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Green Energy Project in Africa



Making Finance Work for Africa (MFW4A)
and The Currency Exchange Fund (TCX)

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ABBREVIATIONS

AfDB	African Development Bank
ALTFI	Africa Long-Term Finance Initiative
CSP	Concentrated solar thermal power
CO ₂	Carbon Dioxide
EEP	Energy and Environmental Partnership Trust Fund
FSD	Financial Sector Deepening
GW	Gigawatt
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPP	Independent Power Producer
kWh	Kilowatt hour
kWp	Kilowatt peak
MFW4A	Making Finance Work for Africa
MW	Megawatts
NDF	Nordic Development Fund
ORE	Offshore Renewable Energy
PV	Photovoltaic
RE	Renewable Energy
REIPPP	Renewable Energy Independent Power Producer Procurement
SEFA	Sustainable Energy Fund for Africa
SDGs	Sustainable Development Goals
TCX	The Currency Exchange Fund
TWh	Terawatt hour

Making Finance Work for Africa (MFW4A) and The Currency Exchange Fund (TCX)**1. BACKGROUND**

Green energy is crucial in the energy transition due to its minimal adverse environmental impact. It provides an alternative to non-renewable energies and contributes to climate change prevention by reducing greenhouse gas emissions. Renewable Energy (RE) is thus rapidly gaining relevance as a key technology for meeting Africa's growing energy demand. Additionally, the continent must simultaneously address the urgent need to provide electricity to the hundreds of millions of people who lack it, as this is essential to stimulate economic growth and contribute to the achievement of Sustainable Development Goals. The continent's geographical diversity offers enormous potential in terms of hydroelectric, solar and wind energy, and its soil contains many minerals and rare earths necessary for clean energy technologies. Therefore, Africa has the potential to take the lead in transitioning the world's energy systems to a net zero future.

However, the main challenges in bridging green energy financing gaps are the lower rates of return of green projects that discourage private investors when compared to fossil fuels¹ as well as the currency mismatch that impede the sustainability of these projects. Electricity tariffs are frequently regulated by governments in domestic currency indexed to hard currency, and they must be kept low in order to serve as a necessary good for all households. The only source of revenue from green energy is user fees. As a result, it is less appealing to private investors. According to Financial Sector Deepening Africa (FSD Africa), Africa is one of the world's most climate-vulnerable regions, captures only 3% of sustainable investment flows, highlighting the challenge for low-income developing countries to capitalize on the green finance boom. Without the necessary skills, data, regulatory frameworks, and policies to support green finance, the continent will struggle to provide sufficient scale, quality, and returns to private investors².

In order to achieve sustainable production and consumption patterns, African countries must invest in green energy. Around 600 million people, or roughly half of the continent's population, lack access to electricity. Sub-Saharan Africa (excluding South Africa) has a per capita energy consumption of 180 Kilowatt hour (kWh), compared to 13,000 kWh in the United States and

¹ Yoshino, N., Taghizadeh-Hesary, F., & Nakahigashi, M. (2019). Modelling the social funding and spill-over tax for addressing the green energy financing gap. *ScienceDirect - Economic Modelling*, 34-41.

² FSD Africa Green Finance

6,500 kWh in Europe³. According to the World Bank, only a few countries in West and Central Africa are on track to provide access to electricity to all of their citizens by 2030, and 263 million people in the region are likely to be without electricity within the next ten years⁴. West Africa has one of the world's lowest rates of electricity access, with only about 42% of the total population and 8% of rural residents having access. Access to energy is crucial not only for the attainment of health and education outcomes, but also for reducing the cost of doing business and for unlocking economic potential and creating jobs.

This high energy demand can be met by adequate investments in green energy infrastructure that will also help to adapt to and mitigate the effects of climate change. In 2020, the International Monetary Fund (IMF) even estimated that an additional \$30 billion in climate adaptation funding is needed in sub-Saharan Africa alone.

