ghana's previous national development plans i.e. the Ghana Poverty Reduction Strategy and the Ghana Shared Growth and Development Agenda I and II. Three major sectors of the economy are highlighted – industry, agriculture, and services – that will require significant investment, and that must be able to withstand economic and natural shocks. A major goal of the current development plan is to build an "industrialized, inclusive, and resilient economy."[120] To achieve this goal, the long-term development plan features a National Infrastructure Development Plan, which prioritizes energy (renewable and non-renewable), mobility,

108 https://www.doingbusiness.org/content/dam/doingBusiness/pdf/db2020/DB20-FS-SSA.pdf
109 https://www.afdb.org/en/countries/west-africa/ghana/ghana-economic-outlook
110 https://www.afdb.org/en/countries/west-africa/ghana/ghana-economic-outlook
111 https://www.theafricareport.com/16814/ghana-oil-production-to-double-to-over-400000bpd-in-next-four-years/
112 http://www.fao.org/ghana/fao-in-ghana/ghana-at-a-glance/en/
113 http://www.fao.org/ghana/fao-in-ghana/ghana-at-a-glance/en/
114 https://www.imf.org/en/News/Articles/2019/12/12/pr19455-ghana-imf-executive-board-concludes-2019-article-iv-consultation-with-ghana
115 https://www.reuters.com/article/imf-worldbank-africa/african-debt-stabilising-but-region-faces-headwinds-imf-idUSL5N2732RE
116 https://www.bog.gov.gh/monetary-policy/policy-rate-trends/
117 https://www.bloomberg.com/news/articles/2020-03-18/ghana-central-bank-cuts-benchmark-rate-to-14-5-from-16
118 https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=GH
119 https://www.bloomberg.com/news/articles/2019-12-05/there-s-no-escaping-quarter-century-losing-run-for-ghana-s-cedi
120 https://www.cabri-sbo.org/en/documents/long-term-national-development-plan-for-ghana-2018-2057

ICT connectivity, water, and urban and rural development.[121] From a planning perspective, Ghana has room to develop its energy, agriculture, and urbanization and transport sectors to address climate change. It should be noted that 2020 was an election year in Ghana, so changes in development priorities may result from any potential election outcomes.

Ghana's banking system features 23 relatively well-capitalized banks, thanks to recent rounds of bank governance and financial de-risking reforms initiated in 2017. A minimum capital directive was the most notable of these reforms, resulting in a wave of bank consolidation that ultimately helped increase Ghana's total banking sector operating assets by 11.3%.[122] Nevertheless, Ghana's non-performing assets ratio remains elevated at 9.8% in 2018.[123] This high non-performing asset ratio has slowed credit growth in Ghana, which hinders the ability of businesses to access credit from banks. In addition, the base rate for commercial loans in Ghana is very high, particularly for projects or technologies with less track record, which further increases the difficulty in getting financing that fits the needs of green projects.[124] Though Ghana's banking sector is making progress on de-risking its operations, Ghanaian businesses and projects still face hurdles in obtaining adequate financing.

Other sources of capital include non-bank financial institutions and the Ghana Stock Exchange. Made up of savings and loans companies, finance houses, mortgage finance companies and leasing companies, Ghana's non-bank financial institutions hold combined assets worth 11.4 billion GHS (c. $2.2 billion) at the outset of 2019.[125] Rural and community banks also play an important role in Ghana's financing sector, representing a combined asset base of 4.1 billion GHS (c. $794.1 million).[126] In addition, the Ghana Stock Exchange has a total market capitalization of 56 billion GHS (c. $9.8 billion) as of December 16, 2019, with 42 companies and two corporate bonds are listed on the exchange.[127]

Ghana's carbon emissions are mainly driven by its land use and energy sectors. As of 2016, the UNFCCC estimated that out of the 42.2 million tons (MT) of CO_2e that Ghana emitted that year, 30.5% came from land use change and 23.8% came from its agriculture sector.[128] These drivers are a result of rapid deforestation as well as population growth that is consistently above 2%.[129, 130] The energy sector also drives Ghana's emissions, as 18.6% of emissions came from burning diesel and natural gas at power plants, while another 17% came from its transportation sector. Ghana's Nationally Determined Contribution (NDC) states that the country aims to reduce its emissions by 45% from a BAU scenario by 2030.

Energy Context

Biomass and oil provide the majority of Ghana's primary energy mix, followed by natural gas and hydro. According to the International Energy Agency (IEA), biomass and oil represented 42% and 41% of Ghana's energy supply in 2017, respectively.[131] Most of this biomass is directly burned to provide residential heating, lighting, and cooking services.[132] Most of Ghana's oil use comes from imports – mainly gasoline and diesel – for its transportation sector.[133] Although Ghana is an emerging crude oil producer, the country must still import the majority of its oil products because Ghana only has one domestic refinery at Tema. Natural gas and hydro power make up most of the remaining energy mix, at 11% and 5%, respectively.[134] Finally, non-hydro renewable energy (solar and wind) only provides 0.02% of Ghana's primary energy supply.

121 https://www.cabri-sbo.org/en/documents/long-term-national-development-plan-for-ghana-2018-2057
122 https://www.pwc.com/gh/en/assets/pdf/ghana-banking-survey-2019.pdf
123 https://www.pwc.com/gh/en/assets/pdf/ghana-banking-survey-2019.pdf
124 https://link.springer.com/article/10.1007/s10708-019-10132-z?shared-article-renderer
125 https://oxfordbusinessgroup.com/overview/restoring-confidence-sector-clean-led-regulators-has-resulted-smaller-more-sustainable-industry
126 https://oxfordbusinessgroup.com/overview/restoring-confidence-sector-clean-led-regulators-has-resulted-smaller-more-sustainable-industry
127 https://gse.com.gh/overview/
128 https://unfccc.int/sites/default/files/resource/gh_nir4-1.pdf
129 https://www.rainforesttrust.org/ghana-lost-over-half-of-its-rainforest-in-2018-rainforest-trust-refuge-expansion-will-combat-further-deforestation/#:~:text=News-,Ghana%20Lost%20Over%20Half%20of%20Its%20Rainforest%20in%202018%2C%20Rainforest,Refuge%20Expansion%20Combats%20Further%20Deforestation&text=According%20to%20a%20new%20report,60%25%20decrease%20in%20primary%20rainforest.
130 https://data.worldbank.org/indicator/SP.POP.GROW?locations=GH
131 https://www.iea.org/data-and-statistics?country=GHANA&fuel=Energy%20supply&indicator=Total%20primary%20energy%20supply%20(TPES)%20by%20source
132 https://www.iea.org/data-and-statistics/data-tables?country=GHANA&energy=Renewables%20%26%20waste&year=2017
133 https://www.iea.org/data-and-statistics/data-tables?country=GHANA&energy=Oil&year=2017
134 https://www.iea.org/data-and-statistics?country=GHANA&fuel=Energy%20supply&indicator=Total%20primary%20energy%20supply%20(TPES)%20by%20source

Ghana has achieved strong gains in access to electricity thanks to a concentrated policy push. According to the World Bank, Ghana's access to electricity soared from 30% to 82% between 1993 to 2018.[135] Nevertheless, 50% of Ghana's rural population and 9% of its urban population still lack electricity. Ghana has set a goal in its National Electrification Scheme of achieving full electrification of the country by 2025, which will require electrifying the more remote and challenging areas, potentially with mini-grids.[136, 137]

Currently, natural gas and large-scale hydropower are the main sources of Ghana's electricity generation. According to the IEA, domestic natural gas provided around 46% of Ghana's electricity in 2017, while hydropower provided around 40% of Ghana's electricity in 2017, most of which generated by the Akosombo Dam on the Volta River.[138] Nevertheless, droughts in recent years have led to low reservoir levels at the Akosombo Dam. In 2018, Akosombo could only operate three turbines out of the six units during off-peak periods and only four turbines during peak periods. In total, only about half the country's hydropower installed capacity is available at any given time.[139] The remainder of Ghana's electricity generation mix comes from oil (mainly diesel-powered plants).[140] Despite the existence of potential non-hydro renewables resources, solar and wind electricity generation in Ghana remains negligible.[141]

Ghana currently faces a near-term electricity oversupply situation, with electricity supply exceeding maximum demand, and high wholesale prices based on past contracts signed. However, hydropower constraints due to drought (which may become more frequent and more severe due to climate change), alongside population and economic growth forecasts make it likely that Ghana may face a longer-term power shortage in the next decade. Given the rate of electricity demand growth, the current oversupply will not be adequate to supply Ghana's estimated power needs by 2030. Hence, additional investment will be needed in the medium term as Ghana's economy grows and diversifies.

In terms of the recent power build-out, Ghana's installed capacity reached 5171MW as of 2019, which is nearly double the amount needed to meet its peak electricity demand.[142] This temporary oversupply of generation capacity stems from a campaign to end electricity shortages in the country. In 2014, the Ghanaian government signed 43 "take-or-pay" (paying for a set volume of electricity regardless of actual usage or need) power purchase agreements with three emergency power producers.[143, 144] Given that power demand growth slowed between 2014–2017 due to electricity tariff increases and lower economic growth, Ghana is unable to absorb the additional power generation.[145] It is important to note that almost all of this new capacity is from new fossil fuel power plants and expansion of existing ones.

This temporary oversupply has created a near-term financial burden for Ghana. As a result of the inflexible "take-or-pay" contracts, Ghana was paying nearly 2.5 billion Ghanaian cedi (c. $484 million) in 2019 for electricity that it does not need, as well as potentially paying $850 million for excess natural gas in 2020.[146] Thus, Ghana has announced its intention to convert all of its power purchase agreements to "take-and-pay" contracts, which means the government only pays for power that it uses.[147] Although this arrangement would help generate savings for the government in the short term, this policy may inadvertently lead to a power supply shortage in the long-term as developers and investors adjust their regulatory risk assessment of Ghana's energy market.

The major players in Ghana's energy space are as follows: The Ministry of Energy, the Energy Commission (EC), and

135 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=GH
136 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/PAOP-Ghana-MarketAssessment-Final_508.pdf
137 https://www.cgdev.org/sites/default/files/electricity-situation-ghana-challenges-and-opportunities.pdf
138 https://www.cgdev.org/sites/default/files/electricity-situation-ghana-challenges-and-opportunities.pdf
139 https://www.hydropower.org/country-profiles/ghana#:~:text=Hydropower%20generation%20has%20declined%20in,end%20of%20the%20dry%20season
140 https://www.iea.org/data-and-statistics/data-tables?country=GHANA&energy=Electricity&year=2017
141 https://www.iea.org/data-and-statistics/data-tables?country=GHANA&energy=Electricity&year=2017
142 http://energycom.gov.gh/planning/data-center/energy-outlook-for-ghana?download=105:energy-outlook-for-ghana-2020-final-draft
143 https://theconversation.com/lessons-to-be-learnt-from-ghanas-excess-electricity-shambles-121257
144 https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-016-0075-y/tables/2
145 https://theconversation.com/lessons-to-be-learnt-from-ghanas-excess-electricity-shambles-121257
146 https://oxfordbusinessgroup.com/overview/power-moves-drive-develop-electricity-infrastructure-ends-period-unstable-supply-government-moves
147 https://oxfordbusinessgroup.com/overview/power-moves-drive-develop-electricity-infrastructure-ends-period-unstable-supply-government-moves

the Public Utilities Regulatory Commission (PURC) are the main public entities tasked with overseeing Ghana's power sector. The Ministry of Energy has two primary responsibilities: 1) Formulating and evaluating policies, programs, and projects for Ghana's power sector, and 2) implementing the National Electrification Scheme.[148]

- The Energy Commission helps issue licenses to operators and advises the Ministry of Energy on policy issues, while the PURC is an independent agency that sets electricity tariff rates and monitors the quality of electricity provision.[149]
- Ghana has a decentralized power sector structure. On the generation side, Ghana broke up its former state-owned vertically integrated monopoly Volta River Authority (VRA) in 2005.[150] That same year, Ghana allowed independent power producers (IPPs) to connect to the grid.[151] As of 2019, IPPs supply about 45% of the country's generation capacity, while the VRA owns the remaining generation capacity.[152]
- The Ghana Grid Company (GridCo) manages transmission of the national grid.
- Distribution of electricity to final consumers is the responsibility of two state owned companies, the Electricity Company of Ghana (ECG) and the Northern Electricity Distribution Company (NEDCo).[153]

Ghana holds high ambitions for a renewable energy buildout, but governmental policies have not yet translated these ambitions into meaningful progress. According to the National Energy Policy of Ghana enacted in 2010, the government set a goal of a 10% share for non-hydro renewable energy in the national electricity mix by 2020, as well as 100% electrification, neither of which were met.[154]

During the push to achieve its energy goals, Ghana's Energy Commission had enacted the Renewable Energy Act 2011, Act 823. This act established two mechanisms to incentivize investment in renewables:[155]

1. A renewable energy feed-in tariff (REFiT).
2. A renewable energy purchase obligation (RPO).

Both of these policies sought to guarantee profitable cashflows for renewable energy projects and support demand for renewable energy. Ghana's PURC began setting the first feed-in tariffs in 2014. However, these feed-in tariffs had to adhere to strict provisions focused on grid reliability and stability, which had a depressing effect on development.[156]

In addition, the Renewable Energy Act established a mandatory connection policy that allowed unfettered grid access for renewable energy, as well as a Renewable Energy Fund.[157] However, the design of the feed-in tariff program limited the size of eligible wind and solar projects. Also, Ghana's distribution companies have reputations as risky off-takers due to their high levels of indebtedness, which undercut the effectiveness of Ghana's pre-renewables policies.[158]

In recent years, Ghana has also pursued other policies and initiatives aimed at supporting renewable energy development, including the Ghana Energy Development and Access Project (GEDAP), as well as the Scaling-up Renewable Energy Program (SREP) as part of the Ghana Investment Plan. The GEDAP is a multi-donor funded project initiated in 2007 and set to run through 2022, and has been primarily focused on strengthening the financial position of the state-owned distribution company ECG, including improved revenue collection and cash management.[159] Despite progress made, ECG still struggles to reach its financial performance goals.[160] The project also supported five pilot solar mini-grid projects in isolated

148 https://www.cgdev.org/sites/default/files/electricity-situation-ghana-challenges-and-opportunities.pdf
149 https://www.cgdev.org/sites/default/files/electricity-situation-ghana-challenges-and-opportunities.pdf
150 https://oxfordbusinessgroup.com/overview/power-moves-drive-develop-electricity-infrastructure-ends-period-unstable-supply-government-moves
151 https://oxfordbusinessgroup.com/overview/power-moves-drive-develop-electricity-infrastructure-ends-period-unstable-supply-government-moves
152 https://oxfordbusinessgroup.com/overview/power-moves-drive-develop-electricity-infrastructure-ends-period-unstable-supply-government-moves
153 https://www.cgdev.org/sites/default/files/electricity-situation-ghana-challenges-and-opportunities.pdf
154 https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/GHANA%29%20National%20Energy%20Policy.pdf
155 http://webcache.googleusercontent.com/search?q=cache:3REGzl1paHIJ:www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf+&cd=8&hl=en&ct=clnk&gl=us
156 http://www.purc.com.gh/purc/sites/default/files/fit_2014.pdf
157 http://webcache.googleusercontent.com/search?q=cache:3REGzl1paHIJ:www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf+&cd=8&hl=en&ct=clnk&gl=us
158 https://www.jstor.org/stable/pdf/26256493.pdf?refreqid=excelsior%3Ace678f61d30a9eaa20c7242f27654160
159 https://projects.worldbank.org/en/projects-operations/project-detail/P074191
160 http://documents1.worldbank.org/curated/en/137111468255865160/pdf/PAD12600PJPR0I010Box391426B00OUO090.pdf

communities on islands in the Volta Lake and around the Volta River.[161]

The SREP is funded by the Climate Investment Funds, and the Ghana program was established in 2015 by the then-Ministry of Power (now folded into the Ministry of Energy). The SREP initiative is designed to focus on three areas of support[162]:

1. Renewable energy mini-grids and stand-alone solar PV systems
   a. This initiative envisioned public sector investment from the African Development Bank and the Ministry of Energy in 55 renewable mini-grids and private sector investment in stand-alone solar PV systems to benefit 33,000 households, 1,350 schools, 500 health centers and 400 communities.
2. Rooftop Solar PV based net metering with battery storage
   a. This initiative was meant to develop a comprehensive net metering program and the deployment of at least 15,000 units of roof-mounted solar PV systems to reduce the economic cost of power on small and medium-sized enterprises (SMEs) and households and increase renewable energy contributions in the electricity generation mix by 25–30MW. This initiative also envisioned the creation of a credit recovery facility and financing instruments developed to support rooftop solar.
3. Utility-scale solar PV/wind power generation
   a. The objective of this initiative is to assist the Government of Ghana overcome key barriers that prevent the growth and expansion of the utility-scale solar PV and wind market in Ghana by catalyzing the first project financed utility-scale renewable energy plants.

In February 2020, Ghana, in partnership with AfDB, released a call for proposals for consultants to help implement key components of the SREP program, including the design of programs to support the development of mini-grids, off-grid solar facilities and a national net metering scheme for PV. In addition, the utility-scale solar aspect of the SREP program has seen progress. VRA has begun building two PV power plants with a total generation capacity of 17MW in the Upper West Region of the country. This development comes two years after the VRA secured funds for the solar projects from Germany's KfW.[163]

Ghana's recently released Renewable Energy Master Plan (REMP) aims to revamp the National Energy Policy and set targets for 2030. Starting in 2019, the REMP aims to achieve the following goals:[164]

1. Increasing the amount of renewable energy capacity from 42.5MW in 2015 to 1363MW in 2030 (with 1094MW of on-grid capacity). This translates into 447MW of solar, 325MW of wind, 122MW of biomass/waste-to-energy, and 200MW of small-scale hydropower and wave energy.
2. Reduce the dependence on biomass as the main fuel for thermal energy applications.
3. Provide renewable energy-based decentralized electrification options in 1,000 off-grid communities.
4. Promote local content and local participation in the renewable energy industry.

This plan estimates that the capacity buildout will create a total of 220,000 new jobs and cut carbon emissions by 11 MT.[165] The REMP has a total investment need of $5.6 billion (or $460 million/year), 80% of which would come from the private sector.[166] In order to attract private sector participation, the plan stipulates that investors can receive exemptions on customs duties for imports of equipment, as well as reduced corporate income tax of 25% and other location-based incentives.[167, 168] However, currency risk and depreciation, as well as the relatively high-interest rate regime, may continue to hold back these renewable energy investment. While Ghana has the stated vision for an overhaul of its energy system towards renewables, the current suite of policies and support may still be insufficient to meet the REMP's ambitious clean energy and electrification targets.

161 https://allafrica.com/stories/202008140111.html
162 https://www.climateinvestmentfunds.org/sites/cif_enc/files/meeting-documents/srep_ip_presentation_ghana_may13_2015_0.pdf
163 https://www.pv-magazine.com/2020/02/10/new-impetus-for-ghanas-solar-ambitions/
164 http://www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf
165 https://oxfordbusinessgroup.com/news/will-renewables-expand-ghana%E2%80%99s-economy
166 https://oxfordbusinessgroup.com/news/will-renewables-expand-ghana%E2%80%99s-economy
167 https://oxfordbusinessgroup.com/news/will-renewables-expand-ghana%E2%80%99s-economy
168 http://www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf

Off-grid solutions have been folded into Ghana's REMP, such as the Mini-Grid Electrification Policy. The utilities VRA, PDS, and the Northern Electricity Distribution Company would lead mini-grid implementation and ownership, with an installation target of 86 systems by 2020 and 200 systems by 2030 (compared to around 22 systems installed today).[169] Most of Ghana's mini-grid pipeline has been funded by donors such as the World Bank and the AfDB.[170] Black Star Energy is the only private operator of multiple mini-grids in Ghana, with 17 systems deployed that serve approximately 6000 customers.[171] Although Ghana's Energy Commission drafted legislation in 2017 that authorized private companies to develop mini-grids with up to 1MW of capacity, Ghana's slow progress on attaining its mini-grid goals may reflect the difficult overall enabling environment in the country. Not only do mini-grids face the usual challenges of lack of long-term and affordable financing, but also face electricity tariffs that are below cost, which further complicates efforts to attract financing.[172]

Ghana also views energy efficiency as a critical element in the management of its energy resources. Ghana's energy efficiency targets are guided by its National Energy Efficiency Action Plan (NEEAP) 2015–2020.[173] This plan outlines the following national energy efficiency targets:

1. A reduction of 200MW–220MW in peak electricity demand by 2020. To achieve this goal, Ghana implemented a campaign to distribute 6 million compact florescent lamps in exchange for incandescent filament lamps for households in 2007. Funded with $15 million from the GEF, this program led to a reduction of 124MW in peak load requirements.[174]
2. Establishment of energy efficiency standards for appliances and buildings. One of Ghana's more successful policies was a refrigerator rebate program that encouraged trading in old fridges for more energy efficiency modules. By the end of the program in 2015, Ghana had replaced around 10,000 fridges (against a goal of 15,000) and apparently saved 400GWh of electricity in that year.[175] Ghana has also passed various laws to encourage energy efficiency in buildings, but these codes have either not entered into force nor been updated in over a decade.[176]

Part of the funding for these energy efficiency measures comes from the Electricity Demand Management Fund, which is nested under the Energy Commission. This fund accrues money from a power factor surcharge imposed on commercial and industrial customers that fail to meet a predetermined power factor threshold.[177] However, this fund has apparently not been used to great effect in supporting energy efficiency improvements.

Importantly, the Millennium Challenge Corporation (MCC) – an US foreign assistance agency – is supporting Ghana in improving energy efficiency as part of its $308 million Ghana Power Compact.[178] While this Power Compact supports multiple aspects in the power sector such as power generation energy access and strengthening of utility companies, it also includes $22 million for an energy efficiency and demand side management (EEDSM) project. This project involves developing improved or new efficiency standards for appliances, encouraging education and more efficient energy use among consumers, investing in more efficient government buildings, and exploring demand side management measures, such as converting streetlights to more efficient LED technology.[179] The Power Compact not only helps define the standards for appliances, but also supports Ghana in establishing the legislative framework that enforces them. In addition, the Power Compact helps conduct energy audits of government buildings and trains teams of energy auditors, especially since energy audits are uncommon.[180] Thus, the MCC further builds upon Ghana's efforts to enhance

169 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/PAOP-Ghana-MarketAssessment-Final_508.pdf
170 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/PAOP-Ghana-MarketAssessment-Final_508.pdf
171 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/PAOP-Ghana-MarketAssessment-Final_508.pdf
172 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/PAOP-Ghana-MarketAssessment-Final_508.pdf
173 https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_PANEE/Ghana_National_Energy_Efficiency_Action_Plan.pdf
174 https://climatestrategies.org/wp-content/uploads/2015/01/Climate-Technology-and-Development-Case-Study-Compact-Fluorescent-Lamps-CFLs-Rob-Byrne-final.pdf
175 http://www.energycom.gov.gh/files/The%20Success%20story%20of%20the%20Energy%20Efficient%20Refrigerator%20Project.pdf
176 https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_PANEE/Ghana_National_Energy_Efficiency_Action_Plan.pdf
177 http://www.energycom.gov.gh/backup-16-08-15/energy_19_2_13/downloads/200eb95d5ded42b4a159010a5baa00ef.pdf
178 https://www.mcc.gov/where-we-work/program/ghana-power-compact#:~:text=MCC%20is%20supporting%20the%20Government%20of%20Ghana%20in%20offsetting%20demand,demand%20side%20management%20measures%2C%20like
179 https://www.mathematica.org/download-media?MediaItemId={B09C8213-9032-4D44-BB5B-3B128EA39BEF}
180 https://www.mathematica.org/download-media?MediaItemId={B09C8213-9032-4D44-BB5B-3B128EA39BEF}

energy efficiency for the country and provides dedicated funding for this purpose.

Climate Smart Agriculture Context

Ghana's agriculture sector is central to its economy, but is also highly exposed to climate change. Given that agriculture provides one of the main sources of employment in Ghana, ensuring agricultural resilience is crucial to maintaining continued economic growth and social stability. Ghana's agricultural products are composed of both cash crops and food crops. Cocoa, rubber, oil palm, coffee, cotton, and tobacco are the predominant cash crops, while cassava, yam, maize, and plantains are the main food crops.[181] In terms of farm size, around 85% of farms are less than two hectares, with 60% of all farms less than 1.2 hectares in size.[182] These figures demonstrate the outsize role of smallholder farmers in Ghana's agricultural sector. Out of all the land that is under cultivation, only 19% is irrigated, meaning that most of these smallholder farmers are constantly threatened by drought.[183] In keeping with Ghana's Long-term National Development Plan, CSA is seen as a way to help the agriculture improve its resiliency to future economic and natural shocks.

Forestry also plays an important role in Ghana's economy. Not only does forestry contribute to 4% of Ghana's GDP, it employs about 120,000 Ghanaians in its formal sector and around 780,000 Ghanaians in its informal sector.[184] In addition, the timber industry is the fourth largest foreign exchange earner after minerals, cocoa, and oil exports. However, Ghana is experiencing one of the highest rates of deforestation in the world. Between 1990–2016, Ghana lost nearly 80% of its forest resources due to illegal logging activity, mainly stemming from land clearing for cocoa plantations, as well as from illegal small-scale mining activities.[185] Addressing the deforestation issue has the potential to strengthen Ghana's natural capital, as well as help achieve Ghana's climate change goals by avoiding future emissions.

The Ministry of Food and Agriculture is the main policymaking body for agriculture in Ghana, including CSA practices. In order to help the ministry, establish an implementation framework for the effective development of CSA, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) prepared a working paper – the National Climate-Smart Agriculture and Food Security Action Plan of Ghana (2016–2020).[186] This National Climate-Smart Agriculture plan represents the Food Security and Agriculture portion of Ghana's overarching National Climate Change Policy. This plan recognizes that the sustainability of natural resources, including land, forest, water and genetic biodiversity is significantly influenced by agricultural practices, and that sustainable agricultural systems are crucial for poverty alleviation.[187]

The expected outputs from the implementation of the Action Plan will include the following:

- Climate-resilient agriculture and food systems for all agro-ecological zones;
- Enhanced expertise for climate-resilient agriculture at all levels, e.g. researchers, agriculture extension officers and farmers;
- Policy makers sensitized on climate-smart practices in agriculture;
- Multi-sectoral institutional mechanisms that support climate-smart agriculture (policy and finance).

In particular, the plan groups Ghana's land area into three agricultural land types and recommends specific policy prescriptions for each one: water conservation and efficient irrigation systems for the Savannah Zone; the development of livestock production systems for the Transition Zone; and development and promotion of climate-resilient cropping systems for the Forest Zone.[188] The plan also lists policy prescriptions such as developing institutional capacity for CSA research, promoting climate-resilient cropping systems, supporting climate adaptation for fisheries, risk transfer systems (i.e. insurance), and improved post-harvest management.[189]

181 http://www.fao.org/ghana/fao-in-ghana/ghana-at-a-glance/en/
182 http://www.fao.org/ghana/fao-in-ghana/ghana-at-a-glance/en/
183 http://www.fao.org/ghana/fao-in-ghana/ghana-at-a-glance/en/
184 https://www.gipcghana.com/invest-in-ghana/sectors/75-forestry/313-investing-in-ghana-s-forestry-sector.html
185 https://www.weforum.org/agenda/2019/05/ghana-is-losing-its-rainforest-faster-than-any-other-country-in-the-world/
186 https://cgspace.cgiar.org/bitstream/handle/10568/69000/http://CCAFS_WP139_CSA_Ghana_nov.pdf
187 http://extwprlegs1.fao.org/docs/pdf/gha169288.pdf
188 http://extwprlegs1.fao.org/docs/pdf/gha169288.pdf
189 http://extwprlegs1.fao.org/docs/pdf/gha169288.pdf

In terms of implementing these policies, access to finance is consistently cited as the main barrier that inhibits growth in the agriculture sector.[190] Ghana does not have a dedicated facility or financial support program specifically for CSA practices, and many agriculture subsectors (with the exception of cocoa) lack strong government value chain support, or programs designed to increase productivity and climate resilience. However, Ghana does have various other facilities that provide funds for agriculture-related uses. One of the main providers of credit is the Agricultural Development Bank, which provides around 85% of institutional credit to Ghana's farmers.[191] Rural and community banks can also help provide additional sources of finance, with a particular focus on working capital loans. In 2010, the Alliance for a Green Revolution in Africa (AGRA), working with Danish donor DANIDA, created a loan guarantee program to support agriculture lending at commercial banks, including Stanbic Ghana, UT Bank and Sinapi Aba Trust. Under this program, for every commercial bank loan to a qualifying agriculture projects, AGRA will guarantee 20% of the loan in the first year, 15% during the second year and 10% between the third and fifth years. The program intends to reach at least 5000 smallholder farmers with total lending of $25 million.[192] However, some developers have struggled to access the program, citing complicated eligibility requirements and long processing times.

DANIDA also established the Rural Development Fund (RDF) in collaboration with Ghana's Ministry of Finance to offer loan facilities to financial institutions (FIs) for the purposes of lowering the cost of finance for Micro, Small, and Medium Enterprises (MSMEs). The idea is to offer lines of credit and loan guarantees to entities such as universal banks, rural banks, and other FIs to provide liquidity support and de-risk lending to the agriculture and renewable energy sectors.[193] Specifically, the RDF offers lines of credit for up to five million GHS for five years at preferential interest rates in order to finance loans for agribusiness; renewable energy; microfinance; manufacturing; services; commerce; and other types of rural MSMEs related to agriculture or renewable energy.[194, 195] The RDF can also cover 50% of losses on term loans and loan portfolios related to the agriculture or renewable energy sectors.[196]

Separately, USAID initiated the 5-year program called Financing Ghanaian Agriculture Project (USAID-FinGAP) in 2013.[197] The program was designed to challenge the traditional view of agriculture as inherently risky and perceptions of small and medium-sized enterprises in agriculture as an unprofitable market segment. The FinGAP program focused on several market interventions, including: "pay for results" grants to participating FIs, business advisory and technical assistance support, support for the use of alternative financing (e.g. Ghana Stock Exchange), and risk mitigation tools (e.g. subsidizing the cost of guarantees from e.g. EXIM bank).[198] At the end of the five year program, there was a reported 344% increase in the number of farmers receiving loans, as well as $260 million in new financing unlocked.[199]

In the forestry sector, Ghana has two main initiatives targeted at supporting sustainable forestry projects: the Ghana Forest Investment Programme (GFIP) supported by the Climate Investment Funds (CIF), and the National Forest Plantation Development Programme (NFPDP). The GFIP offered $50 million (disbursed through multilateral development banks e.g. World Bank, AfDB etc.) to fund three project areas:[200]

1. Enhancing natural forest and agro-forest landscape: $30 million grant-based initiative managed by the World Bank, with a focus on capacity building, policy reforms and pilot projects.
2. Engaging local communities in reducing emissions from deforestation and forest degradation (REDD+): $15 million grant-based initiative managed by the African Development Bank, focused on restoration of degraded lands, promoting climate smart and environmentally responsible cocoa and agroforestry

190 https://thepalladiumgroup.com/news/Transforming-the-Agrifinance-Market-System-in-Ghana
191 https://www.modernghana.com/news/908123/financing-agriculture-in-ghana-the-plight-of.html
192 https://www.modernghana.com/news/908123/financing-agriculture-in-ghana-the-plight-of.html
193 https://www.rdfghana.com/services/
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195 https://www.rdfghana.com/faq/
196 https://www.rdfghana.com/services/
197 https://www.modernghana.com/news/908123/financing-agriculture-in-ghana-the-plight-of.html
198 USAID Financing Ghanaian Agriculture Project (USAID FinGAP). Rick Dvorin. May 10, 2018
199 https://thepalladiumgroup.com/news/Transforming-the-Agrifinance-Market-System-in-Ghana
200 http://mlnr.gov.gh/index.php/programs-projects/ghana-forest-investment-program-fip/

systems, as well as promotion of alternative livelihoods and capacity building

3. Engaging the private sector in REDD+: $10 million initiative by IFC. This project was later discontinued by IFC due to the private sector being unable to meet the fiduciary requirements of the IFC. The allocated budget was then shifted to a concessional loan taken by the government of Ghana to support private sector investment in plantations.

The NFPDP is carried out by Ghana's Forestry Commission, and aims to restore forest cover on degraded lands through increased tree plantations, reduce the wood supply deficit in the country, and enhance food security, all the while creating employment to combat rural poverty.[201] This program is supported by an accompanying Forest Plantations Development Fund.[202] The Fund was established in 2002, but has suffered from low levels of uptake and awareness.[203] As of 2014, the program had supported an estimated 180,000ha (80% public sector, 20% private sector) of forest plantations, with a focus on tree species such as teak, cedrela and eucalyptus.

Industrial and Manufacturing Context

The industrial and manufacturing sector forms an important part of the Ghanaian economy, representing 10% of GDP as of 2019.[204] As part of Ghana's development strategy, the government is trying to both upgrade and diversify its industrial base, which would also create new jobs. One of the key pillars of this effort is the One District, One Factory (1D1F) plan. Initiated in 2017 by the current Ghanaian administration, this plan aims to establish at least one medium-to-large scale enterprise in each of Ghana's 216 districts.[205] The 1D1F plan is slated to create between 1.5 to 3.2 million jobs by the end of 2020.[206] The private sector would supposedly lead a nationwide industrialization program to make the most of local resources in manufacturing products, especially in the aluminum, pharmaceuticals, agricultural processing, textiles and apparel sectors.[207] These projects would receive financial support from both the state and through commercial actors. For example, Ghana's Export-Import Bank received $300 million from the Export-Import Bank of the United States to be channeled towards helping 1D1F projects import machinery, while the Ghana Commercial Bank sponsored the Kete-Krachie Timber Recovery factory with its own funds.[208], [209] Both sources of support would invest through equity using both long and short term trade financing and asset financing.[210] As of early 2019, 79 projects have already received support, while another 35 were undergoing credit appraisals.[211]

The agro-processing sector is one of its major beneficiaries of the 1D1F plan. In 2019, nearly 102 out of 183 projects slated for commission in that year were related to the agro-processing sector, especially for pineapples, rice, maize, and soybeans.[212] Given that the agro-processing industry in Ghana is not well advanced as a result of small firm sizes and inefficient technology, the 1D1F plan appears to have potential to greatly increase the scale and scope of this sector, with potential knock-on effects for both climate-smart agriculture and electricity demand in Ghana.[213] However, the 1D1F plan does not explicitly mention any commitment to implementing projects in a green or sustainable manner.

Although energy does not appear to have a prominent role in the 1D1F plan, a draft of the Renewable Energy Master Plan calls for greater domestic manufacturing of renewable energy technologies (RET) by extending tax breaks for the import of critical components and supporting existing RET manufacturing capabilities.[214] Ghana also apparently received support for renewable energy technology

201 https://www.fcghana.org/page.php?page=291&section=28&typ=1
202 https://www.tropenbos.org/news/more+than+half+of+ghanaian+tree+plantation+farmers+unaware+of+forest+plantations+development+fund
203 https://www.tropenbos.org/news/more+than+half+of+ghanaian+tree+plantation+farmers+unaware+of+forest+plantations+development+fund
204 https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=GH
205 https://oxfordbusinessgroup.com/overview/capacity-building-financial-stability-and-openness-international-investment-support-burgeoning
206 https://oxfordbusinessgroup.com/overview/capacity-building-financial-stability-and-openness-international-investment-support-burgeoning
207 http://1d1f.gov.gh/
208 https://www.ghanaweb.com/GhanaHomePage/business/300m-for-1D1F-742212
209 https://www.gcbbank.com.gh/news-from-gcb/514-gcb-funded-1d1f-factory-commissioned
210 http://1d1f.gov.gh/wp-content/uploads/2017/11/DISTRICT-INDUSTRIALISATION-FOR-JOBS-WEALTH-CREATION.pptx
211 https://oxfordbusinessgroup.com/analysis/factory-force-government-incentives-encourage-private-sector-build-value-added-processing-facilities
212 https://www.ghanaweb.com/GhanaHomePage/business/Agro-processing-projects-lead-1D1F-coming-on-stream-this-year-781581
213 https://www.wider.unu.edu/sites/default/files/wp2017-9.pdf
214 http://energycom.gov.gh/rett/phocadownload/remp/Draft-Renewable-Energy-Masterplan.pdf

transfers from China under a UNDP program from 2014–2018.[215] It remains to be seen whether this RET manufacturing drive can help develop Ghana's renewable energy sector in the near future.

Green Urbanization and Clean Transport Context

Ghana does not have a strong enabling environment for green urbanization and clean transport. Although the Ministry of Local Government and Rural Development established a National Urban Policy and the Ministry of Transport established a National Transport Policy, neither of these policies place strong emphasis on climate change issues. Although the National Urban Policy has identified the importance of establishing green belts and protecting wetlands, there has not been a strong policy push on these aspects.[216] The same situation applies to the National Transport Policy, which recognizes the challenges of vehicular emissions and inefficient fuel use, but has not implemented a commensurate suite of policy prescriptions or program support.[217] At the same time, Ghana is already experiencing the effects of rapid urbanization, including congestion, unregulated urban expansion, limited access to services and affordable quality housing, and institutions unable to cope with the rapid transition.[218] Both of these policies are currently undergoing review and revisions, and may set the stage for increased investment opportunities (including PPP structures) in the future. Green urbanization and clean transport will be an increasingly important sector, especially in terms of emissions and economic growth, as Ghana continues to urbanize and grow its economy. Therefore, this sector remains a crucial area for additional research and support in the future. Nevertheless, primary research details on the progress under Ghana's National Transport Policy and National Urban Policy is beyond the scope of this report.

II. PRIORITY SECTORS

The priority sectors identified as areas of focus for green finance solutions include energy, agriculture, and industrial and manufacturing. Each of these areas is linked to existing government initiatives or policies that seek to bolster the current state.

As for the other five countries included in the scope of this report, the following criteria were utilized to identify these priority sectors:

1. Sectors with significant potential to reduce CO_2 emissions and have the potential to support the continued efforts of the country's progress towards meeting NDCs and SDG commitments;
2. Potential for project pipeline has been identified through the initial market scoping;
3. Significant direct or indirect contributor to the country's Gross Domestic Product (GDP); and
4. A financing gap exists within the market whereby catalytic green capital is needed or is deemed to be of great importance to make progress towards the country's NDCs and development goals.

Energy as a Priority Sector

Despite the fact that Ghana is in a unique position relative to its continental peers with short-term excess power capacity (on-grid only), the country's actual power supply rarely surpasses 60% of its installed capacity.[219] One of the key reasons for this is the country's exposure to climate variability which has changed rainfall and affected the capacity of hydropower plants. With the anticipated increase in electricity demand as linked to projected population growth, the current 'excess power capacity' will be short-lived. Given the anticipated impacts of climate change on Ghana's energy sector and the macroeconomy more broadly, the government has a near-term opportunity to be proactive in a transition to a clean energy economy. The integration of renewable energy to stabilize the supply of electricity will also support the government's vision of building a larger domestic manufacturing sector that is resilient into the future.

The government's policies and development plans seek to address several of the outstanding sector issues. Specifically, the Government of Ghana is focused on:

1. Improving rural electrification rates, which are still low at 50%;
2. Achieving climate targets and a strong interest in reducing the country's dependency on fossil fuels;

215 https://info.undp.org/docs/pdc/Documents/CHN/ProDoc%20-%2091276.pdf
216 http://www.ghanaiandiaspora.com/wp/wp-content/uploads/2014/05/ghana-national-urban-policy-action-plan-2012.pdf
217 https://link.springer.com/article/10.1007/s42452-019-1215-8?shared-article-renderer
218 https://www.worldbank.org/en/news/opinion/2015/05/14/rising-through-cities-in-ghana-the-time-for-action-is-now-to-fully-benefit-from-the-gains-of-urbanization
219 https://www.usaid.gov/powerafrica/ghana

3. Reducing electricity prices in the country as they remain amongst the highest in the region (and it is acknowledged that renewable energy integration into the energy mix is a way to lower O&M costs); and
4. Identification of sectors that can improve employment opportunities in the country.

Ghana's Renewable Energy Master Plan (REMP) aims to increase the proportion of renewable energy in the national energy generation mix to 1,364MW, of which 1,095MW will be grid connected systems by 2030.[220] Within this target is the country's goal of providing decentralized renewable energy electrification options to 1,000 off-grid communities.[221] The plan emphasizes solar energy and to a lesser extent other renewable energy technologies, but excludes hydropower projects greater than 100MW.[222] A core attribute of the plan is new job creation – the rollout of new installed capacity is expected to create 220,000 new jobs and will cut carbon emissions by 11 MT.[223] Total investment required to achieve the REMP's goals is estimated at approximately $5.6 billion, of which 80% is expected to come from the private sector.[224]

Mini-grids are ideal for islands and lakeside communities which have populations greater than 500 people and are unlikely to be connected to the national grid because of the high costs associated with grid expansion and poor return economics for the national utility. Ghana is suitable for solar energy, which has been prioritized by the government to develop a more diversified energy mix. The country also has suitable conditions for wind generation, especially along the coast.

Complications & Opportunities in the Energy Sector

There are numerous challenges that contribute to the slow uptake of renewable energy development in Ghana. Some of the issues in the sector include: [225]

- High cost of financing;
- Lack of access to longer-term finance alternatives;
- Lack of or insufficient incentives such as tax rebates;
- Grid connection constraints and lack of grid capacity;
- Volatility of the local currency;
- Technical knowledge limitations to operate and maintain renewable energy technologies.

- **High Cost of Financing and Lack of Access to Longer-term Finance Alternatives** – Interest rates for debt products in Ghana range from 16% to 25% per annum and usually are not extended for more than a five-year period. These terms are unfavorable for project finance transactions that require longer tenor (to reduce refinancing risk for the developer) and lower borrowing rates (to achieve positive economics for project developers). Taking mini-grid projects as an example, these projects typically only breakeven after ten years and hence would require better financing terms than what is currently available to cover this period at a minimum.

  At the beginning of the current administration's term, the government did intervene and lowered rates by approximately five percentage points. However, this was still insufficient to stimulate growth as financial institutions have alternative investment options that result in more favorable risk return trade-offs.

  International donors and development organizations have attempted to spur growth in renewable energy by providing loans of five to seven years and at concessional rates. But the requirement for co-financing has been identified as a key market constraint. Typical programs have included a 50% to 70% financing match requirement, which means the project developer would likely need international financing connections or a local bank to provide capital; the latter of which has a low probability. For smaller or local developers, access to international financing is not necessarily viable and hence excludes a segment of private developers from participating in the market. There is also arguably a lost opportunity for local financial institutions, but given the dynamics of the banking sector in Ghana and prudential regulations, potential is low for local banks to play a large financing role in the immediate future without significant support.

220 http://www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf
221 http://www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf
222 https://oxfordbusinessgroup.com/news/will-renewables-expand-ghana%E2%80%99s-economy
223 https://oxfordbusinessgroup.com/news/will-renewables-expand-ghana%E2%80%99s-economy
224 https://oxfordbusinessgroup.com/news/will-renewables-expand-ghana%E2%80%99s-economy
225 https://link.springer.com/article/10.1007/s10708-019-10132-z?shared-article-renderer

- **Government Incentives** – With the launch of the REMP in 2019, the Ghanaian government acknowledged the need to introduce incentives into the market to attract private sector actors. As part of the plan, several incentive programs were enacted that focused on the rollout of substantial tax reductions, exemptions on import duties and value-added tax through to 2025 on materials, components, machinery and equipment (only permissible if domestic sourcing is not feasible); and import duty exemptions on plant and plant parts for electricity generation from renewables.[226]

  It is still too early to determine if these incentives are adequate in nature or scale. The roll-out of the incentives, although announced in 2019, were only effective commencing in 2020. The convergence of the COVID 19 pandemic and global recession have likely caused delays and resulted in less international investor interest in emerging markets.

- **Grid Connection Constraints and Lack of Grid Capacity** – The existing grid infrastructure requires improvements in order to connect new renewable generation capacity. Operational maintenance has been poor due to constrained finances and modernization of the grid is required for the country to achieve its vision of becoming a more industrialized middle-income country. Ghana experiences issues with power supply given "changing hydrological conditions, inadequate fuel supplied and dilapidated infrastructure," which will negatively affect the economy and slow development plans.[227]

  In January 2020, the government signed a $250 million MOU through GRIDCO with Siemens "to extend Ghana's power transmission infrastructure, improve the country's grid capacity and stability, as well as enable and expand a stable power export to neighboring countries in the West African Power Pool".[228] This is an important step, but given the sector's financial deficit it is likely that ongoing support will be required. Further research on the geographic areas that will be covered as part of the expansion and upgrades is needed, particularly to determine plans for roll-out of grid extension in support of rural electrification goals. It is likely that this MOU will not support electricity connection for lake and island communities, and hence off-grid solutions are still a necessity in the market. However, the MOU does positively signal that there could be growth potential in the future for more IPPs.