2. GREEN ENERGY SOURCES IN AFRICA

The main sources of green energy used in Africa are hydropower and bioenergy. Historically, hydropower has been the most widely used renewable energy source in Africa. However, due to climate change, it has become highly unpredictable, with droughts sweeping across the continent. According to the International Energy Agency, hydropower generates 17% of Africa's electricity on average. This share could rise to more than 23% by 2040 as part of Africa's ongoing efforts toward clean energy transition and universal energy access. Hydropower even accounts for more than 80% of electricity generation in countries such as the Democratic Republic of Congo, Ethiopia, Lesotho, Malawi, Mozambique, Uganda, and Zambia⁵. This illustrates the importance of this source of energy for the African continent. With the deployment of adequate technology such as hydropower storage, hydropower could prove to be a means of adaptation as well as a mitigant of the effects of climate change⁶.

More recently, wind and solar power have become commercially active. While both energy sources are dependent on weather conditions, Africa's solar energy potential remains high due to the continent's location. Utility-scale conventional or concentrated photovoltaic (PV) and concentrated solar thermal power (CSP) systems, as well as small-scale PV systems suitable for off-grid power generation are all options for solar energy power generation. Solar energy can also be used to generate heat for residential and non-intensive industrial users. Solar and wind capacity increased by 13% and 11%, respectively, from 2019 to 2020, while hydropower increased by 25%⁷. According to PWC, since 2013, Africa's total installed renewable energy

³ African Development Bank. Light Up and Power Africa – A New Deal on Energy for Africa.

⁴ World Bank Blogs: Putting Africa on the path to universal electricity access. Riccardo Puliti. January 31, 2022

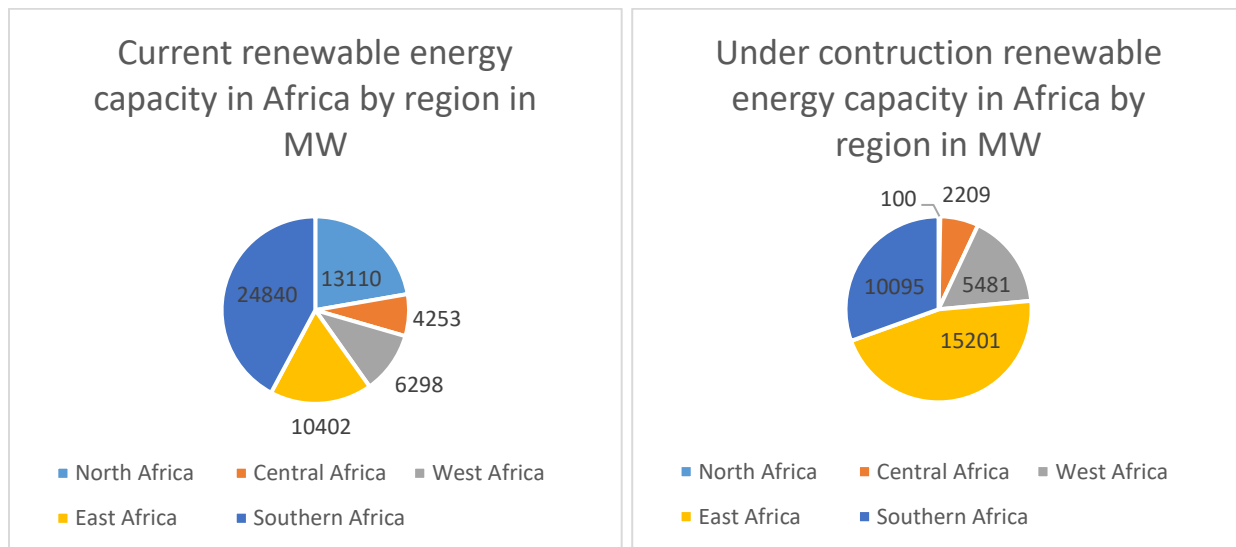
⁵ The rise of alternative energy in Africa: Geothermal power generation. podle: Lisa Dutiro, Candidate Attorney, DLA Piper Africa, Zimbabwe (Manokore Attorneys). Return to Africa Connected: Issue 3.

⁶ Berga, L. (2016). The role of hydropower in climate change mitigation and adaptation: a review. *Engineering*, 2(3), 313-318.

⁷ <https://www.weforum.org/agenda/2022/04/renewable-energy-africa-capabilities>.

capacity has increased by more than 24 Gigawatt (GW) and forecasts for 2050 predict an increase of more than 1000% in the current global renewable energy supply⁸.

Figure 1: Current and under construction renewable energy capacity in Africa by region in Megawatts (MW)



Source: ABIQ

Southern Africa and North Africa are the leaders in terms of current renewable energy capacity. However, West Africa has several projects underway in this direction, which will reach 15,201 MW in the coming years (Figure 1).

2.1 SOLAR ENERGY

Solar energy has been successfully harnessed by technologies such as solar photovoltaic (PV) which were developed to convert the sun's radiational energy into electricity. This technology has evolved over time and is now generating massive amounts of power in various African countries. The table 1 below shows solar energy capacity in select African countries in 2021.

Table 1: Solar energy capacity in Megawatts for selected African countries in 2021.

SOUTH AFRICA	6221
EGYPT	1675
MOROCCO	774
ALGERIA	448

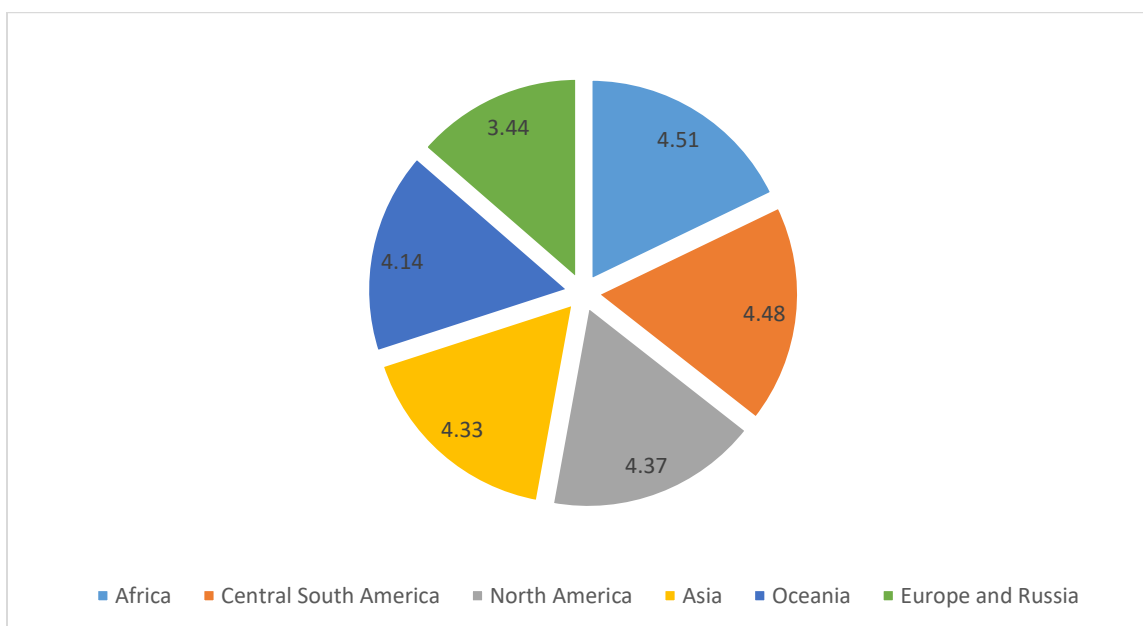
⁸ <https://www.pwc.co.za/en/assets/pdf/africa-energy-review-2021.pdf>

SENEGAL	230
KENYA	147
NAMIBIA	145

Source: statistica.com

According to The World Bank's Global Solar Atlas, Africa has the highest average potential for solar energy⁹ (Figure 2). In Africa's less developed countries, much of the solar energy potential remains unused (Table 1). This could be a once-in-a-lifetime opportunity to provide affordable, dependable, and sustainable electricity services to a large portion of humanity in need of improved economic opportunities and quality of life.