- **Volatility of Local Currency** – Most energy projects are costed in terms of USD. Given that much of the financing for these projects is secured from international financiers and partners, foreign exchange risk is a concern for stakeholders. The volatility of the Cedi is predominantly driven by the country's fiscal challenges (whereby investors lack confidence in the government's ability to stay within targeted expenditure limits), and the country's risk of "overshooting fiscal deficit and debt from arrears." Ghana's budget deficit continues to worsen as government spending increases to bailout the financial sector and liabilities in the energy sector. Lastly the central bank has struggled to build foreign reserves due to the current account deficit, which has added to the Cedi's weakness. Dependence on hard currencies, such as the USD, may subside in the medium to long-term as the country ramps up its own domestic manufacturing capabilities. However, in the interim as the country remains a net importer of goods from staple crops to materials and equipment for infrastructure projects, this issue will remain a weakness and challenge.[229]

- **Limitations in Technical Knowledge for Renewable Energy Projects** – Across certain market participants and sectors, Ghana faces a lack of technical capacity and specific knowledge of renewable energy technology and associated project risks. Local financial institutions have limited in-house capacity to assess the risk of such projects and limited knowledge of the different renewable energy technologies. This will likely result in poorly structured transactions and in financing terms that do not fully match project requirements. In addition, the high upfront capital expenditure associated with renewable energy projects is difficult to overcome if the right types of sovereign financing alternatives are not made available in the market. This challenge is compounded by the lack of capacity amongst stakeholders to understand the longer-term benefits of renewable energy projects. The

226 https://oxfordbusinessgroup.com/news/will-renewables-expand-ghana%E2%80%99s-economy
227 https://www.usaid.gov/powerafrica/ghana
228 https://constructionreviewonline.com/2020/01/ghana-signs-us-250m-power-infrastructure-upgrade-deal/
229 https://www.bloomberg.com/news/articles/2019-12-05/there-s-no-escaping-quarter-century-losing-run-for-ghana-s-cedi

low number of successful demonstration projects in Ghana has not helped to build the case, and has most likely also played some role in the slow transition that is observed.

Potential Interventions for the Energy Sector

Based on the market challenges and dynamics, the existing policy and regulatory initiatives, and the suite of potential interventions needed, the energy sector in Ghana is considered a strong candidate for a green finance facility and a national climate change fund. The following list offers some potential market interventions to consider in the context of a deeper market analysis and concept development.

- **Concessional Capital and Extended Tenor** – In terms of financial products, concessional capital or blended finance structures that pool public and private funds could address the high cost of capital issue. The tenor of the underlying capital support is crucial and should target a term of greater than eight years accompanied with flexible terms.

- **Changes in Co-financing Requirements** – Although there are likely good intentions and a strong rationale for requiring co-financing, given the difficulties of accessing local financing and in the current risk environment, this type of donor eligibility criteria will either have to be 1) relaxed to some degree, 2) converted to a requirement that is staggered over time (potentially tied to milestones), or 3) the financing will have to be accompanied by a guarantee mechanism.

- **Technical Assistance** – Technical assistance and capacity building programs will help to establish a stronger foundational knowledge of renewable energy projects and could help to accelerate the attainment of the targets set out in the REMP. These programs should be administered for a variety of stakeholders across all levels of government (i.e. national, provincial, district, and administrative posts).

- **Project Preparation Facility** – Stakeholder interviews identified a need for a project preparation facility. This is especially true for the smaller scale projects that are not readily deemed commercially viable. Financial support with pre-feasibility and feasibility studies for off-grid projects in rural areas of the country could provide the necessary assistance for small private developers to overcome initial upfront costs in project design and scoping.

Potential Host Institutions for the Energy Sector

Several organizations have been identified as potential host institutions or partners for a new Green Bank or NCCF. These include:

- Ghana Infrastructure Investment Fund
- National Development Bank (proposed)
- ARB Apex Bank
- Ghana Investment Promotion Centre (GIPC)

- **Ghana Infrastructure Investment Fund** – The Ghana Infrastructure Investment Fund has a government mandate to invest in infrastructure projects across the country. It was seeded with $325 million of investment capital from the government but operates autonomously. The investment vehicle can invest across asset classes – debt, equity, or mezzanine debt. The GIIF was also approved by the AfDB for a $85 million credit line, which includes a $400,000 technical assistance facility, which is to be used to target climate projects. To date, the organization has invested in large ticket projects, but acknowledges the country's need for off-grid and mini-grid development, and that there is a potential role for GIIF to play in growing this sub-sector.

  With the GIIF seeking to attain GCF accreditation, it could serve as a potential partner or host institution. Technical assistance and capacity building will be needed to support work in renewable energy projects, as this has not been a core focus for the organization, especially with regard to off-grid installations.

- **National Development Bank** – In 2019, Ghana announced that a new National Development Bank (NDB) would be launched in 2020 with initial funding of $250 million secured from the World Bank to start operations.[230] The envisioned mandate of the new bank is to "refinance credit to industry and agriculture as a wholesale bank; and also provide guarantee instruments to encourage universal banks to lend to these specific sectors."[231] The NDB will seek to be globally rated, which will facilitate access to the

230 https://www.ghanaweb.com/GhanaHomePage/business/Government-to-set-up-National-Development-Bank-in-2020-798857

231 https://www.ghanaweb.com/GhanaHomePage/business/Government-to-set-up-National-Development-Bank-in-2020-798857

global capital markets. One of the main objectives for the NDB will be to provide long tenor funding at more competitive rates to ensure that the key sectors of industry and agriculture have an opportunity to expand. There is anticipated overlap between the NDB's mandate and the government's 1D1F initiative.

If the NDB is successfully launched, even if on a delayed schedule, further investigation into hwo the NDB's mandate can include clean energy, climate mitigation and sustainable economic growth projects should be conducted. Particularly given the NDB's objective of cost competitive lending combined with some form of guarantees – these are two areas of specific interest to potentially leverage.

- **ARB Apex Bank** – The ARB Apex Bank serves as a "mini" central bank for the Rural and Community Banks, known as RCBs.[232] As such, the entity's main function is to provide services to RCBs, including technical, managerial and financial support. ARB Apex Bank was formally registered in 2000 and has since then developed strong ties with the approximately 150 RCBs within the network that service rural areas across the country.

  ARB Apex Bank has been involved in a number of international partnerships, such as the one with Oikocredit, where financing was passed through ARB Apex Bank to lend to rural banks for loan disbursements. Oikocredit and other organizations, such as UNICEF, have worked with ARB Apex Bank to promote financial inclusion and to implement development projects – support of rural banks is seen as critical to ensuring that credit is made available to smallholder farmers, small businesses, and for rural development projects.

  To date, the only green energy project or program that the ARB Apex Bank has been engaged in was the supply of solar energy supplies for off-grid communities in Northern Ghana, a program that was financed through the World Bank. There has been no significant push for green financing programs that include appropriate incentives for RCBs, and this is readily acknowledged as needed by ARB Apex Bank. With the high-touch relationships that ARB Apex Bank and the RCBs have in the rural communities, working with or through ARB Apex Bank could scale the reach of any Green Bank or NCCF especially as it relates to expanding off-grid renewable energy technology adoption.

- **Ghana Investment Promotion Centre** – The Ghana Investment Promotion Centre is tasked with promoting investment across sectors in the country. The GIPC is part of the Office of the President and hence plays a meaningful role in how private sector can be engaged for the development of the energy sector.

Agriculture as a Priority Sector *(including Agro-Processing)*

The agriculture sector is one of Ghana's larger GDP drivers, is a key employer in the country, and a critical source of foreign exchange generated from exports. Consequently, the government has already established important policy frameworks to spur the country's agricultural production. However, agriculture and land use change generate a sizeable proportion to the country's GHG emissions and the sector is also extremely vulnerable to climate change. For these reasons agriculture is highlighted as a priority sector.

As the Ghanaian government continues to emphasize the importance of the country's agriculture industry, there is an opportunity to build a more resilient ecosystem through climate smart agriculture. Water conservation and irrigation have already been identified as crucial interventions for the Savannah areas of the country. There is also a link between agriculture and industry. The introduction of Ghana's 1D1F initiative has laid the foundation for a more interconnected economy, where a greater percentage of processing value will be retained domestically.[233] The relationship between agriculture and industry through agro-processing has been acknowledged by even the Agricultural Development Bank (ADB). In parallel to the launch of 1D1F, the ADB announced that it will support farmers with the necessary financing to companies that are supplying raw materials to factories under the government's 1D1F initiative.

As mentioned earlier, although there is no existing component of the 1D1F initiative that focuses on the integration of green technologies, there is an opportunity to leverage ADB's interest in the area to promote CSA practices, such

232 https://www.arbapexbank.com/

233 https://www.myjoyonline.com/business/economy/governments-investment-attraction-initiatives-spring-up-1d1f-industrial-enterprises/

as efficient irrigation which could support improved yields and farm productivity.

Agro-processing as a Priority Sub-Sector

Under the umbrella of the industrial and manufacturing sector is the government's launch of the 1D1F policy. The initiative has a strong emphasis on the agro-processing industry, which has received attention from agricultural focused financing institutions such as the Agricultural Development Bank. In tandem with the launch of 1D1F, senior management at ADB have noted that they would direct capital to support the outgrower farmers involved in the supply chain of 1D1F companies.

The relationship between the industrial and agricultural sector as highlighted through 1D1F represents an opportunity for a new program to scope a complementary component that seeks to promote and integrate improved agricultural practices into the existing framework. As noted earlier in the report, given the lack of financing made available directly to farmers and across the agricultural sector, the fact that farmers now have an opportunity to be connected to a larger value chain could help to mitigate any associated credit risk.

Complications & Opportunities in the Agricultural Sector

The agricultural sector's contribution to the Ghana economy has declined over time, and the issue has been exacerbated by climate variability. Although the country's government has tried to support farmers with access to credit, and inputs and outputs, a large resource gap still exists. Access to financing and to appropriate financial products represents the biggest challenge, including:

- Financing needs are too small for conventional lenders or commercial banks;
- Risk profile of agricultural borrowers, particularly farmers, are considered too risky;
- Agriculture as a sector is perceived to generate low returns or as unprofitable;
- High interest rates and capital intensity; and
- Time lapse between CSA adoption and realization of benefit is seen as long and risky by farmers.

- **Access to Finance** – The agricultural sector is perceived to be high risk and to have low profit margins. Much of this stigma is driven by a lack of capacity within commercial banks to structure appropriate financing packages and by limited availability of financial products to help mitigate the risks that do exist.

  The challenge that develops in the ecosystem under this dynamic is that when banks do offer financing alternatives to agricultural companies or smallholder farmers, the terms are unfavorable for the borrower and not financially feasible. Unfriendly borrower terms have also been driven by the fact that loan size requirements are typically small and hence conventional financiers have continued to prioritize other larger and more profitable projects.

  Access to capital has been a major constraint in the market and has resulted in a lack of access to farming inputs, including technology to mechanize processes that could improve agricultural production and improve incomes.

  In addition to the general market constraint of access to finance, in many cases upfront capital requirements is another primary hurdle for smallholder farmers and agricultural companies to overcome. Operating cash flows often do not permit for sizeable investments, such as acquiring new irrigation systems, and leads to low adoption of improved farming methods that could be beneficial over the longer term for the individual and the environment.

- **High Cost of Funds** – As mentioned earlier in the report, the banking sector in Ghana is shallow and there is limited capital circulating within the system to adequately support the country's economy and related financing needs. Despite the country's central bank maintaining the monetary policy rate at 14.5%[234], financial institutions in Ghana have continued to lend at rates of 20+% per annum. For the agriculture sector, given the perceived elevated risk, it is not uncommon for rates to surpass 30% per annum.

- **Transition Periods** – There is ample awareness amongst government stakeholders of the negative implications that climate change has and will continue to have on the agricultural sector in Ghana. Evidence of this is apparent in the policy focus of the National Climate-Smart Agriculture and Food Security Action Plan of Ghana (2016-2020).

234 https://tradingeconomics.com/ghana/interest-rate

With clear plans outlined for water resource management and efficient irrigation systems, the largest missing component at this time highlights an earlier point made regarding the lack of financing available for the sector. Any transition that is tied to the adoption of CSA practices will take time to yield benefits, whether that be the shift to new crop varieties, intercropping, or moving to solar powered water pumps for irrigation. Through these periods, borrowers will need access to financial products that have longer tenors, are innovative in nature with principal and interest payments that are flexible, and that provide some form of grace period. This so called 'transition capital' will be critical to seeing a permanent shift from the use of conventional farming techniques to methods that seek to build sector wide resiliency.

Further research into the specifics of constraints that have muted the growth of the sustainable agro-processing industry is required. From initial stakeholder feedback, many of the same complications noted in the Agriculture as a Priority Sector section are likely applicable to agro-processing.

Potential Interventions for the Agricultural Sector

- **Incentives to Local Banking Sector** – With the major constraints to the sector's sustainable growth revolving mainly around financing, a critical problem to solve is how to incentivize financial institutions to lend into the sector at reasonable rates and on practical terms. Credit enhancements, such as guarantees may be useful in certain circumstances, but this tool does not address the problem of limited liquidity in the market nor does it resolve the issue of the high borrower interest rates. Thus, concessional capital would be a valuable intervention to help expand the market. Another aspect to be considered for any guarantee program is the ease of accessibility to guarantee protection if and when it is needed. It has been noted is that banks intentionally limit their deployment of funding because the process of accessing the guarantee payment is onerous in practice. Although rural banks are well positioned to direct capital to the agriculture sector given their deep relationships within rural communities and breadth of their footprint, they have still illustrated risk averseness to agriculture lending as well.

- **Technical Assistance** – Credit enhancements and concessional capital should be coupled with technical assistance and capacity building for the banks that are underwriting the loans. There have been cases cited where the benefits of reduced funding costs for the banks are not passed through to the borrower. To address this, rigorous monitoring of the flow of funds and lending terms should be established.

- **Appropriately Scaled Programs** – The design of any new program should also take into account the fact that solutions need to be very localized in nature and may need to be implemented on a smaller scale. Furthermore, the critical importance of structuring financing so that they are accommodative for transition periods is key. Criticisms of certain development programs have come to the fore as lackluster results have only led to farmers becoming overindebted with limited improvements in terms of productivity and incomes.[235]

- **Agro-processing Sub-sector: Integration with Renewable Energy** – Under the existing design of 1D1F, there is no stated goal or plan to integrate renewable energy with climate smart agriculture. Hence, any catalytic financing program that is designed should focus on identifying specific channels for development and partners to determine the best mode for integration of these two sectors.

- **Agro-processing Sub-sector: Concessional Financing** – As a preliminary step, a recommended intervention is to work with ADB to design a pilot program that provides concessionary financing to farmers to incentivize them to adopt CSA practices. Given the numerous studies that have been conducted and that highlight the positive impacts of CSA on farm production, there are likely three benefits that could come out of such a pilot: (i) outgrower farmers could improve their agricultural production to feed into 1D1F agro-processing companies, thus increasing farmer incomes, (ii) farmers that are currently not contract farmers may be able to increase production to the point where they can graduate and become a part of a larger value chain, and (iii) promotion of CSA practices will support the growth of the agricultural sector in an environmentally sustainable way whilst also supporting the country's ambitions of increasing revenues from

235 https://phys.org/news/2020-08-africa-food-yields.html

agricultural exports. A related option would be to work through ARB Apex Bank to design a renewable energy financing program for factories that are developed in rural districts of the country. This could encourage factories to be established in more remote locations that are not connected to the grid.

- **Agro-processing Sub-sector: Demonstration projects** – Work with organizations such as ADB and ARB Apex Bank to design the initial demonstration projects that can promote renewable energy and CSA. In addition, because of the intersection between industry, agriculture, and energy it is recommended that engagement with representatives from the Ministry of Trade and Industry, Ministry for Local Government and Rural Development, and GIPC all be included in dialogues to design appropriate programs.

Potential Host Institutions for Climate Smart Agriculture

As noted earlier, there are capacity gaps across stakeholders in the agriculture sector especially as it relates to CSA practices and finance modalities. The two existing organizations that potentially could serve as partners or host institutions for a Green Bank facility or NCCF are the:

- Agricultural Development Bank
- Rural Development Fund
- National Development Bank (discussed earlier)

The main contrast for these two options is the size of projects and borrowers that they finance, and the financial products that they offer. These differences also make the organizations complementary. Although both organizations have deep local knowledge of the rural areas in Ghana, an alternative to working with an existing institution is to establish a new institution. The regulatory frameworks are in place to support this and hence this route should be explored as having potential merit.

- **Agricultural Development Bank** – The Agricultural Development Bank (ADB) is one of the key players in the sector given its role as the largest institutional credit provider to agriculture. ADB is a universal bank that offers a range of banking services across sectors but has a specific developmental focus on agriculture. The Government of Ghana owns 32.3% of the bank. From the initial research conducted, the ADB does not offer any financial products that are specifically designed to promote or finance climate smart agriculture. A potential reason for this could be lack of knowledge about technologies or understanding of risks related to financing such projects. However, these issues could be addressed through technical assistance or capacity building program. The ADB is well positioned given its existing mandate and government ownership to serve as an intermediary to direct financing to CSA practices. It is also better capitalized relative to the RCBs, and hence may be better positioned to expand its product offerings (in terms of its staff capacity, flexibility to structure more complex deals, etc.).

- **Rural Development Fund** – The Rural Development Fund also works closely with local financial institutions. With the RDF's broad mandate to provide lines of credit to participating rural FIs, leveraging their existing effort and delving into their business model will be useful to inform the design of new financing mechanisms that seek to support the growth of small businesses working in the agriculture and renewable energy sectors in rural areas. The RDF goes a step further in their intervention by providing participating FIs with technical assistance to provide guidance on how the participating banks could maximize their credit lines and use of guarantees offered.

- **National Development Bank (proposed)** – As discussed earlier, a National Development Bank has been proposed for Ghana. As this initiative takes shape, it will be important to determine the ability of this institution to implement a Green Bank program and support the CSA sector as well as the continued and sustainable growth of Ghana's agricultural sector.

  Within the agriculture sector, any new Green Bank or NCCF will need in-country partnerships to be successful. Although a new entity could be established, given the high touch nature of relationships that are required to build trust with rural communities and farmers, it is suggested that a well-designed partnership be the preferred route for implementation. Both the ADB and RDF could be well suited for this role, however the ADB is likely to have a more direct relationship with borrowers, whereas the RDF is one step removed.

III. CONCLUSION

There is significant opportunity in Ghana for a Green Bank or NCCF, particularly to target and support renewable energy integration across the energy and industrial sectors. Furthermore, with the impact of climate variability on agriculture – one of Ghana's most important sectors – a Green Bank or NCCF could provide critical support to developing a more climate resilient sector.

Ghana has a number of institutions, both existing and currently proposed, that could benefit from increased access to capital and capacity support to launch green bank programs.

Despite the fact that Ghana is in a unique position relative to its continental peers with short-term excess of on-grid capacity, the country is exposed to climate variability affecting the capacity of hydropower plants, and anticipated increases in electricity demand imply that the current 'excess power capacity' will be short-lived. Given the anticipated impacts of climate change on Ghana's energy sector and the macroeconomy more broadly, the government has a near-term opportunity to be proactive in a transition to a clean energy economy. The integration of renewable energy to stabilize the supply of electricity will also support the government's vision of building a larger domestic manufacturing sector.
There are numerous challenges that contribute to the slow uptake of renewable energy development in Ghana. Some of the issues in the sector include: [236]

- High cost of financing;
- Lack of access to longer-term finance alternatives;
- Lack of or insufficient incentives such as tax rebates;
- Grid connection constraints and lack of grid capacity;
- Volatility of the local currency;
- Technical knowledge limitations to operate and maintain renewable energy technologies.

Potential market interventions to consider for Ghana's energy sector (in the context of a deeper market analysis and concept development) include: concessional capital and extended tenor, changes in co-financing requirements, technical assistance, and a Project Preparation Facility. These could be implemented at an existing institution or new institution proposed by the Ghanaian government.

The agriculture sector is also a priority for green investment as one of Ghana's larger GDP drivers, a key employer in the country, and a critical source of foreign exchange generated from exports. However, agriculture and land use change generate a sizeable proportion to the country's GHG emissions and the sector is extremely vulnerable to climate change. Although the country's government has tried to support farmers with access to credit, and inputs and outputs, a large resource gap still exists. Access to financing and to appropriate financial products represents the biggest challenge including:

- Financing needs are too small for conventional lenders or commercial banks;
- Risk profile of agricultural borrowers, particularly farmers, are considered too risky;
- Agriculture as a sector is perceived to generate low returns or as unprofitable;
- High interest rates; and
- Time lapse between CSA adoption and realization of benefit is seen as long and risky by farmers.

236 https://link.springer.com/article/10.1007/s10708-019-10132-z?shared-article-renderer

BENIN

I. COUNTRY OVERVIEW

Benin is categorized as a lower-middle income country according to the World Bank's country classification methodology.[237] The country aims to achieve sustainable and inclusive growth through a multi-pronged development strategy, as outlined in its National Development Plan 2018–2025 and its Government Action Plan (PAG) 2016–2021, which focuses on the development of agro-industrial, tourism, and services sectors.[238] Benin's population stood at around 11.8 million in 2019, with an annual population growth rate of 2.7%.[239, 240]

Although Benin is one of the smallest economies in West Africa in terms of population and overall GDP, the country has experienced robust growth over the past few years; at an average of 5% GDP growth/year between 2014 and 2019.[241] The primary drivers of Benin's growth included increased trade activity and strong agricultural output, especially from cotton and other export crops such as pineapple and cashew.[242] The agricultural sector employs nearly 50% of the country's labor force.[243] The IMF projected that economic growth in Benin would rise to 6.7% in 2020 and 6.6% in 2021, but that forecast does not account for the effects of the COVID 19 pandemic.[244]

Benin's economy is highly exposed to both energy and trade risks. The country imports all of its oil products as well as 50% of its electricity needs.[245] As a result, fluctuations in prices for oil, electricity, or currency exchange rates pose risks to Benin's economic growth. Benin also faces an additional risk due to significant dependence on neighboring Nigeria for trade and energy supply. Trade with Nigeria represents 20% of Benin's GDP, meaning that changes in Nigeria's oil-driven economy have the potential to cause outsized impacts on Benin.[246] From an energy perspective, levels of imported electricity from Nigeria have reached highs of 42% (2010).[247]

Benin's monetary and fiscal indicators have remained stable over the past few years. As one of the eight countries in the West African Economic and Monetary Union (WAEMU), Benin's currency is the CFA Franc, which is pegged to the Euro with full convertibility.[248] The Central Bank of West African States (BCEAO) manages the CFA Franc and has maintained a stable monetary policy environment over the past few years, with inflation at 2.0% as of August 2020[249] and the central bank's marginal lending interest rates at 4.5% in 2019.[250, 251] On the fiscal side, although Benin has kept its fiscal deficit low at 2.5% of GDP, its public debt stands at 54% of GDP in 2019, of which around 25% is denominated in foreign currency.[252, 253] Although the IMF expresses confidence that these low fiscal deficits would gradually decrease the debt-to-GDP ratio, the level of public debt may still pose large risks to Benin's economy, especially given the small size of Benin's

237 https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021

238 http://extwprlegs1.fao.org/docs/pdf/Ben183074.pdf

239 https://data.worldbank.org/indicator/SP.POP.TOTL?locations=BJ

240 https://data.worldbank.org/indicator/SP.POP.GROW?locations=BJ

241 https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=BJ

242 https://www.worldbank.org/en/country/benin/overview

243 http://documents1.worldbank.org/curated/en/319531556511306251/pdf/Benin-Financial-Sector-Review-Stability-for-a-Better-Inclusion.pdf

244 IMF Staff Country Review – https://www.imf.org/en/News/Articles/2019/05/08/pr19152-benin-imf-staff-completes-program-review-mission#:~:text=%E2%80%9CThe%20medium%2Dterm%20outlook%20continues,is%20expected%20to%20remain%20contained.

245 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?contextual=region&end=2018&locations=BJ&start=2018&view=bar

246 https://www.worldbank.org/en/country/benin/overview

247 http://documents1.worldbank.org/curated/en/891701570046002579/pdf/Benin-Increased-Access-to-Modern-Energy-Project.pdf

248 https://www.worldbank.org/en/country/benin/overview

249 https://www.insae-bj.org/statistiques/indicateurs-recents/59-benin-taux-d-inflation#_ftn1

250 https://www.worldbank.org/en/country/benin/overview

251 https://www.bceao.int/en/content/main-indicators-and-interest-rates

252 African Development Bank Benin Economic Outlook – https://www.afdb.org/en/countries-west-africa-benin/benin-economic-outlook#:~:text=Economic%20growth%20in%20Benin%20remains,2016%20to%2029.6%25%20in%202019.&text=The%20fiscal%20deficit%2C%20financed%20through,2.5%25%20of%20GDP%20in%202019.

253 https://www.imf.org/~/media/Files/Publications/CR/2019/1BENEA2019003.ashx

GDP compared to other nations with similar levels of debt (e.g. Ghana).[254] It is also useful to note that Benin's risk of debt distress is moderate according to the latest debt sustainability analysis report by the IMF and the World Bank as of May 2020. The country's debt level also remains below the WAEMU convergence criterion which is 70% of GDP.

Benin's National Development Plan envisions a structural shift in its economy designed to attain a GDP growth rate of 10% per year by 2025.[255] Benin aims to achieve this goal not only through developing its human capital and improving its governance, but also through building a diversified agricultural sector as well as climate-resilient urban and rural spaces.[256] Consequently, investments to fight climate change in Benin should generally align with these national agricultural and climate-resilience goals to gain maximum support from policymakers.

On the climate front, Benin's goals revolve around avoided emissions in the transportation, land use and forestry sectors. According to the WRI CAIT database, Benin's leading emissions sources are land-use change and forestry (10.83 MT of CO_2e), energy (7 MT) and the agriculture sector (4.78 MT).[257] Yet Benin's Nationally Determined Contribution (NDC) to the 2015 Paris Agreement reports that the country is actually currently a carbon sink on a net basis, with its forests contributing to a net absorptive capacity of 35.4MT as of 2012.[258] However, Benin's absorptive capacity is falling sharply as more land is converted for agricultural use. In order to achieve its stated NDC goal of avoiding 120 MT of carbon emissions between 2020–2030 (5Mt from its energy sector and 115MT from its agricultural sector), Benin will require significant investments in renewable energy sources and in climate-smart agriculture practices.

These investments may be difficult to come by, as Benin's banking sector is shallow and generally under-developed, in addition to going through a difficult period that has seen low profitability and high levels of Non-Performing Loans (NPLs). The World Bank reports that Benin's NPL ratio stands at 20.3% as of 2018, which is one of the highest in the WAEMU countries.[259] Benin's banks also have low resilience to financial shocks, as their capital adequacy ratio is 8.6% – barely above the minimum WAEMU standard of 8% – and their return on assets and return on equity ratios are the lowest in the WAEMU group.[260] Finally, Benin's banks have high exposure to the national debt, with government bonds representing around 45% of the banking system's assets in 2015.[261] Due to government bonds offering a 6% interest rate, Beninese banks can use these bonds as collateral to borrow from the Central Bank of West African States (BCEAO) at rates as low as 2.5%.[262] In comparison, the interest rates charged on private sector projects range from 8% – 15% (according to the BCEAO) reflecting a higher risk premium, especially for projects or companies in renewable energy or climate-smart agriculture.[263, 264] Hence, banks are likely see the risk return tradeoff of holding government securities as more favorable. It is also important to highlight that interest rates are also capped across WAEMU member countries.

According to the World Bank, the domestic credit flow from banks to the private sector stood at only 17% of GDP in 2019, with Benin ranking 20th out of 32 African countries surveyed.[265] The low profitability, low resilience, and low appetite for private projects all present high barriers for Benin's banks to invest in climate change and clean energy-related projects.

Other than banks, Benin has access to the regional stock exchange and international financial flows. The Bourse Regional des Valeurs Mobilieres (BRVM) – a combined stock exchange for West Africa – has a $14 billion market capitalization. In addition, the World Bank designed a policy-based guarantee for Benin that covered international

254 https://www.imf.org/en/News/Articles/2019/06/24/pr19231-benin-imf-executive-board-concludes-2019-article-iv-consultation
255 http://extwprlegs1.fao.org/docs/pdf/Ben183074.pdf
256 http://extwprlegs1.fao.org/docs/pdf/Ben183074.pdf
257 http://cait.wri.org/profile/Benin
258 https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Benin%20First/CDN_BENIN_VERSION_ANGLAISE.pdf
259 http://documents1.worldbank.org/curated/en/319531556511306251/pdf/Benin-Financial-Sector-Review-Stability-for-a-Better-Inclusion.pdf
260 http://documents1.worldbank.org/curated/en/319531556511306251/pdf/Benin-Financial-Sector-Review-Stability-for-a-Better-Inclusion.pdf
261 http://documents1.worldbank.org/curated/en/319531556511306251/pdf/Benin-Financial-Sector-Review-Stability-for-a-Better-Inclusion.pdf
262 http://documents1.worldbank.org/curated/en/319531556511306251/pdf/Benin-Financial-Sector-Review-Stability-for-a-Better-Inclusion.pdf
263 https://www.bceao.int/sites/default/files/2020-03/CONDITIONS%20DE%20BANQUE%20DECEMBRE%202019.pdf
264 BOAD interview, June 15, 2020
265 https://data.worldbank.org/indicator/FD.AST.PRVT.GD.ZS?locations=BJ

lenders in the case of debt default, starting in 2018. This guarantee used World Bank funds to help secure a $300 million commercial loan from the Japanese bank MUFG.[266] Furthermore, Benin recently raised $1 billion Eurobond in January 2021.[267] Nevertheless, neither solution addresses Benin's challenges in its domestic financing capacity.

Beyond Benin's inclusion in the BRVM, the country also has access to international capital through the issuance of Eurobonds, which in 2018 mitigated the country's liquidity issues. The country's membership in the WAEMU also has facilitated a relatively more stable exchange rate environment. Benin, raised a sovereign Eurobond of 500 million Euros in March 2019 and this issuance was used to restructure domestic debt. Similarly, Benin has just (beginning 2021) issued a new Eurobond of 1 billion Euro to refinance part of the first issue and to provide funding for new investments.

Energy Context

Biomass and oil provide most of the primary energy required in Benin's economy. According to the IEA, biomass and waste products represented 54% of Benin's primary energy mix in 2017, mainly in the form of firewood or charcoal for cooking, lighting and heating purposes.[268, 269] Oil represented 43% of Benin's primary energy supply, mostly in the form of transportation fuels and electric generation fueled by oil.[270, 271] Coal and natural gas make up most of the remaining 3% of total primary energy supply, while renewables barely register in the primary energy mix.[272] The outsized role of biomass in Benin's energy mix reflects that most of the population's heating, cooking, and lighting needs are met by direct burning of wood fuel and other sources of biomass as opposed to through the use of electric power or gas.

Benin faces several challenges with the provision of electricity. According to the World Bank, only 41.5% of Benin's population has access to electricity as of 2018,[273] which translates into 67% of its urban population and only 18% of the rural population.[274, 275] Benin's electricity generation is dominated by oil, which is imported. More recently, natural gas (also imported) has been providing some generation capacity into Benin's electricity mix. This reliance on costly foreign fossil fuels exposes the country to fluctuations in commodity prices.[276]

Benin had an installed capacity of 227MW in 2017, but many of its power plants are aging and sometimes inoperable, which significantly lowers the amount of electricity that Benin can actually produce.[277, 278] This situation of unreliable generation capacity was somewhat mitigated in the past few years, as Benin signed a contract in 2018 between its national utility and the Finnish company Wartsila to rehabilitate its power plants at Porto-Novo, Parakou, and Natitingou.[279] Nevertheless, during times of peak demand, Benin requires 240MW of generation, which exceeds its current capacity.[280] Coupled with severe transmission and distribution losses ranging from 20–24% of electricity generation, Benin cannot meet its current electricity demand using domestic capacity alone, much less satisfy projected future demand from population and economic growth.[281] As a result, Benin relies significantly on electricity imports from neighboring countries, including Nigeria, Ghana, and Cote d'Ivoire. According to the IEA, imports constituted around 77% of Benin's electricity

266 https://www.worldbank.org/en/results/2019/05/16/guaranteeing-success-in-benin

267 Avec son eurobond de un milliard d'euros, le Bénin lance la saison financière 2021 – Jeune Afrique https://www.jeuneafrique.com/1104967/economie/benin-romuald-wadagni-boucle-un-eurobond-dun-milliard-deuros/

268 https://www.iea.org/countries/Benin

269 https://www.iea.org/data-and-statistics/data-tables?country=BENIN

270 https://www.iea.org/data-and-statistics?country=BENIN&fuel=Energy%20supply&indicator=Total%20primary%20energy%20supply%20(TPES)%20by%20source

271 https://www.iea.org/data-and-statistics/data-tables?country=BENIN

272 https://www.iea.org/data-and-statistics/data-tables?country=BENIN

273 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?contextual=region&end=2018&locations=BJ&start=2018&view=bar

274 https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?locations=BJ

275 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?contextual=region&end=2018&locations=BJ&start=2018&view=bar

276 https://www.iea.org/data-and-statistics/data-tables?country=BENIN&energy=Balances&year=2017

277 Comparative Analysis of Electricity Tariffs in ECOWAS – African Development Bank – ERARA (2019) https://africa-energy-portal.org/reports/comparative-analysis-electricity-tariffs-ecowas-member-countries Comparative

278 https://www.aprenergy.com/case-study/benin/

279 http://news.acotonou.com/h/105465.html

280 https://www.agenceecofin.com/electricite/1309-69211-benin-le-gouvernement-ambitionne-l-autosuffisance-energetique-d-ici-a-2021-avec-une-puissance-installee-de-400-mw

281 https://data.mcc.gov/evaluations/index.php/catalog/214/download/1404

supply (before accounting for losses) in 2017.[282] However, the high cost of imports combined with Benin's unreliable generation capacity have necessitated rolling blackouts that affect the country's economic performance and social stability.[283]

In response to its current energy challenges, Benin has set multiple targets to address both electricity access and electricity generation diversification. According to Benin's Task Force on the Vision of the Electric Energy Sector (Groupe de Reflexion sur la Vision du Secteur de l'Energie Electrique – GRVSE), the country aims to achieve 95% urban electrification and 65% rural electrification by 2025.[284] Benin plans to meet this increase in electrification in part through the development of renewables. According to the Renewable Energy and Energy Efficiency Partnership (REEEP), Benin has sufficient irradiation potential for large-scale solar energy implementation, as well as for wind energy deployment and both large and small-scale hydro.[285, 286, 287]

Benin's 2015 National Action Plan for Renewable Energy (Plan d'Action National des Energies Renouvelables – PANER) set goals of 24.7% and 35.1% of renewable energy penetration in the electricity mix by 2020 and 2030, respectively, compared to current penetration of 2%.[288, 289] However, the 2020 goal has not been met, and significant new investment will be required to meet the 2030 renewable and electrification goals. To attain these targets, the Ministry of Energy announced two goals of achieving 400MW of total installed capacity and producing 100% of its electricity demand domestically by 2021.[290] Benin has a strong focus on increased development of hydro generation resources (both small and large) due to the large untapped hydro potential in the country. According to REEEP, Benin has a commercially viable hydropower potential of 760MW on the River Oueme.[291] In addition, Benin has over 80 potential sites suitable for delivering mini-hydro based rural electrification solutions.[292] Current hydro projects include the rehabilitation of the 65MW Nangbéto dam, which is funded by the German development bank KfW and slated to be completed by 2022.[293] Although Benin and Togo were supposed to jointly support the construction of the 147MW Adjarala dam on the Mono River, the project has stalled since 2017 due to financing issues.[294] In any case, both projects would ideally be integrated into the grid in accordance with Benin's Integrated Water Resource Management strategy (Gestion Intégrée des Ressources en Eau), which calls for a decentralized and trans-sectoral management of these dams.[295]

Multiple institutions contribute to the policymaking process for Benin's energy and power sectors.

- The Ministry of Energy is the main policymaking body on energy issues.[296]
- On the regulatory side, the Electricity Regulation Authority (Autorité de Regulation de l'Electricité – ARE) – an independent regulator under the authority of the President – sets tariff structures and rates.[297]
- The Rural Electrification Agency (Agence Béninoise d'Electrification Rurale et de Maîtrise d'Énergie – ABERME) is responsible for overseeing plans to

282 https://www.iea.org/data-and-statistics/data-tables?country=BENIN&energy=Electricity&year=2017

283 https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Benin-_AR-Energy_Sector_Budget_Support_Programme_-_Phase_I__PASEBE_I_.pdf

284 http://www.ecowrex.org/system/files/repository/2008_groupe_reflexion_vision_secteur_electrique_grvse_-_min_ener.pdf

285 https://wedocs.unep.org/bitstream/handle/20.500.11822/20483/Energy_profile_Benin.pdf?sequence=1&isAllowed=y#:~:text=The%20documented%20solar%20energy%20potential,m%C2%B2%20(REEEP%2C%202012).&text=By%202012%2C%20access%20to%20electricity,Table%203%20and%20Figure%204).

286 Feasibility study and action plan for the manufacturing of components for small-scale wind turbines in Benin – https://www.partnersforinnovation.com/wp-content/uploads/2019/05/Haalbaarheidsstudie-en-actieplan-kleine-windturbines-Benin.pdf

287 https://wedocs.unep.org/bitstream/handle/20.500.11822/20483/Energy_profile_Benin.pdf?sequence=1&isAllowed=y#:~:text=The%20documented%20solar%20energy%20potential,m%C2%B2%20(REEEP%2C%202012).&text=By%202012%2C%20access%20to%20electricity,Table%203%20and%20Figure%204).

288 https://www.iea.org/data-and-statistics/data-tables?country=BENIN&energy=Electricity&year=2017

289 http://www.se4all.ecreee.org/sites/default/files/paner_editing_final_.pdf

290 https://www.agenceecofin.com/electricite/1309-69211-benin-le-gouvernement-ambitionne-l-autosuffisance-energetique-d-ici-a-2021-avec-une-puissance-installee-de-400-mw

291 https://wedocs.unep.org/bitstream/handle/20.500.11822/20483/Energy_profile_Benin.pdf?sequence=1&isAllowed=y#:~:text=The%20documented%20solar%20energy%20potential,m%C2%B2%20(REEEP%2C%202012).&text=By%202012%2C%20access%20to%20electricity,Table%203%20and%20Figure%204).

292 https://wedocs.unep.org/bitstream/handle/20.500.11822/20483/Energy_profile_Benin.pdf?sequence=1&isAllowed=y#:~:text=The%20documented%20solar%20energy%20potential,m%C2%B2%20(REEEP%2C%202012).&text=By%202012%2C%20access%20to%20electricity,Table%203%20and%20Figure%204).

293 https://www.sikafinance.com/marches/togobenin-vers-une-relance-du-barrage-hydroelectrique-de-nangbeto_16398

294 https://thediscourse.ca/energy/will-massive-dam-solve-togo-benins-energy-crisis

295 http://extwprlegs1.fao.org/docs/pdf/BEN161725.pdf

296 https://energie.gouv.bj/page/missions-et-attributions-du-ministere-de-lenergie

297 https://are.bj/

increase rural energy supply.[298] ABERME is also responsible for carrying out the Rural Electrification Policy. Established in 2006, this policy had a goal of electrifying 150 rural communities per year until 2015.[299]

- The Fonds d'Electrification Rurale (Rural Electrification Fund – managed by ABERME) was set up to help the government of Benin attain is rural electrification goals. This fund draws money from both the state and international donors (including the African Development Bank through Projet d'électrification rurale) to engage in grid extension as well as off-grid rural electrification solutions.[300, 301]
- L'Association Interprofessionnelle des spécialistes des Energies Renouvelables du Benin (AISER Benin) is a trade association that represents the interests of the renewable energy sector in the country.[302]
- The Sociéte Beninoise d'Energie Electrique (SBEE) and the Communaute Electrique de Benin (CEB) are the two most relevant players in Benin's power sector. The SBEE is a state-owned utility with a de facto monopoly over Benin's generation and distribution systems, while the CEB is a utility jointly-owned by Benin and Togo that operates the transmission lines between the two countries and imports electricity from other countries such as Ghana and Nigeria.[303]

The Beninese parliament adopted a new law in 2020 that allowed independent power producers to sell into the grid, thus ending SBEE's monopoly (at least on paper).[304] In an effort to improve SBEE's performance, the Beninese government has assigned various performance indicators (e.g. reducing distribution losses, time to get connected to the grid etc.) on the company. The government has also placed the company under the management of a private Canadian firm, Manitoba Hydro International, in order to help restructure SBEE to achieve its performance goals.[305] However, SBEE is still in a challenging financial situation. Studies by the Millennium Challenge Account – a joint initiative by the US government and the Millennium Challenge Corporation – have concluded that electricity tariffs are still too low for SBEE to attain financial sustainability. As neither SBEE nor private developers can recoup their costs, they do not have incentives to meaningfully develop new generation capacity.[306] Thus, the government of Benin is allowing SBEE to raise its tariffs by 5% in 2020 and 10% in 2021, while at the same time extending subsidies worth 16 billion CFA Francs to mitigate the effects of higher electricity prices.[307, 308]

Benin's efforts to increase renewable energy generation are centered around the Millennium Challenge Account–Benin II (MCA-Benin II). A major component of this initiative is the $375 million grant-based Benin Power Compact, signed in June 2017, which aims to strengthen the national utility, attract private sector investment, and fund infrastructure investments in electricity distribution as well as off-grid electrification.[309] The bulk of these funds ($253 million) are being used to modernize Benin's electricity distribution infrastructure, which is critical to improving quality of service and allowing for further penetration of renewables.

The second largest component of the MCC Power Compact ($44 million in grants) is directed toward the off-grid sector in Benin, which is crucial to achieving the country's rural electricity access goals. According to a study by the SNV Netherlands Development Organization, 10% to 50% of the population would require decentralized solar PV systems in order to achieve universal affordable electricity by 2030.[310] To support this off-grid buildout, the MCC Power Compact will fund the creation of a stronger policy framework and sector master plan, including a process for land concessions for serving off-grid areas.

298 https://www.aberme.bj/
299 https://evaluation.gouv.bj/uploads/17.pdf
300 http://are.bj/wp-content/uploads/2017/09/De%CC%81cret-n%C2%B0-2008-719-du-22-de%CC%81cembre-2008-portant-constitution-et-modalite%CC%81s-de-fonctionnement-et-de-gestion-Fonds-dElectrification-Rurale-FER.pdf
301 https://energycentral.com/c/ec/understanding-benin%E2%80%99s-rural-electrification-policy
302 https://www.goafricaonline.com/bj/292834-aiser-benin-associations-professionnelles-cotonou
303 https://www.cebnet.org/ceb-en-bref/missions
304 https://www.agenceecofin.com/electricite/0502-73548-benin-le-parlement-adopte-une-nouvelle-loi-qui-liberalise-la-production-et-la-distribution-de-l-electricite
305 https://www.24haubenin.info/?A-fin-2021-le-Benin-sera-completement-autonome-en-matiere-energetique
306 https://lanationbenin.info/conseil-des-ministres-16-milliards-de-subvention-pour-lelectricite-a-moindre-cout/
307 https://www.energymixreport.com/benin-to-increase-electricity-tariff-by-5-in-2020-and-10-in-2021/
308 https://lanationbenin.info/conseil-des-ministres-16-milliards-de-subvention-pour-lelectricite-a-moindre-cout/
309 https://www.mcc.gov/where-we-work/program/benin-power-compact
310 https://snv.org/update/mini-grids-and-stand-alone-pv-systems-serve-millions-benin-quest-universal-electricity-access

This program also included creation of the "Off-Grid Clean Energy Facility" (OCEF), which offers partial grants to private developers or rural energy systems. OCEF is structured as a "results-based fund" where in addition to a minimum 25% co-financing requirement, beneficiaries receive staged portions of grants upon reaching pre-determined milestones.[311] Eligible projects include off-grid energy to support public infrastructure, SHS, mini-grids, or energy efficiency measures. In July 2020, OCEF announced that it had completed its second and final round of funding, providing $27.9 million in grant support to 11 projects totaling $69.5 million in aggregate value.[312] Projects supported include Mionwa SA, which will build 40 off-grid solar power plants to provide 84,000 Beninese with access to electricity.[313]

Despite this success in mobilizing grant resources to projects, many projects still struggle to raise financing from commercial sources for the remainder of their project capital needs. Even with the existence of green credit lines to local commercial banks and general interest from DFIs and other financiers, investment remains challenged. Many financiers view projects as overly risky and also lack the expertise or incentives to make investments in the off-grid power sector.[314] The constraints of COVID 19 have made the situation worse, with at least one developer participating in the OCEF program reporting that its contracted loan with a local bank was cancelled due to COVID 19.

Benin also benefits from the SUNREF program. A green credit line developed by the French Development Agency (AFD), the SUNREF program has operations in 30 countries that have allocated over 2.5 billion EUR of loans through local financial intermediaries (e.g. commercial banks) to companies dedicated to energy management, sustainable natural resource development, and environmental protection.[315] One of SUNREF's projects in Benin is a 30,000 EUR credit to a local poultry farm owned by PA Conseils in order to finance a solar rooftop power station.[316] Nevertheless, the SUNREF program has faced challenges in expanding its program to more beneficiaries because loan pricing at the project level is often considered too expensive. Local financial intermediaries are hesitant to extend loans to projects that cannot demonstrate cash flow sustainability, which is complicated by the apparent lack of demand for off-grid solutions.[317]

As part of the MCC's Power Compact, the MCC is dedicating $12 million to on-grid renewable power generation. This MCC funding is being used to increase Benin's domestic generation capacity through an Independent Power Producer transaction composed of four solar projects totaling approximately 50 megawatts (AC). Technical and financial evaluations of the first round of bids are currently underway. The MCC funds are not designed to fund the entire capital needs of these projects and additional matching financing is also required. Due to the first-of-kind nature of these projects under the IPP framework, it is unclear if securing financing for these projects will be straightforward, or if additional credit support or patient capital may be required. This first round of 50MW, if financed and built, should pave the way for follow-on projects under the same IPP framework, which will not have the benefit of the $12 million in MCC support and will benefit from financing support.[318]

Additionally, the MCC Energy Compact has $25 million dedicated to Policy Reform and Institutional Strengthening. The policy reform project aims to improve governance in the regulatory environment to help attract more independent power producers into Benin's grid. The management of SBEE under Manitoba Hydropower International is one such governance reform. Other reforms include:[319]

- Updating tariff schedules by December 2019, to avoid the government of Benin forfeiting $80 million of further financing from the MCC to improve distribution infrastructure;[320]

311 https://www.niras.com/development-consulting/projects/off-grid-clean-energy-facility-ocef-in-benin/

312 https://ocef.bj/images/Press-release-Final-Results-of-OCEF-Second-Call-for-Proposals.pdf

313 https://solarquarter.com/2020/06/29/sunkofa-and-powergen-awarded-40-mini-grids-on-the-benin-mini-grid-call-for-proposals/

314 Stakeholder interviews

315 https://www.sunref.org/en/about/afds-green-finance-label/

316 https://www.sunref.org/en/projet/un-mini-reseau-solaire-pour-lelectrification-dune-ferme-avicole-au-benin/

317 Orabank interview, June 12, 2020

318 https://africa-energy-portal.org/news/benin-approves-four-pv-projects-totaling-50-mw#:~:text=The%20four%20solar%20power%20plants,northern%20part%20of%20the%20country.

319 https://catalog.data.gov/dataset/benin-power-sector-policy-and-insititutional-reform

320 https://catalog.data.gov/dataset/benin-power-sector-policy-and-insititutional-reform

- Increasing energy efficiency by funding energy efficiency laboratories and developing product labeling programs; and
- Strengthening the policy and institutional framework for independent power producers by reviewing and updating energy codes, finalizing concessions and PPAs, and designing a competitive IPP solicitation process.

These policy reform efforts are critical to facilitating more deployment of independent on-grid and off-grid projects, as an important challenge cited by developers is the lack of a clear regulatory environment in the off-grid space.[321] Although the regulatory and planning interventions from the MCC Power Compact have made progress in increasing regulatory certainty, additional and sustained efforts are still required to realize a stronger investment environment for projects in the near future.

Grant support from MCC and others is helping pilot projects and new business models move forward. Within this context, additional financing from green facilities can serve as a vital way to complement grants, move the market from pilots to commercial scale replication, and to reach the large investment targets set by the Government of Benin.

Climate-Smart Agriculture Context

While agriculture is a major driver of Benin's economy, the sector is still struggling to meet the food security needs of its growing population, particularly in the face of highly variable weather and changes in climate.[322] Benin has eight agro-ecological regions, each with their own priorities for agriculture ranging from prime cotton growing areas to marine areas for fishing.[323] Benin's major agricultural products include cotton, cattle, maize, cashew, and pineapples, with cotton representing 70% of the country's export earnings.[324] Agricultural cultivation is dominated by smallholder farms, and is characterized by a lack of widespread possession of land titles.[325, 326] Without land titles, these smallholder farmers are often reluctant or unable to make the necessary investments in irrigation and other on-farm machinery, and have limited collateral to seek financing even for modest farm improvements. As a result, less than 0.7% of arable land is currently irrigated, meaning significant amounts of Benin's crops are reliant on rainfall and are vulnerable to drought.[327] Coupled with the low competitiveness (and lack of foreign exchange potential) of crops other than cotton, Benin's agricultural sector, and economy in general, faces high risks due to lack of diversification.

The primary policymakers in the climate-smart agriculture and forestry sectors are the Ministry of Agriculture, Livestock, and Fisheries, and the Ministry of the Living Environment and Sustainable Development. The Office for the Study and Support of the Agricultural Sector also participates in the policymaking process as a representative of the Beninese presidency.[328] According to Benin's National Adaptation Programme of Action (NAPA), the government has identified priority areas towards increasing the resilience of its agricultural sector, including: climate information and early warning systems for food security; promotion of renewable energy; use of surface water for climate change adaptation and specifically identified activities/practices such as integrated watershed management, agroforestry, and improved irrigation water management.[329] Similar policies have been rolled out to support the forestry sector, such as the National Forest Policy that seeks to improve the conservation and management of forests with the participation of local communities, as well as the Environmental Action Plan (EAP) that focuses on changing behavior and better management of natural resources.

Benin's guiding policy for agriculture is its Strategic Development Plan for Agriculture 2025 (Plan Stratégique de Développement du Secteur Agricole – PSDSA), along with the accompanying National Plan for Agricultural Investment and Nutritional and Food Security 2017–2021 (Plan National d'Investissements Agricoles et de Sécurité Alimentaire et Nutritionnelle – PNIASAN). The PSDSA has

321 Renewable Energy Association interview, June 22, 2020
322 http://www.fao.org/3/CA1323EN/ca1323en.pdf
323 https://www.changementsclimatiques.bj/actualites/zones-agro-ecologiques-de-la-republique-du-benin.html
324 http://www.fao.org/3/CA1323EN/ca1323en.pdf
325 https://www.tandfonline.com/doi/full/10.1080/23311932.2018.1488339
326 http://www.fao.org/3/CA1323EN/ca1323en.pdf
327 http://www.fao.org/3/CA1323EN/ca1323en.pdf
328 http://revealingbenin.com/en/agencies/agriculture/
329 http://www.fao.org/3/CA1323EN/ca1323en.pdf

three objectives, including strengthening growth in the agricultural sector to ensure food security, maintaining competitiveness in its agricultural products, and reinforcing the resilience of smallholder farmers.[330] Among the strategies that the plan identifies to achieve its objectives, CSA is envisioned to play a crucial role in building resilience. The PNIASAN elaborates on the role of CSA by listing the priority areas for investment, such as sustainable soil and aquaculture management, risk management products, and agricultural innovations to boost climate resilience.[331] Benin has received grant financing for its CSA programs from both international and national sources, including funds such as the Global Environment Facility and UNDP to fund projects related to forest management, agricultural resilience building, climate information, sustainable energy, flood management and water management among others.[332] Benin has also received aid from various development partners, such as Germany's GIZ, France's AFD, FAO and others.[333] These initiatives have helped improve Benin's agricultural resilience, as seen through the Agricultural Promotion Project (ProAgri GIZ) that helped increase the yields of cashew farmers by nearly 80% in four years.[334]

Many promising CSA technologies have been identified through a combination of local knowledge development and international support. In crop production, important CSA practices identified for Benin by the FAO include the use of improved crop varieties, soil mulching (use of crop residues), polyethylene films, water harvesting and small-scale irrigation (drip or micro actor) and efficient sowing practices.[335] In the livestock sector, potential CSA approaches include the introduction of high-value species or crossbreeding with local animals, conservation of animal feed for the dry season, use of resistant varieties of fodder and seasonal livestock movement. In the forestry sector, CSA activities include planting local fruit trees adapted to climate, as well as off-farm CSA-related practices including the use of biogas, use of organic matter for domestic energy, and the use of improved traditional stoves.

However, many of these practices require upfront investment and training to be effective, which present a serious barrier to increased adoption. Among other barriers holding back widespread adoption, a report from the FAO specifically lists "poor financial services" as one of the key drivers limiting investment in CSA practices in Benin.[336]

These financial services challenges can be addressed through development partner grant programs and innovative financing solutions. One such pilot financing project is the West Africa Initiative for Climate-Smart Agriculture (WAICSA), developed under the Climate Finance Lab managed by the Climate Policy Initiative.[337] Initiated by the Commission of the Economic Community of West African States (ECOWAS), WAICSA is a facility that employs blended finance solutions specifically to support CSA practices. This facility is funded by public resources from ECOWAS member countries as the first-loss tranche, and supported by DFIs and private investors as the Class A mezzanine and Class A senior tranches, respectively. This structure is meant to provide loans at concessional rates in order to de-risk investments in CSA and accelerate progress in this sector.[338] These funds would be channeled through local banks and microfinance institutions, as well as through partnerships with smallholder farmers.[339] Although WAICSA is still in its pilot phase and expected to launch in early 2020 (pre COVID) in 6 countries, successful implementation would mean expansion to all 15 nations in ECOWAS. Another pilot project to note is a $3.4 million GEF program completed in 2018 that focused on CSA practices in nine villages, including provision of equipment and tools to support fish farms.

In May 2013, the Beninese Cabinet voted to transform the previous National Environmental Fund (FNE) into the National Fund for the Environment and Climate (FNEC). FNEC mainly targets reforestation, agriculture and livestock and is an important partner for the promotion of CSA practices. FNEC achieved accreditation to the Green Climate Fund (GCF) for grants only. Although a

330 https://tapipedia.org/node/37538 – really good resource – see pages 47 to 52 after downloading the document
331 https://tapipedia.org/node/37538
332 http://www.fao.org/3/CA1323EN/ca1323en.pdf
333 http://www.fao.org/documents/card/en/c/CA1323EN/
334 http://www.fao.org/documents/card/en/c/CA1323EN/
335 http://www.fao.org/3/CA1323EN/ca1323en.pdf
336 http://www.fao.org/3/CA1323EN/ca1323en.pdf
337 https://www.climatefinancelab.org/project/africa-climate-smart-agriculture/
338 https://climatepolicyinitiative.org/wp-content/uploads/2019/10/WAICSA-v16_18092019-_Final.pdf
339 https://climatepolicyinitiative.org/wp-content/uploads/2019/10/WAICSA-v16_18092019-_Final.pdf

GCF funding proposal has not yet been approved, this institution could serve as an important potential source of additional grant funding for CSA in Benin.[340]
Finally, any discussion about agriculture in Benin must address the role of cotton. As the largest contributor of employment and the majority of Benin's foreign exchange, cotton plays a crucial role in the agricultural sector.[341]
In terms of the climate effects, the actual harvesting of cotton has a low carbon footprint, as low-mechanized, hand-picked cotton is prized for its quality, and is common in Benin.[342] However, cotton must be processed using cotton gins which also increases the value of the cotton. Although these machines do not consume energy in significant amounts, the lack of reliability and the high prices of electricity in Benin hinder the growth of this industry.[343] This situation reinforces the case for integrating off-grid renewables into Benin's agriculture sector, specifically for cotton ginning and other agro-processing. Since off-grid electricity solutions are not subject to the issues facing Benin's electricity grid, they can provide a more reliable power source, and, if paired with favorable financing, they could also offer relatively lower electricity prices that could help further develop Benin's cotton ginning capacity. Although this solution does not address the political issues surrounding Benin's cotton ginning sector, deploying off-grid power plants could contribute greatly in helping more farmers move up the value-added chain in the cotton sector, as per the country's National Development Plan.

Green Urbanization and Clean Transportation Context

Benin has steadily become more urbanized in recent years, with nearly 50% of the population now living in urban areas.[344] Increasing urbanization puts pressure on local services and natural systems, and thus, the Government of Benin has set a number of goals with a focus on increased transportation connectivity and regional links, modernization and sanitation of strategic urban areas, including to increase tourism and ecosystems services, and promotion of economic activities.[345]

One important initiative is Benin's "Porto Novo – Green City" project. Started in 2014, the plan centers on transforming Benin's official capital (and second largest city) Porto-Novo into a sustainable city.[346] This initiative covers various sectors, with those relevant to green urbanization listed below:[347]

- Upgrading roadways – modernizing Benin's roads to improve circulation and mobility, as well as reduce cyclical flooding.
- Protecting and developing the Porto Novo lagoon – removing dumping grounds, redeveloping the lagoon space to promote tourism and provide nature-based carbon capture services.
- Efficiently managing household waste – creating a virtuous cycle between waste organization, collection, and recycling, all for the purpose of creating more jobs and reducing waste.

These green urbanization policies are also being applied in other Beninese cities, especially in the country's largest city of Cotonou. Other urbanization-related policies and partnerships revolve around reducing floods, improving stormwater drainage, and increasing access to potable water.[348, 349]

Benin's climate change program, PAVICC, is another important policy initiative. Financed by a loan from AFD and implemented by the Ministry of the Living Environment and Sustainable Development, this program aims to increase support for urban planning and sustainable infrastructure in the city of Cotonou, especially in terms of better managing urban flooding.[350] Specific policies include better urban planning that takes climate risks into account, improved stormwater drainage infrastructure, and

340 http://www.fao.org/3/CA1323EN/ca1323en.pdf
341 https://www.greengrowthknowledge.org/case-studies/economics-conventional-and-organic-cotton-production-benin
342 https://afcot.org/wp-content/uploads/2019/07/West-African-Cotton-Brochure-ENGLISH.pdf
343 http://cftn.ca/sites/default/files/AcademicLiterature/Power%20In%20West%20African%20cotton%20supply%20chains.pdf
344 https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=BJ
345 http://revealingbenin.com/en/agencies/living-environment/
346 https://theconversation.com/porto-novo-an-african-city-taking-action-against-climate-change-42501
347 http://revealingbenin.com/en/agencies/living-environment/
348 https://www.afdb.org/sites/default/files/documents/projects-and-operations/benin-support_project_for_cotonou_stormwater_drainage_programme_papc.pdf
349 https://www.wsp.org/sites/wsp/files/publications/WSP-Benin-Innovative-Public-Private-Partnerships-Rural-Water-Services.pdf
350 https://www.afrik21.africa/en/benin-afd-allocates-58-million-euros-to-improve-urban-resilience/

reinforcing city zones that are prone to flooding.[351] Many of these projects are public sector in nature, and receive support from multilateral institutions such as the AfDB (Projet d'appui au Programme d'assainissement pluvial de Cotonou – PAPC) and World Bank. A clear area for additional research could be focused on methods to structure projects to increase the potential for private sector participation, especially if they can replicate the public-private partnerships currently employed to improve water access in its rural areas.[352]

The West Africa Coastal Areas (WACA) Management Program is also active in promoting climate change adaptation solutions for Benin's cities. Funded by a consortium of international development agencies that includes the World Bank, the Nordic Development Fund, and the Global Environment Facility, the WACA program provides a platform for West African countries to boost knowledge transfer, foster political dialogue, and mobilize public and private finance to tackle coastal erosion, flooding, pollution and climate change adaptation.[353] This platform also establishes a "marketplace" where the target countries and financiers can communicate about their investment priorities.[354] In terms of financing, the program seeks to unlock funds through public private partnerships, project guarantees, and bonds, though the choice of instrument depends on whether the project is revenue-generating or non-revenue generating.[355] The WACA program identified five focus areas for Benin, namely the development of localized strategies, the maintenance of strategies for adaptation, and the strengthening of legal and institutional capacity for managing coastal areas, as well as for communication and regional collaboration. The program envisions these efforts to require just over 140 million EUR of investment.[356] Already, the WACA program has begun feasibility studies to design and build long-term coastal protection infrastructure, as well as take immediate emergency action for areas that are the most threatened by climate change.[357]

Benin does not have a national strategy to promote zero-emission transport. Nevertheless, the Ministry of Environment has initiated a series of actions to help reduce local air pollution in Benin's urban areas. These efforts include setting standards for air quality and adopting laws and regulations in areas ranging from air pollution levels, to emissions of hydrofluorocarbons, to the import of motor vehicles.[358] In addition, the Ministry provides a program that helps monitor and repair vehicles, usually free of charge. These services have helped to greatly reduce the amount of black carbon emitted in Benin's cities.[359] As Benin continues to urbanize and more people start to use personal vehicles, these kinds of clean transportation policies must also be scaled up.

II. PRIORITY SECTORS FOR GREEN INVESTMENT

With Benin's ambitions of expanding the economy through a focus on the energy and agriculture sectors, combined with the existing enabling policies and frameworks of support, it is recommended that any new Green Bank financing or NCCF intervention target these as priority sectors. The recommendation is further supported by the fact that the country's climate objectives are also heavily linked to these two sectors.

Similar to the other five countries included in the scope of this report, the following criteria were utilized to identify these priority sectors:

- Sectors with significant potential to reduce CO_2 emissions and have the potential to support the continued efforts of the country's progress towards meeting NDCs and SDG commitments;
- Potential for project pipeline has been identified through the initial market scoping;
- Significant direct or indirect contributor to the country's Gross Domestic Product (GDP); and

351 https://www.afd.fr/fr/carte-des-projets/adapter-les-villes-du-benin-aux-changements-climatiques-pavicc
352 https://www.wsp.org/sites/wsp/files/publications/WSP-Benin-Innovative-Public-Private-Partnerships-Rural-Water-Services.pdf
353 https://www.wacaprogram.org/about-us
354 https://www.wacaprogram.org/finance-instruments-0
355 https://www.wacaprogram.org/finance-instruments-0
356 https://www.wacaprogram.org/sites/waca/files/knowdoc/BENIN%20MSIP4211183024_rapport_v4.2%2C%20final%20report%20March%202017_0.pdf
357 https://www.wacaprogram.org/country/benin
358 https://www.ccacoalition.org/en/news/benin-making-progress-control-black-carbon-and-other-pollutants
359 https://www.ccacoalition.org/en/news/benin-making-progress-control-black-carbon-and-other-pollutants

- A financing gap exists within the market whereby catalytic green capital is needed or is deemed to be of great importance to make progress towards the country's NDCs and development goals.

Energy as a Priority Sector

The complications of Benin's energy sector make it a prime candidate for scaled adoption of renewable energy. The country's dependence on neighboring nations for imported oil results in the energy supply being expensive and potentially unreliable. In addition, the weak electricity infrastructure results in relatively high losses across transmission and distribution systems.

Integrating a greater proportion of renewables into the energy mix could result in large energy cost reductions over the medium to long term, would contribute to greater energy independence, and would allow Benin to prepare for anticipated energy demand spikes while ensuring progress towards achieving climate targets.

The introduction of new laws to support the opening of the energy market to the private sector, creates an opportunity to for renewable energy project planning and implementation. However, given the financial state of the government and state-owned enterprises, such as the SBEE and CEB, external financial and non-financial support will be critical inputs if the country is to make any progress towards its renewable energy targets in the near term.

As noted earlier, Benin has attempted to construct and commission utility-scale energy projects such as the 147MW Adjarala hydro-electric dam project on the Mono River, but was unsuccessful due to sovereign financing constraints. In order to meet existing and anticipated energy demands in Benin, a focus on both utility-scale and smaller projects, including mini-grids and more distributed energy systems, is needed. With the country's highly dispersed population (estimated by the World Bank in 2018 as 102 people/km^2), utility-scale projects are limited to serving highly urbanized areas like Cotonou, the country's economic capital.[360]

For rural areas, off-grid renewable energy systems are the most suitable solution to ensure energy access, as extension of the grid in the foreseeable future is unlikely due to high costs and slow implementation. Benin's government acknowledged the need for an alternative plan and introduced the "Fonds d'Electrification Rurale" (Rural Electrification Fund), which mainly targets rural areas – 1,400 localities have been identified under the program. Sites are assessed by size and will use a combination of micro-grids or distributed systems (e.g. solar kits and solar home systems) to provide electricity access.[361] The Government of Benin further understood that commercial viability of rural energy projects was paramount if it was to be successful in attracting private sector interest. As a means of improving the financial sustainability of such projects, the Off-Grid Electricity Access Policy seeks to support the development of electricity use with a complementary focus on electricity for productive uses – "economic activities such as agriculture, commerce, small local businesses, etc."[362]

Across the country there is ample opportunity to scale up solar, wind, and mini or pico-hydro projects. Further research into the which technologies are most appropriate for each of the regions of the country is recommended.

Complications & Opportunities in the Energy Sector

Complications within the energy sector range from inadequate funding to lack of technical expertise and capacity. These and other challenges involve various stakeholders from the national government to municipalities and across the spectrum of private sector actors.

- **Underfunded agencies** – ABERME is the sole government agency tasked with rural electrification, but remains significantly underfunded and under resourced. The SOC has been successful in supporting some electricity connection projects but has little experience with IPPs and off-grid companies. In 2019, Benin received a $133 million grant from AfDB to finance two projects, one of which is a rural electrification project. The grant funding is expected to increase rural electricity access from 8.11% in 2018 to 9.74% in 2022.[363] The AfDB's African Development

360 https://data.worldbank.org/indicator/EN.POP.DNST?locations=BJ
361 https://energycentral.com/c/ec/understanding-benin%E2%80%99s-rural-electrification-policy
362 https://energycentral.com/c/ec/understanding-benin%E2%80%99s-rural-electrification-policy
363 https://constructionreviewonline.com/2019/11/benin-receives-us-133m-grant-for-sanitation-and-rural-electrification/

Fund (ADF) will finance the first sub-programs and it is anticipated that they will play a further role in mobilizing additional capital. Although such projects help to lay the path for future growth, as a singular project it is noted that there will still be a significant electricity supply gap. ABERME will need significantly more financing and capacity building resources to successfully achieve the country's rural electrification target of 65% by 2025.

- **High Costs of Service** – Benin's dependency on imported electricity has resulted in high costs of service. Yet, such costs cannot be easily passed through to end-users. With poverty rates still high at 46.4% as of 2018, affordability is an important aspect of consideration not only to facilitate accessibility, but also to ensure that demand levels are high enough to support the financial sustainability of energy projects.[364] In many cases, the lack of appetite from the private sector is due to tariff rates that are not cost reflective.

  As a means for closing the gap, subsidies and incentives that can support greater private developer participation in the market is likely needed in the initial stages. This is especially true for renewable energy projects, which have high upfront capital costs. With the opening of the energy sector to IPPs, there is an opportunity to right size the historical energy challenges; one significant change will be to develop greater in-country generation capacity through the support of IPPs.

- **Lack of Technical Knowledge of Capacity** – In 2019, the World Bank published their Implementation Completion and Results Report for a $70 million project that had grant support from GEF and AFREA, known as the Increased Access to Modern Energy (IAME) project. Its main objectives included improvement of the existing electricity infrastructure, financing of new transmission lines to reduce losses in the north, and rural electrification through on-grid connections. IAME's main institutional strengthening component targeted support of ABERME, but this was dropped due to the risk presented by ABERME's low capacity.

  In the context of rural electrification, this example highlights the need for grant-funded technical assistance. The technical assistance and capacity building that is required is broad in scope from understanding how to plan, assess, implement and operate renewable energy projects to establishing fundamentals around the financing of such projects. With the high dependency that rural areas have on ABERME's ability to execute on rural electrification projects, this support is deemed critical.

  Lack of technical knowledge and capacity is also an issue within government, especially at the municipal level, and within the local commercial banks.

- **Limited Financing Alternatives for Private Sector Developers** – Across the spectrum of project sizes and renewable energy technologies, access to finance has been identified as a major constraint. Despite the fact that various IFI backed programs have been established to direct capital to privately developed projects and the creation of an improved regulatory environment for private sector participation, financing alternatives both from local and international resources remain limited. As a result, the co-financing requirements of IFI and ODA programs are difficult to satisfy, and projects are often not progressed.

  Local financial institutions lack the risk appetite for project finance and renewable energy projects. Part of the challenge, as noted earlier, is the limited technical knowledge and internal capacity of local commercial banks to assess such projects.

  In the context of the region, Benin's financing costs, which average 6% to 9% per annum, are considered too high for renewable energy projects to achieve economic returns that make sense.

  Guarantees and forms of concessionary financing could help to address these aforementioned issues as it relates to financing. And although the World Bank's policy-guarantee program helps to improve market liquidity from international financiers, a gap still exists in terms of the depth of the local capital markets.

- **Weak Grid Infrastructure** – The mix of projects that will need to be developed to meet the electricity demand in Benin include on-grid and off-grid solutions. However, a preliminary step to installing any new generation capacity will be enhancements to the country's grid infrastructure; this is especially true for any on-grid

364 https://www.worldbank.org/en/country/benin/overview

solutions. Benin's grid infrastructure is outdated, and limited funding has historically been channelled to maintain the transmission and distribution networks.

The World Bank funded project, IAME, helped to resolve some of the transmission loss issue by running a new transmission line along the north-south corridor in Benin, where the country imports electricity from Nigeria.[365] The project's other sub-components also supported rehabilitation and reinforcement of the SBEE's electrical distribution network in major urban centers. According to the IAME's project completion documents, several of the targets were achieved and yielded high economic returns. Despite these accomplishments, it is likely that there are other areas of improvement and support that will be required by SBEE to strengthen the grid infrastructure. This is especially true given the future estimates of electricity demand increases. Projects similar to IAME will need to be scoped and funded by international organizations, as the resources of key government stakeholders is anticipated to remain limited.

- **Pipeline of Projects are Considered Un-bankable** – Benin's pipeline of renewable energy projects has been noted by financing stakeholders as un-bankable. This has been the case in terms of feedback from international and local financing partners. Perspectives from those interviewed included the fact that even with available funding, the pipeline remains too weak to absorb capital and economic returns are unattractive. These challenges may be due to a lack of adequate support during the pre-feasibility and feasibility stages of project design.

  In addition to the limited technical knowledge in the market, there is also a lack of understanding by smaller developers around ongoing financial management of projects and project operations. This is seen as a key risk by the financing community – the lack of experience in renewable energy project management is related to the potential mismanagement of project cash flows, with implications to return on capital.

- **Challenges Accessing Climate Finance due to Lack of Technical Capacity** – Beyond the general commercial viability of projects, it has been noted by stakeholders including government agencies that there is a general lack of capacity to design green projects that meet the standards of climate finance programs or vehicles. Consequently, even where a project shows promise of strong economics, access to capital may be constrained because of project design. This has been most pronounced at the municipal level of government, where a lack of expertise on developing green projects has been a key inhibitor.

- **Regulatory Policies at the National and Subnational Levels of Government Are Not Clear** – Benin has made headway in terms of developing an enabling environment to support private sector participation in the energy sector. However, the development of more robust policies is still needed, especially related to streamlining application and permitting processes and providing more timely and comprehensive feedback to developers on tenders. Stakeholders noted that the weaknesses in the existing institutional processes, combined with the continuous delays associated with project reviews and approvals was a significant deterrent.

  Additionally, clarity on grid expansion plans need to be better communicated to the market. Project developers have noted that clearance and assurance regarding the grid is a critical part of their assessment of new projects, and that an average of ten years assurance is likely needed, although this depends on the locality.

Potential Interventions for the Energy Sector

Based on the market dynamics described above, existing policy and regulatory initiatives, and the suite of potential interventions as outlined, the energy sector in Benin is considered a strong candidate for a green finance facility and a national climate change fund. The following list offers some potential market interventions to consider in the context of a deeper market analysis and concept development.

- **Project Preparation Facilities** – Project preparation facilities (PPFs) could help the energy sector in Benin to develop projects that will be attractive to public and private sector investors. PPFs would prove most useful to support municipal projects, for smaller project developers such as SME players, and within certain local commercial banks.

365 http://documents1.worldbank.org/curated/en/891701570046002579/pdf/Benin-Increased-Access-to-Modern-Energy-Project.pdf

- **De-risking Mechanisms** – De-risking mechanisms could help unlock private sector capital from local banks. Government guarantees have been noted as a key mechanism to support improved credit flows from local financiers. Although numerous guarantee schemes offered by organizations such as the African Guarantee Fund (AGF), FAGACE, African Trade Insurance Agency (ATI), and World Bank Group, there is an opportunity to develop add-on programs that specifically target the renewable energy sector and which focus on stimulating the Government of Benin to offer more public sector guarantees. This could be achieved through grant funding directly channeled to the Ministry of Finance or through a second loss guarantee facility offered by an IFI or multilateral agency.

- **Project Size** – It is also necessary to address the issue of project size. Smaller projects are subject to the same lengthy permitting processes as larger scale projects and are less likely to be financed due to their lower return profile. These challenges could be tackled through two interventions. One option is to develop a one-stop-shop for permitting and licensing, similar to the concept being designed by the UNDP for biomass energy. This could result in shorter lead times for project development and a reduction of costs for developers. The second potential intervention is to create a mechanism that bundles smaller projects together, leveraging commonalities which could expedite review not only through a one-stop-shop for permitting and government approvals, but also for financing considerations.

- **Green Credit Lines** – Direct funding, preferably on concessionary terms, to local banks or to project developers would be useful, especially for smaller projects. For local banks, the funding should be coupled with at least partial credit guarantees, if not full guarantees. One model that could be piloted is a guaranteed green credit line directed to local financial institutions, which integrates a project preparation facility focused on pre-development activities. Although SUNREF is meant to serve as such a market mechanism, several aspects of the program have proved challenging and deterred market actors from participating. These challenges include: (i) inflexible eligibility criteria that do not align with market needs (e.g. rigidity around which renewable energy technologies are financeable or meet program criteria), (ii) pricing for the capital offered is considered too expensive by developers, and (iii) despite the technical assistance being offered to the local commercial banks – banks are still unwilling to extend credit to borrowers because the projects are not generating adequate levels of cash flow to offset the perceived or actual project risk.

  As future programs are designed, eligibility requirements should be discussed with stakeholders in advance to clarify approach, capacity needs, what types of green projects would qualify, and what types of technical assistance are required.

- **Diversify Project Pipeline** – To help ensure that the renewable energy mix is diversified (beyond investor interest in solar projects), consideration should be given to creating incentives and directing concessionary financing to project sponsors of hydro projects. From a financing perspective, given the higher significant costs associated with developing hydro projects (as compared to solar projects), reducing the cost of capital is an important aspect to consider towards stimulating credit flows from local financial institutions. This should be coupled with technical assistance and capacity training, given that renewable energy technology appears to be less understood by local banks.

- **Avoid Over-reliance on Challenge Funds** – There is a need to address a perceived overemphasis in the market by donors on challenge funds and pay for success models. Although these structures may provide for aligned incentives between stakeholders, they still do not address the market's need for funding to cover upfront capital costs, which smaller and local project developers have difficulty raising because of the lack of market liquidity and risk averseness of the local capital markets.

  Under the MCC's Power Compact, the MCC is dedicating $12 million to on-grid renewable power generation, but the program's design is not intended to provide 100% of the project funding required. Given the early stage nature of the IPP framework that is being tested in the market, there is a chance that the match funding needed for the short-listed projects will not be filled by commercial banks unless there is some form of guarantee. Hence, in terms of opportunities for a green catalytic finance facility to complement existing

active programs, the MCC Power Compact is a prime candidate. A Green Bank could provide concessionary finance as match funding, and potentially help structure a guarantee mechanism. A NCCF has a role to play as well, potentially complementing the green finance with grant funding to provide capacity building within the local banks and through separate initiatives to local project developers.

- **Link Rural Electrification to Productive Uses of Energy** – As mentioned earlier, a multitude of programs and projects have been initiated in Benin to address the low levels of electrification across the country. One area that has untapped potential is expanding the productive uses of energy to address the issues of limited livelihood options, low-income levels, and an inability to pay for electricity. A holistic approach designed to bring income-generating off-grid energy solutions to rural areas that is integrated with viable livelihood options, training, technical assistance, and long-term capacity building could be effective in expanding energy access. Local commercial banks have highlighted this challenge noting that without a productive use component built into programs, rural electrification projects will likely continue to struggle to access financing. Productive use of energy is a way to provide a level of assurance to financiers that projects have bankable cash flows and to demonstrate debt serviceability.

Potential Host Institutions for the Energy Sector

In terms of potential host institutions and/or partners, there are a number of government agencies and private institutions that have been identified as potential partners or host institutions, including:

- Agence Cadre de Vie pour le Développement du Territoire
- Ecobank Benin
- Agence Béninoise d'Electrification Rurale et de Maîtrise d'Énergie – ABERME
- National Fund for Environment and Climate (FNEC)

- **Agence Cadre de Vie pour le Développement du Territoire** – The Agence Cadre de Vie pour le Développement du Territoire (Agency for Living Environment and Sustainable Development) is responsible for implementing and managing development projects related to the living environment, regional planning, building growth hubs, and driving sustainable development.[366] The agency plays a coordination role with strategic partners through the life cycle of projects in urban development, road infrastructure, and waste management. Furthermore, it is responsible for feasibility, technical, financial and judicial studies as part of its pre-project development functions.[367] The agency is also involved in sourcing investment capital, which makes it well positioned to serve as a partner for both green catalytic finance and NCCF grant funding.

- **Ecobank Benin** – Ecobank Benin already plays an active role in the renewable energy market in the country. The bank is one of the larger banks in the market and has demonstrated knowledge of the renewable energy industry, relative to its peers. Given Ecobank's regional footprint there is also potential that knowledge sharing, and financing models can be replicated through the bank's network into other parts of West Africa, thus supporting the acceleration of successful structures. Additionally, its role in the Millennium Challenge Corporation program illustrates experience working with MLA-backed programs. There is still potential for additional capacity building, but the institution is one of the more progressive players in terms of financing and may potentially be a strong candidate as an intermediary for managing a green credit line program.

- **Agence Béninoise d'Electrification Rurale et de Maîtrise d'Énergie** – ABERME plays a central role in the implementation of Benin's rural electrification strategy and is involved in rural electrification policy setting. Despite some of the challenges noted earlier, it is recommended that the organization be integrated into any green finance facility or NCCF program development that include goals for rural electrification. With ABERME's depth of knowledge in rural areas and understanding of electricity demand dynamics, their involvement can help launch more comprehensive programs. However, technical assistance, capacity building, and funding would be needed as a preliminary step. ABERME has a long history of managing donor

366 http://revealingbenin.com/en/agencies/living-environment/

367 http://revealingbenin.com/en/agencies/living-environment/

funding and is one of the key actors in the market that may be most suitable for partnering or even hosting a NCCF.

- **National Fund for Environment and Climate (FNEC)** – FNEC's existing GCF accreditation, awarded in February 2019, makes the government entity a strong potential partner for finance and grant intermediation. This public institution has financial autonomy and is under the mandate of the Ministry of Living Environment and Sustainable Development. Although its main mission is to support agriculture, livestock and forestry, from the perspective of productive uses for energy and the nexus between agriculture and energy the organization may be one of the most suitable partners within government entities in Benin.

Climate Smart Agriculture as a Priority Sector

With the government's focus on building a climate resilient agricultural sector, two specific areas have been identified in the NAPA as priorities: (i) the promotion and integration of renewable energy, and (ii) the adoption of improved irrigation, i.e. efficient irrigation systems. Furthermore, through the country's PSDSA, CSA practices have already been identified as a key intervention by government – providing further scope for a green finance facility or NCCF to complement existing national targets and goals.

In terms of the nexus between agriculture and renewable energy, projects such as the UNDP's Building a Resilient Energy Future in Benin aim to promote the production of electricity by the gasification of agricultural waste residues (biomass) and the establishment of a main network and isolated mini-grids for electrification. In addition to its focus on providing government support to develop enabling policies, as well as institutional and regulatory frameworks, the project included components to establish a financial mechanism that sought to facilitate participation in biomass power generation.

Cotton remains Benin's largest cash crop and although the country should plan for an eventual diversification away from a dependency on cotton, this is unlikely to happen in the near future. In this context, any focus on the cotton industry should be targeted towards identifying efficiencies in the gin processing of raw materials. There have been limited studies conducted thus far that explores how renewable energy could be integrated into the process, but at a minimum renewable energy could provide greater continuity of electricity access to the industry, which is currently plagued by down times that hurt productivity.

Complications & Opportunities in the Climate Smart Agricultural Sector

Through the various development plans that the government of Benin has adopted to help transition the agricultural sector to a more climate resilient state, the greatest current gap is the lack of financing alternatives and technical knowledge. Several ODA funded programs have helped to conduct preliminary studies on suitable solutions but fall short of identifying appropriate financing mechanisms.

- **Lack of Access to Financing and Appropriate Financial Product Alternatives** – Agriculture as a sector requires a unique set of financial products, preferably designed to be cash flow based. Climate change has negatively impacted agricultural yields of farmers in Benin and given that the majority of farming is conducted by subsistence or smallholder farmers, the likelihood that alternative income streams could support the covenant requirements of conventional financing is low. In addition, many agricultural borrowers are not deemed credit worthy, and the lack of land ownership in the country makes it even more difficult for potential borrowers to qualify for conventional loans, as they lack access to hard collateral that would otherwise compensate for the perceived increased risk of lending in the sector.

  The process of transitioning to CSA practices requires relatively high amounts of upfront capital. Cash flows from existing farming practices are unlikely to be adequate to absorb such costs through funds from operations. Consequently, alternative finance products that are patient enough to absorb any volatility of cash flows during the transition period are needed, as well as those products that can provide flexible financing terms in order to avoid creating a cycle of indebtedness for the farmer or agricultural business.

- **Limited Technical Knowledge** – Within the agriculture sector there is still limited technical knowledge of climate smart agriculture practices. Although there have been programs that have supported readiness and capacity building, such as the GCF program,

these have been designed to specifically improve the capacity of the Directorate General of Climate Change Management of the Ministry of Environment, not the end-users of the technologies. Furthermore, programs are arguably too limited in terms of time horizon and should be designed to cover longer durations to limit dis-adoption.

Potential Interventions for the Climate Smart Agricultural Sector

With the number of existing and recently completed ODA programs that target CSA and solutions addressing the intersection between agriculture and renewable energy, Benin has developed some of the critical foundations from which more scalable projects could be launched. Benin has been successful in laying some of the initial groundwork for sourcing funding to support CSA goals. One area of development is the potential to access and utilize international climate finance from sources such as the GCF for readiness and capacity building programs. Although these early steps likely helped develop both a strong foundational basis from which to scale and an understanding around how CSA can be better integrated to improve productivity and yield, there still exists a gap on actual financing of projects.

- **Biomass Energy** – In terms of biomass energy, the UNDP has helped establish a one-stop-shop for issuance of the various administrative authorizations necessary for renewable energy power plant projects and facilitated the development of a biomass energy trading market. This type of financing mechanism seems to have helped monetize biomass energy supply. Biomass energy has the potential to serve as an alternative off-grid energy source for rural areas and is considered a viable renewable energy solution for the existing level of agricultural activity and waste produced. In addition, biomass energy can also contribute to a reduction in GHG emissions.

- **Concessionary Finance and Guarantees** – Interventions identified for the agricultural sector include concessionary financing and guarantees. Lowering the cost of financing and improving bank liquidity have been noted as two areas where greater support could potentially improve the flow of credit to the agricultural sector. Guarantees have been noted as important to help de-risk lending to the sector, given the smaller project sizes and volatility of cash flows from farming operations. While the cotton industry has been noted as well organized, potentially reducing banks' perceived risks of this sub-sector, there is less appetite for financing other agriculture projects.

  Given the nascency of CSA practice adoption, guarantees or other forms of risk mitigation could help immensely. As noted earlier, many of the international donor interventions have been specifically targeted at policy development, institutional framework strengthening, building technical knowledge, and conducting studies to determine the most appropriate solutions for the country. There is a still work to be done on defining financing mechanisms that could open up the sector more from a local financing perspective.

- **Project Aggregation** – Similar to the energy sector, the agricultural sector could also benefit from an aggregation mechanism or a centralized repository of bankable projects. In addition, there is a lack of information flow within the country, which may be contributing to the low number of projects being financed. With greater information flow, successful models in one part of the country could be more easily replicated – sector wide coordination is considered paramount.

Potential Host Institutions for the Agricultural Sector

Several government agencies and private sector organizations have been identified as potential partners or host institutions. The following entities are considered to be positioned to help the agriculture sector scale sustainable solutions:

- National Fund for Environment and Climate (FNEC)
- Coris Bank

- **National Fund for Environment and Climate (FNEC)** – The National Fund for Environment and Climate (FNEC) has been identified as a well-positioned agency within the country through which climate finance could be directed to promote and fund CSA-related activities. With FNEC's existing GCF accreditation to receive grants, a next step could be to determine whether the organization could qualify for GCF financing as well. There may be potential to scope a program that assists FNEC to move in this direction through readiness and capacity building programs.

- **Coris Bank** – Among private sector institutions, Coris Bank is a potential partner given its active role in working with agricultural SMEs. The bank recently established a credit line of 500 million CFA with the International Fund for Agricultural Development. The bank also has expertise in solar project financing and could hence serve as an intermediary for both agriculture and renewable energy directed capital.

III. CONCLUSION

Based on a high-level view of market dynamics, existing policy and regulatory initiatives, and the suite of potential interventions identified, the energy sector in Benin is considered a strong candidate for a potential Green Bank and a National Climate Change Fund. In terms of the energy sector, the country's dependence on neighboring nations for imported oil results in the energy supply being expensive and potentially unreliable. In addition, the weak electricity infrastructure results in relatively high losses across transmission and distribution systems. Integrating a greater proportion of renewables into the energy mix could result in large energy cost reductions over the medium to long term, would contribute to greater energy independence, and would allow Benin to prepare for anticipated energy demand spikes while ensuring progress towards achieving climate targets. A Green Bank/NCCF initiative would be well positioned to address energy sector challenges ranging from inadequate funding to lack of technical expertise and capacity.

Benin's agriculture sector also surfaces as having significant potential for leveraged investment. With the government's focus on building a climate resilient agricultural sector, two specific areas have been identified in the NAPA as priorities: (i) the promotion and integration of renewable energy, and (ii) the adoption of improved irrigation, i.e. efficient irrigation systems. Furthermore, through the country's PSDSA, CSA practices have already been identified as a key intervention by government – providing further scope for a green finance facility or NCCF to complement existing national targets and goals. Through the various development plans that the government of Benin has adopted to help transition the agricultural sector to a more climate resilient state, the greatest current gap is the lack of financing alternatives and technical knowledge. Several ODA funded programs have helped to conduct preliminary studies on suitable solutions but fall short of identifying appropriate financing mechanisms.

The government has established a number of policies, frameworks, and rolled out incentives to provide for an enabling environment. Some of the key constraints that a Green Bank and NCCF could assist to alleviate include:

- Injection of concessional capital to reduce the cost of funding and risk exposure for local banks;
- Provision of technical assistance and capacity building for off-grid renewable energy projects, and CSA practices;
- Establish a project preparation facility to support early stage projects and small local developers to scale to a size that is commercially bankable; and
- Long tenor financing that could be on-lent through either a new financing entity or an existing organization.

TUNISIA

I. COUNTRY OVERVIEW

Tunisia is one of the wealthier countries in Africa, with a GDP per capita of around $3,317 in 2019.[368] Nevertheless, the country has experienced weak economic growth since its revolution in 2011 due to domestic and external factors (e.g. political instability, labor strife, terrorist attacks, turmoil in Libya, etc). Although the election of President Kais Saied in October 2019 returned some measure of political stability to the country, the effects of the COVID 19 pandemic have exacerbated other outstanding economic challenges, which complicate efforts to boost growth and employment.

Tunisia's GDP grew by 1% in 2019, compared to 2.6% in 2018 and 1.9% in 2017.[369] Agriculture, tourism, information and communication technologies (ICT), and manufacturing are the main contributors to Tunisia's economy. Agriculture represented 10.4% of Tunisia's GDP and 12.4% of employment in 2019.[370] Tourism represented around 14.2% of GDP and directly employed 400,000 people in 2019, while the ICT sector contributed to 7.5% of GDP and employed 86,000 people in 2018.[371, 372] On the industrial side, Tunisia's manufacturing is primarily export-oriented, especially in the chemistry and textiles sectors.[373] Thus, Tunisia has a relatively diversified economy, but is becoming increasingly services-oriented.