Figure 2: Potential solar energy output by world region in Kilowatt hour/Kilowatt peak/day (kWh/kWp/day)



Source: Global Solar Atlas/ The World Bank (Statistica) 2022

According to the International Energy Agency (IEA), Africa is home to 60% of the best solar resources globally, yet only 1% of global installed solar PV capacity¹⁰.

⁹ <https://www.weforum.org/agenda/2022/07/africa-solar-power-energy-sustainability-climate-change/>

¹⁰ <https://www.weforum.org/agenda/2022/09/africa-solar-power-potential/#:~:text=According%20to%20the%20International%20Energy,clean%20energy%2C%20the%20IEA%20says.>

2.2 BIOENERGY

Africa presents a wide variety of raw materials for bioenergy. Despite all these resources, the bioenergy capacity on the continent was only 1709 MW in 2021 with another 151 MW under construction. The continent has enormous untapped arable land, which could offer significant potential for more sustainable bioenergy. These biomass resources are generally used at the traditional level and represent a high proportion of household consumption¹¹. However, the lack of infrastructure and costly biomass energy technology are a hindrance to the modern development of this energy source. In addition, the burning of harvested organic matter (biomass) remains the main source of energy for many households in Africa, even though it causes greenhouse gas emissions and negatively impacts health and environment.

2.3 HYDROPOWER

About 12% of the world's hydropower potential resides in Africa, with a technical potential of 1,800 Terawatt hour (TWh)/year. Hydropower would represent in 2020, more than 70% of the renewable energy supply in Africa but also one of the cheapest. According to IEA, the role of hydropower in mitigating and adapting to climate change and in achieving the SDGs is crucial on the continent. Moreover, it offers the possibility to produce continuous power compared to wind and solar energy.

Although hydropower's share of renewable energy is the least negligible in Africa's energy supply, its potential is far from being exploited with only 11% used¹². The current capacity of hydropower is about 37000 MW and 20000 MW are under construction. However, it is necessary to take into account the climate change in the implementation of these hydropower projects in order to optimize their use especially with regard to water resource availability. Hydropower through the construction of dams can also have effects on the immediate environment.

2.4 WIND ENERGY

Wind energy in Africa typically exists in two different forms, onshore wind farms which are large installations of wind turbines located on land, and offshore wind farms which are installations located in bodies of water. It is increasingly being used to meet the growing demand for safe, dependable, and renewable energy. Aside from the environmental benefits, both onshore and offshore wind are increasingly capable of providing lower-cost power than fossil fuels¹³. According to a recent IFC-commissioned report, Africa has 59,000 GW of technical onshore and offshore wind potential, enough to meet the continent's energy demand 250 times over. As the

¹¹ <https://www.irena.org/publications/2013/Aug/Biomass-Potential-in-Africa>

¹² <https://www.waterpowermagazine.com/features/featurean-investors-guide-to-hydropower-in-africa-9297435/#:~:text=Africa%20also%20has%20the%20highest,with%20only%2011%25%20being%20utilised.>

¹³ African wind power struggles to gain momentum. Ben Payton. June 14th 2022 Africa Energy & Resources.

continent continues to seek ways to expand energy access, the adoption of wind as a source of energy is expected to accelerate. Only South Africa, Morocco, and Egypt have so far been truly successful in utilizing their wind resources and attracting private funding to establish wind parks¹⁴. According to the nation's Independent Power Producer (IPP) Office, South Africa has already commissioned 34 wind farms with an installed capacity of more than 3.3 GW through its highly regarded Renewable Energy Independent Power Producer Procurement (REIPPP) program. Building wind farms that take advantage of Africa's vast wind resources will spur investment, create clean energy jobs, and support critical infrastructure, and help support thriving local economies in line with the region's Sustainable Development Goals.

3. AFRICAN CHALLENGES TO ACCESSING GREEN ENERGY

Despite having the necessary energy resources, many Africans continue to lack access to power. Solar energy has been of main interest in terms of renewable energy sources due to its abundance and immense potential. Thermogalvanic cells have the potential to supplement energy production from fossil fuels in Sub-Saharan Africa. It has a lot of solar power available to it. However, it needs new funding sources in order to reach its full potential. Moreover, Offshore Renewable Energy (ORE), which includes marine (wave and tidal energy) and onshore wind, has the potential to supply significant amounts of green, sustainable energy while reducing CO2 emissions. Furthermore, investing in modern technologies that convert organic matter into high-energy fuels can help Africa generate more clean energy and improve energy used by Africans staying in developing countries. However, the main barriers to deployment have been technical difficulties and high costs, with currency risk being one of the biggest drivers of these high costs.