One of Tunisia's main challenges is its increasing indebtedness, especially to external creditors. Tunisia's public debt to GDP grew from 39.2% in 2010 to 72.2% in 2019. This government indebtedness already exceeds the emerging market debt burden benchmark of 70%.[374] Sustained fiscal deficits drove the growth of this debt, in particular the wage bill for government employees.[375] Tunisia has financed these deficits through external borrowing. As of 2019, its level of external debt to GDP stood at 94.8%, which represents an increase of nearly 95% between 2010–2019.[376] These high debt figures put the country at risk of debt distress. In terms of other economic indicators, the policy lending rate stands at 6.25%, which is lower than its peak of 7.75% in 2019.[377] Inflation has fallen from 7.3% in 2018 to 6.7% in 2019, with the recent decline in oil prices likely to further reduce inflation in the short-to-medium term.[378] The Tunisian Dinar's exchange rate against the US dollar appears relatively stable over the past year, and in previous years where the local currency has experienced severe depreciation, this has actually benefited the export sector of the economy. Thus, Tunisia's overarching challenge is its deep indebtedness, which limits the country's ability to borrow external funds to fund development projects.

Tunisia's economic development goals are outlined in its 5-year national development plans. Led by the Ministry of Development for Investment and International Cooperation, the most recent plan from 2016–2020 set out six goals, namely achieving an average growth rate of 4%, reducing the poverty rate to 2%, increasing the national investment rate to 25%, creating 400,000 new jobs, reducing the unemployment rate to 12%, increasing the national savings rate to 18%, and reducing the informal sector to 20% of GDP.[379] To achieve these goals, the 2016–2020 national development plan rests on five pillars, specifically good governance and reform (especially against corruption), transforming Tunisia into an

368 https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?contextual=region&end=2019&locations=TN&start=2019&view=bar

369 https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=TN

370 https://santandertrade.com/en/portal/analyse-markets/tunisia/economic-political-outline

371 https://english.aawsat.com//home/article/1840766/tunisia-13b-tourism-revenues-expected-2019#:~:text=The%20tourism%20sector%20contributes%20to,minimum%20of%202%20million%20Tunisians

372 https://www.tradecommissioner.gc.ca/tunisia-tunisie/market-reports-etudes-de-marches/0002801.aspx?lang=eng

373 https://santandertrade.com/en/portal/analyse-markets/tunisia/economic-political-outline

374 http://pubdocs.worldbank.org/en/647121603047340365/pdf/16-mpo-am20-tunisia-tun-kcm.pdf

375 Phillipe Trape interview, September 4, 2020

376 https://fred.stlouisfed.org/series/TUNDGDPGDPPT

377 https://countryeconomy.com/key-rates/tunisia#:~:text=Tunisia%20has%20lowered%20its%20interest%20rates%20by%200.5%20percentage%20points,Banks%20to%20implement%20monetary%20policy.

378 https://fred.stlouisfed.org/series/FPCPITOTLZGTUN

379 https://www.solidar-tunisie.org/sites/default/files/fichiers/publications/evaluation-du-plan-de-developement.pdf

economic hub, human development and social inclusion, a concrete vision for the region, and sustainable development based on a green economy.[380] Tunisia is currently formulating its 2021–2025 national development plan, though it is unclear how the COVID 19 pandemic has affected this process. Tunisia is also developing a national strategy for employment for 2020–2030 in cooperation with its Ministry of Professional Training and Employment and two major unions, which will aim to balance the labor market by transforming the economic model, enhancing human capital, and strengthening market governance.[381, 382] This national strategy for employment reflects how Tunisia considers reducing unemployment to be one of its highest priorities, especially with a total unemployment rate of 16% in 2019, and a youth unemployment rate of 36%.[383, 384]

The Tunisian state-dominated banking system currently faces risks from issues in loan quality as well as availability of liquidity. Although Tunisia has 30 banks active in the market, the three largest banks under government control hold around 40% of the country's banking assets as of 2019.[385] However, the banking sector is in a weak position after years of political instability, especially with regard to its loan quality. The level of non-performing loans (NPLs) stood at 14.1% in 2019, rising from 13.4% in 2018.[386] This high NPL ratio emerged from the legacy of bad debts after the Arab Spring in 2010–11. This NPL ratio was already expected to grow to 14.1% before the COVID pandemic struck.[387] Although the capital adequacy ratio of the banking sector was relatively stable at 11.9% in 2017, the rising NPL levels reflect a looming risk to Tunisia's banking sector.

In addition to a loan quality problem, the banking industry also faces a lack of liquidity. Tunisia's banks are experiencing a funding gap due to a shortage of customer deposits.[388] Therefore, banks must raise funds either from the government, international institutions, or the stock exchange. This limited ability to raise capital has resulted in a liquidity squeeze that ultimately required the Central Bank to extend support to banks in 2018 and 2019.[389] In this context, commercial banks already lacked the liquidity to fund development projects, and the COVID 19 pandemic looks to exacerbate this trend.

The Tunis Stock Exchange (BVMT) is one of the largest stock exchanges in Africa. The BVMT boasts of $8.34 billion in market capitalization as of March 2020, with over 81 companies listed.[390] The market is active in the trading of stocks, government bonds and corporate bonds. It attracts local, regional (MENA) and global investors.

Islamic finance also plays a role in Tunisia. As of 2018, its share of total assets in the country's banking sector was around 5–6%, up from 2% in 2014.[391, 392] Islamic banks represent 6.3% of total deposits and 4.8% of total banking sector credit.[393] Although only three banks in Tunisia are specialized in Islamic finance, there is a strong potential for Islamic finance to provide additional sources of alternative financing in the future.[394]

Tunisia's carbon emissions are mainly driven by its power and transportation sectors. Tunisia emitted 32 million tons (MT) of CO_2 in 2018, with 9MT coming from its power sector and another 8MT from its transportation sector, mainly as a result of their use of fossil fuels for energy.[395, 396] According to Tunisia's NDC, the country

380 https://www.solidar-tunisie.org/sites/default/files/fichiers/publications/evaluation-du-plan-de-developement.pdf
381 https://www.onu-tn.org/uploads/emploi/15333012260.pdf
382 https://www.leaders.com.tn/article/27084-lancement-de-la-formulation-de-la-strategie-nationale-pour-l-emploi
383 https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?locations=TN
384 https://data.worldbank.org/indicator/SL.UEM.1524.ZS?locations=TN
385 https://www.export.gov/apex/article2?id=Tunisia-Banking-Systems
386 https://www.spglobal.com/_assets/documents/ratings/research/global-banking-outlook-2020.pdf
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390 https://www.tradinghours.com/exchanges/bvmt
391 https://www.webmanagercenter.com/2020/01/21/443697/en-2018-le-pnb-des-banques-islamiques-a-atteint-234-mdt-rapport-bct/
392 https://economix.fr/uploads/source/doc/seminaires/musulman/Samouel%20Beji_REV-Post%20Revolution%20Tunisian%20%20Financial%20System.pdf
393 https://www.webmanagercenter.com/2020/01/21/443697/en-2018-le-pnb-des-banques-islamiques-a-atteint-234-mdt-rapport-bct/
394 https://www.webmanagercenter.com/2020/01/21/443697/en-2018-le-pnb-des-banques-islamiques-a-atteint-234-mdt-rapport-bct/
395 http://www.globalcarbonatlas.org/en/CO2-emissions
396 https://www.iea.org/countries/tunisia

aims to lower its greenhouse gas emissions across all sectors (energy, industrial processes, agriculture, forestry and other land use, and waste) in order to lower its carbon intensity by 41% in 2030, relative to the base year 2010, and specifically lower carbon intensity in its energy sector by 46% compared to 2010 levels.[397]

Energy Context

Fossil fuels dominate Tunisia's primary energy mix. According to the International Energy Agency (IEA), natural gas and oil represented 48% and 41%, respectively, of Tunisia's total primary energy supply in 2018. [398] The remainder of the country's energy mix came from biofuels and waste (10%) and renewables (1%).[399] During the same year, 96% of natural gas was used to power the electricity sector, while the transport and industrial sectors consumed 51% and 18%, respectively, of Tunisia's oil usage.[400] In terms of the country's fossil fuel trade flows, Tunisia imported 60% of its natural gas in 2017, mainly from Algeria.[401] Although Tunisia is a net exporter of crude oil, the country still needed to import 91% of its refined oil products consumption due to its limited domestic refining capacity.[402] As of 2018, Tunisia had 99.8% universal electricity access, with 99.9% of its urban population and 99.5% of its rural population having access to electricity.[403, 404, 405]

Tunisia can supply all of its electricity demand through domestic generation with a total installed electricity generation capacity of 5,781MW as of 2019.[406] Natural gas and oil generation plants generated 97% of Tunisia's electricity, while the remaining 3% came from renewables.[407] Thus, Tunisia's installed capacity includes 5,417MW from fossil fuels (almost all natural gas) and 364MW from renewables.[408, 409] However, Tunisia's power generation is dependent on the country's ability to import natural gas. Not only are imports rising, but the Dinar has also weakened over the past five years against the US dollar and the Euro as a result of past political instability and the associated economic slowdown.[410] This depreciation further strains Tunisia's ability to continue importing natural gas to meet its rising electricity demand. Coupled with 17% losses of electricity production during the transmission phase, Tunisia is already facing significant challenges in maintaining a reliable electricity supply for all, especially during the summers when electricity demand is at its highest.[411]

Policy Actors

The main policy actors in Tunisia's electricity sector include:

- The Ministry of Industry, Energy, and Mines (formerly the Ministry of Energy, Mines, and the Energy Transition, which was folded into the Ministry of Industry) sets the energy policy for the country, and supervises the state-owned energy companies.
- The National Agency for Energy Management (ANME) serves as an informal energy regulator. While the ANME does not have the authority to approve electricity tariffs, the Agency conducts energy audits, certifies standards and labels for energy efficient equipment, and overall promotes energy efficiency and renewable energy.
- The Tunisian Company of Electricity and Gas (STEG) is a state-owned, vertically integrated utility that owns 5,310MW of Tunisia's generation capacity. STEG generates over 80% of the country's electricity and holds a monopoly over the transmission and distribution grids.[412]

397 https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Tunisia%20First/INDC-Tunisia-English%20Version.pdf
398 https://www.iea.org/countries/tunisia
399 https://www.iea.org/countries/tunisia
400 https://www.iea.org/data-and-statistics?country=TUNISIA&fuel=Energy%20consumption&indicator=Oil%20products%20final%20consumption%20by%20sector
401 https://www.iea.org/data-and-statistics?country=TUNISIA&fuel=Oil&indicator=Oil%20products%20imports%20vs.%20exports
402 https://www.iea.org/data-and-statistics?country=TUNISIA&fuel=Oil&indicator=Oil%20products%20final%20consumption%20by%20sector
403 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=TN
404 https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?locations=TN
405 https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=TN
406 https://tunesien.ahk.de/fr/news/news-en-detail/obg-report-mars-2019-le-secteur-de-lenergie-tunisien
407 https://www.trade.gov/country-commercial-guides/tunisia#:~:text=Tunisia%20has%20a%20current%20power,produces%2081%25%20of%20the%20electricity.
408 https://www.trade.gov/country-commercial-guides/tunisia#:~:text=Tunisia%20has%20a%20current%20power,produces%2081%25%20of%20the%20electricity
409 https://www.pv-magazine.fr/2020/09/25/la-tunisie-lance-un-nouvel-appel-doffres-pour-70-mwc-de-photovoltaique/#:~:text=Le%20gouvernement%20a%20lanc%C3%A9%20un%20troisi%C3%A8me%20appel%20d'offres%20en,les%20%C3%A9nergies%20renouvelables%20(Irena).
410 Google search – graph that appears
411 https://www.trade.gov/country-commercial-guides/tunisia#:~:text=Tunisia%20has%20a%20current%20power,produces%2081%25%20of%20the%20electricity.
412 https://www.export.gov/apex/article2?id=Tunisia-Electrical-Power-Systems-and-Renewable-Energy

- The Carthage Power Company is Tunisia's only independent power producer (IPP), which owns a 471MW combined cycle gas plant.[413]
- The Energy Transition Fund (FTE – formerly the National Energy Management Fund FNME) is a fund governed by the Ministry of Industry, Energy, and Mines that is dedicated to promoting renewable energy and energy efficiency measures. The FTE has a total capitalization of 40 million dinars (around 14 million USD).[414] Funded by taxes on energy and transportation products such as imported passenger cars or incandescent lightbulbs, as well as by earnings from the fund's investment activities, the FTE is authorized to support energy conservation projects by providing loans and repayable grants, as well as by taking equity positions.[415, 416]
- The Depollution Fund (FODEP) is a special treasury fund set up to encourage companies to protect the environment against pollution, as well as promote the use of clean and non-polluting technologies. Governed by the National Agency for Environmental Protection (ANPE), which sits under the Ministry of Environment, and capitalized in part by a grant from the German Development Bank KfW, this fund provides grants that cover a maximum of 20% of the investment cost of the installed technology.[417, 418] The fund also grants access to a FOCRED (Fund to Protect the Environment in Industrial Areas) credit line from KfW that covers 50% of the investment cost, repayable over 10 years, subject to a grace period of 3 years, at the interest rate set at 4.25%.[419]

Sector Trends and Challenges

The state-owned structure of the power sector enables Tunisia to sell electricity at below-market costs for the purposes of political stability. Although the Tunisian government embarked on a policy of gradually increasing electricity prices to align them with the actual cost of electricity generation in 2014, tariffs have still not caught up to average costs due to rising gas prices and the depreciation of the Dinar.[420, 421] As a result, STEG must receive heavy government subsidies – around 30% of total cost of production – to offset its annual operating losses, and yet is still posting negative profits.[422, 423] These losses obstruct STEG's ability to invest in new generation capacity in the face of rising electricity demand. STEG is also heavily indebted as a result of borrowing in foreign currency to plug its financing gap and reached an unsustainable debt-to-equity ratio in 2016, meaning that the utility has very limited room to access additional external funds to develop new generation capacity.[424] Non-cost reflective tariffs also constrain private investors who must also rely on state subsidies to ensure profitable power offtake agreements.[425] Thus, state subsidized electricity prices weaken the ability of private investors to develop new generation capacity.

Despite the obstacles presented by the structure of the domestic electricity market, Tunisia has significant potential for renewable energy deployment across the country, especially from wind and solar resources. A study by the ANME from 2016 found that Tunisia's onshore wind energy potential stood at 8000MW – enough to power the entire country.[426] The study identified Tunisian coastlines and the country's southern regions as the best sites for wind power deployment.[427] In terms of solar power, the

413 https://www.trade.gov/country-commercial-guides/tunisia#:~:text=Tunisia%20has%20a%20current%20power,produces%2081%25%20of%20the%20electricity.
414 AfDB interview, November 13, 2020
415 https://menaselect.info/uploads/countries/tunisia/Country%20Fact%20Sheet%20Tunisia_Energy%20and%20Development%20at%20a%20Glance%202018.pdf
416 https://www.energiemines.gov.tn/fr/themes/energie/efficacite-energetique/fonds-de-transition-energetique-fte/
417 http://www.anpe.nat.tn/Fr/fodep_11_52
418 https://www.webmanagercenter.com/2019/01/31/430476/un-don-allemand-de-pres-de-31-mdt-pour-le-fonds-tunisien-de-depollution/
419 http://www.anpe.nat.tn/Fr/fodep_11_52
420 https://blogs.eui.eu/medirections/tunisia-social-anger-spreading-following-increase-fuel-prices-h-meddeb/
421 http://documents1.worldbank.org/curated/en/296941561687292260/pdf/Tunisia-Energy-Sector-Improvement-Project.pdf
422 STEG interview, October 23, 2020
423 http://documents.worldbank.org/curated/en/241221549641861408/pdf/Concept-Project-Information-Document-Integrated-Safeguards-Data-Sheet-Energy-Sector-Performance-Improvement-Project-P168273.pdf
424 http://documents1.worldbank.org/curated/en/296941561687292260/pdf/Tunisia-Energy-Sector-Improvement-Project.pdf
425 Phillipe Trape AfDB Economist interview, Sept 4, 2020
426 http://www.cemi-tunis.org/medias/files/bulletin-cemi-oct-an.pdf
427 file:///C:/Users/Leo/Downloads/DREI%2520Tunisia%2520Full%2520Report_30Mar15.pdf

same study found that Tunisia's solar irradiation potential ranged from 1,800 kWh/m^2 in the north to 2,600 kWh/m^2 in the south.[428] Although the most abundant renewable solar resources in southern Tunisia are not near major population centers, sites along the country's coasts still demonstrate the potential for significant renewable energy development.

However, the share of renewables in Tunisia's electricity generation mix remains very low compared to its renewable energy potential. As of 2018, Tunisia has installed approximately 362MW of renewable energy.[429] Wind farms comprise 245MW of this installed capacity, while solar plants and hydroelectric facilities each have 62MW installed.[430, 431] While renewables currently do not play a significant role in Tunisia's electricity mix, their importance could grow in the coming years, especially if renewable energy projects are developed with the purpose of creating more jobs to tackle the country's unemployment challenge.[432, 433]

Two major regulatory structures govern Tunisia's renewable energy buildout.

1. Law No. 2015–12 on the legal framework for renewable energy project implementation
2. Decree 2016–1123 on the specific conditions and procedures for the sale of electricity from renewable sources.[434]

These regulatory structures provide a guide for developers and investors to identify the eligibility and compensation regimes for proposed projects. The laws outline three regulatory regimes: licensing for IPPs for local consumption (below a set capacity threshold); a concession scheme for large-scale projects both for local consumption and for export; and small-scale energy self-consumption.[435]

The licensing regime for the small-scale IPPs (smaller than 10MW for solar, 30MW for wind) requires developers to enter into an agreement with the Ministry of Industry, Energy, and Mines. This agreement stipulates that the IPP has two years for PV projects and three years for wind projects to form the project company and complete the plant.[436] The IPP is only allowed to produce electricity after obtaining a separate authorization from the Ministry and undergoing a commissioning test by STEG.[437] Tunisia has already issued authorizations for two rounds of tenders for solar projects, with the first round awarding 64MW and the second round awarding 70MW.[438] A third round is apparently underway, also for a total of 70MW.[439] The government has also awarded authorizations for a round of four wind projects, each with 30MW of capacity, in January 2019, under the "authorization scheme."[440] STEG would be the offtaker for all of the electricity generated from these projects. However, most of these tenders are apparently stalled in their development as a result of a lack of viable financing options, despite efforts by international donors to help developers build their business plans and financing capacity.[441] Only two projects out of all these tenders are online, both of which with a capacity of 1MW and funded through on-balance sheet financing.[442]

The large-scale concession regime covers any projects that are larger than those included in the small-scale licensing regime. Just as with the licensing regime, STEG would be the offtaker from these large-scale projects. The Ministry issues a call for public tender, and awards contracts once validated by the Tunisian parliament.[443] Tunisia already issued a 500MW solar tender under this

428 https://www.ecomena.org/solar-tunisia/
429 https://www.ecomena.org/solar-tunisia/
430 https://www.export.gov/apex/article2?id=Tunisia-Electrical-Power-Systems-and-Renewable-Energy
431 https://www.pv-magazine.fr/2020/09/25/la-tunisie-lance-un-nouvel-appel-doffres-pour-70-mwc-de-photovoltaique/#:~:text=Le%20gouvernement%20a%20lanc%C3%A9%20un%20troisi%C3%A8me%20appel%20d'offres%20en,les%20%C3%A9nergies%20renouvelables%20(Irena).
432 Phillipe Trape AfDB Economist interview, Sept 4, 2020
433 Hela Cheikhrouhou interview, October 19, 2020
434 https://www.itu.int/en/ITU-D/Regional-Presence/ArabStates/Documents/events/2017/ICTCC/Presentations/Session8/ANME_ICT%20%20CC_Tunisia%20_July%202017.pdf
435 https://menaselect.info/uploads/countries/tunisia/Country%20Fact%20Sheet%20Tunisia_Energy%20and%20Development%20at%20a%20Glance%202018.pdf
436 https://menaselect.info/uploads/countries/tunisia/Country%20Fact%20Sheet%20Tunisia_Energy%20and%20Development%20at%20a%20Glance%202018.pdf
437 https://menaselect.info/uploads/countries/tunisia/Country%20Fact%20Sheet%20Tunisia_Energy%20and%20Development%20at%20a%20Glance%202018.pdf
438 http://taiyangnews.info/business/tunisia-launches-3rd-70-mw-auction-round/
439 http://taiyangnews.info/business/tunisia-launches-3rd-70-mw-auction-round/
440 https://www.windpowermonthly.com/article/1523024/first-tunisia-tender-rewards-european-firms
441 GIZ interview, October 30, 2020
442 GIZ Interview, October 30, 2020
443 https://menaselect.info/uploads/countries/tunisia/Country%20Fact%20Sheet%20Tunisia_Energy%20and%20Development%20at%20a%20Glance%202018.pdf

regime in May 2018, with a project list for a 200MW plant in the province of Tatouine, two 100MW facilities in the provinces of Kaiouran and Gafsca, and two more 50MW solar parks in the provinces of Sidi Bouzid and Tozeur.[444] The winners of this tender were announced in December 2019, with a Norwegian company, Scatec Solar, picking up the 200MW project as well as the two 50MW plants, while France's Engie and China's TBEA each picked up the two remaining 100MW projects.[445] Thus, the projects under the large-scale concession regime appear to attract more developer interest. However, most of the focus under the concession regime is on large-scale solar projects, with large-scale wind projects not moving forward.

The small-scale energy self-consumption regime provides a framework for private companies and households to produce renewable energy for their own uses or to sell back to the grid. With an amendment to this regime passed in 2019 and in 2020, this framework allows private players to set up project companies and sell up to 30% of excess power to STEG at a fixed price, as well as sell electricity to other large consumers through the national grid.[446, 447] However, one of the major challenges with this regime is that the PPAs would only enter into force after the project is commissioned.[448] This arrangement increases the perceived risk of these projects, and thus they face difficulty in getting financing from banks.

However, all three of these regimes face challenges in attracting private financing. So far, no domestic commercial bank in Tunisia has extended loans to projects under any of the three regimes.[449] For the concession regime, the main constraint is the mismatch between the loan tenors. Commercial banks can give corporate loans for 7–10 years, but concession regime projects require tenors of around 19 years.[450] Tunisian banks also face issues with its licensing regime, as these projects can only enter into PPAs once they've reached their commercial operation date (COD).[451] As a result, both project developers and lenders are exposed to high levels of risk during the construction phase, especially with regard to force majeure or changes in policy. In addition, there is no clearly defined mechanism to compensate these projects before COD, as they do not receive offtake guarantees from the state, nor do domestic banks have the adequate capacity for project finance.[452]

Improving energy efficiency complements Tunisia's plans to meet its rising electricity demand and strengthen its energy independence. According to Tunisia's Nationally Appropriate Mitigation Actions (NAMAs) for energy, total energy demand should be reduced by 34% in 2030 compared to business as usual. This reduction would mitigate 22 Mt of CO_2e by 2030, which corresponds to a reduction of 48% in emissions as compared to a 'business as usual' emissions scenario.[453] To that end, the Tunisian Renewable Energy Action Plan 2030 set two energy efficiency targets:

1. Lowering Tunisia's energy intensity by 3% per year between 2016–2030
2. Improving energy efficiency by 17% between 2016–2030, meaning Tunisia would consume 17% less energy to deliver the same amount of economic output as a business-as-usual scenario.

In addition, Tunisia has put in place the following energy efficiency policies and programs:[454]

- An energy audit of public building and facilities
- A public lighting efficiency campaign through the widespread deployment of LEDs and other low-energy lightbulbs
- Energy efficiency certifications of household appliances
- Refurbishing 300,000 residential and public buildings to become more energy efficient by 2020.
- Implementing an energy efficiency certification system for public buildings.
- Designing an urban transportation plan for at least five communities.

444 https://www.pv-magazine.com/2018/05/14/tunisia-launches-500-mw-solar-tender/

445 https://www.pv-magazine.com/2019/12/20/winners-and-prices-of-tunisias-500-mw-pv-tender/

446 https://www.alexander-partner.com/fileadmin/downloads/renewable_energy_in_tunisia_-_ipp_regime.pdf

447 https://www.eversheds-sutherland.com/global/en/what/articles/index.page?ArticleID=en/Energy/Tunisia_amends_the_2016_auto-consumption_regime_in_a_step_towards_market_deregulation

448 UPC interview, October 9, 2020

449 Attijari Bank interview, November 9, 2020

450 Attijari Bank interview, November 9, 2020

451 Attijari Bank interview, November 9, 2020

452 Attijari Bank interview, November 9, 2020

453 http://www.environnement.gov.tn/PICC/wp-content/uploads/NAMAs-in-Tunisia-anglais.pdf

454 https://www.res4med.org/wp-content/uploads/2017/11/Country-Profile-Tunisia-Report_05.12.2016.pdf

Finally, Tunisia received a $55 million credit line (reduced to $40 million after a project restructuring in 2012) from the World Bank in 2009 to scale up the country's industrial energy efficiency and cogeneration investments.[455] This credit line was extended to three banks in Tunisia – BH, BFPME, and Amen Bank. This project was meant to reduce the energy intensity of the Tunisian economy, as well as increase the deployment of renewable energy.[456] The ANME would be responsible for implementing this credit line.[457] By the end of the project in 2016, this project had achieved 87.63 ktoe of energy savings, against a target of 83.79 ktoe, as well as a cumulative reduction of 205.84 $ktCO_2$ of emissions.[458] This project also managed to attract $42 million in total investments into energy efficiency projects (including disbursements from the credit line), against a target of $52 million.[459]

Sector Goals, Initiatives & Programs

Tunisia has introduced several regulatory measures and policies to attract private investments in renewable energy. The Tunisian Solar Plan (TSP) is the country's main policy roadmap for the development of renewable energy. The TSP was originally established in 2009 by ANME, but underwent revisions in 2012 and 2016 to reach its current form. The TSP calls for renewable energy to produce 30% of Tunisia's electricity by 2030 (15% wind, 10% solar, 5% hydro).[460] To achieve this goal, this plan targets the installation of 3815MW of renewable energy by 2030, as stipulated by Notice No. 01/2016 from the Ministry of Industry, Energy, and Mines.[461] In terms of the specific capacity allocation, the plan envisions 1,755MW to come from wind energy, 1,510MW from PV solar, 450MW from CSP solar, and 100MW from biomass.[462] The buildout of this planned capacity breaks down into three phases: 1,000MW in the first phase (2017–2020), 1,250MW in the second phase (2021–2025), and 1565MW in the third phase (2026–2030).[463] Given how Tunisia's total renewable energy capacity does not exceed 400MW as of 2019, there is much work to be done to be able to reach the goals of the TSP. Nevertheless, the Tunisian Solar Plan demonstrates the clearest indication of the country's priorities in its renewable energy buildout.

The Tunisian Renewable Energy Action Plan 2030 is a separate national policy that combines renewable energy goals with related energy efficiency goals. Launched in November 2016 by the Ministry of Industry, Energy and Mines, this plan also sets the goal of producing 30% of Tunisia's electricity from renewable sources by 2030, as well as aims to lower energy intensity by 3% per year and reduce total energy consumption by 17% compared to a business-as-usual scenario.[464] This plan differs from the Tunisian Solar Plan in the scale of its renewable energy buildout. Whereas the TSP calls for the installation of 3,815MW of renewable energy by 2030, the Renewable Energy Action Plan calls for the installation of 2,250MW, split between 1,000MW from 2017–2020 and 1,250MW from 2021–2030. Thus, greater clarity regarding any overlap between the TSP and the Renewable Energy Action Plan would help resolve how these two plans work in a complementary fashion.

In terms of policies for off-grid renewable energy, Tunisia offers multiple incentive programs to encourage the development of rooftop solar PV and SWH installations. Most of these programs revolve around extending subsidies to partially cover the capital costs of rooftop solar installations, most of which is supported by the FTE. The three main programs consist of the Program Solaire (PROSOL) policy, the PROSOL-Elec policy, and the Bâtiment Solaire program.

The Program Solaire (PROSOL) policy is Tunisia's main incentive program to install solar-powered water heaters across the country. Launched in 2005 by a joint initiative between the United Nations Environment Programme, the national utility STEG, Tunisia's ANME, and the Italian Ministry for Environment, Land and Sea (IMELS), the PROSOL policy provides a loan mechanism for

455 http://documents1.worldbank.org/curated/en/134241475519900776/ICR-Main-Document-P104266-2016-09-29-14-52-09302016.docx
456 https://documents.worldbank.org/en/publication/documents-reports/documentdetail/549061468312358978/tunisia-energy-efficiency-project-environmental-management-framework
457 http://documents1.worldbank.org/curated/en/648471468350132160/pdf/728310PJPR0P100ox0379800B00PUBLIC00.pdf
458 http://documents1.worldbank.org/curated/en/648471468350132160/pdf/728310PJPR0P100ox0379800B00PUBLIC00.pdf
459 http://documents1.worldbank.org/curated/en/648471468350132160/pdf/728310PJPR0P100ox0379800B00PUBLIC00.pdf
460 http://www.anme.nat.tn/fileadmin/user1/doc/DEP/Rapport_final__PST.pdf
461 http://www.tunisieindustrie.gov.tn/upload/ENR/Guide_detaille_ENR_tunisie_mai2019.pdf
462 http://www.tunisieindustrie.gov.tn/upload/ENR/Guide_detaille_ENR_tunisie_mai2019.pdf
463 http://www.tunisieindustrie.gov.tn/upload/ENR/Guide_detaille_ENR_tunisie_mai2019.pdf
464 https://www.rcreee.org/news/tunisia-announces-renewable-energy-action-plan-2030

households to purchase solar water heaters, along with a 20% subsidy for the water heater capital costs.[465] This program has installed around 26,000 solar water heaters each year between 2005 and 2016, benefiting over for over 50,000 families.[466, 467]

The PROSOL-Elec and the Bâtiment Solaire programs present regulatory frameworks and incentives aimed at encouraging the adoption of off-grid household solar systems. The PROSOL-Elec program aims to install 190MW of rooftop PV capacity by 2020.[468] The Bâtiment Solaire program offers subsidies similar to those of PROSOL-Elec, but targets the installation of PV solar systems for commercial and industrial customers.[469] To achieve this goal, this program offers the following incentives:

1. A subsidy for 30% of the investment cost (up to a maximum of 3000 dinars per kWh)
2. A subsidy for 10% of investment cost from IMELS
3. A 5-year loan that STEG would repay (excluding any accumulated interest).[470]

Tunisia is also participating in the SUNREF program, financed with 73.2 million EUR from the French development bank AFD.[471] This program is comprised of three parts. The first part sets up credit lines to local banks (UBCI, UIB, Amen Bank and BH) to finance green investments. This credit line is worth 60 million EUR in total.[472] The second component is a technical assistance program in collaboration with ANME and ANPE to help them identify eligible projects, conduct technical analysis of the proposed investments and the monitor their implementation after the investment decision.[473] The third component establishes a financial incentive mechanism where local banks would pay out bonuses to companies that successfully complete their green investments, thus lowering the overall cost of projects.[474] As of March 2020, this program has financed 18 projects and has disbursed around 15.3 million EUR.[475]

The FTE can also serve as a source of credit for renewable energy projects, but faces challenges in performing at its full potential. Despite a plan to offer more financial products, the FTE has only given out subsidies of up to 30% for solar PV systems (especially projects conducted by ANME), but has not yet transitioned to giving repayable grants/loans or investing in equity.[476] The main barrier to this transition revolves around whether to offer concessionary interest rates. Although concessionary rates would certainly help attract more project developers, there is some concern in the Tunisian government of the potential to compete with other providers of concessionary finance, such as the SUNREF program.[477] In addition, the relatively small capitalization of FTE limits the fund to investing in small scale projects, either in the self-consumption regime or the licensing regime.[478]

Another potential financing mechanism in the works is a new renewable energy fund in collaboration with the Caisse des Dépôts et Consignations (CDC) and STEG's renewable energy arm. The CDC is Tunisia's investment vehicle for the country's pension funds, as well as other national savings, such as those from the post office from smallholders.[479] This new renewable energy fund would be geared towards financing projects with high environmental impact, and would invest in a private equity capacity using direct investment or convertible bonds for both private sector and PPP projects.[480, 481] The fund has a target of 50

465 https://sustainabledevelopment.un.org/index.php?page=view&type=99&nr=39&menu=1449
466 https://www.res4med.org/wp-content/uploads/2017/11/Country-Profile-Tunisia-Report_05.12.2016.pdf
467 https://sustainabledevelopment.un.org/index.php?page=view&type=99&nr=39&menu=1449#:~:text=In%202005%2C%20the%20Tunisian%20government,through%20financial%20and%20fiscal%20support.
468 https://www.dena.de/fileadmin/dena/Dokumente/Pdf/3197_Market_Info_Tunisia_Photovoltaik.pdf
469 https://www.dena.de/fileadmin/dena/Dokumente/Pdf/3197_Market_Info_Tunisia_Photovoltaik.pdf
470 http://www.medrec.org/En/PROSOL%20Elec_11_13
471 https://www.energiemines.gov.tn/fr/themes/energie/efficacite-energetique/projets-et-programmes/programme-sunref-afd/
472 https://www.energiemines.gov.tn/fr/themes/energie/efficacite-energetique/projets-et-programmes/programme-sunref-afd/
473 https://www.energiemines.gov.tn/fr/themes/energie/efficacite-energetique/projets-et-programmes/programme-sunref-afd/
474 https://www.energiemines.gov.tn/fr/themes/energie/efficacite-energetique/projets-et-programmes/programme-sunref-afd/
475 https://www.energiemines.gov.tn/fr/themes/energie/efficacite-energetique/projets-et-programmes/programme-sunref-afd/
476 AfDB Interview, November 13, 2020
477 AfDB Interview, November 13, 2020
478 AfDB Interview, November 13, 2020
479 Hela Cheikhrouhou interview, October 19, 2020
480 https://www.leconomistemaghrebin.com/2019/01/15/cdc-creation-fonds-financement-energie/
481 AfDB interview, November 13, 2020

million EUR, with 40% provided by the CDC, and the rest coming from the AfDB as well as other multilateral donors such as the GCF.[482, 483, 484] The ultimate aim of this fund is to act as a catalyst to finance proof-of-concept projects in renewable energy and energy efficiency that are commercially viable and have relatively fast preparation times. Thus, the fund would potentially focus more on licensing scheme scale PV projects (5–10MW).[485] This fund is currently under development and a request for proposals has gone out in February 2019. According to interviews with stakeholders, this fund should be ready to launch in 2021 or 2022.[486]

Climate Smart Agriculture and Forestry Context

Agriculture plays a smaller, but still significant, role in Tunisia's economy as a driver of both economic growth and employment, especially in rural areas. While the average farm size is ten ha, over 75% of the 500,000 registered farms in the country are smaller than that figure.[487] The olive oil, dates, fishing, and citrus sectors are some of the most important crops for Tunisia, especially for their export earnings, while wheat and barley represent the major staple crops.[488, 489] On the forestry side, Tunisia has about 1.3 million hectares of forests, 75% of which are located in the north of the country.[490] These forests cover only 5% of the national territory, and contributes to around 0.3% of Tunisia's GDP as of 2015.[491, 492]

Tunisia has around 5.4 million ha of land under cultivation, but only 435,000 ha (or 8%) of that land is under irrigation.[493] However, this irrigated land accounts for 35% of national agricultural production.[494] On the other hand, one of the major climate risks for Tunisia is water stress. According to data from Tunisia's Ministry of Agriculture, the total amount of water available in the country is equivalent to 420 cubic meters per person per year, which makes the country "very water scarce" by U.N. Water standards.[495] A study by the International Fund for Agricultural Development claimed that drought would reduce the rain-fed arable land by 30% by 2025, and that the annual cost of environmental degradation tallies to 2.7% of GDP.[496] As a result, ensuring water efficiency and reliability of water-smart irrigation is a must in order for Tunisia's agriculture to become climate resilient.

The main policy making body responsible for agriculture in Tunisia is the Ministry of Agriculture, Water Resources, and Fisheries. Within this ministry, the entities involved with forest administration are the General Directorate of Forestry and the Department of Forest Usage (Régie d'Exploitation Forestière – REF).[497]

Sector Goals, Initiatives & Programs

Despite the importance of shifting to climate-smart agriculture (CSA), the government does not have any current overarching plans or initiatives to spur investment in this sector. The most recent plan on CSA was the National Strategy for Adaptation to Climate Change for Agriculture and Ecosystems in Tunisia from 2007, which entailed implementing early warning systems for climate, improved water management and enforcement of the Water Code to protect underground aquifers and reduce water overconsumption, and deepening the mapping of Tunisia's agricultural land by climate change risk.[498] It is unclear whether this plan is still in effect, or was implemented at all. Nevertheless, stakeholders have expressed that the

482
483 https://www.ilboursa.com/marches/la-cdc-en-quete-d-un-gestionnaire-pour-son-nouveau-fonds-d-investissement-vert-_15838
484 AfDB Interview, November 13, 2020
485 AfDB Interview, November 13, 2020
486 AfDB Interview, November 13, 2020
487 https://docs.wfp.org/api/documents/1054e263-6efd-4511-bef3-a0b68278c14e/download/
488 https://www.export.gov/apex/article2?id=Tunisia-Agricultural-Sector
489 https://www.intracen.org/exporters/organic-products/country-focus/Country-Profile-Tunisia/#:~:text=The%20main%20cereal%20crops%20are,olive%20oil%20(FAO%2C%2014.07.
490 http://www.fao.org/3/a-az357f.pdf
491 https://www.climateinvestmentfunds.org/sites/default/files/meeting-documents/fip_investment_plan_for_tunisia_0.pdf
492 http://www.fao.org/3/a-az357f.pdf
493 http://www.fruitnet.com/eurofruit/article/180298/irrigation-project-kicks-off-in-tunisia
494 http://www.fruitnet.com/eurofruit/article/180298/irrigation-project-kicks-off-in-tunisia
495 https://www.reuters.com/article/us-tunisia-water-land-feature-trfn/thirsty-crops-leaky-infrastructure-drive-tunisias-water-crisis-idUSKBN1XB2X1
496 https://www.ifad.org/en/web/operations/country/id/tunisia
497 https://www.reuters.com/article/us-health-coronavirus-tunisia-logging-fe/under-the-cover-of-lockdown-illegal-logging-surges-in-tunisia-idUSKBN22D4H5
498 http://www.environnement.gov.tn/PICC/wp-content/uploads/Strat%C3%A9gie-nationale-d%E2%80%99adaptation-de-l%E2%80%99agriculture.pdf

government is currently mapping the Tunisian agricultural sector as part of the design process of a national food security plan. This design process targets subsectors such as water, fisheries, rangeland etc. in order to find bankable projects.[499]

On the other hand, the World Bank is implementing its own CSA program in Tunisia, through which it made a loan of $140 million to Tunisia in 2018 for its "Irrigated Agriculture Intensification Project," with around $22 million already disbursed.[500] This project targets six regions (Beja, Bizerte, Jendouba, Nabeul, Sfax and Siliana) in order to improve the management of limited water resources.[501] The project has four different objectives, namely institutional modernization (i.e. setting up a new irrigation management entity), rehabilitation and improvement works of irrigation infrastructure, supporting agricultural development and market access, and covering equipment costs, impact assessment studies, and training related to the project's environmental and social management framework.[502] The project will be implemented by the Ministry of Agriculture and the Regional Authorities for Agricultural Development (CRDA).[503] However, stakeholders have expressed that Tunisia will require more sustainable solutions than simply more efficient irrigation, especially given the increasing water scarcity in the country. Examples of such solutions include technology transfers for agroecology as well as advanced agricultural engineering.[504]

Tunisia also applied to the GCF in 2019 to obtain $34 million in grant funding for a project to improve CSA in southern portions of the country. The project objective is to build the resilience of smallholder farmers and ecosystems by rehabilitating degraded ecosystems, increasing the efficiency of farming systems, creating new green job opportunities, and enhancing the enabling environment for adaptation and mitigation.[505] These initiatives usually take the form of establishing climate-proof irrigation and land management techniques, improving livestock watering systems, and diversifying farmer income sources.[506] Nevertheless, this project is still awaiting approval.

In terms of forest conservation and management, the Tunisian government has published a NAMA on forestry. This NAMA set a goal of reforesting 119,000 hectares of forests between 2018–2034 using trees native to the region. This plan also envisages the restoration of 68,000 hectares of natural forests and the planting 42,500 hectares of shrubs to defend against desertification in the same time frame, as well as the planting of 10,000 hectares of olive trees between 2017–2020.[507] These efforts should result in a cumulative absorption of 20 MT of CO_2 by 2034, as well as allow forests to take up 10% of Tunisia's national territory.[508] However, it is unclear whether this NAMA has received the adequate funding or political support to start being implemented.

The Climate Investment Funds (CIF) also has a Forest Investment Program (FIP) in Tunisia. This program set out to increase carbon sequestration and enhance the production, improved use and value of the goods and socio-economic and environmental services of Tunisia's agro-sylvo-pastoral landscapes.[509] These goals would be achieved through integrated management of landscapes in Tunisia's least developed regions, investing and rehabilitating degraded land, and sustainable management of rangelands.[510] However, the CIFs has only funded the preparation phase of this FIP, and not the implementation phase. Thus, this FIP serves more as a framework to guide policy decisions rather than a concrete set of policies themselves.[511]

499 Ministry of Agriculture interview, November 12, 2020
500 https://projects.worldbank.org/en/projects-operations/project-detail/P160245
501 http://www.fruitnet.com/eurofruit/article/180298/irrigation-project-kicks-off-in-tunisia
502 https://projects.worldbank.org/en/projects-operations/project-detail/P160245
503 http://www.fruitnet.com/eurofruit/article/180298/irrigation-project-kicks-off-in-tunisia
504 Ministry of Agriculture interview, November 12, 2020
505 https://www.greenclimate.fund/sites/default/files/document/22630-towards-climate-resilient-agriculture-and-livelihoods-southern-tunisia.pdf
506 https://www.greenclimate.fund/sites/default/files/document/22630-towards-climate-resilient-agriculture-and-livelihoods-southern-tunisia.pdf
507 http://www.anme.tn/sites/default/files/deuxieme_rapport_biennal_de_la_tunisie_-_ccnucc.pdf
508 http://www.anme.tn/sites/default/files/deuxieme_rapport_biennal_de_la_tunisie_-_ccnucc.pdf
509 https://www.climateinvestmentfunds.org/sites/default/files/meeting-documents/fip_investment_plan_for_tunisia_0.pdf
510 https://www.climateinvestmentfunds.org/sites/default/files/meeting-documents/fip_investment_plan_for_tunisia_0.pdf
511 https://www.climateinvestmentfunds.org/sites/default/files/meeting-documents/fip_investment_plan_for_tunisia_0.pdf

Green Urbanization and Clean Transportation Context

The urbanization rate in Tunisia is relatively high, at 69% as of 2019.[512] The country would benefit from green urbanization and clean transportation initiatives, especially in terms of improving its air quality, as the World Health Organization ranks Tunisia's air quality as "unsafe."[513]

In June 2019, Tunisia was selected as one of the eligible countries for the "Green Cities Facility" sponsored by EBRD with funding from GCF, which is meant to provide both capacity building and funding to help selected cities minimize adverse environmental impacts and support the natural environment, in collaboration with the EBRD's Green Cities program.[514] This GCF-funded facility plans to funnel $303.5 million to nine countries, one of which Tunisia, to improve ten cities that have higher than average energy and carbon intensity, and are facing a range of environmental and social issues.[515] This facility will provide concessional financial instruments that will allow ambitious investments in climate-resilient urban infrastructure such as district heating/cooling, low-carbon buildings, and solid waste management.[516] However, due to delays Tunisia is not listed as one of the countries on EBRD's current Green Cities list, so more clarity on Tunisia's potential participation in green urbanization projects under this program is needed.

Tunisia was also already engaged in national sustainable cities program prior to its inclusion in the GCF facility. Launched in Tunis in June 2019, this consists of creating awareness among stakeholders for the smart/sustainable city concept.[517] The ministry in charge of this program is the Ministry of Local Affairs and the Environment.[518]

II. PRIORITY SECTORS

The energy and green cities sectors represent the two most promising sectors in Tunisia for where a Green Bank or NCCF could serve in a catalytic role to spur sustainable growth.

Within the energy sector, the government has made progress towards building an enabling environment for private sector participation through policy and regulatory changes. In addition to the country's institutional framework, Tunisia's renewable energy targets provide strong guidance in the immediate term. In spite of these positive milestones, the sector still requires support for capacity and field building. A Green Bank could also play a critical role through providing de-risking mechanisms, as the sector lacks a long-term track record, especially in regard to utility-scale renewable energy projects.

Ensuring that the country's planning and policies focus on reducing energy consumption through energy efficient infrastructure is essential for realizing its energy transition objectives. With the projected growth in electricity demand and growing populations in urban areas, Tunisia will need to approach urban development with a focus on energy efficiency. It is also important to address water constraints and plan strategically for water consumption through water management practices. Energy efficiency and water resource management are two areas where funding support for policy development and subsequent financing for the adoption of new technologies will be crucial. In both areas, a NCCF or Green Bank's support will be needed to bring these sub-sectors to scale. Early seed funding for projects could build a robust business case for more private sector involvement.