African hydropower is vulnerable to climate change due to the continent's high sensitivity to water availability and low adaptive capacity. As a result, greening the financial sector through green bonds would be advantageous to mobilize additional capital in the fight against climate change. Green finance would provide financial support for financially viable investments that help to protect the environment and reduce carbon emissions. It also presents an opportunity to attract additional capital to Africa to finance the climate transition.

Overall, renewable sources are inexpensive to operate but have high installation costs, which must be financed upfront. Providing a high-quality energy basis for African development thus requires a comprehensive approach to financing. If Africa is to take a new, low-carbon approach to development, its countries must mobilize sustainable public, private, and multilateral and bilateral donor financing to raise the funds needed for renewable-energy projects¹⁵. Regardless of the funding organizations that are available, more funding and investments in green energy

¹⁴ <https://african.business/2022/07/apo-newsfeed/africas-wind-energy-industry-expected-to-diversify-as-interest-to-harness-the-continent-wind-grows-by-paul-sinclair/>

¹⁵ Powering Africa with Solar Energy – IMF F&D

supply and private market infrastructure assets are required overall. Local currency solutions will be crucial in the transformation to a just and fair energy transition.

They need to put in place a framework that promotes transparency and predictability so that investors can have some visibility into how their funds are being used and what the returns are. It is also important to broaden the investor base with a regulatory framework that meets international standards but also by designing products that are specific to investors interested in renewable energy such as conservative bonds. Another local possibility would be to encourage local investors to invest directly through government bonds as was recently done in Kenya through mobile money¹⁶. These issues can also be done at the city or town level where investors could be concerned by the needs of their communities. In this sense, international donors can also provide facilities to local financial institutions that can reach SMEs at lower transaction costs. Government must provide assistance to private sector for more green issuance in order to facilitate the access to financing for the many African companies and SMEs operating in the renewable energy sector. Finally, it is also necessary to encourage the participation of private financing, without which the current financing needs cannot be met.

Box 1: Some potential sources and catalysts of green financing in Africa

In recent years, several initiatives have been put in place to facilitate access to financing for green projects in Africa. Here are some of the most important ones:

- **The Sustainable Energy Fund for Africa (SEFA)**

A multi-donor Special Fund managed by the African Development Bank that provides catalytic finance to unlock private sector investments in renewable energy and energy efficiency. The Fund's overarching goal is to contribute to universal access to affordable, reliable, sustainable, and modern energy services for all Africans, in accordance with the new deal on Energy for Africa and SDG 7.

- **The Energy and Environment Partnership Trust Fund (EEP Africa)**

A clean energy financing facility hosted and managed by the Nordic Development Fund (NDF) with funding from Austria, Finland, NDF and Switzerland. It is guided by a vision for a climate-resilient, zero-carbon future with the aim of contributing to the achievement of the Paris Agreement on climate change and Sustainable Development Goals (SDGs). EEP Africa provides early-stage grant and catalytic financing to innovative clean energy projects, technologies, and business models in 15 countries across Southern and East Africa. Project financing is supplemented by technical support, investment facilitation and knowledge sharing.

- **The Africa Go Green (AGG) fund**

A pan-African fund with a majority of its investments in West Africa. It was launched by KFW on behalf of the German government to promote private investments that mitigate or reduce greenhouse gas emissions. The objective of the AGG Fund is to stimulate further reductions in greenhouse gas emissions by providing companies and industrial entities, local financial institutions and other businesses involved in the renewable energy or energy efficiency sector with medium and long-term senior debt, mezzanine financing and guarantees.

4. FUNDING REQUIREMENTS

The World Bank, the International Energy Agency, and other partners, such as the United Nations, continue to urge developed economies to provide more assistance to developing economies, including Africa, in rising energy and renewables sectors.

It is estimated that the continent will need to invest between \$60 billion and \$90 billion per year to achieve universal electricity access by 2025, with a strong emphasis on encouraging clean and renewable energy solutions¹⁷. This includes adding 160 GW of new capacity, 130 million new on-grid connections, 75 million new off-grid connections, and providing clean cooking solutions to 150 million households. The African Development Bank (AfDB) is willing to invest \$12 billion of its own funds in the energy sector over the next five years. The remaining amount required for green financing in Africa over the next five years is approximately \$438 billion, which will fund the installation and all associated costs of the green infrastructure. In addition, the IEA added that between 2026 and 2030, Africa requires investment of \$190 billion annually to implement clean solar energy and accomplish climate goals.

Therefore, the most desired plan for financing green energy projects would be for funders such as AfDB, EEP Africa, IEA, the World Bank and others (multilaterals) to collaborate as co-financiers. However, local currency funding solutions should be considered here, as the vast majority of loans is still denominated in dollar or euro, exposing borrowers to currency risk.

Additionally, African governments and regulators must put in place tax policies adapted to the countries reality including tax subsidies on green energy outcomes or returns in order to involve more private sector and investors to create competitiveness in green energy financing. An adequate financial infrastructure including a good regulatory framework, de-risking tools but also a climate risk pricing structure is necessary to reduce the cost of financing. Specifically with regard to debt swaps, the IMF suggests linking debt swaps to adaptation or environmental mitigation projects to build resilience to climate change¹⁸.

5. RATIONALE FOR LOCAL CURRENCY FUNDING OF ENERGY PROJECTS

The African continent needs to be able to mobilize long-term financing to finance the green transition. This is crucial to invest in the required infrastructure. According to the Africa Long-Term Finance Initiative (ALTFI), due in part to the low level of African financial market development, the annual infrastructure investment gap need is estimated at about \$31 billion per year¹⁹. In addition, since the main source of long-term financing for infrastructure comes, in hard currency, from multilateral and bilateral institutions, this creates an exchange rate risk for

¹⁷ African Development Bank Group. Light Up and Power Africa – A New Deal on Energy for Africa.

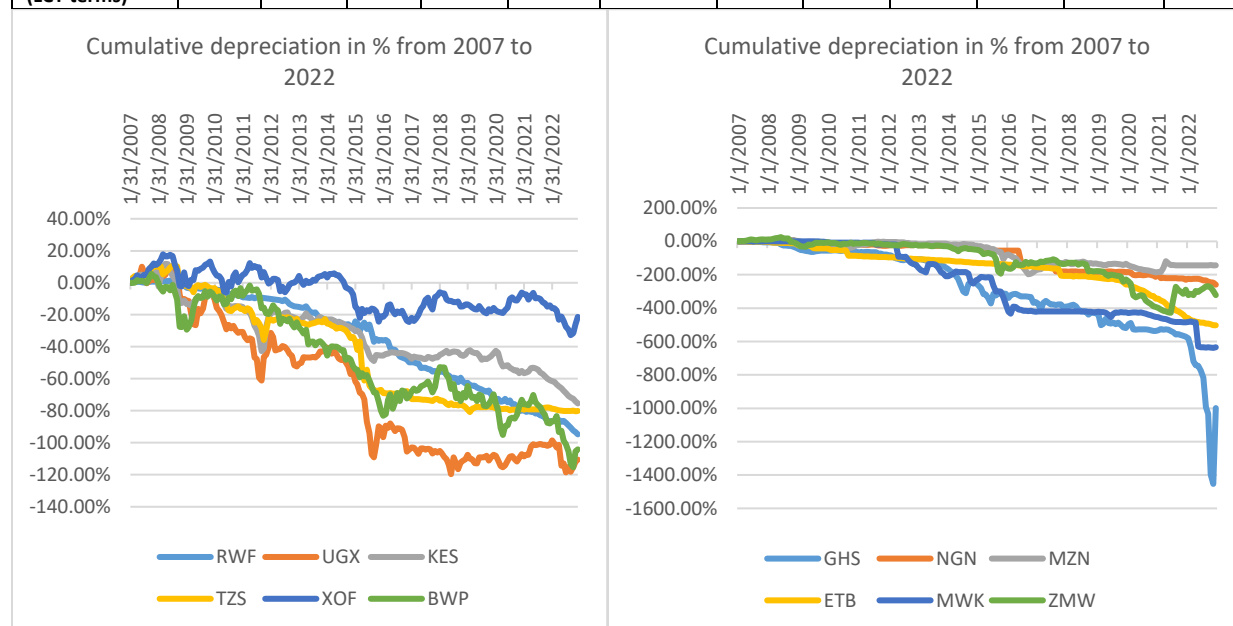
¹⁸ <https://www.imf.org/en/Publications/WP/Issues/2022/08/11/Debt-for-Climate-Swaps-Analysis-Design-and-Implementation-522184>