Both sectors have gained some traction in recent years as international development banks have provided financial and non-financial support, and involved a variety of different stakeholders.

As for the other five countries included in this report, the following criteria were utilized to identify these priority sectors:

- Sectors with significant potential to reduce CO_2 emissions and have the potential to support the continued efforts of the country's progress towards meeting NDCs and SDG commitments;

512 https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=TN

513 https://www.iamat.org/country/tunisia/risk/air-pollution#:~:text=In%20accordance%20with%20the%20World,maximum%20of%2010%20%C2%B5g%2Fm3.

514 https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp086-ebrd-multiple-countries.pdf

515 https://www.greenclimate.fund/project/fp086

516 https://www.greenclimate.fund/project/fp086

517 http://www.environnement.gov.tn/index.php/fr/developpement-durable/processus-de-planification-et-des-gestions-participatives-a-l-echelle-locale-du-dd/programme-national-des-villes-durable-en-tunisie

518 https://www.afrik21.africa/en/tunisia-country-will-benefit-from-ebrds-green-cities-programme/#:~:text=Tunisia%20is%20one%20of%20nine,will%20be%20revitalised%20in%20Tunisia.

- Potential for project pipeline has been identified through the initial market scoping;
- Significant direct or indirect contributor to the country's Gross Domestic Product (GDP); and
- A financing gap exists within the market whereby catalytic green capital is needed or is deemed to be of great importance to make progress towards the country's NDCs and development goals.

Energy as a Priority Sector

Tunisia is in a unique position from an energy perspective given its high national electrification rates. As noted earlier, much of Tunisia's electricity is powered by imported gas. However, there is an opportunity for the country to transition to clean energy generation sources that will help the country meet its NDCs and GHG emission reduction targets, create new quality jobs associated with a green economy, and potentially lower the cost of electricity in the country, given that renewable energy projects have a more cost efficient operating and maintenance profile as compared to conventional power plants.

The country is considered ideal for solar and wind projects – with solar radiation being the strongest in the south of the country and with numerous wind sites identified along the northern coast, central and southern regions of the country.

The Tunisian Solar Plan specifically sets out a target for renewable energy integration, 12% by 2020 and 30% by 2030 of total installed capacity. Wind and solar energy provide the most promise of the renewable energy technologies to help Tunisia transition to a state of greater energy security. Although historically there has been limited new renewable energy assets developed by IPPs, it is anticipated that the predominant share of the additional capacity will be delivered through this structure.

The roll out of several renewable energy programs, sponsored by multilateral and bilateral development agencies provide a foundation on which a Green Bank or NCCF could base its design. Specifically, lessons drawn from the launch of the SUNREF program in Tunisia could prove useful, especially regarding capital deployment and a potential partnership with the four commercial banks. The government of Tunisia has also expressed interest in seeking funding from the GCF, GEF and the Adaptation Fund.

Complications and Opportunities in the Energy Sector

Tunisia has been challenged by numerous factors that have limited the integration of renewable energy into the national energy mix. Barriers have ranged from issues surrounding the country's political transition to financial constraints, as well as the sector's oversight and operations. The following areas have been highlighted as potential points of opportunity where a Green Bank or NCCF could add value.

- **Complexity of the Schemes Designed to Promote Renewable Energy** – Tunisia's IPP laws have many specific intricacies and challenges. (Challenges related to standard power purchase agreement (PPA) terms will be discussed later in this section.)
  - **Authorization scheme** – This scheme was established to address the needs of the sub 10MW (smaller scale) projects, and there has been difficulty in bolstering interest from the private sector, particularly developers and financiers. Challenges include PPA terms and the subpar creditworthiness of the sole power off-taker, STEG, which make many of the projects are considered to be "un-bankable."
  - **Concession scheme** – Launched to help address the needs of larger scale renewable projects, which initially targeted any projects larger than 10MW for solar and 30MW for wind, these schemes have similarly encountered challenges with PPA terms. Although this scheme was launched relatively recently, the wind component has already been on hold because of financing issues, further highlighting some of the challenges of this approach.
  - **Auto-consumption scheme** – Established to allow companies and industry to generate their own energy, this scheme received positive market feedback. However, the lack of clarity around regulations governing net metering mechanisms has impeded it from growing to its full potential.

- **Counterparty Risk** – A particularly significant complication is the weak financial standing of STEG. Given the utility's monopoly over generation and transmission assets and its status as the sole power off-taker for all related contracts, non-payment or breach of contract are noted as considerably

high risks for power developers (IPPs). This has broad negative effects on private sector interest in terms of the operating environment in Tunisia. The legal and contract structure of the PPA does not provide assurances to for counterparty risk. Hence, identification and use of de-risking products, such as guarantees, are considered important interventions to provide market assurance and stability.

STEG continues to receive financial support from the state and yearly subsidies, but given the macroeconomic outlook of the country, even STEG will likely suffer from further financial deterioration, which could affect its capacity to supply electricity services.

- **Macroeconomic Environment and Associated Risk** – Tunisia's economic potential has always been acknowledged but a number of events contributed to the country's lackluster economic performance when compared to peer countries and other upper-middle-income countries.[519] Although the country has continued to liberalize and open its economy since the 1980's, approximately 50% still remains under state control, which has contributed to historically weak GDP growth, high (youth) unemployment, and exposed vulnerabilities of the system in light of the global pandemic.[520] The country's public finances are in a dire position, with a record budget deficit of 14% of GDP anticipated as the country increases spending to address impacts of the pandemic – representing the largest deficit for Tunisia in 40 years.[521] Tunisia's Long-Term Foreign Currency Issuer default rating was downgraded to single B in May 2020.[522] In June 2020, the government began negotiations with key sovereign lenders to delay debt repayments – another signal that Tunisia's pre-pandemic economic woes are likely to remain an issue for a period of time.[523]

  In light of these circumstances and the country's ongoing political transition, investment interest from the private sector has waned. In order for the country to achieve its sustainable development goals, international financial and non-financial support is required to offer concessional finance products and risk-reduction solutions.

- **Power Purchase Agreement Terms Are Weak** – Part of Tunisia's PPA risk is related to counterparty risk, as discussed earlier in this section. In addition, standard PPAs have presented a challenge for private sector actors. These PPAs do not provide for any public sector guarantee, and the political force majeure is considered too high a risk to mitigate given the country's economic and political state.

  Within Tunisia, the "absence of an independent regulator for fair arbitrage between STEG and investors" has been noted as a high risk.[524] Given the state's broad control over the country's assets, establishing an independent regulator or ombudsman is considered an important step to provide assurance to the private sector, particularly investors.

- **High Cost of Financing** – Renewable energy projects, such as solar and wind, have experienced high costs of financing (debt and equity). According to the DREI Tunisia study conducted in 2018, this is driven by three main risk issues – power market risk, counterparty risk, and political risk.[525] Unlike other countries covered in this report, the study found that developer risk had no impact on the cost of equity or cost of debt, as its risk perception is lower in Tunisia.[526]

  Another aspect that has implications for the cost of capital, specifically financing from local banks, is the lack of liquidity in the market and general lack of track record in utility-scale renewable energy.[527]

  A Green Bank could help develop the renewable energy sub-sector by funding early stage projects to assure they achieve bankability and by financing

519 https://www.worldbank.org/content/dam/Worldbank/document/MNA/tunisia_report/tunisia_report_the_unfinished_revolution_eng_synthesis.pdf

520 https://www.worldbank.org/content/dam/Worldbank/document/MNA/tunisia_report/tunisia_report_the_unfinished_revolution_eng_synthesis.pdf

521 https://www.reuters.com/article/tunisia-economy-cenbank-int-idUSKBN27D1LC

522 https://www.fitchratings.com/research/sovereigns/fitch-downgrades-tunisia-to-b-outlook-stable-12-05-2020

523 https://www.reuters.com/article/us-tunisia-economy-2020/tunisia-seeks-late-debt-payments-as-crisis-hits-economy-state-budget-idUSKCN24E18V

524 DREI Tunisia 2018 Full Results

525 https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/DREI%20Tunisia%202018%20Methodology%20and%20Assumptions%20(English)%20(Jun%202018)%20(FINAL).pdf

526 https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/DREI%20Tunisia%202018%20Methodology%20and%20Assumptions%20(English)%20(Jun%202018)%20(FINAL).pdf

527 https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/DREI%20Tunisia%202018%20Methodology%20and%20Assumptions%20(English)%20(Jun%202018)%20(FINAL).pdf

pilot projects or programs, especially for alternative renewable energy technologies. This type of intervention could provide proof of viable business models that could stimulate stakeholder interest and lay a path for scalability and speedier adoption of PPP structures.

- **Power Sector Subsidies** – In Tunisia, there are two main subsidies that impact the sector: (i) the first is non-cost-reflective tariffs and fiscal transfers to STEG, and (ii) the second is subsidized gas input prices. Although there has been some reform in recent years, such as the increase to retail tariffs, these subsidies require further overhaul to support greater participation restore market balance and to improve the environment for IPPs.

Potential Interventions for the Energy Sector

Based on the market dynamics and challenges identified, a set of potential interventions are highlighted below to help stimulate renewable energy adoption in Tunisia. Each of these are addressable by a green finance facility and a national climate change fund but require deeper market analysis to inform concept development.

- **Project Preparation Facility and Technical Assistance** – Stakeholders across the energy sector acknowledged that mobilizing the country's transition to a cleaner energy mix requires developing projects that can leverage various sources of funding, including climate finance solutions. There is a very limited existing track record and scarce pipeline of 'bankable' projects. These market challenges could be mitigated through programs designed to absorb early stage project risk, while simultaneously providing technical assistance to build a more robust ecosystem of sector players, early stage project funding, and technical assistance. The market needs more robust programs focused on technical assistance that can enhance knowledge of new technologies.

  The Mediterranean Solar Plan (MSP) which was sponsored by the European Commission offered one such technical assistance facility that sought to provide project preparation support to eligible investments in renewable energy and energy efficiency.[528] Tunisia was one of eight Mediterranean countries that benefited from the MSP's project preparation initiative. The initiative sought to build a robust pipeline of projects that had high probability of receiving funding from one of the participating European Financing Institutions.[529] The model represents an end-to-end project development solution. Lessons from the implementation of the initiative should be used to inform future Green Bank or national climate change fund programs in Tunisia.

- **Concessional Capital** – Since 2011, Tunisia has continued to seek a balance between social and political tensions, and economic prosperity. Although the country has made progress through recent decades, the global pandemic has set the country back in terms of economic advancement. These issues, combined with the budget deficit and high indebtedness, imply that there may be less of a focus on climate change adaptation and mitigation in the immediate future. This will make it harder for private developers to access needed concessional funding and grant funding to support the launch of new renewable energy projects. And as commercial banks remain reluctant to finance such projects, access to finance for local, and smaller private developers will remain low.

  Without the proper incentives or alternative financing structures designed to mitigate risk, such as leveraging concessional capital as part of a blended finance vehicle, capital flows to renewable energy projects from local financial institutions will continue to remain weak.

- **Guarantees** – Guarantees are considered a powerful and increasingly useful tool to encourage broader market participation. As outlined earlier, there are a number of risks that project developers and financing entities are exposed to because of the structure of the sector. As MDBs continue to explore and consider shifting their intervention models away from direct and intermediated lending towards alternative models that are more catalytic in nature, there is likely a growing need for strong, credit worthy guarantors. This is imperative in the Tunisian context especially in light of the risk that STEG poses to its counterparties and given the fundamental weaknesses of the standard PPA.

528 https://ufmsecretariat.org//wp-content/uploads/2013/01/MSP-PPI_brochure.pdf

529 EIB, AFD, KfW, AECID, and EBRD

- **One-stop Shop** – It has been highlighted during interviews conducted by the UNDP for the De-risking Renewable Energy Investment 2018 assessment that licensing and permitting processes in Tunisia add complexity to the operating environment. Similar to other developing economies, the establishment of a one-stop shop to streamline the process of permitting could alleviate a bottleneck that causes developers to lose time and incur additional expenses.

Potential Host Institutions for the Energy Sector

It is important to gain social acceptance for renewable energy projects as consistent with economic development, job opportunities, and employment growth early on in the process of Tunisia's energy transition. Given the political environment within the country, identification of existing organizations to serve as partners or host institutions is entity potentially strong pathway toward creating or housing a Green Bank or NCCF grant facility. Some of the existing organizations that have been identified as having potential to fill this role include (i) the Energy Transition Fund, (ii) Fonds de Depollution, and (iii) the Renewable Energy Fund:

- **Energy Transition Fund** – The Energy Transition Fund (FTE) has been operational since 2005 but was reformed in 2017. It is managed by the National Energy Conservation Agency and is responsible for financing energy efficiency and renewable energy projects. The organization has a mandate to deploy capital in the form of grants, equity, or debt, but has mostly focused on grants to date, and does not have a strong focus on recycling funds or financial sustainability. FTE's funds come mainly from tax revenues and potentially from carbon tax if such a tax is levied. The edict under which FTE was created also allows for the organization to be financed through other means including funding from international cooperation arrangements.

  The FTE has served in intermediary roles for the deployment of capital for projects aligned with its mandate. For example, the FTE served as the administrator of green credit lines such as SUNREF (which was financed by AFD). Given the organization's unique position in the energy sector ecosystem, further exploration with the FTE is recommended to determine if it might be a suitable partner or host institution, and to better understand any limitations or organizational constraints that are relevant to serving in this type of a role.

- **Fonds de Dépollution** – The Fonds de Dépollution (FODEP) was established under the 1993 finance law as a special treasury fund to make investments in companies that are proactively reducing pollution associated with their operational activities. The fund has the capacity to use finance as a tool to promote and encourage companies to offset environmental deterioration and harm that was brought about by decades of rapid industrial growth. The model employed by the FODEP is one of blended finance or a PPP structure, whereby participating companies must contribute at least 30% equity to any particular investment project presented to FODEP, and FODEP's subsidy is capped at 20%. The residual funding comes from subsidized bank loans, which are underwritten under highly favorable terms. Projects also benefit from tax and duty incentives.[530]

  Given the FODEP's long history, the organization has developed experience in working with international development organizations such as AFD and KfW. It has historically utilized its subsidy to complement funding provided by development organizations and could potentially be a good partner from a co-financing perspective for a new Green Bank (i.e. representing the portion of government contribution to seed such a facility).[531]

- **Renewable Energy Fund** – The Renewable Energy Fund has not yet been fully established. It is being created jointly by the Caisse des Dépôts et Consignations (CDC) and STEG-ER, in partnership with the African Development Bank. With seed funding, the Renewable Energy Fund project has launched a call for expressions of interest for the creation, development and management of an investment fund dedicated to the equity / quasi-equity financing of projects with a high environmental impact and geared towards Tunisia's energy transition. Although the launch of this new entity is still to be confirmed, there could be an opportunity for partnership whereby a NCCF provides technical assistance and capacity building to eligible projects, while a new Green Bank facility could provide the complementary debt, equity and quasi-equity

530 http://www.anpe.nat.tn/Fr/fodep_11_52

531 http://documents1.worldbank.org/curated/en/760031499338439264/pdf/ACS17905-V2-WP-P153680-PUBLIC.pdf

funding needed. Such an invest approach at the REF could also seek to aggregate smaller projects (e.g. companies within an industrial park) to reduce risks and build scale.

Green cities as a priority sector

Urban centers across the globe are typically the largest emitters of greenhouse gases and the largest consumers of energy.[532] Hence, focusing on improving how cities are built and / or retrofitted represents an opportunity for a new Green Bank and NCCF, as well as a sustainable solution for a country like Tunisia with a relatively high urbanization rate.

Tunisia's focus on sustainable urban development is linked to its growth in urbanization, need for increased energy efficiency, and limits to the country's water supply and need for conservation. Another area of interest for Tunisia is the design and funding of improved urban transport systems across its cities.

From an energy efficiency perspective, the country's TSP laid out clear targets. Energy efficiency was also prominent in the country's NDC, which noted an interest in intensifying promotion of energy efficiency in all consumer sectors and for all energy usages.[533] Given the building sector's energy consumption levels, energy efficiency was also highlighted in the National Strategy (adopted in 2012).

In terms of water resource management, reducing water losses is noted as critical. Leveraging smart metering, developing systems that enhance the reuse and recycling of water, and focusing on the upgrade of aging infrastructure are all key investment areas.

Earlier this year it was announced that Tunisia had joined the MobiliseYourCity Partnership which has enabled National Urban Mobility Plans and Programmes (NUMPs). This represents an example of Tunisia's ambition to build more liveable and sustainable cities. Under the Ministry of Transport, Tunisia is embarking on the necessary studies and an action plan to advance this goal. By 2030, the expected result is a reduction of GHG emissions of 3.3 million tCO_2eq compared to the BAU scenario.[534]

Complications and Opportunities for Green Cities

Tunisia's macroeconomic situation and politically unstable environment also pose risks for the green cities agenda, particularly as the sector matures and becomes the focus for increasing private sector participation and FDI.

Despite Tunisia having been identified in 2018 as one of the countries to be involved in the EBRD's Green Cities Programme, it is not clear if Tunisia is still planning to move forward with participation in this initiative. Several stakeholders noted that previous attempts to build green city models had made little progress. It was also considered important to highlight green cities as a priority sector given the connection between urban planning and the country's focus on energy efficiency initiatives and water management.

- **Borrowing Capacity of Municipalities** – As much of Tunisia is still state controlled, including some of the largest local banks, the municipal sector has struggled to develop "decentralized financing solutions to improve cost recovery and commercial discipline, notably in urban transport … and in public water and wastewater utilities."[535] With the difficulty of achieving decentralization, municipalities are essentially cut off from accessing finance and have very limited to no borrowing capacity.

  The borrowing capacity of municipalities is also affected by their weak or non-existent credit profiles, lack of local liquidity in the market, and lack of incentive to encourage local financial institutions to finance such projects.

- **Institutional and Legislative Frameworks** – In terms of urban transport and mobility, Tunisia's participation in National Urban Mobility Plans and Programmes (NUMP) highlighted the gaps and "absence of the concept of mobility in the institutional and legislative frameworks." Through this process, other planning areas were highlighted as being deficient, such as the

532 https://www.oecd.org/regional/cities/circular-economy-cities.htm
533 https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp086-ebrd-multiple-countries.pdf
534 https://mobiliseyourcity.net/tunisia-promotes-development-sustainable-and-consistent-urban-mobility-system
535 https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp086-ebrd-multiple-countries.pdf

lack of strategic approaches to mobility at the national and local levels, a siloed approach to managing the various modes of transport and related systems, and the "lack of mobility charges at the national and local levels."[536] The allocation of use of public funds to finance urban mobility also needs to be rationalized and optimized.

Similar issues are likely to arise and exist in other sub-sectors of green cities and will need to be resolved before significant progress is made. This includes a focus on more coordinated approaches and improving the exchange of best practices between urban centers.

- **Capital Intensive Projects** – In addition to municipalities being challenged by access to capital, projects such as building, retrofitting, and reinforcing infrastructure to be more climate resilient is considered to be heavily capital intensive with high upfront costs and long payback periods. Concessionary capital that is favorable not only in terms of pricing, but also in tenor length are required to match the long payback periods of such investment types.

Potential Interventions for the Green Cities Sector

Given the scope of the market complications outlined above, the following interventions have been identified as those with the strongest potential to accelerate the sector, especially in light of the unique economic and political situation in Tunisia.

- **Technical Assistance and Capacity Building** – Generally, municipalities are resource constrained and will require support to deliver on the ambition of building climate resilient and green cities. Any financing will need to be accompanied with strategic planning, policy reform, technical assistance and capacity building.[537] This holistic approach may also help to build an enabling environment that is able to attract private sector involvement, including the potential to draw capital from the local financial markets.

- **Concessional Finance** – Concessional instruments are considered to be an important tool to incentivize sector transition, given the high upfront costs associated with developing climate resilient infrastructure. Concessional financing products are also needed because adaptation investments can lack the revenue generation potential of mitigation technologies.[538]

  Given the fiscal state of the national government, it is likely that there will be limited financial capacity to fund such initiatives, and the finances of most municipalities are likely even weaker. Without access to below market rate funding or grants, progress towards achieving the sustainable development of cities will either be significantly reduced, or projects will not be undertaken at all.[539]

  As municipality revenues are all generated in local currency, ensuring that any financing facility can either help to mitigate foreign exchange risk, or more ideally, can provide long-term, patient capital in local currency is crucial. This will be an important aspect of any program design to ensure that municipalities can maintain a level of financial sustainability.

- **Project Preparation and Pilot Project Funding** – Green urban development is in relatively nascent stages of development in Tunisia. In many cities, the focus is constrained and budgets do not allow for allocations of capital to support pre-feasibility, feasibility studies, or energy audits. Hence, any new program design should take into account the vast need of financing for pre-development activities and also consider financing early stage projects. Furthermore, funding pilot projects is an important step to raise awareness among municipal leaders and the general public, while helping to build a case that robust commercially viable projects are possible to develop.

Potential Host Institutions for the Green Cities Sector

- **Energy Transition Fund** – In addition to the ministries and key policy actors noted earlier in the report, the Energy Transition Fund (FTE) represents the strongest potential candidate to serve as a host institution or partner for a new Green Bank or national climate

536 https://mobiliseyourcity.net/tunisia-promotes-development-sustainable-and-consistent-urban-mobility-system
537 https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp086-ebrd-multiple-countries.pdf
538 https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp086-ebrd-multiple-countries.pdf
539 https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp086-ebrd-multiple-countries.pdf

change fund. The organization already has an existing mandate that includes a focus on energy efficiency. As noted earlier, the FTE has experience in working with international development organizations. The entity's capacity to disburse funding through various products is deemed to be a positive attribute.

III. CONCLUSION

Despite the obstacles presented by the structure of the fossil-fuel based domestic electricity market, Tunisia has significant potential for renewable energy and energy efficiency deployment across the country, especially from wind and solar resources. While renewables currently do not play a significant role in Tunisia's electricity mix, their importance could grow in the coming years, especially if renewable energy projects are developed with the purpose of creating more jobs to tackle the country's unemployment challenge.[540, 541] With a relatively high urbanization rate, Tunisia's green cities sector is also a potential priority for the capacity of a Green Bank or NCCF to help catalyze investment and support sustainable growth as well as water and energy efficiency. Both sectors have gained some traction in recent years as international development banks have provided financial and non-financial support, and involved a variety of different stakeholders.

With Tunisia's fiscal constraints, identifying sources of co-financing from the government to seed any new Green Bank initiative will likely be challenging. As seen in other countries, a typical alternative is for the government to issue bonds to raise the needed funding. However, in light of the country's recent sovereign credit rating downgrade and ballooning debt levels and budget deficits, access to financing with amenable terms is likely to be a challenge. Alternative structures will need to be explored to cope with this specific circumstance.

The Tunisian government has made efforts in recent years to provide clarity around and guidance on development priorities and related targets. There are various opportunities across the country's energy sector and its green cities agenda for a Green Bank and a NCCF to accelerate the rate of sustainable development. Interventions focusing on project preparation, concessional financing, and risk reduction and guarantee mechanisms in the energy sector have been identified as having the strongest potential. In terms of the green cities plan, a NCCF and Green Bank are likely to be most impactful in terms of supporting municipalities with the technical assistance and capacity building support required to reform policies and improve strategic planning. On the financing side, concessional loans or grants will likely be the most effective intervention given the limited resources of most municipalities and limited borrowing capacity.

540 Phillipe Trape AfDB Economist interview, Sept 4, 2020

541 Hela Cheikhrouhou interview, October 19, 2020

UGANDA

I. COUNTRY OVERVIEW

Uganda has seen stable economic growth over the past ten years, averaging approximately 5.4% and peaking in 2011 at 9.4%.[542, 543] However, this trend is projected to decline due to the COVID 19 pandemic affecting key drivers of the economy including tourism and hospitality, manufacturing, retail and wholesale trade, and education. Uganda's economy is also threatened by continued regional instability from neighboring countries, which are key export markets. As a result, the African Development Bank (AfDB) anticipates a decrease in GDP growth down to a best-case scenario of -0.5% in 2020.[544] Coupled with rapid population growth, this decrease in GDP growth will put increased pressure on the country's natural resources and offset the benefits of the last decade of economic growth. This economic slowdown will affect Uganda's ability to achieve its development goals, as set in its National Development Plan III for the period of 2020 to 2025.

Moreover, Uganda has been facing a number of structural development challenges. These challenges include not only a low level of industrialization and a lack of sustainable infrastructure, but more importantly low access to electricity (at 28% in 2019, one of the lowest in Africa), and one of the world's fastest population growth rates (at 3.3% per year, with forecasts predicting a population boom from 42.7 million in 2018 to over 80 million by 2040). [545, 546, 547] In addition, income inequalities across gender and region, low productivity in the rainfed agricultural sector, extreme deforestation (Uganda has lost more than 50% of its natural forest cover since 1990), and climate change effects such as prolonged droughts, pest diseases, heavy rains and flooding, all present additional challenges for the country. If no climate-adaptive action is taken, the country will face annual costs ranging estimated at $273 billion to $437 billion over 40 years from 2010–2050, with the largest impacts on energy, agriculture, and infrastructure. [548, 549]

Development Goals and Nationally Determined Contribution (NDC) Targets

Uganda has defined a Green Growth Development Strategy for the period of 2017 to 2031 with five focus areas, including sustainable agriculture production (value chain upgrade, irrigation and integrated soil fertility management), natural capital management and development (tourism, forestry, water resources, wetlands, etc.), planned urbanization and development of green cities, sustainable transportation, and renewable energy investments. Additionally, Uganda has identified four economic sectors as having the strongest potential to transform the national economy, generate inclusive green growth, and environmental sustainability. These sectors include agriculture, renewable energy, industrialization, and urbanization. Uganda has targeted a 10% GDP increase, as well as a CO_2 reduction of more than 55 million tons (MT) and the creation of four million of jobs across targeted priority green sectors (see Figure 1), all by 2031.[550]

542 As an average from the 4.5% average during 2011 to 2017 and 6% between 2018 and 2019. World Bank data. Uganda | Data (worldbank.org)

543 World Bank data. Uganda | Data (worldbank.org)

544 African Economic Outlook 2020 Supplement amid COVID 19.

545 Draft Energy Policy 2019.

546 Uganda Irrigation for Climate Resilience Project, World Bank, Report 2020.

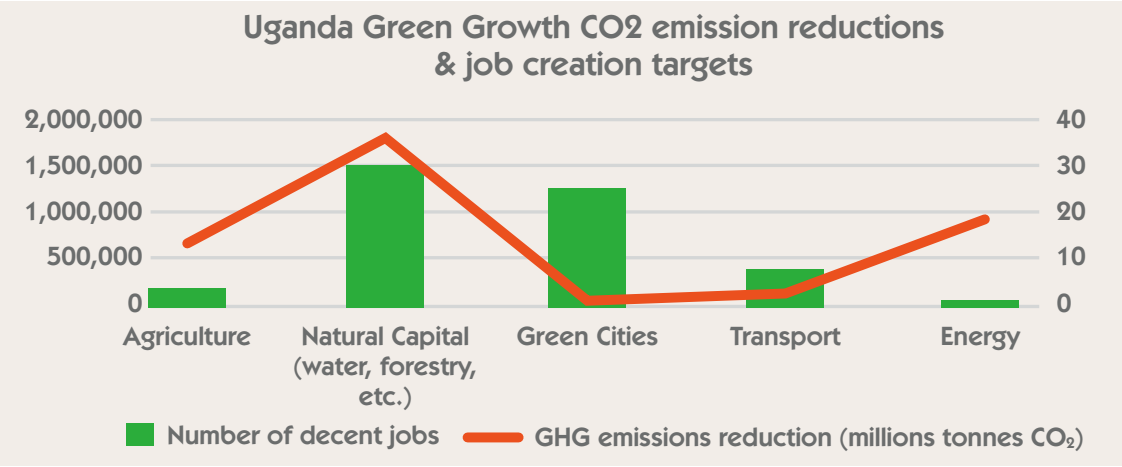
547 Uganda Irrigation for Climate Resilience Project, World Bank, Report 2020.

548 (Markanday et al. 2015).

549 Uganda Irrigation for Climate Resilience Project, World Bank, Report 2020.

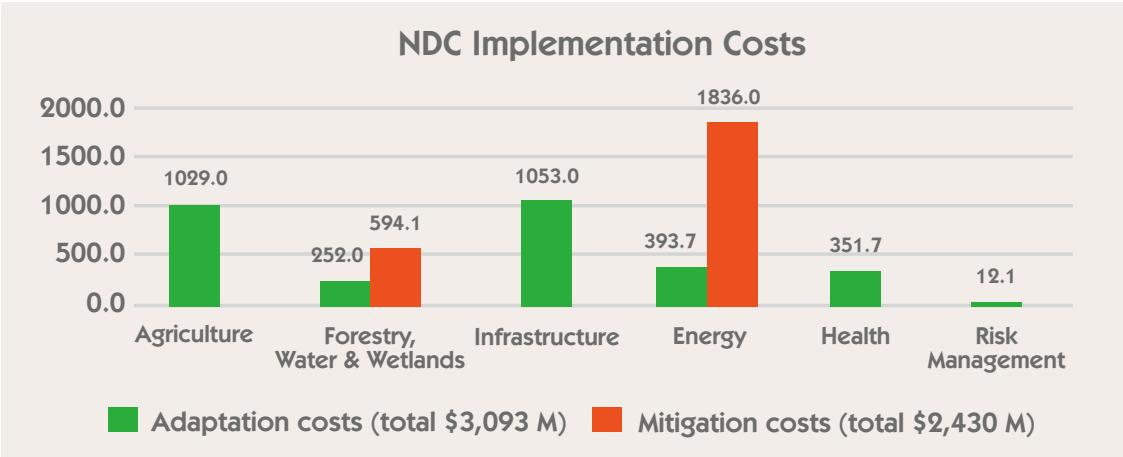
550 Uganda green growth development strategy, 2017/18 – 2030/31 report.

Figure 1: Uganda's Green Growth Development Strategy summary of CO_2 emission reductions & job creation potential per priority sectors[551]



Regarding Uganda's national climate goals as related to the Paris Accord, the cost of implementation of Uganda's NDCs has been estimated at $5.52 billion, with $3.09 billion for adaptation and $2.43 billion for mitigation.[552] Below are the total NDC costs per priority sector as indicated in the *Uganda Rapid Situational Assessment NDC Implementation Report* published in May 2020. While costs vary across priority sectors, Agriculture and Energy share the highest investment needs with $1.03 billion for agriculture sector), $570 million for Forestry, and an estimated $1.05 billion for infrastructure and clean transportation.[553] See the chart below for the breakdown in each sector across adaptation and mitigation related costs.

NDC costs per priority sector, 2018[554]



The country has committed to funding 30% of these implementation costs from domestic capital sources, with the remaining amount expected to be financed via international sources.[555] Consequently, Uganda is currently exploring the creation of a National Finance Vehicle (NFV) to mobilize both domestic and international finance to support NDC related investments. In February 2020, the government of Uganda convened a workshop on *Accelerating Finance for NDC Implementation through National Financing Vehicles (NFVs),* which yielded a recommendation to explore the creation of a NFV to support acceleration of the country's NDC implementation. A pilot

551 Uganda green growth development strategy, 2017/18 – 2030/31 report
552 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final
553 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final
554 Uganda Rapid Situational Assessment NDC Implementation Stocktake_May 2020_Final
555 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final.

project was subsequently commissioned to explore the appropriate form and structure of this proposed NFV, as supported by the United Nations Environment Program (UNEP). The recommendations stemming from this small project are referenced later in this chapter.

Uganda faces several key challenges on securing financing for the private sector in general and particularly in the green sector, alongside challenges of credit constraints and poor execution of public projects. The Uganda banking industry is composed of 24 commercial banks with total assets of UGX 30,558 billion ($8.25 billion) as of June 2019. [556, 557, 558] Commercial bank lending to the private sector has been increasing for shilling (UGX) dominated loans at an average growth of 12% from June 2015 to June 2019.[559] In 2019 average credit growth was 12.5%, whereas for first 10 months of 2020 it was 11.1%.[560] The current economic crisis due to COVID 19, coupled with underlying structural challenges, represent a threat to the country's financial stability due to the increasing inability of private sector borrowers to service their debt obligations.[561] This has led to a slowing of credit from commercial banks with manufacturing, agriculture and trade most affected with credit growth decreases of 3.5%, 2.4%, and 2.2% respectively. [562]

In addition to impacts on the stability of the private sector, the COVID-related economic downturn is likely to affect public finances as well as the ability to issue sovereign debt, as revenues decrease while government expenditures (mostly due to the pandemic) increase. Although institutions such as the World Bank and the IMF have provided $300 million and $150.5 million (UGX 557.45 billion), respectively, for COVID 19 mitigation and budget support, Uganda will still face financial constraints.[563, 564, 565] As of June 2020, Uganda's fiscal deficit was UGX 9.5 trillion.[566, 567]

Decreasing economic activity and stalled private sector credit growth is likely to continue as the pandemic persists, especially for green sectors which have less access to domestic finance overall. More fundamentally, Uganda's financial sector is not well equipped to provide targeted and affordable financing for low-carbon market development. The combination of a lack of well-developed projects and lack of technical green finance experience at local banks has contributed to Uganda's current inability to meet green investment targets. The major source of green finance in Uganda, as in most countries in the East African region, has been through international development finance institutions and impact investors.

Based on these conditions, several national green sectors have been identified as major drivers of Uganda economic growth with a high potential to maximize climate change impact, including agriculture & forestry, transport and energy.

Energy Context

Uganda recently revised its 2002 Energy Policy to align it with the country's development goals. The policy lists strategic interventions that include reinforcing and expanding the electricity grid based on service territory electrification, master plans for increased grid densification and intensification, promoting and developing innovative off-grid renewable energy supply systems, and promoting productive use of energy to increase energy uptake and overall affordability. Furthermore, the development goals in the National Development Plan for 2020 to 2025 identify the following targets:

- Increase electricity access from 24% of the population to 60%
- Increase per capita electricity consumption from 100 kWh to 578 kWh
- Reduce biomass energy used for cooking from 85% to 50%

556 Bank of Uganda Annual report 2018/2019
557 Bank of Uganda Annual report 2018/2019
558 Exchange rate of 1USD= 0.00027 as of August 2020, Morningstar.
559 Average compound growth based on BoU data (BoU Annual report 2018/2019).
560 BoU Financial Stability Review March 2020
561 Financial Stability Review March 2020, Bank of Uganda.
562 BoU Financial Stability Review March 2020
563 BoU Financial Stability Review June 2020
564 Exchange rate of 1USD= 0.00027 as of August 2020, Morningstar.
565 BoU Financial Stability Review June 2020
566 Exchange rate of 1USD= 0.00027 as of August 2020, Morningstar.
567 BoU Financial Stability Review June 2020

- Increase the share of clean energy used for cooking from 15% to 50%
- Increase high-voltage transmission lines from 2,354 km to 4,354 km
- Increase grid reliability to 90%

Uganda has defined an ambitious electrification plan, with major renewable on-grid investment as well as a private sector-led off-grid renewable energy, especially for rural electrification. The national strategy Vision 2040 estimates Uganda's renewable energy potential at 5,300MW and targets 22,222MW for total installed capacity by 2030, increasing to 41,738MW by 2040.[568] Uganda aims to supply much of this increase in total capacity through renewables. Specific goals include 60% renewably-sourced electricity for grid-based access by 2027 and 80% by 2040. The target for solar on-grid energy supply is estimated at 5,000MW by 2030.[569] Regarding its National Determined Contribution (NDC) targets, Uganda plans to triple its current renewable energy generation capacity in the next ten years and reach 3,200MW by 2030.

Energy demand in Uganda is mostly driven by household consumption. The main source of primary energy for residential use is biomass (fuel wood and charcoal), mostly used by households for cooking (only 0.8% of Ugandans had access to clean cooking in 2016).[570] As of June 2019, biomass accounted for 88% of the total primary energy consumed in Uganda, while the remaining 10% of primary energy consumed is generated from fossil fuels (kerosene and oil products).[571]

Uganda's electricity market is characterized by low demand. As of 2019, the national electrification rate stood at 28% – a major increase from 5% in 2002.[572] Urban areas represented most of this new electricity consumption. Nevertheless, electricity only represents 2% of the total primary energy consumption.[573] The average electric power demand peak was 723.76MW in 2019 including electricity exports to Kenya and Tanzania.[574] Peak demand is significantly lower than the installed capacity, despite recent 12% growth of domestic peak demand in 2018–2019.[575] For the last five years, the average annual growth rate in peak demand has been increasing, but this growth has not been enough to absorb electricity generation capacity.

In the last 20 years, electricity generation capacity has increased from 317MW in 2002 to 1,252MW at present.[576, 577] This growth in generation capacity has resulted in a short-term oversupply situation, with hydropower representing almost 92% of the total new electricity capacity installed.[578] Electricity is Uganda is generated from various sources including 1,004MW from hydropower, 100MW from thermal, 96MW from cogeneration/biogas, 50.8MW from solar, and 1MW from imports.[579] For the last five years, renewable energy sources have been diversifying thanks to major country initiatives such as the Global Energy Transfer Feed in Tariff Program (GET FiT). It is worth noting that almost 14 out of 30 of generation projects in the country are supported by the GET FiT program, in particular most of the small renewable electricity generation projects e.g. solar generation. [580, 581] As of June 2020, the key milestones for the Uganda GET FiT Program included 14 hydro projects (118.4MW), two solar PV projects (20MW) and one biogas project (20MW).[582] Three other hydro projects were under construction for an additional capacity of 36MW.

Off-grid markets have been developing with a mix of public and private investment. These markets are characterized by solar home systems and other solar product

568 The Uganda Green Growth Development Strategy, 2017/18 – 2030/31
569 The Uganda Green Growth Development Strategy, 2017/18 – 2030/31
570 https://www.se4all-africa.org/seforall-in-africa/country-data/uganda/
571 Source: MEMD 2015; Draft National Energy Policy October 2019
572 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=ZG
573 Source: MEMD 2015; Draft National Energy Policy October 2019
574 Maximum Demand (era.go.ug)
575 Maximum Demand (era.go.ug)
576 Draft Energy Policy, 2019.
577 https://www.era.or.ug/
578 https://www.era.or.ug/index.php/stats/generation-statistics/installed-capacity
579 https://www.era.or.ug/index.php/stats/generation-statistics/installed-capacity
580 GET FiT Uganda Annual report 2019.
581 Stakeholder consultations.
582 Uganda GET FiT Annual Report 2019.

distribution and mini-grid development. Generation and distribution assets regarding mini-grids are owned or managed by the government, private companies, local communities, or through Public Private Partnerships (PPPs). The public sector role in the mini-grid market involves multiple interventions, such as the implementation of the Rural Electrification Programme, identification of mini-grid sites through the Rural Electrification Agency, licensing and grid territory expansion through the Electricity Regulation Authority (ERA), and subsidies for both generation and connection. Despite these efforts, less than ten mini-grid projects have been installed in Uganda to-date, with several sites currently up for tender according to the Rural electrification Agency (REA). At the end of 2019, the installed capacity supply for off-grid power was 5.9MW with two of the largest off-grid power plants providing 86.4% of this capacity.[583, 584] The mini-grid market still needs significant investment to scale-up, especially for mini-hydro project development.

As Uganda expands and strengthens the off-grid regulatory environment, more commercial tenders are focusing on underserved areas. Private sector companies such as BBOXX, Village Energy, Village Power, Aptech Africa, Solar Now, Ultra Tec, etc. and local communities are leading the development of the off-grid value chain (both generation & distribution) with the support of development partners and local financiers. Regarding the solar product distribution market in particular, multiple technologies have been introduced in Uganda's market including solar home systems, water heaters, refrigerators, water pumps, sewing machines, oil seed presses, fans, etc. with private sector developers offering financing solutions such as leasing and the use of pay-as-you-go financing mechanisms.

Additionally, several energy associations across various sub-sectors representing private sector interests have explored partnerships with commercial banks, microfinance institutions, development partners and local community organizations to provide financing solutions to increase access to electricity for their end-customers. These include the Uganda Solar Energy Association, the Biomass Energy Efficient Technologies Association, Hydropower Association of Uganda, Energy Efficiency Association of Uganda, and the Uganda National Biogas Alliance.

Key actors in Uganda's energy sector include the following:

- The Ministry of Energy and Mineral Development charged with providing national policy guidance on energy.
- The Electricity Regulatory Authority (ERA), established in 2001 as part of the government reform of the energy sector, has a mandate to regulate electricity generation, transmission and distribution. ERA issues all required licenses along the electricity value chain (generation, transmission, distribution, import and export).
- The Uganda Electricity Generation Company Limited (UEGCL) incorporated in 2001 and focuses on electricity generation, transmission and substation infrastructure. The company develops and manages Uganda's power generation plants. Renewable energy projects currently in its portfolio include large hydro power projects (such as Isimba Hydro Power Plant 183MW, Isimba and Karuma Hydro Power Project 600MW) as well as medium and small RE projects (Muzizi project 44MW, NyagakIII 5.5MW, Latoro SHPP 4.2MW, Okulacere SHPP 6.5MW, etc.).
- The Uganda Electricity Transmission Company Limited (UETCL) has the mandate to build, manage and operate installations for high voltage electricity transmission with a capacity above 33kV. Additionally, the UETCL is responsible for electricity imports/exports as well as management of Uganda's fiber optic system.
- The Uganda Electricity Distribution Company Limited (UEDCL) has the mandate to develop and maintain national electricity distribution assets. The UEDCL is also responsible for building, managing and operating transmission installations with capacity up to 33kV.
- The Rural Electrification Agency (REA) was created in 2001 with a mandate to execute Uganda's rural electrification strategy to achieve 10% rural electrification by 2012. In 2018, the REA was identified as the lead implementation agency for the Electricity Connection Policy 2018–2027 (ECP) to address the challenge of low demand and connection rates. Key objectives of the ECP are: i) increase number of annual connections from the average of 70,000 in 2018 to 300,000 connections by 2027; and ii) increase

583 https://www.era.or.ug/index.php/stats/generation-statistics/installed-capacity

584 https://www.era.or.ug/index.php/off-grids/energy-generation-and-sales

electricity demand on the grid by 500MW by 2027.[585, 586] REA is supervised by the Rural Electrification Board (REB).[587]

- The Uganda Energy Capitalization Credit Company (UECCC) is a Government institution created in 2007 under the Renewable Energy Policy act to facilitate investments in Uganda's Renewable Energy sector, with a particular focus on enabling private sector participation through the creation of the Uganda Energy Credit Capitalization Trust (the Trust). UECCC's mandate also includes providing financial and technical support to unlock renewable energy and/or rural electrification projects and programs.

Agriculture and Forestry Context

Uganda has defined agriculture as a major driver of national economic growth and has placed a priority on the need to build its resilience to climate change. The agriculture sector represents approximately 25% of national GDP, provides 50% of exports, employs 70% of the population, and is the main source of employment for 87% of Uganda's women and youth.[588, 589, 590] Main crops in Uganda include root crops (sweet potatoes, cassava, and potatoes), oil crops (groundnuts, soybean, sunflower), pulses (beans, field peas, cow peas, pigeon peas), banana plantains, cereals (maize, rice, wheat) and cash crops (coffee, tea, cocoa, cotton and tobacco) mostly for exports.

Agriculture in Uganda has relied primarily on rainfall, resulting in vulnerability to climate change impacts such as prolonged droughts, floods, and landslides. These increased vulnerabilities result in dire social and economic consequences and significant economic loss for the sector. In 2010–2011, the country experienced a production loss of 7.5% of its GDP due to climate impacts. For example, a drought in 2010 accounted for 38% and 36% loss in production for beans and maize respectively, causing losses estimated at $1.2 billion, while floods caused losses estimated at $62 million and impacted nearly 50,000 people.[591, 592, 593] As a result, rural households, which represent about 80% of the Uganda population, struggle with poverty due to their reliance on rainfed agriculture.

Various government interventions are being implemented by the Ministry of Agriculture, Animal Industry and Fisheries with the support of development partners. These includes the agricultural value chain development project and micro scale irrigation program. Additionally, a climate smart livestock system program and ongoing climate smart agriculture program are supported by development partners.

Forestry represented 16.1% of the contribution of the Agriculture, Forestry and Fishing sector to national GDP in 2019.[594] The sector has seen a steady growth of 5.5% for the last five years between 2014–2019.[595] Forestry has been impacted by the overconsumption of biomass as the primary source of energy. The country has lost at least 50% of its forest land between 1990 to 2010, falling from 4.9 million ha in 1990 to 2.6 million ha in 2010, thus causing significant damage to Uganda's environmental landscape.[596] Agriculture and forestry sectors are the leading sources of GHG emissions in Uganda.[597] Population growth has limited the impact of efforts to reduce the rate of forest loss. In 2015, the total forest land decreased further to 1.96 million ha, prompting the government to launch multiple initiatives to address the deforestation trend.