¹⁹ <https://altf.afdb.org/sites/default/files/2021-11/Africa%20Long-Term%20Finance%20Initiative%20-%202020%20Annual%20Report.pdf>

African countries. Its impact on sustainability but also consumer protection in the countries concerned is a fundamental issue for responsible lending practices. Indeed, if donors/lenders provide loans in USD for five to ten-year projects in Africa, the loan burden tends to increase vis a vis the borrower as the domestic currency tends to depreciate against the dollar over time (Figure 3). This makes it difficult for the debtor country to pay and adds pressure on sovereign debt service. As can be seen in Figure 4, Sierra Leone, Ghana and Egypt even exceeded the 30% depreciation threshold against the US dollar just in 2022.

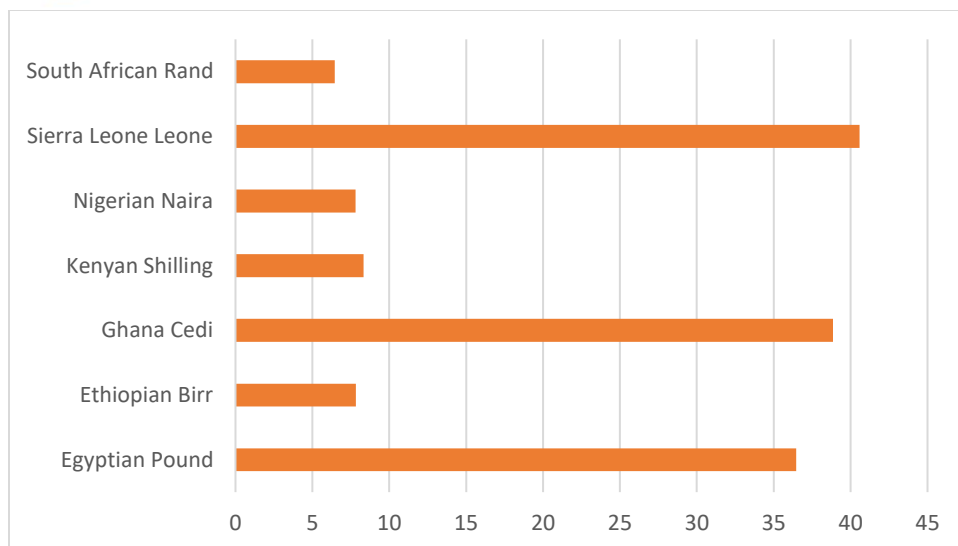
Figure 3: Cumulative currencies depreciation against US dollar from 2007 to 2022 (%)

	RWF	UGX	KES	TZS	XOF	BWP	GHS	NGN	MZN	ETB	MWK	ZMW
YE07 USDLCY rate	545	1698	64	1154	449	6	1	118	24	9	140	4
YE22 USDLCY rate	1070	3718	123	2330	612	13	10	461	64	54	1026	18
Period Depreciation (LCY terms)	96%	119%	93%	102%	37%	111%	946%	291%	168%	479%	631%	368%
Annualized Depreciation (LCY terms)	5%	6%	5%	6%	2%	6%	20%	11%	8%	14%	17%	13%



Source: TCX. Note: RWF=Rwandan Franc, UGX=Ugandan Shilling, KES=Kenyan Shilling, TZS=Tanzanian Shilling, XOF= West African CFA Franc, BWP= Botswana Pula, GHS=Ghanaian Cedi, NGN= Nigerian Naira, MZN= Mozambican metical, ETB= Ethiopian Birr, MWK= Malawian Kwacha and ZMW= Zambian Kwacha.