As part of the Uganda Vision 2040, a Sustainable Forest Management program was launched to restore forest cover to the 1990s levels while also addressing climate change impacts in the agriculture sector. Under this program, various interventions have been launched to

585 Electricity Connection Report 2018-2027.
586 Electricity Connection Report 2018-2027.
587 Uganda Electricity Act 1999.
588 World Bank data.
589 World Bank data.
590 World Bank data.
591 National Irrigation Policy Document, 2017.
592 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final (OPM 2012).
593 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final (OPM, 2012; World Bank, 2020; GFDRR, 2020).
594 Bank of Uganda 2019 Annual report (Forestry GDP 2018/2019 at UGX3,886 billion; total Agriculture, Forestry, Fishing GDP at UGX24,145 billion).
595 Bank of Uganda 2019 Annual report (Forestry GDP 2018/2019 at UGX3,886 billion; total Agriculture, Forestry, Fishing GDP at UGX24,145 billion).
596 National statistics, MWE; THE UGANDA GREEN GROWTH DEVELOPMENT STRATEGY, 2017/18 – 2030/31
597 WRI CAIT, 2015.

promote the adaptation of climate change resilient agricultural production systems.

Key actors in Uganda's agriculture and forestry sector include the following:

- The Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) is mainly responsible for the development and enforcement of policies related to agriculture activities. Its main objectives include increasing production and productivity, addressing key challenges, improving agricultural markets and value addition as well as institutional strengthening for agricultural development.
- The Ministry of Water and Environment (MWE) is the key ministry regarding climate change action in Uganda. Through its Climate Change Department (CCD), the MWE works in collaboration with the National Planning Authority (NPA) and the Ministry of Finance to mainstream and enhance climate action in all sectors of the economy. The Climate Change Department of the Ministry of Water and Environment (MWE/CCD) plays a coordination role while Ministries, Agencies and District Local governments (MALGs) are responsible for direct implementation of climate actions. The MWE is currently the only GCF direct access Accredited Entity (grants only, not finance) in Uganda. It also serves as the national implementing and direct access entity for the Adaptation Fund (AF). Furthermore, the MWE plays the role of the national focal point for the United Nations Framework Convention on Climate change (UNFCCC).

Green Urbanization and Clean Transport Context

Urbanization and transport are priority green development sectors for Uganda with significant potential for job creation. Uganda's rapid population growth (average of 5.6% per year) has led to rapid urbanization as the urban population grew from 1.7 million in 1991 to 7.4 million in 2014, with the capital city of Kampala the largest urban center.[598, 599] In Kampala, approximately 40% of the population lives in informal settlements without basic infrastructure (water, waste, and sanitation, etc).[600] Rapid urban growth coupled with climate change, poor city planning, and inadequate infrastructure have had major impacts on the city's natural environment including wetlands degradation, soil erosion, intense flooding, etc.

The transport sector in Uganda is growing with road infrastructure representing 90% of transport activities.[601] Road transportation has been growing rapidly with the number of vehicles increasing at an average annual rate of 15% with more than 1.2 million vehicles as of 2016.[602, 603] Motorcycles are the fastest growing vehicle category and a major source of air pollution in Kampala.

Uganda has prioritized its urbanization around four regional cities and five strategic cities in its Vision 2040 plan, including Kampala. As the 13th fastest growing urban centre in the world, Kampala and its Jinja-Kampala-Entebbe (JKE) corridor accounts for more than 60% of Uganda's GDP.[604] The other five strategic cities development are aligned with the country target economic sectors including industry, tourism, mining and oil.

Uganda's NDC urban-related targets include: i) ensure climate resilient public and private buildings, ii) update transport codes and regulations, iii) update risk assessment guidelines, and iv) improve water catchment protection. Other mitigation measures include the development and enforcement of building codes for energy efficient construction and renovation as well as the implementation of a long-term climate resilient transport policy.

Multiple efforts are underway to improve the connectivity and productivity of urban municipalities in the JKE corridor to strengthen Uganda's economic growth with a focus on industrial parks and clean transportation, including a bus rapid transit project with electric bus transportation in Jinja city.
Key actors in Uganda's urbanization and transport sectors include the following:

- The Ministry of Works and Transport is responsible for the planning, development, and maintenance of transport infrastructure and engineering works in the

598 The Uganda green growth development strategy, 2017/18 – 2030/31
599 The Uganda green growth development strategy, 2017/18 – 2030/31
600 Green Urban Development in African Cities, Urban Environmental Profile for Kampala, 2015, World Bank Report.
601 The Uganda green growth development strategy, 2017/18 – 2030/31
602 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final.
603 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final.
604 www.ugandacig.com

country. It also supports regulatory functions and research activities related to roads, rail, water or air transport and other engineering works on behalf of the government of Uganda.

- The Ministry of Lands, Housing and Urban Development is responsible for ensuring sustainable and effective use and management of land and orderly development of urban and rural areas as well as safe, planned and adequate housing for socio-economic development. Primary activities include formulating national policies, strategies and programs in the lands, housing and urban development sectors.

II. PRIORITY SECTORS

The energy and climate smart agriculture sectors represent the two most promising sectors in Uganda for where a Green Bank or NCCF could serve in a catalytic role to spur sustainable growth.

The selection of these sectors was based on the set of analytical criteria applied to each of the six countries considered in this report:

- Sectors with significant potential to reduce CO_2 emissions and have the potential to support the continued efforts of the country's progress towards meeting NDCs and SDG commitments;
- Sectors where project pipeline seems to have potential, contingent on further market analysis;
- Sectors that are a significant direct or indirect contributor to the country's Gross Domestic Product (GDP); and
- Sectors where a financing gap exists within the market that could be served by catalytic green capital to make progress towards the country's NDCs and development goals.

Energy as a Priority Sector

Despite the current over supply of electricity, Uganda's energy sector needs substantial growth if it is to meet the demands of the country's ambitious industrialization and economic development goals. Installed capacity will need to quadruple in order to achieve 2030 development goals. It will be important to leverage existing initiatives towards what is needed to achieve energy sector NDC targets, which are estimated to require roughly $2.4 billion for mitigation activities (energy power supply) and $393.7 million for adaptation activities.[605]

Existing initiatives include the following:

- Mobilization of over $455 million in investments through the GET FiT program (with approximately $190 million in public funding and $165 million in private financing);
- Multiple financing schemes such as the Energy for Rural Transformation program funded by the World Bank;
- Innovation challenge grants under the NDC program;
- The carbon financing program at GIZ;
- The Uganda Energy Credit Capitalization Company (UECCC);
- The Uganda Off-grid Energy Market Accelerator;
- The solar fund set up at the Diamond Trust Bank providing loans to solar companies, and;
- The Uganda Development Bank green investment line financing both high level and high value energy projects through loans.[606]

Complications & Opportunities in the Energy Sector

Despite recent efforts to develop low-carbon markets, significant challenges remain to effectively unlock private investment in the renewable energy sector in Uganda. These challenges include poor regulatory frameworks, a lack of sustainable grid infrastructure, low electricity demand, and lack of affordable and appropriate financing solutions to expand the off-grid market.

- **Lack of Sustainable Grid Infrastructure, Especially for Electricity Transmission and Evacuation** – Structural challenges and barriers regarding the development of grid infrastructure in Uganda include the need for high upfront capital, high financing costs, high levels of corruption, and poor execution of public projects and limited technical expertise. Limited technical expertise has been a major cause of delays during the project construction phase as local project developers struggle to meet international standards regarding environmental & social aspects. Additionally, the lack of reliability and capacity in the transmission system is a major constraint, leaving it unable to

605 Uganda_Rapid Situational Assessment_NDC Implementation Stocktake_May 2020_Final.

606 Uganda GET FiT Annual Report 2019.

serve the increased load from new projects. This has constrained electricity demand, despite significant efforts to reduce electricity losses from over 35% 2002 to 17.4% in 2019 and improve the reliability of the electricity transmission systems for substations in industrial parks. [607]

- **Low Connection Rates Affect Electricity Access and Demand** – Uganda's current oversupply of electricity is a key challenge impacting efforts to increase the country's power generation capacity and energy access. Efforts to improve the connection rates were launched two years ago by the Rural Electrification Agency through the Electricity Connection Policy 2018-2027 (ECP). The ECP aims to achieve a 60% level of electricity access by 2027. Since its implementation, over 250,000 households and businesses have been connected to the grid.[608] However multiple challenges remain, including the lack of affordable direct financing available to consumers to buy connection systems.

- **Low Electricity Demand Limiting Power Generation** – Uganda's electricity demand is constrained based on a low level of industrialization, low level of productive use of energy, and the lack of affordable access to electricity in rural areas. Households remain the largest consumer of primary energy (mostly biomass), followed by the transport sector which consumes 90% of oil-based energy. These factors constrain off-grid market development especially in rural areas.

  Over the last ten years, multiple generation projects were developed in an effort to stabilize supply. However, given demand constraints, Uganda is now faced with a near-term oversupply of electricity which impacts the country's willingness to develop additional power generation capacity. Consequently, the Electricity Regulatory Authority (ERA) is currently focusing on aligning new power generation with adequate demand, and is restricting issuance of new Power Purchase Agreements (PPAs). In the longer term, however, stakeholders have indicated that economic recovery and growth, along with increased urbanization and industrialization, will lead to renewed load growth.

- **Weak Regulatory Frameworks Impact the Off-grid Market** – Despite recent updates, including the renewable energy feed-in tariff, the energy regulatory framework in Uganda is still considered a challenge by those stakeholders interviewed, especially regarding supervision of the off-grid market. Specifically, evolving policy around feed-in tariffs (which have been changing every two to three years), concessions, guarantees, restrictive tariffs on imported material and equipment for construction and inconsistent application of import duties are all key challenges for private sector investment in the sector (especially mini-grids). Despite a less cumbersome license regime as compared to grid-connected projects, off-grid projects still face numerous administrative and licensing hurdles. This prevents private sector developers from planning investments appropriately.

- **Lack of Affordable Finance Constrains the Off-grid Market** – Uganda's existing local financing capacity is not able to meet the country's climate investments needs or provide appropriate funding (in terms of low interest rates, small scale shilling denominated loans, longer tenors, etc.) to private sector renewable energy developers. In terms of cost of finance, average lending rates (for shilling denominated loans) have been declining in average for the last two years, from 21.1% as of June 17 to 19.0% as of June 2019.[609] However, these rates remain prohibitively high according to green-sector private stakeholders.

  Additionally, the Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEA) indicates that small-scale and distributed projects are unable to secure financing. Loan size thresholds are typically too high compared to the market's needs, which are usually far below $500,000 on average. For example, a solar powered irrigation scheme in Moyo District (which was uniquely able to access support from development partners) had a total cost of $484,339. While this project is considered "medium scale" and typical in terms of size, it is a ticket size that is difficult for commercial financiers to support. UNREEEA estimates that 80% of market needs are for small loans from SMEs, with only 20% for medium or large companies than can develop large-scale projects commensurate with larger commercial loans.

607 Draft Energy Policy, 2019.

608 Stakeholders interviews.

609 Bank of Uganda Annual report 2018/2019

- **Lack of Technical Expertise Constrains Development of Bankable Projects** – The lack of technical expertise to develop bankable projects in the renewable energy sector has been a major challenge, despite efforts by various development partners through such initiatives as *Scaling–up Rural Electrification using Innovative Solar Photovoltaic (PV) Distribution Models* as funded by the European Union to build local developer capacity, or *Transforming Energy Access* as funded by DFID (now FCDO) in the United Kingdom to support skill development.[610, 611] Additionally, the lack of technical capacity has also hindered the country's ability to access GCF funds for private sector projects, via the Ministry of Water and Environment, the sole GCF accredited entity in the country.

- **Off-grid Development for Productive Use** – Further investments are needed to increase electricity access targeting productive use in rural areas (outside of Kampala the capital). Most existing initiatives regarding off-grid market development focus on electricity access for lighting in rural areas, yet low-income households cannot afford the cost of SHS systems in these areas. Beyond solar home systems, there is a need for solar products/appliances and mini-grid development for productive use activities such as milling, welding, tailoring and irrigation. These activities have strong market potential locally and could be scaled-up with appropriate financing support.

- **Biogas Development to Replace Biomass** – Replacing biomass as a primary source of energy has been a challenge for Uganda involving both a change in household habits and in the economic capacity of households and other market participants. The government of Uganda and its development partners have invested in an awareness campaign to demonstrate biogas as an alternative to biomass alongside a framework of financing programs to develop off-grid markets. The UECC, for example has launched a pilot biomass-replacement refinance facility.

- **Transmission, Connection and Energy Efficiency Infrastructure** – To increase access to renewable energy, Uganda plans to focus on expanding power lines, substations and transmission facilities, according to the Uganda Regulatory Energy Authority (REA). Investments in energy efficiency for both industrial and public usage is also a priority to help increase energy availability and reduce energy bills. These investments will also focus on faulty installations, lack of appropriate standards, poor aftersales services, and reducing losses in the network while improving overall system security and safety of supply. Projects currently in the pipeline include the rehabilitation of an existing 1.9MW hydropower plant, upgrading the low and medium voltage distribution network, and installing electricity meters. According to the REA, the private sector will be allowed to provide some of these transmission solutions. This process has already started, with plans to have a PPP framework by the end of 2020.

Potential Interventions for the Renewable Energy Sector

- **Small and Medium Sized Loans, Tailored to Meet Market Needs** – Uganda's renewable energy sector is comprised primarily of small to medium sized companies, particularly in the off-grid segment. Stakeholders have indicated the need for products designed to support smaller projects and/or aggregation options to improve access to effective finance. Most existing product offerings from financing institutions target large projects with a minimum investment ticket size that is larger than what is needed for projects by local developers. In addition, the market needs expanded grant and equity components to facilitate uptake of loan products from commercial banks.

- **Direct Project Finance from a Dedicated Institution** – Existing financial products do not offer adequate direct financing to project developers but instead focus on credit lines to local financial institutions to support projects at a capped affordable interest rate of 15%, compared to the 25% average market interest rate for green projects.[612, 613] These on-lending programs face various challenges, including very high levels of collateral to service these green credit lines, inadequate marketing and awareness, difficulty in reporting and monitoring the loans from the

610 http://database.energyfacilitymonitoring.eu/acpeu/project/4624/

611 http://energyaccess.org/news/recent-news/applied-research-program-transforming-energy-access/

612 As per UECCC interview.

613 Stakeholders interview.

commercial banks to project developers. The UECCC has indicated its willingness to mobilize more funding and offer direct financing to support renewable energy developers.

- **Expand Energy Demand through the Following Options:**

  Increase Credit Offerings for Connection Infrastructure and Productive Use of Energy to Consumers – Increased electricity connection with a focus on diversifying solar technology use will be critical to increase energy demand especially in off-grids markets. There is a particular opportunity in Uganda's agriculture value chain. As the price of solar PV decreases, solar irrigation projects can be scaled-up in off-grid rural areas to improve water access and crop development where the grid is not accessible. Solar-powered irrigation systems can serve as a cheaper alternative to diesel. A green bank or financial institution could offer a program that consolidates existing initiatives and coordinates relevant stakeholders across the sector to design financial products specifically designed to expand solar technology use.

  Offer Loans Linked to the Level of Electricity Demand – Low market demand has been a key constraint for development of Uganda's off-grid sector. A financial product that could offer loans with yields that vary based on the electricity demand (higher price vs lower price base on the demand), adjacent to a guarantee instrument could help address the market's demand constraints.

  Provide Risk Capital to Unlock Private Investments Targeting Sustainable Grid Infrastructure – As on-grid electricity supply continues to surpass demand in the short term, leveraging public risk capital to engage the private sector through PPP frameworks could support investments in Uganda's renewable energy grid infrastructure. Supplying risk-bearing capital to decrease public utility risk and increase connection access will provide more comfort to the Ugandan regulator in issuing new PPAs.

- **Technical Assistance to Develop Specific Sub-sectors** – Project developers have identified project preparation support as one of the immediate needs to unlock private investments in the biogas sector. The Uganda wind power sub-sector is still nascent and requires financing as well as technical assistance for its development to support project feasibility, market studies, needed regulatory frameworks, and master plans to facilitate wind market development.

Potential Green Bank Host Institutions for the Energy Sector

- **The Uganda Energy Credit Capitalization Company (UECCC)** – The current mandate of the UECCC is to promote renewable energy generation & distribution and clean cooking. It offers specific products to address financial gaps in the sector, including a solar loan facility, a connection loan facility, a working capital facility, a partial risk guarantee facility. These facilities do not offer direct financing to project developers but rather credit lines to local financial institutions to support projects at a capped affordable interest rate of 15%.[614] The governance structure of the UECCC would require revision to allow for mobilization of private investment. The UECCC currently does not have shared capital, and it is limited by guarantee.[615] The Ministries of Energy and Finance as well as the private sector foundation of Uganda are the "owners" of the UECCC. It would require an upgrade in terms of institutional capacity to be able to offer direct financing and project preparation support to complement the current on-lending program with commercial banks and microfinance institutions. Overall, this expanded mandate would be consistent with its existing mandate and increase capacity to mobilize international green finance as well as more private investment.

  Existing relevant interventions at the UECCC include:

  - Credit support instruments for solar projects, including lines of credit to financial institutions to on-lend to end users. This program has been supported by the World Bank through its Energy for Rural Transformation program in Uganda.
  - A working capital facility to provide loans to increase electricity access. Key implementers

614 As per UECCC interview.

615 A company limited by guarantee does not have any shares or shareholders (like the more common limited by shares structure) but is owned by guarantors who agree to pay a set amount of money towards company debts.

include the Rural Electrification Agency, Ministry of Health, Ministry of Water & Environment, and Ministry of Education.

- Lines of credit to support on-grid end user electricity access. Two financial institutions are currently providing the lines of credit directly to the end-users and the REA is leading implementation.
- Pilot biogas financing program with a credit line to EBO financial services and Biogas solutions Uganda Ltd. that provides technical assistance and selects biogas promoters.
- Long term debt offerings to facilitate longer tenor debt from financing institutions, targeting mini-grid hydropower projects.

Climate Smart Agriculture (CSA) and Forestry as Priority Sectors

Climate change, coupled with a rising population and other structural challenges have affected Uganda's agriculture sector, putting food security at risk. As a result, the government of Uganda has identified agricultural resilience to climate change as a priority, as well as highlighted the need to mobilize green investments to ensure economic development alongside Uganda's NDC targets.

Specific interventions are being implemented to tackle agricultural challenges and decrease the sector's vulnerability to climate change. Irrigation development is one of the major interventions planned by the government to sustain agriculture growth in the face of climate change and rainfall variability. Under the country's National Irrigation Master Plan 2010–2035, the government plans to rehabilitate existing public irrigation schemes and develop new ones with the goal of irrigating more than 550,000 ha of land by 2035.[616]

Other planned interventions regarding climate smart agriculture include the development of conservation agriculture and climate resilient cropping systems. The Uganda Vision 2040 plan promotes the use of water harvesting and solar-powered efficient irrigation to increase agricultural productivity and ensure food security. A regional center for crop improvement was created in 2018 with the support of the World Bank and many projects around banana conservation are being developed by farmers in the western part of the country. Supporting these efforts will be a critical part of Uganda's growth trajectory, involving cross cutting economic sectors including agriculture, energy, water and forestry.

Key interventions in forestry include reforestation efforts and agroforestry investments targeting private land. This will require a restoration rate of 138,600 ha per year, according to the Ministry of Water and Environment.[617] Realizing this goal will require significant investments, especially on private forest land. To date, public funding and support from development partners have been the major sources of finance for the forestry and natural resource sectors. However, public funding alone will likely be insufficient to finance the total costs of NDC climate smart agriculture and natural resources targets.

Complications & Opportunities for the Agriculture & Forestry Sectors

- **Lack of Infrastructure and Technologies to Increase Agriculture Productivity** – Lack of appropriate infrastructure and technologies, such as storage facilities, water infrastructure and irrigation systems for the majority of small-scale farms, has led to climate vulnerability, low productivity, and a weak value chain in the agriculture sector. For example, the Ministry of Agriculture reported that improved irrigation systems such as drip irrigation from harvested water could support adapting to climate change impacts and increase yields by 2–5 times for the majority of crops.[618]

- **Lack of Technical Skills from the Majority of Farmers to Deploy Agricultural and Green Technologies** – In Uganda, only 5% of farms are commercially oriented and 25% are semi-commercial.[619] The remaining 70% are small subsistence farms with fragmented land holdings. Most farmers in rural areas lack the skills, capacity, resources, knowledge, and information to access finance, green technologies, and climate resilient inputs (e.g. improved seeds, etc.). Most of these farmers have limited access to non-farm incomes and therefore sometimes face food insecurity due to overreliance on rain-fed agriculture.

616 *Irrigation Area Type A covering 295,000 ha and Irrigation Area Type B, 272,000 ha.*

617 The Uganda green growth development strategy, 2017/18–2030/31

618 National Irrigation Policy Document, 2017

619 World bank data.

- **Access to Appropriate Finance Remains a Structural Constraint for Local Farmers** – Most commercial banks and other financial institutions in Uganda do not offer finance solutions tailored to meet the needs of agricultural projects, and instead apply the same financing standards and risk management practice across multiple sectors. This has led to a significant mismatch between market demand and available financial product offerings in the agricultural sector, with available loan sizes often too high as compared to the needs of small farmers. For example, the Biodiversity Investment Fund (BIF) as financed by KFW to support renewable energy, tourism, aquaculture, organic agriculture, forestry & apiculture, and other wildlife-based enterprises has a minimum ticket size of 500 million Ugandan shillings ($135,000), which is too high for the majority of small projects targeted by the BIF. In addition, the post COVID 19 financing program from the Uganda Development Bank offers recovery loans with a minimum ticket size of 100 million shillings ($27,000), which is a threshold that is too high for most commercial farmers. As agricultural and forestry projects can often have high upfront costs, followed by sustained cost savings over a number of years, this mismatch between existing financial products and market needs constrains development of the agricultural sector.

- **High Cost of Finance and Collateral Requirements Are Very Stringent for Farmers and Agribusiness Entrepreneurs** – Available financial products are primarily short-term products, with the longest term around three years maximum with high interest rates and high collateral requirements (at least 50% of the loan). For collateral in particular, most local banks require an asset located in Kampala, such as a land title. Yet most of the time commercial farms are located outside of Kampala and therefore cannot provide the farm land title as a collateral. According to the East African Development Bank (EADB), these restrictive requirements have constrained existing financing program implementation, including the BIF. Although aggregation products were offered by the BIF to project developer associations, but providing collateral as a group has also been difficult. The Fund was launched two years ago but no disbursement has happened yet.[620]

- **Financing Initiatives to Support the Forestry Sector Have Yet to Materialize** – Initiatives such as the Tree Fund are still not operational or capitalized, despite the pressing need to address significant deforestation on private land across Uganda. The Tree Fund was established by the National Forestry and Tree Planting Act in 2003 with the mission to support Ugandan forest restoration efforts by promoting tree planting for non-commercial purposes across the country.

- **Inaccessibility of International Climate Finance for Farmers** – Accessing international climate funds for private sector businesses is a challenge in Uganda, as in most countries in Africa. The Ministry of Water and Environment, for example, has been unable to successfully secure GCF funding for multiple projects in this sector. The need for stronger project preparation to ensure alignment with GCF eligibility criteria was identified as an urgent need to address the issue of international climate finance accessibility. This is particularly true for projects in forestry in order to stem the tide of deforestation. In addition, inadequate communication with project developers and landowners was noted as an essential gap in accessing existing green financing resources.

- **Need for Partnerships with Public Institutions to Develop the Agriculture Value Chain** – The Government of Uganda has prioritized development of the agriculture value chain as a key intervention to develop sector growth and drive national economic development. Yet there is no appropriate framework to promote large scale private investments in the agriculture sector. Additionally, Public Private Partnerships (PPP) frameworks are perceived risky due to the political outlook and corruption issues in Uganda.

- **Lack of Coordination among Existing Initiatives, Especially in the Forestry Sector** – There are multiple initiatives in the forestry sector that could benefit from integration to have more leverage and reach a meaningful scale. These initiatives include rural tree planting programs, such as the "Investing in Forest and protected Areas for Climate Smart Development Project" recently launched by the International Development Association (World Bank), as well as programs for rural solar electrification. Several of these

620 EADB interviewed as of June 26, 2020.

could be integrated with existing efforts to reduce biomass use in private land in rural areas. Capitalizing on and coordinating these initiatives could also help project developers better access local financing.

- **Need for Efficient Climate Smart Irrigation** – Development of irrigation has been identified as central to Uganda's climate smart agriculture sector. Major investments are expected in micro, medium and large-scale irrigation systems to mitigate challenges related to water shortages as a result of prolonged droughts. A Micro Scale Irrigation Program was launched to promote new irrigation technologies, including efficient drip irrigation and other groundwater savings technologies. Under this program, the government pays between 25% to 75% of the total cost of the irrigation equipment to offset high upfront costs for farmers. As most small-scale water pumping systems are imported, farmers need appropriate financing to address high upfront costs. Some local manufacturers like Future Pump have started providing end-to-end services, including direct financing and leasing solutions to address this need.[621] Assisting local manufacturers to provide appropriate financing support to their consumers could help unlock this market. It is also important to note that, despite these opportunities, Uganda faces a number of challenges related to mobilizing domestic and international financing for infrastructure and actually implementing these projects.

- **Invest in Productive Use of Renewable Energy for Agriculture** – Supporting agricultural activities that utilize solar energy and biogas to promote the transition from diesel could also help enhance development of the agricultural value chain in Uganda. These activities include, food drying, milling, small agro-processing, irrigation, etc. There is significant potential to scale up these technologies, as to date there are only two companies that have tried solar pump irrigation (in dry areas and refugees' camps).

- **Agroforestry Development on Private Land** – Uganda's Vision 2040 forestry objectives include reforestation and agroforestry investments on private land, with an estimated restoration rate of 138,600 ha per year (Ministry of Water and Environment).[622] The government of Uganda estimates that the bulk of reforestation will occur on private land and is looking for appropriate incentives to encourage these efforts. Sustainable agroforestry activities could also help increase food security for farmers. Approaches should seek to leverage existing funding initiatives such as the "Investing in Forest and Protected Areas for Climate Smart Development Project" which promotes forestry plantation in a holistic program alongside tourism and social economic empowerment.

Potential Interventions for Agriculture and Forestry

- **Offer Financing Solutions Designed to Promote Productive Use of Renewable Energy and Efficient Water-Related Technologies** – Uganda could help mitigate the climate change impacts of its agricultural sector by providing financing solutions designed to support the transition from diesel power systems to renewable energy in the agriculture sector, as well as for the adoption of adaptation measures. A targeted financing program that leverages the current limited offerings by the Ministry of Agriculture (MAAIF) could be brought to a more meaningful scale.

- **Offer Guarantees or Reimbursable Grants to Address Burdensome Collateral Requirements and Offset the Cost of Capital** – The high levels of collateral required by Uganda banks has been a key constraint for farmers who generally lack sufficient assets. To tackle this challenge, a green finance institution could provide guarantees or reimbursable grants to farmers to provide collateral and unlock investment from local banks. This green institution could also help farmers access available funding sources such as the BIF at EADB. Grants could also offset the cost of capital for farmers looking to adopt climate-related technologies.

- **Provide Aggregated Loans to Address the Issue of Ticket Size** – Some agri-business groups are currently considering collective strategies to better access financing, such as creating a common pool of funding to serve as collateral for aggregated loans for green projects. This could also help facilitate linkages between farmers and small-scale industries and contribute to value chain development.

621 https://futurepump.com/uganda-sf2/

622 The Uganda Green Development Strategy, 2017/18–2030/31.

- **Provide Project Preparation Support** – Technical assistance for project preparation including feasibility studies and project design has been identified by project developers and commercial lenders as useful towards increasing the pipeline of bankable green projects in this sector. In addition to increasing access to international climate finance, enhanced project preparation can also help mitigate project risk and unlock private investment from local commercial banks.

- **Capitalize the Uganda Tree Fund** – Capitalizing and operationalizing the Tree Fund would provide appropriate and market-fit financing support to the forestry sector.

Potential host institutions for the Agriculture and Forestry sectors

- **The Agricultural Credit Facility (ACF)** – The ACF was formed in 2009 by the Bank of Uganda in partnership with the Ministry of Finance, Planning and Economic Development, the Uganda National Development Bank, commercial banks, Micro Deposit Taking Institutions, and Credit Institutions. The main objective of the ACF is to promote the commercialization of the agriculture sector through the provision of medium and long-term financing to agriculture and agro-processing projects. The financing program is administered by the Bank of Uganda. The facility operates on a refinance basis whereby the PFIs provide the loans to farmers and agro-processors and then refinance them through the Bank of Uganda. Eligible projects include the acquisition of equipment and machinery and the building of storage facilities etc.

- **Yield Uganda Investment Fund (Yield)** – The Yield Investment Fund was set-up in 2017 by the National Social Security Fund (NSSF) and the European Union through the International Fund for Agriculture Development (IFAD). The fund is managed by Pearl Capital with an initial capitalization of 12 million EUR. It offers equity, quasi-equity and debt to SMEs with a ticket size ranging from 250,000 EUR to 2 million EUR. The Fund was able to increase its capitalization commitments from 12 million EUR to 20 million EUR as of 2020 and has already disbursed over 5.8 million EUR.

III. CONCLUSION

Uganda is currently exploring the creation of a climate-dedicated National Financing Vehicle (NFV) as an innovative mechanism to mobilize both national and international climate finance resources directed to high impact climate action. The creation of an NFV is aligned with the Government of Uganda's national planning objectives and green growth development goals as current investment trajectories are not on track to meet these goals, particularly from the private sector. The low carbon-sector currently faces a substantial investment gap, with related implications for economic growth.

A Uganda climate-focused NFV will require a flexible structure that can attract both domestic and international climate finance. Additionally, it would require a special relationship with the Government of Uganda designed to increase private sector investments in the local low-carbon market. An integrated approach (with both grants and finance) is required to unlock investment in green projects in Uganda. Grants will continue to be required to support project preparation and some market subsidization, and finance is essential to bring markets to scale and mobilize private investment.

Following these insights, and based upon a "decision-tree" type options analysis conducted for the UNDP and government of Uganda, the National Development Bank (UDBL) has been identified as the most viable near-term option to host a Uganda climate-focused NFV. This path would leverage a strong existing national institution and is based on a balance of strategic concerns and consideration of local context. Based on these findings, the UNDP is working with Uganda to commission a feasibility study, to design and structure the proposed NFV to mobilize climate green financing to through a partnership with a local financial institution. Strengthening the institutional capacity of the Uganda National Development Bank to mobilize climate finance resources and offer affordable and appropriate financing solutions to green projects could help the country recover from the COVID 19 economic crisis. Additionally, Uganda would benefit from a climate-dedicated National Financing Vehicle (NFV) to achieve national climate ambitions and related targets as established in Vision 2040, National Development Plan (NDPIII), National Determined Contributions (NDC).

MOZAMBIQUE

I. COUNTRY CONTEXT

Mozambique has navigated multiple economic difficulties over the past few years. GDP growth has slowed as attributed to a decline in public and foreign direct investment resulting from the disclosure of previously undisclosed external borrowings in 2016.[623, 624] This sudden disclosure caused the IMF to cut off its programme to the country, which partially contributed to currency collapse and debt default, from which the country is only starting to recover.[625] In 2019, Mozambique was hit with two cyclones which resulted in loss of life and related consequences for the country's economic growth.[626] Coupled with the impacts of the COVID 19 pandemic, Mozambique faces challenges in returning to an economic path consistent with rapid development.

Mozambique is one of the poorest countries in Africa, with a GDP per capita of $491 in 2019.[627] The country experienced 2.2% GDP growth in 2019, which continues a trend of lower growth since 2016, a period when the country recorded 3.2% average real GDP, well below the 10% average during 1996-2015.[628] Mozambique's GDP growth is primarily driven by the agriculture and extractive industry sectors. Agriculture represented 24% of Mozambique's GDP in 2016, though that figure has fallen slightly in recent years.[629, 630] The extractive industry sector represented 7.4% of GDP in 2018, up from 6.9% in 2016.[631] Mozambique's primary mining products are coal and aluminum.[632] As the second-largest producer of aluminum in Africa and the 14th largest in the world, this resource represents almost a third of Mozambique's exports, and the national aluminum company Mozal is the biggest industrial employer in the country.[633, 634] While Mozambique discovered enormous reserves of offshore natural gas in 2010, these reserves have yet to be tapped.[635] Multinational companies such as Total and Exxon are in the process of developing these reserves with an eye to establishing LNG export facilities worth $55 billion of investment.[636, 637] If these projects come online, they will have a profound impact on the economy and government's revenues.[638] According to the IMF, initial production of LNG could begin in 2023 and reach full capacity by 2026, though these estimates do not account for the effects of the COVID 19 pandemic.[639]

Mozambique's debt-to-GDP stood at 110.5% at the end of 2018, as a result of running large fiscal deficits over the past few years.[640] Although this indebtedness level represents debt distress, the IMF considers the current situation to be sustainable, as the government is engaged in

623 https://www.afdb.org/en/countries/southern-africa/mozambique/mozambique-economic-outlook#:~:text=Economic%20activity%20slowed%20in%202016,reached%20in%202016%20and%202017

624 https://www.worldbank.org/en/country/mozambique/overview

625 https://www.eaglestone.eu/xms/files/Mozambiques_banking_sector_regains_stability_-_World_-140819.pdf

626 https://www.unocha.org/southern-and-eastern-africa-rosea/cyclones-idai-and-kenneth#:~:text=On%20the%20night%20of%2014,Sofala%20Province%2C%20in%20central%20Mozambique.&text=With%20wind%20gusts%20of%20up,left%20374%2C000%20people%20in%20need.

627 https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?contextual=region&end=2019&locations=MZ&start=2019&view=bar

628 https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=MZ

629 https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/country_notes/Mozambique_country_note.pdf

630 https://www.theigc.org/wp-content/uploads/2019/04/Armand-et-al-2019-Final-report.pdf

631 https://eiti.org/mozambique#:~:text=The%20extractive%20sector%20in%20Mozambique,in%202017%20and%202018%2C%20respectively

632 http://documents1.worldbank.org/curated/pt/386461513950634764/pdf/122234-Mozambique-Economic-Update-Digital.pdf

633 https://www.thebusinessyear.com/mozambique-2016/aluminum-legacy/focus

634 https://thesa-mag.com/features/mining/mozal-aluminium-economic-beacon-21st-century-mozambique/

635 https://webcache.googleusercontent.com/search?q=cache:j7fvmt__kq4J:https://www.imf.org/~/media/Files/Publications/CR/2019/1MOZEA2019003.ashx+&cd=18&hl=en&ct=clnk&gl=us

636 https://www.worldoil.com/news/2020/7/16/total-finalizes-16-billion-mozambique-lng-financing-program

637 https://financialpost.com/pmn/business-pmn/mozambique-gas-project-valued-same-as-whole-nations-economy

638 https://africanbusinessmagazine.com/sectors/energy/mozambique-towards-an-economy-transformed-by-gas/

639 https://webcache.googleusercontent.com/search?q=cache:j7fvmt__kq4J:https://www.imf.org/~/media/Files/Publications/CR/2019/1MOZEA2019003.ashx+&cd=18&hl=en&ct=clnk&gl=us

640 https://www.imf.org/en/Publications/CR/Issues/2019/06/18/Republic-of-Mozambique-2019-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-46996

efforts to restructure the country's loans.[641] Mozambique's policy lending rates are still high at 14.25%, but down from a peak of 23.25% in 2016.[642] Inflation has fallen to 2.9% in 2019, down from 26.5% in 2016 thanks to continued tight monetary policy and food price stability. [643, 644] The exchange rate for the Mozambiquan Metical has been broadly stable against the US Dollar.[645] Despite this, the country has limited headroom to leverage external capital for development projects.

Mozambique's economic development plan is laid out in its National Development Strategy 2015–2035. Created by the Ministry of Planning and Development, this plan outlines four priorities, including the development of human capital, development of infrastructure for a productive base (such as more electricity infrastructure), research and development in energy and agriculture, and improvement in institutions. The plan also identifies agriculture, transport, electricity, water, construction, and communication as the sectors with the most growth potential. Ultimately, these efforts collectively aim to achieve a quintupling of GDP per capita by 2035, with a significant focus on Mozambique's agricultural sector, and on its industrial base to help the country move up the value chain into higher value-add outputs.[646]

According to the IMF, Mozambique's banking sector is stable, liquid, well-capitalized, and profitable, even though the rate of non-performing loans (NPLs) reached 11% in February 2019.[647] However, the banking sector is dominated by foreign banks. Of the six largest banks in Mozambique, only Moza Banco's majority shareholders are from Mozambique.[648] The six largest banks control 85–90% of all assets, loans, and deposits in the country and are seeing subdued lending as a result of high interest rates, which have driven banks to channel money into government securities rather than private loans.[649] On the non-bank side, Mozambique has a small but active stock exchange, the BVM, with a $1.3 billion capitalization as of 2018.[650] The BVM may represent an alternate source of financing, but its small size means that it may only offer limited support for climate change related projects.

Mozambique's carbon emissions are mainly driven by the land use and forestry sectors. Mozambique emitted 66.8 million tons (MT) of CO_2 equivalent in 2013, of which over half came from changes in forest land (most likely as a result of deforestation for new agricultural land and for wood fuel for cooking and heating).[651] Agriculture represented another quarter of these emissions, with the remaining coming from energy, waste, and industrial processes.[652] According to Mozambique's NDC, the country aims to reduce its emissions by 76.5 MT of CO_2 equivalent between 2020–2030, conditional on the provision of financial, technological, and capacity building from the international community.[653, 654]

Energy Context

Given the high reliance on solid fuels in off-grid areas, Mozambique's primary energy mix is predominantly driven by biomass. According to the IEA, 66% of Mozambique's energy comes from biomass, with a focus on wood fuels and waste for cooking, heating, and lighting.[655] Oil and hydro represent around 15% and 11% of the country's energy mix, respectively. Natural gas and coal make up the remaining 8% of primary energy supply, with a negligible

641 https://www.imf.org/en/Publications/CR/Issues/2019/06/18/Republic-of-Mozambique-2019-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-46996

642 https://www.imf.org/en/Publications/CR/Issues/2019/06/18/Republic-of-Mozambique-2019-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-46996

643 https://www.imf.org/en/Publications/CR/Issues/2019/06/18/Republic-of-Mozambique-2019-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-46996

644 https://www.afdb.org/en/countries/southern-africa/mozambique/mozambique-economic-outlook#:~:text=Economic%20activity%20slowed%20in%202016,reached%20in%202016%20and%202017.

645 https://www.imf.org/en/News/Articles/2019/11/13/pr19411-mozambique-imf-staff-concludes-visit

646 http://unohrlls.org/custom-content/uploads/2014/10/Mozambique-Report.pdf

647 https://www.imf.org/en/Publications/CR/Issues/2019/06/18/Republic-of-Mozambique-2019-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-46996

648 https://www.eaglestone.eu/xms/files/Mozambiques_banking_sector_regains_stability_-_World_-140819.pdf

649 http://documents1.worldbank.org/curated/en/614411526647372508/pdf/Concept-Project-Information-Document-Integrated-Safeguards-Data-Sheet-Mozambique-Financial-Inclusion-and-Stability-Project-P166107.pdf

650 https://macauhub.com.mo/2018/08/13/pt-bolsa-de-valores-de-mocambique-atrai-mais-cinco-empresas/

651 https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID_GHG%20Emissions%20Factsheet_Mozambique.pdf

652 https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID_GHG%20Emissions%20Factsheet_Mozambique.pdf

653 https://webcache.googleusercontent.com/search?q=cache:hR31Oylkn_IJ:https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Mozambique%2520First/MOZ_INDC_Final_Version.pdf+&cd=1&hl=en&ct=clnk&gl=us

654 https://ndcpartnership.org/news/changing-game-mozambique-launches-partnership-plan-catalyze-implementation-long-term-ndc

655 https://www.iea.org/data-and-statistics?country=MOZAMBIQUE&fuel=Energy%20supply&indicator=Total%20energy%20supply%20(TES)%20by%20source

amount of non-hydro renewables.[656] The dominance of biomass-based energy reflects a widespread lack of electricity access. As of 2018, only 31% of the population had access to electricity.[657] This rate of electrification breaks down into 72.6% of Mozambique's urban population and only 8% of its rural population.[658, 659]

Almost all of Mozambique's electricity generation comes from hydropower, with natural gas and a small amount of solar making up the remainder of the electricity mix.[660] Out of Mozambique's 2,867MW of installed capacity in 2018, the Cahora Bassa dam represents 2,075MW.[661, 662] However, the Cahora Bassa dam is situated in the north of Mozambique and lacks a direct connection to the demand center of Maputo in the south.[663] As a result, the Cahora Bassa dam exports nearly all of its electricity production to neighboring countries of Zimbabwe and South Africa. Mozambique must then re-import the needed electricity from these countries (particularly South Africa) at increased prices, mainly to power Mozal's aluminum processing operations.[664] This lack of an integrated national grid is one of the most pressing challenges for Mozambique's electricity generation sector. Although Mozambique has secured financing for the Temane Regional Electricity Project – a 400kv power line that would connect the capital Maputo with a 420MW natural gas power plant (still under construction) in the province of Temane, much more is required to enable Mozambique to achieve full grid integration and increased electrification.[665]

Mozambique's remaining electricity production comes from 109MW of smaller hydro plants owned by the national utility Electricidade de Moçambique (EDM), as well as 641MW from natural gas fired power plants.[666, 667] Mozambique has installed 42MW of solar capacity, with its first utility-scale 40MW solar plant at Mocuba coming online in 2019.[668, 669] All of this on-grid generation capacity suffers from high transmission losses and vulnerability to natural disasters. Transmission and distribution losses reach 27% of electricity output, while natural disasters or operating failures result in significant blackouts – as seen during floods in 2015.[670, 671] Thus, Mozambique's power generation sector is fragile and fragmented, which further exacerbates the country's electricity access challenge, even for those connected to the grid.

Policy Actors

The main policymakers active in Mozambique's energy sector include the following:

- The Ministry of Energy and Mineral Resources (MIREME) supervises the electricity portfolio, sets energy policy, and oversees the energy regulator.
- Energy Regulatory Authority (ARENE) serves as the energy regulator, with the power to approve electricity prices, propose new policies on energy matters, and promote "free competition" in energy services. (Formerly known as the Conselho Nacional de Electricidad – CNELEC).[672]
- Electricidade de Mozambique (EDM) is the state controlled, vertically-integrated national utility that manages the national grid, with a controlling stake in HCB – the owner of the Cahora Bassa hydropower plant – and a stake in the Mozambique Transmission Company.
- Hidroeléctrica de Cahora Bassa (HCB) is the independent power producer that owns the Cahora Bassa dam. EDM owns an 85% stake of the

656 https://www.iea.org/data-and-statistics?country=MOZAMBIQUE&fuel=Energy%20supply&indicator=Total%20energy%20supply%20(TES)%20by%20source
657 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=MZ
658 https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?locations=MZ
659 https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=MZ
660 https://www.iea.org/data-and-statistics/data-tables?country=MOZAMBIQUE&energy=Electricity&year=2018
661 https://www.usaid.gov/powerafrica/mozambique
662 https://www.hydropower.org/country-profiles/mozambique
663 https://www.rvo.nl/sites/default/files/2019/01/Final-Energy-report-Mozambique.pdf
664 https://www.rvo.nl/sites/default/files/2019/01/Final-Energy-report-Mozambique.pdf
665 https://www.globeleq.com/mozambique-government-celebrates-securing-of-funding-for-temane-regional-energy-project/
666 https://www.hydropower.org/country-profiles/mozambique
667 https://www.eia.gov/international/analysis/country/MOZ
668 https://www.iea.org/data-and-statistics/data-tables?country=MOZAMBIQUE&energy=Electricity&year=2018
669 https://scatecsolar.com/2019/08/14/inaguration-of-the-40-mw-mocuba-solar-power-plant/
670 https://www.powerutilityleadership.com/wp-content/uploads/2018/02/Mozambique_Power_Crisis.pdf
671 https://www.rvo.nl/sites/default/files/2019/01/Final-Energy-report-Mozambique.pdf
672 https://clubofmozambique.com/news/energy-reguator-authority-approved/

company.[673] HCB regularly sells power to South Africa and Zimbabwe both as energy exports and in order to "wheel" its electricity to Maputo.

- Mozambique Transmission Company (MOTRACO) is a joint venture transmission company with equal shares split between South Africa's Eskom, EDM and Swaziland Electricity Company (SEC).
- Fundo National de Energia (FUNAE) is a public fund charged with funding the development production, distribution and promotion of low-cost power, as well as with promoting the conservation and sustainable management of power resources. FUNAE focuses primarily on renewable energy resources, and has been funded 60% by international development institutions and 40% by the national budget.[674] FUNAE also acts as a de-facto rural electrification authority for Mozambique, as part of its responsibilities include providing energy solutions to rural areas.
- National Fund for Sustainable Development (FNDS) is another public fund that replaced the National Environment Fund in 2016. This fund's main mandate is to promote and finance development projects, especially in rural areas.[675] The scope of these projects includes programs for environmental adaptation and mitigation of climate change, sustainable management of forests, conservation of biodiversity, land administration and land use planning.[676]
- National Hydrocarbon Company (ENH) is the Mozambican state entity responsible for researching, prospecting, producing and marketing petroleum products and represents the state in petroleum operations. Founded in 1981, ENH participates in all petroleum operations and in their respective phases of exploration, production, refining, transportation, storage and marketing of hydrocarbons including LNG and GTL inside and outside the country. At the downstream level, ENH aims to diversify and increase gas use in Mozambique.

The financial weakness of EDM poses a significant challenge to Mozambique's power sector. This is in large measure caused by EDM's below-cost tariff structure alongside rising costs. Even though the company has recently raised tariffs, there was still a 20% gap between its tariffs and the cost of supply as of 2018.[677] In addition to the fact that the price of re-importing electricity from South Africa is three times more expensive than what South Africa pays Hidroeléctrica de Cahora Bassa (HCB), the depreciation of the Metical against the South African Rand in 2015–2016 further exacerbated EDM's financial issues.[678] Although EDM raised its tariffs yet again in 2019, it is doubtful that these changes alone can overcome the utility's financial troubles, especially given the utility's existing debt load of over $1 billion.[679, 680] As a result, EDM cannot afford to make the investments needed to improve Mozambique's grid infrastructure. This underinvestment in grid infrastructure has led to widespread dissatisfaction with the quality of power, as EDM's own study revealed that 56% of customers surveyed said that their power was of low or bad quality, and that 76.7% of customers surveyed said that they owned private generators.[681] This unreliable electricity supply hinders the full productive capacity of Mozambique's industrial base, thus restricting the country's efforts to increase its industrial capacity. Coupled with a weak institutional framework that prevents the MIREME from performing integrated and coordinated planning and monitoring, EDM lacks the required financial or institutional resources to provide widespread on-grid electricity services in a sustainable manner.[682]

Despite its current lack of widespread non-hydro renewable energy installed capacity, Mozambique has an extremely high potential for renewables deployment. According to a study conducted by the Government of Mozambique and FUNAE between 2011–2013, the country can support over 23,000GW of solar power, followed by 19GW of hydro (large and small), 5GW of wind, 2GW of biomass, and 0.1GW of geothermal.[683] The study also

673 https://www.edm.co.mz/sites/default/files/documents/Reports/EDM_STRATEGY_2018_2028.pdf
674 https://www.rvo.nl/sites/default/files/2019/01/Final-Energy-report-Mozambique.pdf
675 https://www.aler-renovaveis.org/en/communication/news/mozambican-government-creates-sustainable-development-fund/
676 https://www.climate-laws.org/geographies/mozambique/policies/decree-no-6-2016-creating-the-national-fund-for-sustainable-development-fnds
677 https://www.edm.co.mz/sites/default/files/documents/Reports/EDM_STRATEGY_2018_2028.pdf
678 https://www.edm.co.mz/sites/default/files/documents/Reports/EDM_STRATEGY_2018_2028.pdf
679 https://www.edm.co.mz/sites/default/files/documents/Reports/EDM_STRATEGY_2018_2028.pdf
680 https://www.esi-africa.com/industry-sectors/finance-and-policy/mozambique-introduces-sharp-electricity-tariff-increase/
681 https://www.edm.co.mz/sites/default/files/documents/Reports/EDM_STRATEGY_2018_2028.pdf
682 https://www.edm.co.mz/sites/default/files/documents/Reports/EDM_STRATEGY_2018_2028.pdf
683 https://www.get-invest.eu/market-information/mozambique/renewable-energy-potential/#:~:text=Mozambique%20has%20a%20total%20renewable,and%20geothermal%20(0.1%20GW).

identified at least 2.7GW worth of solar power, 230MW worth of wind projects, 128MW worth of biomass projects, and 5.6GW of hydro projects that have the potential to be readily developed.[684] Thus, Mozambique has enormous potential to shift its electricity mix to renewables, especially given the widespread abundance of solar power. However, the high level of import taxes and VAT for the required equipment was noted as a significant barrier to the expansion of renewables by multiple stakeholders.[685] Coupled with other facilitation services fees, these import taxes and VAT could easily amount to 30–40% of the installation cost of solar products in the country.[686]

The off-grid market in Mozambique has significant potential to provide electricity access with a focus on rural areas. The market potential for private-sector led off-grid solutions in Mozambique is four million households.[687] These households would gain access to electricity and at a cheaper rate than possible through diesel-fired generators. A study by the consulting company ICF concluded that consumers in Africa generally save an average $3.15 for every dollar spent on a pico-PV system when compared to relying on fossil fuel.[688] In addition, off-grid systems could help increase the rate of irrigation for Mozambique's agricultural land and replace the need for diesel-powered systems, thus increasing the crop yield and resiliency of the country's farmers.[689]

In terms of energy efficiency, USAID indicates that Mozambique has successfully implemented energy efficiency programs in the past, and is currently rolling out new standards for industrial motors and commercial lighting.[690] However, Mozambique does not appear to have major initiatives to improve energy efficiency across its economy at the moment, especially as energy efficiency does not feature prominently in its National Electrification Strategy nor its National Energy for All 2030 (ProEnergia) program.

Planning Goals & Targets

Mozambique is engaging in multiple initiatives to develop both its national electrification plans and its renewable energy buildout. Mozambique launched its National Energy for All 2030 (ProEnergia) programme in 2018, with an accompanying National Electrification Strategy.[691] This program calls for universal electricity access by 2030 through on-grid and off-grid solutions, as well as for the continued entry of private operators into the electricity market.[692] The National Electrification Strategy estimates that its goal of achieving universal electricity access with 70% on-grid solutions and 30% off-grid solutions would require $540 million annually, totaling an investment of $6.5 billion between 2020–2030.[693] The ProEnergia plan already secured a $82 million grant from the World Bank in 2019, and is receiving further support from a $66 million Multi-Donor Trust Fund (MDTF) mechanism administered by the World Bank and financed by Sweden, Norway and the EU.[694] This support from the World Bank and the MDTF would help extend the grid to over 250,000 households, 50% of which are in the five poorest provinces of Mozambique – Niassa, Nampula, Zambezia, Cabo Delgado and Sofala. It would also help remove an expensive upfront connection charge for new customers.[695] On the off-grid side, this financing would help IPPs establish PPPs for combined solar PV and battery mini-grids in collaboration with FUNAE and EDM, and also set up a results-based financing facility for quality-certified solar-home systems and solar pumps.[696] Thus, the ProEnergia plan and the National Electrification Scheme

684 https://www.get-invest.eu/market-information/mozambique/renewable-energy-potential/#:~:text=Mozambique%20has%20a%20total%20renewable,and%20geothermal%20(0.1%20GW).

685 https://www.aler-renovaveis.org/contents/files/aler_mz-report_oct2017_web.pdf

686 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/Country-Brief-Mozambique.pdf

687 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/Country-Brief-Mozambique.pdf

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689 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/Country-Brief-Mozambique.pdf

690 https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID_Energy-Efficiency-Opportunity-Study-Mozambique.pdf

691 https://www.aler-renovaveis.org/en/communication/news/official-presentation-of-the-mozambique-national-electrification-strategy-until-2030/#:~:text=On%20November%2012%2C%20the%20National,Republic%20of%20Mozambique%2C%20Jacinto%20Nyusi.&text=The%20goal%20is%20to%20ensure,feasible%20and%20financially%20sustainable%20approach

692 https://www.aler-renovaveis.org/en/communication/news/official-presentation-of-the-mozambique-national-electrification-strategy-until-2030/#:~:text=On%20November%2012%2C%20the%20National,Republic%20of%20Mozambique%2C%20Jacinto%20Nyusi.&text=The%20goal%20is%20to%20ensure,feasible%20and%20financially%20sustainable%20approach

693 http://documents1.worldbank.org/curated/fr/594061554084119829/pdf/Mozambique-Energy-for-All-ProEnergia-Project.pdf

694 https://www.worldbank.org/en/news/press-release/2019/04/02/mozambique-gets-148-million-to-increase-access-to-electricity-in-five-poorest-provinces

695 http://documents1.worldbank.org/curated/fr/594061554084119829/pdf/Mozambique-Energy-for-All-ProEnergia-Project.pdf

696 http://documents1.worldbank.org/curated/fr/594061554084119829/pdf/Mozambique-Energy-for-All-ProEnergia-Project.pdf

along with funding from World Bank and MDTF offers an ambitious roadmap towards universal electrification which is partly based on renewable energy.

The Strategy for New and Renewable Development 2011–2025 (EDENR) is Mozambique's roadmap for the greater deployment of renewables. Under this plan, Mozambique aims to achieve three central objectives:[697]

- Improving access to energy services through renewables
- Developing renewable energy technology
- Accelerating private investment in renewables

The EDENR also targets various actions for on-grid and off-grid deployment of renewables. The strategy devises multiple fiscal incentives for off-grid renewables development, such as import tax and VAT exemptions.[698] Mozambique also attempted to develop a feed-in tariff regime to support the EDENR, but neither the fiscal incentives nor the feed-in tariff was ultimately implemented.[699, 700] The fact that Mozambique's first utility scale solar plant was only inaugurated in 2019 demonstrates how this strategy may not have been as effective as originally planned, especially without the accompanying fiscal incentives.

Despite these national strategies, the enabling policy environment for private participation in developing renewable energy is lacking, especially for the deployment of off-grid and mini-grid solutions. The policy challenges are fourfold:

- A uniform tariff model across Mozambique;
- Heavily subsidized fossil fuel industry;
- Unclear regulation on land concessions and licensing; and
- Lack of quality standards.[701]

The uniform tariff means that any electricity project must charge the national tariff rate, no matter the true cost of generation. Despite recent tariff increases, this tariff scheme is not conducive to deploying mini-grids by private companies, as they cannot recoup the costs of their investment, even if remote customers are willing to pay slightly higher prices. This tariff issue is exacerbated by the cheap cost of conventional liquid fuels (such as kerosene), thanks to heavy subsidies from the government. Thus, mini-grids struggle to compete with existing energy sources for off-grid electricity solutions.

In addition, the regulatory environment for mini-grids is marked by a lack of clarity and certainty. All production, transportation (including import and export), distribution, and commercialization of electric energy in Mozambique is governed by the Electricity Law. Although the law allows private sector actors to generate and distribute power at the local level, as well as negotiate tariffs on a case-by-case basis, the law does not have any overarching enabling allowances for mini-grids. This means that most mini-grid projects are subject to utility-scale project rules and the sub-commercial national tariffs.[702] Furthermore, any separately negotiated mini-grid tariff rates must conform to the national rate once the grid arrives in the same area of operation.[703] Mini-grid projects also need to apply for land concession contracts from the government, regardless of their generation capacity, which creates complications for private mini-grid developers.[704] Finally, Mozambique does not have the capacity to guarantee the quality of its mini-grid PV equipment, which is not conducive to building consumer trust and price expectations.

Nevertheless, Mozambique, in collaboration with USAID,is undertaking revisions to its Electricity Law which may address some of these enabling environment challenges. These revisions are meant to support the universal electrification goal by 2030. The revisions would further support the role of private investment in the import and export of electricity, electricity consumption, and energy services. In particular, the revisions clarify the award of concessions and licenses for utility-scale projects and smaller projects. The revisions introduce three types of energy permits – concessions, licenses, and simplified licenses.[705] While concessions are issued for projects that are 500MW or

697 https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/MOZAMBIQUE.pdf

698 https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/MOZAMBIQUE.pdf

699 https://www.rvo.nl/sites/default/files/2019/01/Final-Energy-report-Mozambique.pdf

700 https://www.get-invest.eu/market-information/mozambique/governmental-framework/#:~:text=Mozambique%20has%20been%20implementing%20energy%20sector%20reforms%20for%20over%20two%20decades.&text=The%20country's%20Renewable%20Energy%20Strategy,100%20MW%20up%20to%202025.

701 https://gggi.org/site/assets/uploads/2019/02/Mozambique-Country-Brief.pdf

702 https://gggi.org/site/assets/uploads/2019/02/Mozambique-Country-Brief.pdf

703 https://gggi.org/site/assets/uploads/2019/02/Mozambique-Country-Brief.pdf

704 https://www.dlapiper.com/en/europe/insights/publications/2019/11/africa-connected-issue-3/renewable-energy-in-mozambique/

705 https://www.engineeringnews.co.za/article/ministerial-approval-for-new-mozambique-electricity-law-pending-2019-04-03

larger in scale and that involve state capital, smaller projects can be issued licenses directly by the energy regulator ARENE.[706] These licenses are for generation projects using any source above 4MW, as well as energy transmission outside of the grid and energy distribution, and is valid for at least 35 years.[707] For mini-grids specifically (smaller than 4MW), they can receive simplified licenses for own use and consumption of electricity, while allowing for the sale of excess electricity generation.[708] Although this law was supposed to be confirmed in 2020, the onset of the COVID pandemic has delayed its implementation.[709]

In terms of a cooperation framework with donor countries, Mozambique signed the "Energy Compact Africa – Mozambique" in 2017 with a collection of stakeholders such as USAID, the AfDB, the EU, cooperation agencies from Germany, Italy and the USA, and the governments of the United Kingdom and the Netherlands.[710] The main focus of the Compact is to develop a market for the new and renewable energy sector in Mozambique, through the combined efforts of government, private sector partners, and donor assistance.[711] While the Compact does not provide financing, this initiative helps connect stakeholders and provides a framework for coordinating renewable energy policy.

Sector Initiatives & Programs

Mozambique is engaging in two major programs to develop its on-grid renewable energy generation capacity. The PROLER (Promoçao de Leilões de Energias Renovaveis) program is an initiative to establish both a regulatory framework and an auction mechanism for 120MW of large-scale solar energy projects.[712] Led by the French Development Agency (AFD) and funded by a grant of 37.7 million EUR from the European Union, the PROLER program supports these auctions by conducting all the feasibility studies and preliminary environmental and social studies.[713] The PROLER program also establishes a guarantee mechanism for private power producing companies participating in the auction to limit the risk of non-payment by the electricity buyer (in this case EDM), thus reducing off-taker risk.[714] The goal is to use the EU funding to leverage 200 million EUR in private investment into the solar projects. The PROLER program officially launched its call for tenders in September 2020, having added a 40MW wind project to its 120MW solar procurement efforts.[715]

Mozambique is also preparing to launch a GET-FiT program, in collaboration with the KfW Development Bank and other international donors. The GET-FiT provides a comprehensive set of tools to support private participation in renewable energy projects, in particular running the reverse auctions, extending credit guarantees to protect against contract termination risks and liquidity risks, and offering viability gap funding that boosts tariff prices to more attractive levels.[716] A pre-feasibility study in 2015 found a GET-FiT program could help promote independent power producers (IPPs) for renewable energy in Mozambique, as well as address certain challenges in the country's power sector, such as off-taker risk, lack of IPP-track record, the unavailability of risk mitigation options, and the immaturity of any renewable energy feed-in tariff framework.[717] In October 2019, Mozambique signed an agreement with KfW for a 25 million EUR grant to set up a GET-FiT program for the country, targeting 32MW of solar PV and battery projects in its first round, with an ultimate goal of installing 130MW of renewable energy.[718, 719] Although this program was slated to begin implementation in the first half of 2020 and call for tenders in 2021, the COVID 19 pandemic may have delayed this timeline.[720]

706 https://www.engineeringnews.co.za/article/ministerial-approval-for-new-mozambique-electricity-law-pending-2019-04-03
707 https://www.engineeringnews.co.za/article/ministerial-approval-for-new-mozambique-electricity-law-pending-2019-04-03
708 https://www.engineeringnews.co.za/article/ministerial-approval-for-new-mozambique-electricity-law-pending-2019-04-03
709 Embassy of Sweden interview, September 16, 2020
710 https://www.aler-renovaveis.org/en/communication/news/aler-signs-the-energy-compact-agreement-to-expand-solar-energy-in-mozambique/
711 https://open.enabel.be/en/MOZ/2127/509/u/boosting-collaboration-efforts-for-renewable-household-energy-in-mozambique-the-energy-africa-mozambique-compact.html#:~:text=In%20November%202017%2C%20under%20the,renewable%20energy%20sector%20in%20Mozambique.
712 https://www.afd.fr/en/carte-des-projets/proler-developing-power-production-renewable-energies
713 https://www.afd.fr/en/carte-des-projets/proler-developing-power-production-renewable-energies
714 https://www.afd.fr/en/carte-des-projets/proler-developing-power-production-renewable-energies
715 https://www.pv-magazine.com/2020/10/01/mozambique-tenders-120-mw-of-solar/
716 https://www.getfit-moz.org/about-getfit
717 https://www.getfit-moz.org/about-getfit
718 https://www.aler-renovaveis.org/en/communication/news/get-fit-programme-in-mozambique-achieves-another-important-milestone/
719 https://www.aler-renovaveis.org/en/communication/news/implementation-of-get-fit-program-expected-for-2020/
720 https://www.aler-renovaveis.org/en/communication/news/get-fit-programme-in-mozambique-achieves-another-important-milestone/

In the off-grid market, FUNAE has been the main driver for deploying rural electricity solutions, but other donor-led initiatives have emerged in recent years. With FUNAE acting as both a financier and the operator, this institution has installed approximately 70 diesel-based mini-grids operated by local communities, approximately 1,500 solar home systems, and around 60 solar irrigation systems as of 2016, which benefitted about 3.7 million customers.[721, 722] However, most of the solar power systems installed by FUNAE have been at schools, hospitals, and administrative offices rather than for residential use, and many of the diesel mini-grids have failed due to operation and maintenance issues.[723]

The BRILHO Energy Mozambique program is a five-year effort from 2019–2024 meant to catalyze the country's off-grid potential by de-risking investments in off-grid energy solutions. Funded by the UK's Department for International Development (DfID, now the Foreign Commonwealth & Development Office – FCDO) and working under the Energy Compact Mozambique, BRILHO offers structured non-reimbursable funding and specialized support for improved cooking solutions, solar home systems, and green mini-grids, in addition to improving access to information, setting benchmarks, and advocating for a better regulatory framework.[724] BRILHO's employs two grant instruments to deploy its funding – catalytic grants for those starting up or scaling up their businesses, and grant-based results based financing (RBF) to offer incentives for businesses to tackle more challenging markets.[725] Under the RBF program, developers can be eligible for grants based on meeting certain quantitative and qualitative targets, but they can only receive up to 50% of their project costs as grants—the remaining financing must be sourced elsewhere.[726] The BRILHO program can provide support of between £50,000 up to £1,500,000 per project, and currently has a total budget of around £25.7 million, to be spent over eight years.[727]

Another donor-led initiative is the Energizing Development (ENDEV) program, implemented by GIZ and funded by multiple European donor countries. With a budget of over 14 million EUR, the ENDEV program in Mozambique ran from 2006 to 2019, with a focus on grid densification, small solar PV systems, and improved cookstoves. For the solar component, the ENDEV program worked with private sector partners, NGOs, and educational institutions to develop the market for solar home systems and pico-solar solutions. ENDEV helped connect distributors with quality manufacturers of PV products and services, and to develop last mile rural retail networks.[728] Although ENDEV did not provide direct financing, the program provided training for salespeople and helped reduce the transaction costs associated with information asymmetry for private solar PV distributors. ENDEV ultimately helped over 30,000 people gain access to electricity through solar solutions, replacing expensive and harmful kerosene lamps.[729]

Mozambique also signed an agreement with the company Ignite Power – the fastest growing developer of pay-as-you-go off-grid solar generators in Africa – to deliver domestic solar power generators for 300,000 homes across the country – or 6.2% of the rural population.[730] The deal structure entails the creation of a local company, Ignite Moçambique, to carry out the installation of these solar power solutions, while receiving sponsorship funding from an independent Mozambiquan private equity firm Source Capital.[731] The total cost of the project would be $48 million dollars, and has already received debt commitments from the Development Bank of Southern Africa (DBSA).[732, 733]

In terms of financing facilities, Mozambique has multiple resources from international donors to draw upon. The Green People's Energy for Africa project provides windows of financing for decentralized renewable energy

721 https://www.rvo.nl/sites/default/files/2019/01/Final-Energy-report-Mozambique.pdf
722 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/Country-Brief-Mozambique.pdf
723 https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/Country-Brief-Mozambique.pdf
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728 https://endev.info/images/7/73/Factsheet_EnDev_Mozambique_EN.pdf
729 https://endev.info/images/7/73/Factsheet_EnDev_Mozambique_EN.pdf
730 https://www.ignite.solar/post/ignite-power-to-deliver-electricity-to-300-000-families-mozambique
731 https://www.dbsa.org/EN/DBSA-in-the-News/NEWS/Pages/20200220-DBSA-inest-Ignite-Mocambique.aspx
732 https://www.ignite.solar/post/mozambique-president-nyusi-launches-ignite-power-project-to-supply-energy-to-1-8-million-people
733 https://www.dbsa.org/EN/DBSA-in-the-News/NEWS/Pages/20200220-DBSA-inest-Ignite-Mocambique.aspx

systems in rural areas across the continent. Funded by BMZ, The Green People's Energy project not only offers funds for equipment installation, but also provides training in renewable energy systems, promotion of renewable energy for productive use, and advisory services to improve investments and framework conditions.[734] These services are all offered in Mozambique, alongside a results-based financing facility called the Fund for Sustainable Access to Renewable Energy (FASER), which was jointly established by the Green People's Energy, EnDev, and the Foundation for Community Development.[735] The energy portion of the FASER facility supports commercial enterprises and agricultural enterprises to purchase equipment such as photovoltaic systems and solar irrigation pumps to power their business activities.[736]

Mozambique also has access to two credit lines to finance private sector participation in off-grid renewable energy solutions. One credit line is funded by KfW, while the other is organized by the United Nations Industrial Development Organization (UNIDO) and funded by the Global Environment Facility.[737, 738] Both credit lines are implemented by the Commercial Bank of Investments (BCI).

The KfW credit line offers a total of 3 million EUR that can be extended either for short and medium-term operations or the leasing of movable property operations. These operations are in Metical and the term can be up to five years at a 15% fixed rate, with a limit of up to five million Metical for individuals and up to 20 million Metical for companies.[739] This line focuses specifically on clean energy development.

On the other hand, the UNIDO credit line is geared towards boosting energy for productive purposes in rural areas.[740] This credit line has an initial capitalization of $1 million over three years and aims to provide loan guarantees for companies that do not meet the required standards for collateral.[741]

Although these credit lines provide crucial financial support for private renewable energy developers, they are not employed to their full potential. Companies wanting to use these credit lines still face high interest rates in Mozambique, as well as a burdensome application process.[742] In addition, the bank officials lack the experience and expertise needed to evaluate these renewable energy projects, which further complicates the loan application process. Coupled with the fact that the funds for both credit lines sit in the Central Bank of Mozambique and must be approved by the Central Bank before they are disbursed, these credit lines still require further development before they can fully benefit private off-grid renewable energy developers in the country.[743]

Finally, the Beyond the Grid Fund for Africa (BGFA) has recently entered Mozambique.[744] Funded by the Swedish International Development Cooperation Agency (SIDA), established and managed by the Nordic Environment Finance Corporation (Nefco) and implemented in partnership with the Renewable Energy and Energy Efficiency Partnership (REEEP), BGFA employs a results-based financing model to de-risk company entry into the off-grid market. This results-based financing aims to build markets where none existed previously as well as scale up any existing operations, as successfully demonstrated by the pilot programme the Beyond the Grid Fund for Zambia (BGFZ). BGFA is currently operating in Burkina Faso, Liberia, Mozambique, Uganda and Zambia.[745]

Climate Smart Agriculture and Forestry Context

Agriculture plays a central role in Mozambique's economy, contributing approximately 20% of GDP and 79% of total employment.[746] Nearly 95% of this sector's production

734 https://www.giz.de/en/worldwide/77417.html
735 https://gruene-buergerenergie.org/en/countries/mozambique/
736 https://gruene-buergerenergie.org/en/countries/mozambique/
737 https://www.aler-renovaveis.org/en/communication/news/bci-creates-an-environmental-credit-line/
738 https://open.unido.org/api/documents/5868684/download/UNIDO%20GEF%206%20Mozambique%209225%20CEO%20re-submission%20app.pdf
739 https://www.aler-renovaveis.org/en/communication/news/bci-creates-an-environmental-credit-line/
740 http://www.tse4allm.org.mz/index.php/en/midia/a-unido-em-parceria-com-o-bci-financia-sistemas-de-energia-renovavel-para-usos-produtivos-na-zona-rural-de-mocambique
741 http://www.tse4allm.org.mz/index.php/en/midia/a-unido-em-parceria-com-o-bci-financia-sistemas-de-energia-renovavel-para-usos-produtivos-na-zona-rural-de-mocambique
742 Interview with GIZ, September 16, 2020
743 Interview with GIZ, September 16, 2020
744 https://beyondthegrid.africa/news/the-beyond-the-grid-fund-for-africa-launches-its-second-call-for-proposals-for-micro-grid-enterprises-in-mozambique/
745 https://beyondthegrid.africa/bgfa-countries/
746 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf

comes from 3.2 million smallholder farmers, with roughly 400 commercial farmers making up the remaining 5% of agricultural production.[747] Over 80% of these smallholder farmers plant maize and cassava, as well as other staples such as rice and wheat.[748] While most of these staples are cultivated for sustenance purposes, commercial farmers focus on tobacco, cotton, cashews, and sugar as cash crops.[749] Although more than 62% of Mozambique's land area is arable, only 7% is cultivated.[750] Most of this cultivated land is located flood-prone areas.[751] In addition, most of the country's agriculture is rain-dependent, and thus vulnerable to drought.

Mozambique has approximately 3.3 million ha of potentially irrigable land, but only about 50,000 ha of that land is under operational irrigation infrastructure. Most of the irrigated land is in the center and south of the country and focused on cash crops such as sugarcane.[752] Low levels of electrification in rural areas means that farmers often depend on diesel powered agricultural systems (e.g. pumping, milling) where they can afford them.[753] Further complicating matters is the fact that only 3–5% of the country's land holdings are registered in terms of ownership, and only 3% of farmers have deeds to their lands.[754] Coupled with the fact that all land technically belongs to the state according to Mozambique's Land Law, these smallholder farmers have little incentive to invest any additional revenue into improving the climate resilience of their agriculture.

The forestry sector is also important to Mozambique's economy. 43% of Mozambique's land area (34 million hectares) is forested, and forestry-related activities contributed to the direct employment of 22,000 people in 2011.[755] In some rural communities local forests contribute almost 20% of household cash income and 40% of subsistence (non-cash) income.[756] However, Mozambique is losing its forests at an average of 0.58% per year, resulting in around 40 MT of CO_2 emissions each year.[757] This deforestation is driven by urban expansion (12%), the collection of wood fuel for cooking and heating purposes (7%), the (at times illegal) extraction of timber products (8%) and the conversion of forests to small-scale agriculture (65%).[758]

Policy Actors

The main policymakers for the agriculture and forestry sectors in Mozambique are the Ministry of Agriculture and Food Security, and the newly created Ministry of Land, Environment, and Rural Development (MITADER). Within MITADER, the institutions involved in forest management are the National Directorate of Forests (DINAF), National Directorate of Land (DINAT), National Directorate of Environment (DINAB), National Center for Cartography and Remote Sensing (CENACARTA) and the aforementioned National Fund for Sustainable Development.[759]

Planning Goals & Targets

The policy foundations for climate smart agriculture in Mozambique include the National Adaptation Programme of Action (NAPA) and the National Climate Change Adaptation and Mitigation Strategy (NCCAMS) for 2013–2025. With the NAPA focused on strengthening capacities of agricultural producers to deal with climate change as a priority sector, a number of climate smart agriculture (CSA) initiatives have been implemented.[760] In particular, crop residue management, mulching, composting, and rotations are some of the key climate-smart practices that are being adopted across several production systems

747 http://www.fao.org/mozambique/fao-in-mozambique/mozambique-at-a-glance/en/
748 http://www.fao.org/mozambique/fao-in-mozambique/mozambique-at-a-glance/en/
749 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf
750 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf
751 http://www.fao.org/mozambique/fao-in-mozambique/mozambique-at-a-glance/en/
752 https://www.grain.org/media/W1siZiIsIjIwMTMvMDIvMjgvMTRfMzFfMjNfNjg0X1BFRFNBX0ZJTkFMX0VuZ2xpc2hfMjJfTm92LnBkZiJdXQ
753 https://gggi.org/site/assets/uploads/2019/02/Mozambique-Country-Brief.pdf
754 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf
755 http://documents1.worldbank.org/curated/en/147761541432074205/pdf/131837-WP-P160033-PUBLIC-Country-Forest-Note-Final.pdf
756 http://documents1.worldbank.org/curated/en/147761541432074205/pdf/131837-WP-P160033-PUBLIC-Country-Forest-Note-Final.pdf
757 http://documents1.worldbank.org/curated/en/147761541432074205/pdf/131837-WP-P160033-PUBLIC-Country-Forest-Note-Final.pdf
758 https://redd.unfccc.int/files/2018_frel_submission_mozambique.pdf
759 https://redd.unfccc.int/files/2018_frel_submission_mozambique.pdf
760 https://www.adaptation-undp.org/projects/mozambique-national-adaptation-programme-action-napa#:~:text=National%20Adaptation%20Programmes%20of%20Action,social%20costs%20of%20climate%20change

in Mozambique.[761] The NCCAMS builds on the work of the NAPA by further emphasizing the resilience of agriculture and livestock, as well as developing low-carbon agricultural practices.[762] Mozambique's strategic plans in these sectors (e.g. Strategic Plan for the Development of the Agriculture Sector (PEDSA), the National Agriculture Investment Plan (PNISA), the National Irrigation Strategy 2011) all emphasize increasing both the productivity of food crops and the resilience of agriculture to the effects of climate change, creating an ambitious overarching framework for the implementation of CSA in Mozambique.[763] Expanding agricultural areas under irrigation is a key objective in Mozambique's PEDSA Strategic Plan, with a goal of increasing yields for both smallholder and larger farmers. Efficient drip irrigation systems, powered by distributed renewables in rural and drought-prone areas, could support the growth in yield and greater crop variety, as well as contribute to increasing the resilience of Mozambique's agriculture sector.[764] However, actual funding for climate change related measures often does not match the ambition of these plans, as the national government spent only 3.1% and 7% on the environment and on agriculture, respectively, in 2010.[765]

Sector Initiatives & Programs

Non-government entities and international donors are also involved in supporting CSA in Mozambique. One of the more prominent initiatives is the Pro-Poor Value Chain Development in the Maputo and Limpopo Corridors (PROSUL) program, which lasted from 2012–2019. Led by the International Fund for Agricultural Development (IFAD), the PROSUL program was geared towards increasing the incomes of smallholder farmers by producing irrigated vegetables, cassava and livestock including cattle, goats and sheep in a climate resilient way.[766] The PROSUL program was coordinated by the Ministry of Agriculture and Food Security, and administered by the Agricultural Development Fund. This program aimed to reach over 20,000 households by strengthening land rights in the horticulture, cassava, and red meat value chains.[767] These land rights regularizations were accompanied by interventions in irrigation schemes with multipurpose wells, gender mainstreaming, training in food supplementation for animals for long periods without rain, and identification and demarcation of communal grazing areas.[768, 769] As of the final progress report, this program overachieved its goals by benefitting nearly 29,000 households by the end of 2019.[770]

There are multiple other international donor programs active in Mozambique for CSA. For example, USAID instituted a five-year program, Feed the Future Climate Smart Agriculture Beira Corridor (FTF-CSA-BC), to increase awareness and demonstrate effectiveness of key climate smart technologies and practices (e.g. improved seed, water conservation techniques etc.), as well as to strengthen market access and supply for farmers.[771] Other initiatives include the Pilot Programme for Climate Resilience funded by the World Bank and the Climate Smart Agriculture Programme funded by the UK.[772] In terms of actually funding CSA, the Global Environment Facility (GEF) has been the main source of grant funds for Mozambique, contributing $70 million for projects related to agriculture, forestry, and adaptation in coastal areas.[773] Other funders include the Adaptation for Smallholder Agriculture Program (ASAP), the Global Climate Change Alliance (GCCA), and the MDG Achievement Fund. While Mozambique receives strong technical and financial support from abroad for climate smart agriculture, the country does not have a dedicated local funding facility to support this sector.

761 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf

762 https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/MOZAMBIQUE%29%20National%20Climate%20Change%20Adaptation%20and%20Mitigation%20Strategy.pdf

763 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf

764 https://gggi.org/site/assets/uploads/2019/02/Mozambique-Country-Brief.pdf

765 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf

766 https://www.ifad.org/en/web/operations/project/id/1100001618/country/mozambique

767 https://reliefweb.int/report/mozambique/land-tenure-interventions-pro-poor-value-chain-development-project-maputo-and

768 https://reliefweb.int/report/mozambique/land-tenure-interventions-pro-poor-value-chain-development-project-maputo-and

769 https://www.ccardesa.org/sites/default/files/ickm-documents/Climate%20Smart%20Agriculture%20in%20Mozambique%20%28CSA%29.pdf

770 https://www.ifad.org/documents/38711644/40046455/Mozambique%201100001618%20PROSUL%20Supervision%20Report%20October%202019/1938706b-0e3f-cdad-48a6-b47f933b1802

771 https://www.usaid.gov/mozambique/fact-sheets/feed-the-future-mozambique-climate-smart-agriculture-activity-beira

772 https://media.africaportal.org/documents/Policy_Brief_Issue_19.2017_CSA_Mozambique_-_Final_Draft01.pdf

773 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf

Mozambique is currently in the process of implementing a "Reducing emissions from deforestation and forest degradation in developing countries" (REDD+) strategy to protect its forests and achieve its emissions reductions goals. One of the most prominent initiatives to help Mozambique achieve its REDD+ goals is the Forestry Investment Project. With $47 million of funding from the World Bank, the IFC, and the Climate Investment Funds (CIF), and administered by MITADER and FNDS, the Forestry Investment Project is a two-tiered plan that finances overarching reforms as well as pilot programs in specific provinces to test deforestation and emissions reduction strategies.[774] The overarching reforms target strengthening forest governance and land tenure, sustainable agriculture and livelihoods, sustainable biomass energy, and establishing multipurpose forests with both natural forest preservation and commercial forest plantations.[775]

The second tier of the Forestry Investment Project revolves around two programs: the Zambézia Integrated Landscape Management Program (ZILMP) and the Integrated Landscape Management Program in Cabo Delgado Province (PROGIP-CD).[776] ZILMP is a forest conservation and management program aligned with Mozambique's REDD+ strategy and managed at the national level by the FNDS.[777] The Zambézia province has around 13% of Mozambique's forest cover, but also accounts for 8% of the national deforestation level.[778] The ZILMP is meant to reduce emissions due to deforestation in the province by 30% below the reference level (around 6 MT of CO_2e) in the first period (2018–2019) and by 40% in the second period (2020–2024).[779] These emissions can be monetized thanks to an agreement with the FCPF Carbon Fund, which will pay up to $50 million to designated beneficiaries once the emissions reductions are verified. These payments would be split 70% to communities, 20% to the private sector, 2% to the provincial government, 4% to the district government and 4% to Gilé National Reserve, to be reinvested in sustainable management practices.[780] Meanwhile, the PROGIP-CD is meant to reduce illegal logging and mining in Quirimbas National Park, as well as promote sustainable practices in agriculture, timber extraction and in charcoal production.[781]

To support these programs, the World Bank has also contributed $300 million in total since 2013 to ongoing policy reform efforts, such as a the revision of its policy and legal frameworks, the creation of a new institution for forest law enforcement, a moratorium on new forest concessions, and a ban on log exports, as well as helped connect Mozambiquan authorities with multiple sources of DFI financing.[782] Thus, the forestry sector appears to have more large-scale sources of grant funding to support goals of transitioning to more sustainable forest practices.

Green Urbanization and Clean Transportation Context

Although Mozambique's rate of urbanization is low at 36.5% in 2019, the country could still benefit from clean transportation and green urbanization strategies that take climate change into account.[783] The transportation sector has seen rapid growth and even during the 2016 financial crisis, the national car fleet continued to grow.[784] Motorcycles are also a key growth area, as they represent 11% of Mozambique's vehicle fleet, with imports still increasing.[785] The nation's capital is experiencing heavy congestion, with one car per every four residents (compared to one car per every 45 residents elsewhere in the country).[786] Although emissions from the transportation sector are low (4 Mt of CO_2 as of 2018), this figure could grow as more Mozambiquans acquire personal vehicles.[787]

774 https://www.climateinvestmentfunds.org/sites/cif_enc/files/mozambique_fip_investment_plan.pdf
775 https://www.climateinvestmentfunds.org/sites/cif_enc/files/mozambique_fip_investment_plan.pdf
776 https://redd.unfccc.int/files/2018_frel_submission_mozambique.pdf
777 https://ewsdata.rightsindevelopment.org/files/documents/24/WB-P164524.pdf
778 https://www.nitidae.org/en/actions/zilmp-etude-de-preparation-a-un-programme-juridictionnel-redd-dans-la-province-de-zambeze-zambezia-integrated-landscapes-management-program
779 https://www.forestcarbonpartnership.org/system/files/documents/Mozambique_Revised%20ERPD_16April2018_CLEAN.pdf
780 http://documents1.worldbank.org/curated/en/147761541432074205/pdf/131837-WP-P160033-PUBLIC-Country-Forest-Note-Final.pdf
781 https://redd.unfccc.int/files/2018_frel_submission_mozambique.pdf
782 http://documents1.worldbank.org/curated/en/147761541432074205/pdf/131837-WP-P160033-PUBLIC-Country-Forest-Note-Final.pdf
783 https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=MZ
784 https://www.globalfueleconomy.org/blog/2018/september/mozambique-fuel-economy-workshop-considers-policies-for-cleaner-more-efficient-vehicles
785 https://www.globalfueleconomy.org/blog/2018/september/mozambique-fuel-economy-workshop-considers-policies-for-cleaner-more-efficient-vehicles
786 https://clubofmozambique.com/news/capital-of-mozambique-has-one-car-for-every-four-people/#:~:text=Despite%20the%20congestion%20crisis%2C%20the,2017%2C%2030%2C000%20cars%20were%20purchased.
787 https://www.iea.org/data-and-statistics?country=MOZAMBIQUE&fuel=CO2%20emissions&indicator=CO2%20emissions%20by%20sector

Local air quality is also a concern in large cities with growing use of personal vehicles. The main policymaking body for transport – the Ministry of Transport and Communications – and the Ministry of Mineral Resources and Energy have both expressed interest in switching to cleaner vehicles, either using electricity or natural gas.[788, 789] There are a few existing private sector initiatives to promote clean transportation, such as the company Mozambikes which uses local labor to assemble bikes from imported parts and sells them at low costs to Mozambique's poorest inhabitants.[790] Nevertheless, this sector does not appear to be a major priority for Mozambique's climate change agenda in the near term, given the lack of financing solutions and programs available to support clean transportation.

Green/sustainable urbanization, however, may rank higher in Mozambique's climate priorities. Mozambique is vulnerable to floods and violent storms. These disasters pose a particular threat to its low-lying cities such as Beira, as seen through the 1.8 million people affected and $773 million in damages caused by flooding from Cyclone Idai in 2019.[791] However, over 60% of Mozambique's population is predicted to live in urban areas by 2030.[792] Thus, the main policymaking body for urbanization – the Ministry of Public Works, Housing and Water Resources – is currently working with USAID's Coastal City Adaptation Project (CCAP) to expand the uptake of resilient construction techniques.[793] In addition, the World Bank has funded the rehabilitation of a storm drain system in the city of Beira through a $120 million credit, which has helped reduce the risk of flooding by 70%.[794] Despite these efforts, Mozambique appears to lack a fully coordinated policy to address the dangers of climate change to its cities, and therefore has not invested the necessary funds to make systemic changes in this sector.

II. PRIORITY SECTORS FOR GREEN INVESTMENT

As Mozambique's energy sector continues to move towards a more open and efficient market with efforts to support increased private sector participation, a NCCF and/or a green finance facility would be an appropriate and timely intervention to support the scaling up of renewable energy. The country has continued to leverage support from international organizations to develop more robust policies and to seed pilot projects to diversify the energy mix. Given the country's geographic and environmental renewable energy potential, especially for solar, a foundation for progress has been established. The energy sector should be prioritized given the potential to shape its growth and the opportunity to leverage recent initiatives towards renewable energy project development.

Similar to the energy sector, the agriculture sector is a significant focus of Mozambique's development strategies. Although there has been less international involvement in the agriculture sector (relative to the energy sector), climate smart agriculture is a key area of interest for the government. Existing government frameworks and the various pilot programs outlined earlier are all consistent with the potential for an NCCF or green finance facility. However, it should be noted that many of these initiatives and plans are in early stages of implementation and more specific market direction needs to be developed.

As for the other five countries discussed in this report, the following criteria were considered in the identification of priority sectors:

- Sectors with significant potential to reduce CO_2 emissions and have the potential to support the continued efforts of the country's progress towards meeting NDCs and SDG commitments;
- Potential for project pipeline has been identified through the initial market scoping;
- Significant direct or indirect contributor to the country's Gross Domestic Product (GDP); and

788 http://www.xinhuanet.com/english/africa/2019-11/07/c_138537188.htm

789 https://www.globalfueleconomy.org/blog/2018/september/mozambique-fuel-economy-workshop-considers-policies-for-cleaner-more-efficient-vehicles

790 https://seed.uno/articles/blog/bringing-mobility-to-mozambique-s-poorest

791 https://news.un.org/en/story/2019/05/1039381

792 https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Transition_Towards_Green_Growth_in_Mozambique_-_Policy_Review_and_Recommendations_for_Action.pdf

793 https://www.urbanet.info/climate-resilient-housing-mozambiques-coastal-cities/

794 https://www.worldbank.org/en/news/feature/2018/06/05/helping-mozambique-cities-build-resilience-to-climate-change

- A financing gap exists within the market whereby catalytic green capital is needed or is deemed to be of great importance to make progress towards the country's NDCs and development goals.

Energy as a priority sector

As noted earlier, Mozambique's electricity generation has been dominated by hydropower, with dependence on hydroelectric power plants representing over 90% of the total primary energy supply.[795] With the discovery of natural gas reserves, the country has focused investment on development of large-scale natural gas power plants. Natural gas production has increased by 5.3% per year on average since 2004, and has represented an increasing proportion of the country's export revenues.[796] Three new natural gas projects representing approximately 335MW of generating capacity have been implemented, with power sold to EDM. With these projects and the pipeline of new natural gas projects, the country's energy mix is shifting away from its dependence on hydropower and Cahora Bassa. The government has also started to recognize the importance and benefits that renewable energy can offer to meeting the electricity demands of rural areas where off-grid renewable energy projects and distributed energy systems will be critical to closing the electrification gap.

Mozambique is ideal for renewable energy generation, particularly solar, given the country's high potential on solar radiation. As of 2017, 15MW of solar capacity had been installed. More recently, 41MW from two photovoltaic power plants are underway, one PV power plant in Mocuba, and another in Metoro. In terms of other renewable energy sources, wind generation is being considered and viability studies are being conducted for windfarm sites in Namaacha, Manhica, and Cahora Bassa – representing a total potential capacity of 90MW.[797] According to the FUNAE published resource, ATLAS, the total overall potential for renewable resources is 23,026GW – the vast majority of it attributed to solar potential. The ATLAS also includes 189 potential locations for grid-connected renewable energy power plants.[798] Mozambique's manufacturing and infrastructure sectors are also capital intensive where increased private investment is needed. De-risking private sector investment to support green industrialization would build sustainable economic structural transformation and generate more employment while also meeting climate change goals.

Complications & Opportunities in the Energy Sector

Although Mozambique has made progress in recent years towards improving the legal and operating environment for new energy projects, a number of challenges remain in the market that impact participation of the private sector. The following complications impact private developers and across a range of energy projects under consideration.

- **Weak Offtaker** – EDM serves as the sole off-taker for all generation projects and has a broad role that monopolizes the energy sector in Mozambique. The electricity utility's weak financial state has implications for the sector that include:
  - Lack of financial capacity to maintain and upgrade the transmission lines;
  - Poor credit history and dominance as a power off-taker results in difficulties for project developers to access financing (debt and equity capital); and notably
  - Insufficient capacity of the government to implement development plans for the grid connection of new renewable energy projects.

- **Access to Finance and Cost of Financing** – From the perspective of project developers, access to finance at affordable rates from local financial institutions is a significant challenge. Part of the issue is linked to EDM's monopoly as the only power off-taker, but other factors contribute to the high cost of financing. These factors include a lack of capacity within local banks to assess renewable energy projects and related risk, as well as a lack of incentive for banks to take risk given the attractive rates of return offered by government-backed securities.

  In spite of the various international donor backed programs that have been implemented to stimulate renewable energy project development, local private developers face difficulties in meeting either the requirement for co-financing to access grant funding or the need to have secured early stage capital from

795 https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/mozambique
796 https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/mozambique
797 https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/mozambique
798 https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/mozambique

other sources to participate in challenge fund designed programs. In many cases, it is the larger international players that benefit from these grant programs and results-based financing mechanisms as opposed to local developers (the difficulties associated with the repatriation of funds to be discussed later in this report).

With relatively high cost of funds, project developers are unable to structure commercially sustainable projects. They also face the risk that as tariffs are increased, these higher costs will be passed down to the electricity end-user. The flip-side to this scenario is that the national tariff rates remain relatively stagnant, which further prohibits private developers from pursuing smaller scale projects that are cost prohibitive to develop because of their size.

Local banks require interest rates as high as 30% per annum and only give tenors that are considered to be too short for mini-grid projects. Typical loan tenors are up to five years, but given the market dynamics for mini-grid systems, private financing of up to ten years is needed.

- **Currency Terms and Convertibility** – Mozambique has historically had strict laws around the repatriation of funds, which has made it complex for international actors to participate in business activities in the country. However, recent changes to the law in 2018 appear to have facilitated greater flexibility and less bureaucracy.[799] Despite the positive change, it is advised to monitor these regulations closely, as they could have negative effects on international interest in the market.

  Private developers continue to seek to negotiate PPA terms in hard currency, but recent changes have either been adopted or are in the midst of being adopted that would allow EDM to convert all future contract obligations to Metical. Given the complexities that accompany this type of change, it is suggested that more research into this matter be conducted to better understand the market implications.

- **Grid Infrastructure** – Mozambique's national grid is divided into three separate sub-grids, which do not interconnect or connect the country's largest power generation source – the Cahora Bassa hydro plant – to main consumption centers. With the recently announced 560 km transmission line project, supported by the Islamic Development Bank and others, Maputo will be connected to Tete Province through the construction of the Temane-Maputo power line.[800] Announced in July of 2019, the scale of this project represents an important step to improving and expanding the national grid infrastructure.

  However, beyond this initiative is a deeper requirement to upgrade existing transmission and distribution lines to reduce losses and facilitate the connection of new generation capacity, including the integration of renewable energy. Funding for projects that focus on maintenance and upgrades of the existing grid infrastructure have been limited and are beyond the capacity of EDM's own financial resources. Hence, there is an opportunity for either grant funding or concessionary financing structures to be designed to specifically focus on these areas.

- **Regulatory Environment and Framework** – Regarding mini-grids, Mozambique lacks a clear regulatory framework and policies to provide private sector stakeholders the assurance needed to pursue new projects. Although the energy law has continued to evolve, challenges still exist especially as related to government-issued concession contracts, issues of currency (in)convertibility, and the inability or absence of much-needed government guarantees.[801] Furthermore, current procedures for securing concessions and licensing for renewable energy projects are complicated and administratively burdensome.[802]

  Although reforms to the Electricity Law are expected to simplify current concession and licensing mechanisms, the adoption and implementation of these proposed changes have not yet taken place.[803]

- **Tariff Regime** – As affordability of electricity in Mozambique is of critical importance, tariffs for grid

799 https://www.pwc.co.za/en/assets/document/exchange-control-alert--revision-to-the-exchange-control-regulation.pdf
800 https://constructionreviewonline.com/2019/07/mozambique-to-receive-us-99-7m-for-temane-maputo-power-line-project/
801 https://www.dlapiper.com/en/europe/insights/publications/2019/11/africa-connected-issue-3/renewable-energy-in-mozambique/
802 https://www.dlapiper.com/en/europe/insights/publications/2019/11/africa-connected-issue-3/renewable-energy-in-mozambique/
803 https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/mozambique

connected power have not been cost reflective. This is driven by the fact that the vast majority of end-consumers have a very low ability to pay. In addition, EDM's monopoly makes it difficult to negotiate market related tariffs needed to achieve commercial viability.[804]

For mini-grids, the historical issue with tariffs has revolved around the lack of a legal framework for the regulation of tariffs for off-grid customers. For rural electrification, this is exacerbated by the absence of a legal basis for application of the approved public-private partnership laws.[805] Although MIREME received assistance to design a legal framework for mini grids in the country, the draft outline of regulation remains un-adopted. These problems have significantly undermined interest in rural electrification projects.

The GET-FiT Programme, as mentioned earlier, is an initiative launched with the support of KfW Development Bank to expedite the development of smaller renewable energy generation projects by: (i) supplying tariff viability gap funding, (ii) providing targeted technical assistance, (iii) providing risk mitigation against off-taker risk, and (iv) supporting renewable grid integration support. When KfW first considered replicating its GET-FiT model in Mozambique, the initiative was originally complemented by Mozambique's MIREME Renewable Energy Feed-in Tariff (REFiT). However, the feed-in tariff was only made available for a period of three years and administrative procedures were never approved so investment flows never materialized.

In 2019, the REFiT and GET-FiT program concepts were essentially merged. GET-FiT is supporting viability studies for 130MW of renewable energy projects, namely photovoltaic projects with storage and small hydroelectric power plants, with potential for wind and biomass projects to be considered later in the program's life.[806] With grant funding of only 25 million EUR,[807] there is still a significant opportunity for new programs to complement this initiative.

- **Concession and Land titles** – The ability of energy projects to gain title for land use is a critical issue in Mozambique for developers and financiers. While all land in the country is owned by the state and cannot be sold or encumbered, land use can be granted to private persons and entities under the Direito do Uso e Aproveitamento da Terra (DUAT) system. Land concessions in Mozambique are limited to 50 years for hydropower projects and to 25 years for all other technologies.[808]

  Several international organizations are already involved in supporting modification of the existing laws that govern land issues around the development of energy projects. There is potential that the last round of Electricity Law reforms may simplify these constraints.

Potential Interventions for the Energy Sector

- **Project Preparation Facility** – Despite progress in the energy sector, there is still a lack of capacity across key stakeholders to grow the renewable energy market. Many local financiers lack risk assessment experience in the renewable energy sector. These financiers are also disincentivized to lend to this sector given more favorable investment alternatives that have lower perceived risk. With these financing limitations impacting even later stage projects, there is a market need for early-stage project financing solutions, including support for pre-feasibility studies, project design, etc. Stakeholders noted that access to alternative, flexible, and concessionally priced financial products is also needed to support projects reaching "bankability." Technical assistance and capacity building is also required by other stakeholder groups including government actors, and within financial institutions.

  Leveraging the work and researching the successes of the PROLER program is recommended. There may be an opportunity to expand an existing program such as PROLER, as opposed to starting a new initiative from scratch.

- **Capacity Building Programs** – Regulatory and policy reforms across the energy sector have helped improve the operating environment for private sector actors. However, there are still challenges related to legal aspects of renewable energy projects, such as the lack

804 https://www.dlapiper.com/en/europe/insights/publications/2019/11/africa-connected-issue-3/renewable-energy-in-mozambique/
805 http://www.euei-pdf.org/en/recp/policy-advisory/mini-grid-legal-support-to-mireme
806 https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/mozambique
807 https://www.getfit-moz.org/news/another-important-milestone-achieved-by-get-fit-programme-in-mozambique
808 https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/mozambique

of clarity on regulation within the mini-grid sub-sector. NCCF funding could be used to provide support to key government agencies such as MIREME and ARENE. Given limited resources, grant funding is considered an appropriate tool to ensure that next iterations of tariff structures and regulations are conducive to greater private sector participation.

Similarly, NCCF funding could be directed to the provision of technical assistance and capacity building to support EDM, as it remains under resourced. Grant funding is also needed by local financial institutions to provide training on technical capacity for analyzing renewable energy projects. Although technical support has accompanied a few of the existing programs, such as KfW's green credit line to BCI, there is still an opportunity to strengthen knowledge around different sizes of projects and across the various renewable energy technologies.

- **Guarantees** – Given the weak financial position of EDM, government guarantees are sought by project developers and financiers. For international stakeholders, in addition to a government guarantee, further credit enhancements from internationally credit worthy counterparties is also required. According to some literature, lenders may require a guarantee from an A+ rated counterparty; Mozambique's sovereign rating for foreign currency is CCC.[809, 810]

- **Sources of Concessionary Capital** – Without intervention from the government or support from international financial institutions, the flow of capital from local banks to renewable energy projects will likely remain limited. Even with programs such as the BCI green credit line structure from KfW, there is still a sizeable gap for access to affordable financing with adequate tenors. Given the nascency of the renewable energy sector and particularly of the mini-grid space in Mozambique, financing that is affordable, flexible in terms, and patient in nature is considered crucial.

  The KfW BCI green credit line has remained underutilized. Stakeholders have noted issues with the complexity of satisfying the eligibility criteria, and that pricing is still relatively high with inflexible terms. Although the pricing of around 15% per annum is more favorable than some of the other market pricing quoted, i.e. up to 30% per annum, this is still too expensive for certain projects, especially those projects that are smaller in scale or those that target rural electrification. The tenor of the underlying loans is up to five years, which in certain cases is not adequate for renewable energy projects given the low tariff rates.

Potential Host Institutions or Partners for the Energy Sector

Within Mozambique several stakeholders have been identified as strong potential host institutions or partners for a new green catalytic finance facility or NCCF. The energy sector is going through significant change and in some areas a complete overhaul. As a result, it is recommended to work through existing organizations and ministries involved in the sector is a strong bet for mobilizing kry stakeholders and leveraging existing capabilities.

- Fundo Nacional de Desenvolvimento Sustentável (FNDS)
- EDM
- Fundo Nacional de Energia (FUNAE)

- **Fundo Nacional de Desenvolvimento Sustentável (FNDS)** – The National Sustainable Development Fund has served as a key implementation intermediary for projects in the energy sector. FNDS requires additional capacity building and support but is considered to be a good potential host given the ministries that govern the agency and the fact that its mandate allows it to retain financial autonomy.

- **EDM** – Given the utility's monopoly over the national grid, EDM is a critical partner for all energy sector initiatives. The organization requires a significant technical assistance and capacity building especially as it relates to renewable energy. However, the organization has already been structured to facilitate the ramp up of renewable energy projects.

- **Fundo Nacional de Energia (FUNAE)** – As a public institution with a mandate to promote rural electrification and access to modern energy services, FUNAE is a key actor in promoting the adoption of renewable energy technologies. The agency has had several successes in implementing renewable energy projects that have improved social services. With

809 https://www.dlapiper.com/en/europe/insights/publications/2019/11/africa-connected-issue-3/renewable-energy-in-mozambique/

810 https://www.fitchratings.com/research/sovereigns/fitch-affirms-mozambique-at-ccc-09-07-2020

established knowledge of rural and remote areas, combined with the existing in-house capacity and technical knowledge on renewable energy projects, FUNAE could serve as either a host institution or as an implementing partner.

Agriculture and Climate Smart Agriculture as a Priority Sector

The agriculture sector in Mozambique is dominated by smallholder farmers and remains informal as a sector. Food security in Mozambique is a serious concern for the government, especially after several natural disasters increased the risk of food insecurity, notably Cyclones Idai and Kenneth in 2019. In addition to the government's interest in food security, there is also a focus on livelihoods and employment in rural areas.

The country's interest in ensuring that the economy is climate resilient is highly relevant to the agriculture sector. Rainfall in Mozambique has remained sporadic and the scope of irrigation is limited. Average rainfall has continued to decline by approximately 3.1% per decade and over the same timeframe the country has experienced rising temperatures along with periods of heavier rainfall and severe flooding.[811] Weather patterns and rain volatility are further impacted by the cycle of El Nino, which in 2016 led to severe droughts across the country.[812]

The absence of a government agenda has hindered climate smart agricultural practices from gaining traction and receiving adequate attention given the climate related challenges that are faced by the country. While some CSA measures are being applied, these have mainly focused on low-input and cost-effective practices.[813]

According to a World Bank report, the two main greenhouse gas emitters in agriculture are livestock production and savannah burning.[814] To mitigate these sources of GHG emissions, practices such as improved livestock and pastures management could help significantly. Beyond this, there is an opportunity to support adoption of new technologies that enhance farm productivity, such as solar powered water pumps or efficient drip irrigation systems.

To date there has been limited focus from small-scale farmers for adoption of CSA practices due to low access to knowledge, technology, and appropriate financing mechanisms and products.[815] The agriculture sector has also been slow to explore CSA investments because of limited examples of demonstrated benefits for livelihoods, socio-economic improvements, and the environment.

As the agriculture sector remains in nascent stages of growth, it is well positioned to benefit from the support of international development organizations and ODA, who can help build the policies and agenda needed to spur adoption of CSA practices. Given the limited attention and knowledge in-country on CSA, future investment and focus will remain low without external intervention and grant funded programs.

Complications & Opportunities in the Agriculture Sector

The sector remains challenged for the reasons highlighted above, but there are also various opportunities to address market barriers, particularly if these interventions are undertaken early. The fact that CSA is in early stages, would allow Mozambique to benefit from existing CSA experience and practice in other countries and regions. Some of the key constraints that have been identified through stakeholder interviews and literature review are discussed below:

- **Access to Finance** – Agricultural inputs for CSA typically have high associated costs. This is particularly true for technology inputs such as efficient irrigation systems or renewable energy powered equipment. In Mozambique, smallholder farmers have limited access to financial services, credit, and insurance products to transition to new farming practices while managing the downside risk associated with transition periods and financing.

  Financial inclusion, especially in the rural areas of the country, has been supported by initiatives such as Mozambique's One District, One Bank project, with funding from the Ministry of Culture and Tourism and FNDS.[816] This project is an important first step toward

811 https://climateknowledgeportal.worldbank.org/country/mozambique/climate-data-historical
812 https://allafrica.com/stories/201812310213.html
813 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf
814 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf
815 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf
816 https://macauhub.com.mo/2019/02/15/pt-governo-de-mocambique-quer-chegar-ao-final-de-2019-com-uma-agencia-bancaria-em-cada-distrito/

ensuring that remote areas have access to banking services as well as credit. However, this 2019 initiative is likely to be negatively impacted by the global pandemic and will require additional support to ensure that product development is aligned with market needs.

- **Limited Market Benefits of CSA** – As the agriculture sector in Mozambique is fairly informal and the government has not yet built an enabling environment through its development agenda, the lack of a track record highlighting the benefits of CSA practices has been a constraint for the sector. This lack of demonstrated market benefits has slowed scaling of CSA by both farmers and private sector investors. The limited technical knowledge and low access to technologies have dissuaded local financial institutions from extending credit to the CSA sector. This also exacerbates the underlying capacity of banks to understand the risk of agricultural projects.

- **Lack of Pipeline of Bankable Projects** – There is a clear role for the private sector to play in the agriculture sector, but a key constraint to overcome is the risk appetite for local banks. Given the limited traction of CSA in the market, an initial focus should be placed on incentivizing banks to finance pilot projects. Partially funded through grants or credit lines, these pilot projects can help the sector develop and prime the banking sector to scale up their own capacity. Although there is a lack of bankable projects today, this scenario can be overcome with financing structures that limit risks associated with early stage projects. New technologies and business models can be tested at a smaller scale and then expanded and replicated as appropriate.

- **Financial Product Design and Insurance** – Similar to what has been noted for other countries in this report, investment in CSA is considered to be cost prohibitive in Mozambique. There are high upfront costs associated with transition, while the transition periods themselves create uncertainty for farmer incomes. Given the high levels of perceived risk in the agricultural sector overall, the lack of investment is unlikely to change without innovative solutions and a review of the existing financial products and insurance products. Agricultural climate risk insurance and concessionary capital terms for small-holder farmers are two primary areas where further research needs to be done. Financial products should be structured to have cash flow-based repayment schedules, especially given the changing climate's impact on farming production and yield.

Potential Interventions for the Climate Smart Agriculture Sector

- **Technical Assistance and Capacity Building** – Technical and capacity building is needed at the government level to support the creation of clear development plans, targets and direction for the sustainable growth of the agricultural sector. Policies and institutional frameworks need to be structured and incentives may have to be used to encourage private sector participation. The private sector's role includes financing of projects, and development of the range of new climate smart technologies that are appropriate for Mozambique.

- **Enabling Environment through Policy and Planning** – Potential interventions to support a growth path for CSA practices include funding for policy development, creation of more robust development plans that integrate incentives for transition, and support for pilot projects to test new technologies and business models. In addition, the World Bank's CSA report on Mozambique highlighted the lack of extension services available to farmers, which are important channels for knowledge exchange and training. Grant funding through a NCCF for extension services would support adoption of new technologies.

- **Concessional and Early Stage Project Financing Alternatives** – Financing for early stage project development and pilot projects will likely need to come from grant funding or through blended finance vehicles that seek to leverage catalytic and concessional donor capital. It is unlikely that this early stage funding will flow from banks and local financial institutions, due to perception of risk and factors such as high overnight lending rates. As outlined earlier, there are a number of initiatives in this arena (with the largest funding support coming from the GEF), and these programs should be reviewed to identify where they can be replicated and amplified. Given the fact that Mozambique's natural

environment is so varied, it is likely that unique models will be needed for each region, tailored to the local environment.

- **Combined Approaches for CSA and Renewable Energy** – Lastly, there is an opportunity to merge strategies that serve both CSA and the renewable energy sectors. The objectives of a new green finance facility or NCCF can serve combined outcomes through technologies such as solar powered farm equipment, water pumps, and providing general access to electricity in rural areas through the installation of distributed energy systems.

Potential Host Institutions or Partners for the Agriculture Sector – CSA

Some of the key partners or host organizations to consider when designing a new green catalytic finance facility or NCCF include:

- FNDS
- Ministry of Agriculture and Food Security (MASA)
- Ministry of Land, Environment and Rural Development (MITADER)

Given the nascency of the CSA sub-sector and its less formalized institutional structure, it is recommended that any new programs or vehicles work through existing organizations and ministries in Mozambique.

- **FNDS** – Similar to the energy sector, FNDS represents a strong potential partner or intermediary to manage and disburse funds related to sustainable development initiatives. FNDS is an independent public body with administrative and financial autonomy and was created under the sectorial tutelage of MITADER and under the financial tutelage of the Ministry of Economy and Finance. The organization's mandate facilitates its authority to mobilize and manage financial resources (including international funding) to be "used for sustainable development policies and to promote and support such policies through projects and programs linked to improved environmental management, climate change mitigation, the sustainable management of forests, biodiversity conservation and land planning."[817] The FNDS is already involved in land use related projects, including a REDD+ initiative which is being carried out in coordination with the Ministry of Land, Environment and Rural Development.

- **Ministries (MASA & MITADER)** – Other key partners focused on CSA adoption planning include several government ministries including the Ministry of Agriculture and Food Security (MASA), the Ministry of Land, Environment and Rural Development (MITADER), Mozambique Agriculture Research Institute (IIAM), Ministry of Economy and Finance (MEF), National Council on Sustainable Development (CONDES), National Metrological Institute (INAM), National Institute of Disaster Management (INGC) and National Institute of Irrigation (INIR), among others.[818] However, the entities that should be prioritized given their existing mandates include the Ministry of Economy and Finance, MITADER, and MASA. As the National Directorate for Monitoring and Evaluation (under the Ministry of Economy and Finance) is the country's representative to the Green Climate Fund, coordination with this entity is considered crucial. MITADER and MASA are the main government ministries responsible for rural development and agriculture, and both have already integrated CSA related investments into their programming.[819]

In terms of the private sector, partnering with financial institutions that are involved in the One District, One Bank project (such as Millennium BIM) will help improve access to financial services and products, given the focus on increasing banks' footprint to better serve remote areas.

III. CONCLUSION

Both a catalytic green finance facility and a NCCF could prove useful for Mozambique. With current market dynamics, a catalytic green finance facility seems most appropriate for the clean energy sector to address the financing challenges for both grid connected and off-grid solutions. Off-grid areas will still need additional support to improve the operating environment, but given the progress made to date, the need for a green finance facility to accelerate such progress is imminent.

817 https://www.forestcarbonpartnership.org/system/files/documents/Mozambique_Revised%20ERPD_16April2018_CLEAN.pdf
818 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf
819 https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Mozambique.pdf

Grant funding through a NCCF is applicable to both the energy and agriculture sectors. Within energy, grant funding will be helpful for the poorest regions or districts across the country where the tariff gap to develop commercially viable projects is largest. For the agriculture sector (with a specific focus on the adoption of CSA practices), grant funding should be the primary tool used to develop the sector from the ground up. The few programs that have been implemented to date provide a good base from which to launch complementary initiatives, but the amounts of grant funding that have been directed to this area remain relatively small in scale.

In summary, Mozambique is in much earlier stages of growth in both the energy and agriculture sectors relative to other countries discussed in this report. As such, the focus should be on incubating new models and addressing risks that are common to early stage projects. Mozambique also faces key challenges related to mobilizing domestic and international financing for infrastructure and related capacity constraints as required to effectively implement such projects. Some of the key constraints that can be addressed through the establishment of a catalytic green finance facility and NCCF include:

- Injection of concessional capital to reduce the cost of funding for local banks;
- Provision of technical assistance and capacity building for renewable energy projects (grid connected and off-grid), and to develop more technical knowledge of sustainable farming practices including the adoption of CSA;
- Support for risk mitigation mechanisms, such as guarantee structures, that can stimulate private sector participation; and to
- Establish a project preparation facility to support early stage projects and small local developers to scale to a size that is commercially bankable.

7 | Overview of process to design, form, capitalize and launch Green Banks alongside National Climate Change Funds

The core elements and considerations involved in Green Bank and NCCF design are summarized below. It is important to note, however, that effective Green Bank formation needs to reflect a *country-driven approach* specific to market conditions and the needs and requirements of local host organizations, partners and capital sources. There is no one-size-fits-all approach to Green Bank formation.

1) Political Champion & Host Institution

A Green Bank and/or related NCCF effort must be based on some level of national interest from relevant energy, environment or finance agencies and/or the associated political leadership. It is critical that a high-level national or institutional champion be established early in the process to provide legitimacy, traction with other key stakeholders, and with sources of public and private capitalization. This process then needs to identify an effective host organization that is fully committed to the mission of the Green Bank and has the organizational capacity to form, launch, implement and sustain the Green Bank mandate and operations over time.

The essential characteristics of a Green Bank or NCCF host organization include the following as noted below. The Green Bank can be placed in a new purpose-built entity through a variety of structures or it can be placed within an existing "host" institution that has a consistent mission alongside the financial and market capacity to achieve the desired outcomes of the Green Bank.

It is important to note that, based on the requirements often associated with prospective Green Bank capitalization, it is often necessary to work through an existing institution rather than through a newly formed structure. While a purpose-built Green Bank entity can be more precisely designed to meet and implement the desired mission and mandate, capital sources are generally uncomfortable with the risk associated with placing loans in a new or "greenfield" institution with no financial track record, established balance sheet, or management team in place. And, it is difficult, if not impossible, to hire a management team to help provide needed investor confidence in advance of full Green Bank capitalization.

The essential characteristics of a Green Bank host institution or new stand-alone entity include the following:

- ➜ The host institution/Green Bank entity must be aligned with the Green Bank's mandate, mission and objectives, including a gender-responsive approach
- ➜ The host institution/Green Bank entity must have strong buy-in and championship for the Green Bank at the highest levels of institutional leadership
- ➜ The host institution/Green Bank entity must have (or be willing to create) the necessary financing capacity that is specifically aligned with relevant green climate and sustainable development sectors.
- ➜ The host institution/Green Bank entity must have a suitable Public-Private Partnership type of structure capable of using a mix of public and private funding to leverage and co-invest with commercial partners at the project level
- ➜ The host institution/Green Bank entity must be able to receive capitalization from various type of investment partners including debt, equity, and guarantees from development partners, climate funds, sovereign funds, and private and/or commercial capital.
- ➜ The host institution/Green Bank entity needs to be able to work within any existing sovereign debt constraints
- ➜ The host institution/Green Bank entity requires political and economic stability, and must have a low or no incidence of corruption, and allow the Green Bank/ NCCF to be protected from political interferrence
- ➜ The host institution/Green Bank entity must create or put in place all necessary legal structures

➜ The host institution/Green Bank entity must be able to offer affordable financing (after pricing in administrative costs, risk premium, currency hedging, etc.)

Green Banks and/or NCCFs Through a New or Existing Institution?

Should a Green Bank be created through a new purpose-built entity or within an existing "host" institution?

- A new purpose-built Green Bank (as a public entity, private corporation or a public-private partnership) can be precisely designed to meet and implement a focused mission and mandate. However, capital sources can be uncomfortable with the risk associated with placing loans in a new or "greenfield" institution with no financial track record, established balance sheet, or management team in place.
- Creating a Green Bank through an existing institution can be effective and more achievable in terms of attracting capital and implementing operations based on an existing financial track record, established balance sheet, and management team. It is critical, however, that Green Banks created on this model have a focused mandate in line with Green Bank objectives and the requirements of capitalization sources.

2) Project Pipeline & Market Gaps

Identifying the existence of specific market gaps that are relevant to bringing green, inclusive and climate related investment to scale is an essential first step towards Green Bank development. Market gaps must be clear across a range of stakeholders for Green Bank investment demand to develop. If there are no obvious shortcomings in the way green and low-carbon markets currently operate and scale, it is hard to justify the creation of a dedicated finance entity and research and discussion with key stakeholders is required to determine how a Green Bank can add value to scaling green and climate related investment in any given country or market.

In addition to noting market gaps, Green Bank development requires identification of specific investment opportunities, priority sectors for Green Bank investment, and a potential pipeline of projects within those market sectors that is also gender-inclusive. The size, sectors and specifics of this projected project pipeline are critical to securing capitalization from potential Green Bank investors and creating the financial model for initial operation of the Green Bank. A detailed prospective project pipeline analysis should be based on examining the current green and climate related market size, and market potential in the context of existing policies, programs, national plans and institutions. It also involves a focused interview process to identify the specific market barriers across market participants.

The requirements for determining market gaps and an adequate project pipeline include the following:

➜ Priority green and climate related sectors that can be brought to scale through financial interventions that address specific market gaps must be clearly identified
➜ An adequate and inclusive project pipeline must be identified for projects that are consistent with the Green Bank mandate, mission and objectives, and these projects must be bankable and or commercially viable with relevant credit enhancements
➜ Local or regional commercial banks must express interest and capacity to participate in co-financing projects in priority sectors and in the initial pipeline with the addition of credit enhancements by the Green Bank
➜ There must be an adequate level of project flow from developers who are seeking local currency financing for bankable projects
➜ A sufficiently strong and durable "enabling environment" is required for initial priority sectors (e.g. clear regulatory schemes, existence of complementary grants to bring down prices, etc.)
➜ The project pipeline must be in sectors where there is clear and sufficient market demand

3) Capitalization

Identifying and engaging sources of public and private capitalization including equity, debt and concessional finance is critical for Green Bank creation. Significant sources of Green Bank capitalization include funds from domestic sources and development partners. Potential sources of capitalization funds include:

- Climate funds such as the GCF, GIF, others
- Development partners
- Domestic co-investors
  - National development banks
  - Sovereign wealth funds
  - Pension funds
  - other appropriate initiatives or funds
- Philanthropy
- Diaspora and high net worth individuals

Capital requirements usually begin with an assessment of:

1. Mission and mandate and whether the Green Bank is a match with investor or sponsor goals,
2. The structure of the Green Bank so it fits targeted investor investment criteria, and
3. An assessment of risk by potential Green Bank investors or sponsors, taking into account key factors such as a Green Bank and/or host institution's financial track record, established balance sheet, green investment capacity and experience, and management team.

The pathway that funds must take to land in a Green Bank is also an important structural factor to take into account. If funds must flow through the government, then Ministry of Finance support and sovereign debt limits come into play. If funds are sought from the Green Climate Fund, then a partnership with a GCF Accredited Entity must be created that is aligned with the proposed Green Bank structure and can fit within country headroom and exposure limit for that partner institution. If domestically sourced funds are engaged, their requirements need to be matched to the Green Bank structure. In all cases, specific sources of capital can only flow to specific types of legal structure (public, private, or PPP type) and must be aligned with the Green Bank mission and mandate and also with the nature of the project pipeline across the identified priority sectors.

The requirements for Green Bank capitalization include the following:

- ➜ Capital must be consistent with the Green Bank and/or host institution mandates and mission
- ➜ Capitalization partners must be comfortable with the Green Bank or host institution in terms of risk assessment, investment mandate, and institutional capacity
- ➜ Capital must be provided on terms that will allow financial products to be effective and affordable. This often – almost always – requires a blended finance approach in addition to a mix of FX and local currency funding
- ➜ To be sustainable over time, future capitalization prospects should be identified from diverse sources that allow for the viable and continued operation of the Green Bank.
- ➜ Capital needs to either be provided in local currency or an affordable hedging option needs to be available that is consistent with affordable pricing by the Green Bank

4) Market-Fit Financial Products

Green Bank formation includes the design of innovative financing solutions that can address market gaps and support opportunities to scale up targeted green and climate related sectors. Green Bank product offerings must be based on identified market needs, capabilities and challenges and on a thorough review of low-carbon markets and associated project pipeline across priority sectors (such as renewable energy, smart agriculture, biomass, water & sanitation, clean transportation, and green urbanization). This process must identify the challenges faced by the local financial market to support green projects in order to determine viable, tailored and sustainable financing solutions that can be implemented by a Green Bank. Green Bank product offerings can also draw from Green Bank best practice as established around the world.[820]

Overall, a Green Bank's innovative financing solutions should be designed to support the development of green projects while building local green finance capacity. Product offerings have four key objectives: i) help green projects overcome challenges and open new financing opportunities, ii) crowd in private investment with a particular focus on mobilizing domestic resources, iii) increase adoption of green technologies, and iv) build overall green financing capacity across the target market.

There are five key principles that generally guide financial product development for Green Banks

- **Additionality:** does the product address key market challenges identified in the market, including filling gaps in sectors where projects struggle to access affordable financing?

820 http://coalitionforgreencapital.com/wp-content/uploads/2017/07/Green-Banks-in-Emerging-Markets.pdf

- **Impact:** will the product help achieve the Green Bank mandate while creating a measurable impact in the market (both climate & development)?
- **Ease of implementation:** will it be feasible to implement considering the Green Bank host institutional status and the country's financial market needs and availability of skills?
- **Leverage:** will the product be able to leverage and engage private commercial investments at the project level, or via demonstration effect?
- **Best practice:** lessons learned from Green Banks implementation around the world. Green Banks increase investment, and act as innovators in their local markets to mitigate risks through financial solutions that can be replicated by other market actors.

Finally, the Green Bank must identify the market delivery mechanism, or go-to-market channel through which products will be deployed.

Based on these considerations, the requirements for Green Bank financial products include the following:

➜ A suite of initial catalytic financial products with "product-market fit" specifically tailored to support the near-term priority project pipeline across relevant sectors

➜ Institutional and staff capacity to develop additional market-fit financial products and pivots to address financing needs for emerging project pipeline across relevant sectors as they develop

➜ An initial and evolving suite of financial products that meet the five criteria (as noted above) that are essential components of Green Bank purpose and mandate:

- Additionality
- Impact
- Ease of Implementation
- Leverage
- Best Practice

5) Alignment with National Goals and Targets

Green Bank formation must be based in an assessment and understanding of all relevant national policy and planning goals for green and related low-carbon and sustainable development sectors (with an inclusive focus). A clear picture of existing national goals and related targets for specific sectors is required to determine if government priorities can be served by a Green Bank and to identify priority sectors and related investment needs. A country's policy and enabling environment across relevant sectors and Government agencies is also a key consideration for Green Bank development.

An assessment of national goals, plans, policies and targets will lead to identification of the following essential factors:

- Sectors aligned with national green growth objectives
- Technologies that are priorities given local needs and market conditions
- Sectors that are likely to have growing market demand and a pipeline of commercial or "near-commercial" bankable projects with ability for private co-finance to be catalyzed
- Sectors with clear regulatory frameworks and supporting environment (including clear market rules and frameworks, and the availability of project preparation support and supplemental grants where necessary.

Based on these considerations, Green Bank alignment with national goals, plans policies and targets can be assessed through the following indicators:

➜ Green Bank alignment with NDCs and national climate goals

➜ Green Bank alignment with relevant Sustainable Development Goals

➜ Green Bank alignment with other relevant national plans and targets across priority sectors

➜ Green Bank alignment or complementarity to existing grant or finance programs designed to advance national plans and targets

➜ Green Bank alignment with sectors with clear regulatory frameworks and effective enabling environment

6) Project Preparation & Grant Capacity

Any Green Bank requires a robust capacity to develop the flow of bankable projects across target sectors, and to sustain that flow of projects over time. In addition to market-fit financial products, a Green Bank generally needs to be formed with or alongside a Project Preparation Facility (PPF), that provides reimbursable and non-reimbursable grants to support early-stage project development and potentially, direct funding to eligible projects. An NCCF or Green Fund is often the most appropriate way to create an effective PPF and related grants facility to compliment the financing activities of a Green Bank. A NCCF can be created as a new stand-alone institution or within an existing agency or country-based institution. The purpose of a PPF can be focused on to helping projects transition "from feasibility to bankability" and assist projects to secure commercial finance through the Green Bank's lending arm. Where a Green Bank provides PPF grant funding, it is generally intended to serve a "catalytic" role at an early stage for transactions that may otherwise be too risky or complex to pursue. Project preparation grants are intended to support feasibility and technical studies, legal contract development and other activities that contribute toward a specific project's viability. As consistent with a Green Banks mission and mandate, PPF support should prioritize early-stage, high-impact, innovative projects and businesses that have a high probability of successful completion based on developer track record and sound business plans.

The PPF itself can be implemented through a variety of structures. It can be integral to the Green Bank as a whole, created alongside through a coordinated partner institution, or be placed in an adjacent unit of the Green Bank host institution. In any case, close coordination between the PPF and the credit side of a Green Bank is essential to ensure that the PPF invests in projects that can move successfully to bankability and Green Bank investment. It is also critical to develop a long-term sustainability plan for the PPF as a grants-based facility.

The PPF requires a clear list of project eligibility criteria that are aligned with those of the overall Green Bank and its investment guidelines. These eligibility criteria should include: definition of eligible green project types, eligible project size, demonstrated potential for mobilizing private investment, that the project is a proof-of-concept (first time that the project has been done), and an indication that a project faces difficulty in securing access finance, etc.

Green Bank PPF's generally focus on funding activities in the following primary areas:

- Technical and Feasibility Studies providing project analysis, design and studies to appropriately structure financing.
- Grants to reduce project cost and increase bankability particularly for those that are "first-of-a-kind" and have significant proof-of-concept, or "demonstration effects" for the market.
- Grants to mitigate financial risk and facilitate co-financing from commercial banks. For example, grants provided as partial cash collateral to projects where excessive collateral is required by commercial banks.

Based on these considerations, a Green Bank Project Preparation Facility should exist and be designed to serve the following functions:

➜ The PPF should be designed to bring potential projects from feasibility to bankability/repeatability
➜ The PPF should have a grant program to work alongside financing programs to support project preparation, technical feasibility studies, and to provide grants as needed to make projects financeable

7) Market Outreach Strategy

The impact of any Green Bank is closely related to its market outreach capacity and ability to build a robust and diverse project pipeline across all target sectors. To effectively expand market reach beyond business-as-usual, a Green Bank requires a targeted marketing and communications strategy designed to support its mandate and investment objectives. This outreach strategy also needs to be dynamic – tailored to the initial phase of launching the new Green Bank and then evolve to support the continued operations of the Green Bank over time as markets change and grow. To this end, the market outreach strategy should be reviewed by on an annual basis to keep pace with target markets and pipeline development.

Key objectives of a market strategy should include:

1. Support for building near term/longer term project pipeline
2. Market outreach to inform product offerings

3. Green Bank visibility and communicating impacts and results in support of future capitalization and pipeline development
4. Build knowledge and capacity for green lending with public and private market actors, including project sponsors and co-financiers
5. Gender-inclusive market outreach and project development

Market outreach program components should include several elements including: (1) staffing to support direct interaction with market participants; (2) branding to support visibility and understanding of the Green Bank and specific programs; and (3) web presence to support visibility and market engagement.

Based on these considerations, a Green Bank initiative must include the following core elements:

➜ Green Banks require a market-specific outreach strategy designed to engage private sector co-investors, develop the pipeline of potential CFF projects, and expand future capitalization

8) Start-up Funding, Staffing & Plan for Sustainability

A Green Bank requires sufficient funds to establish the initial leadership team, create and implement a marketing strategy, develop operational financial products, establish the deal origination and review teams, and conduct all monitoring, verification and reporting procedures. As it requires a period of time to bring deal flow to self-sustaining income levels, start-up funding requirements include several years (depending on market dynamics and pipeline development) of early-stage op/ex funding to cover operational costs. These start-up funds can be provided via grants to the Green Bank which are secured alongside initial capitalization, from climate funds, development partner grants or other sovereign sources.

In addition to early-stage start-up funds, Green Banks are often designed so that, in time, they become financially self-sustaining. Based on an integrated financial model, management fees and return expectations need to be designed to cover the ongoing operations of a Green Bank so it becomes a break-even operation vs. over reliance on ongoing infusion of operating funds.

Establishing the leadership team is also an essential early-stage component of Green Bank formation. Whether placed at an existing institution or structured as a new stand-alone entity, a recruitment process and/or selection of the Green Bank CEO-equivalent is essential for effective launch, team building and securing capitalization. Funding to support the recruitment process and salaries for the CEO and senior management team through the early years of operation are also necessary.

Based on these considerations, a Green Bank initiative must include start-up funding and financial plan for self-sustaining operation as follows:

➜ Early stage op/ex funding is required to support the initial period (3-5 years) of Green Bank operation including recruiting and hiring the initial leadership or technical team, create and implement a marketing strategy, develop operational financial products, establish the deal origination team, and conduct all monitoring, verification and reporting procedures.
➜ A Green Bank requires an integrated business plan and full financial model that are designed to support self-sustaining operations
➜ To support viability over the long-term, a Green Bank can also set a strategic plan for additional rounds of re-capitalization over time.
➜ Selection of a CEO/Green Bank Director with appropriate experience and leadership abilities to drive the catalytic market role of the Green Bank and establish operations is required
➜ Hiring/appointing a gender-inclusive leadership team with expertise in all relevant areas including product development and deployment, market outreach and pipeline development, project finance, deal origination, monitoring and evaluation, interface with private sector co-investors is required.

9) Monitoring, Verifying & Reporting

Green Banks require an integrated system of monitoring, evaluation and reporting to ensure financial diligence and that a Green Bank meets the requirements of its climate, SDG and related mandates. When placed at an existing host institution, these monitoring and reporting requirements need to be integrated and consistent with those of the host institution. Monitoring and evaluation procedures must also be consistent with the specific requirements of all capitalization partners to the Green Bank.

Broad monitoring and reporting requirements include the following major elements:

- Project level monitoring
- Fund level monitoring
- Project level evaluation
- Fund level evaluation

Based on these considerations, a Green Bank initiative must include a MRV program as noted:

➜ Integrated monitoring, evaluation and reporting systems to ensure both financial diligence and that the Green Bank meets the terms of its climate, SDG and related mandates.
➜ MRV requirements that satisfy the needs of Green Bank capitalization partners and co-investors
➜ MRV requirements that are integrated and consistent with those of the host institution, where applicable.

MRV procedures can be a sginficant drag on the speed and agility of Green Banks or Green bank partners – therefore any MRV approach should be designed to avoid unnecessary extras steps and onerous reporting requirements at the project level. An important goal of any green finance institution should be an MRV policy that balances the needs for transparency and accountability with its role as a dynamic financial institution that works well with the private sector.

8 | Conclusions and Recommendations

Based on the high-level overview of country-specific market dynamics, existing funding and financing programs, and market gaps and priorities provided through this multi-country scoping project, a combination of Green Banks adjacent to National Climate Change Funds have strong potential to be an effective and inclusive way to help scale private investment in support of national climate and sustainable development goals in the six study countries. A combination of catalytic climate finance facilities alongside green grant programs focused on the low-carbon and sustainable development sectors has the potential to support greater private sector participation and to more effectively mobilize support from global development partner institutions.

While specific market conditions vary, two sectors stand out as priorities across all of the study countries including ***renewable energy*** and ***climate smart agriculture***. In addition, green cities infrastructure is a potential priority sector, particularly in Tunisia. Determining the scale and nature of investment needs across these sectors would require an in-depth market analysis to identify and quantify project pipelines for each sector and in each country. This market analysis would also further inform the nature of market barriers and the specific market interventions, financial products, and related grant supports that are needed in each to unlock private investment and leverage climate investment in an inclusive approach.

Based on this initial assessment of country needs, objectives and institutional capacities, it appears that near-term Green Bank exploration alongside National Climate Change Funds would be appropriate in Ghana, Tunisia, Zambia, Uganda, and Benin. In Mozambique, it seems best to start with forming a National Climate Change Fund to provide initial grant capacity and then to potentially grow into an expanded green finance capacity. In all countries, key issues such as capitalization potential, debt sustainability and interaction with existing program and institutions will need to be addressed.

In all cases, the exploration of new potential climate finance capacity should be integrated with utilization (or expansion) of existing National Climate Change Funds as grants remain an essential complement to financing in all study countries (and in general regardless of a country's level of development). In addition, potential Green Banks in the six countries need to be integrated with an effective Project Preparation Facility (PPF), as an adequate and robust project pipeline is essential to effectively utilize any financing capacity.

The next steps towards Green Bank and National Climate Change Fund exploration and development would include the following:

1. Conduct an in-country mission to identify a lead champion for a new climate finance initiative and the intended host institution.
2. Conduct an in-depth market analysis to identify and quantify the project pipeline for a new Green Bank/ Climate Finance Facility and/or a complementary NCCF across all priority sectors and in a gender-inclusive approach.
3. Define and develop the structure for a proposed Green Bank and/or NCCF, including host (or incorporation if needed), governance and business plan
4. Define and develop the structure of the necessary project preparation facility (or the interface with an existing PPF)
5. Identify and engage with potential co-capitalization partners
6. Define the indicative structure of an AfDB loan to provide initial capitalization of the Green Bank alongside an initial loan from the Green Climate Fund.

7. Engage in the Funding Proposal process with GCF or other partners to co-capitalize a new Green Bank via the AfDBs role as an Accredited Entity
8. Eventual capitalization, formation and operationalization of the new Green Bank(s)

To advance these recommendations into action requires country-driven leadership and commitment combined with a pool of technical assistance funding to support market assessment and Green Bank/NCCF design and execution. It also required the partnership of a suitable GCF Accredited Entity – a role that naturally fits with the capacity and interest of the AfDB.

Systemic Approach

While Green Bank and NCCF formation needs to be country-driven and based on country-specific market dynamics, existing funding and financing programs, and market gaps and opportunities, there is an opportunity to support Green Bank development at scale in Africa.

The essential challenges in Green Bank formation lie in three areas:

1. Identifying the host institution and appropriate structure
2. Securing capitalization from various sources including the GCF, Climate Funds, development partners and sovereign loans and/or grants, particularly in countries that are debt constrained.
3. Securing the necessary technical assistance funding for Green Bank/NCCF design and structuring work

To date, the lack of a coordinated approach to Green Bank formation has resulted in a very time and labor intensive process to advance these steps on a country-by-country basis. Challenges have included:

- Lack of direct-access accredited entities to provide core climate-oriented loans and equity to capitalize Green Banks and NCCFs (the GCF is a valuable source of funds, but can only flow through "accredited entities").
- Elongated timelines on both technical support grants for Green Banks design and structuring and on securing capitalization.
- High global ambition to mobilize climate investment in Africa, but a lack of clarity on replicable institutional approaches – such as the Green Bank model – to bring this intention to scale.
- Lack of clarity on priority project pipelines and the specific financial interventions that could bring the green sector more quickly to scale.

Working with an umbrella local development finance institution such as AfDB, in coordination with other international development partners, presents an opportunity to coordinate across these challenges and build systemic capacity. By "bundling" several Green Bank initiatives together, into systemic multi-country initiatives could allow for better access to: (1) technical assistance support for design and structuring work; (2) coordinated and facilitated capitalization via a combined application to the Green Climate Fund through an Accredited Entity, and/or to other sources of capital from development finance institutions or other Climate Funds; and (3) development of replicable Green Bank financial products and/or NCCF grant programs designed to meet common needs in priority sectors across multiple countries with similar market challenges.

Overall, on both the individual country level, and at a systemic multi-country level, the Green Bank model, adjacent to National Climate Change Funds holds tremendous potential to build country driven capacity to advance climate investment in support of national green growth and climate objectives.

Stakeholder Interview List

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