Figure 4: Local African currencies depreciation against US dollar in 2022 (%)



Source: Bloomberg

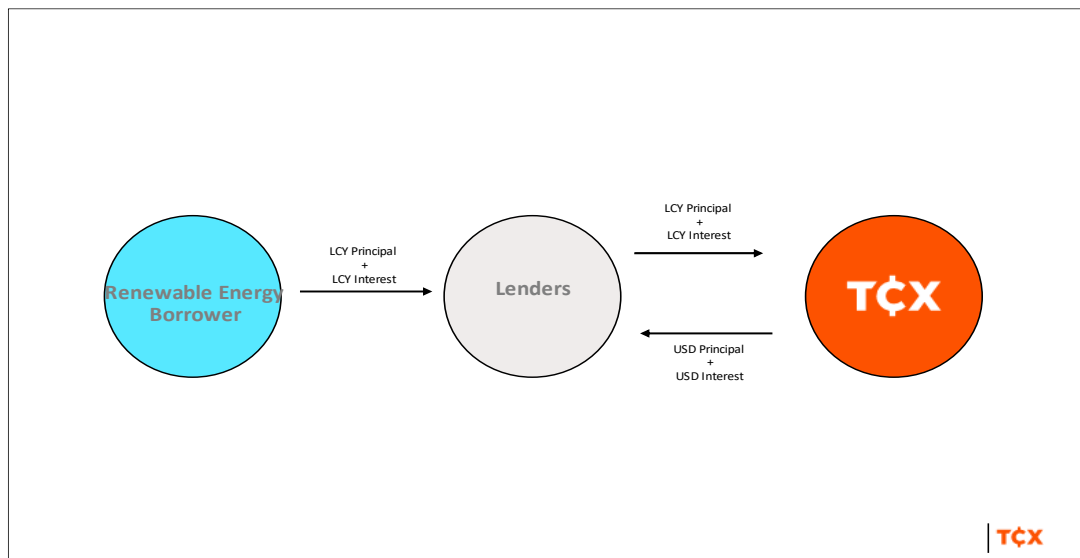
Explicitly, revenue from power projects is typically generated in local currency, whereas their financing and fuel costs for thermal power projects are denominated in US dollars or other hard currencies. As a result of the exchange rate depreciation, revenues may be insufficient to cover costs. The increased costs are not the fault of either the utility nor the government. When faced with the need to manage exchange rate risk, a decision must be made between passing the cost on to consumers thus creating social tension and energy poverty or absorbing the cost directly, putting strain on the utility's or the state's finances. Unfortunately, the need to absorb losses is typically greatest when the currency is at its weakest and, as a result, the government and consumers are likely experiencing stressful economic times²⁰. To avoid this, some countries can even index their electricity prices to the dollar, so that when the dollar rises in value, the burden falls on consumers, creating a major consumer protection concern. Furthermore, because most power purchasing agreements for energy are in dollars, when the dollar appreciates, prices rise, causing consumers to go without electricity.

For long-term sustainability and to ensure consumer protection, solutions against currency fluctuation must be considered when providing funding. For instance, lenders/borrowers and investors can use swaps to hedge (part of) their loans/investments. With a local currency swap, two parties agree to exchange the principal and/or interest payments of one loan in one currency for an equivalent loan in local currency (Figure 5). The hedging provider absorbs the currency risk. Loans in local currency can be provided by the Multilaterals, DFIs or financial institutions via hedging providers such as the Currency Exchange Fund (TCX), a special purpose fund that can

²⁰ TCX. 2013 Africa Energy Yearbook. private sector perspectives. A Powerful Case for Local Currency

provide currency hedging products to local borrowers in frontier and less liquid emerging markets²¹. This makes it possible to have long term funds in local currency. Eliminating currency risk makes it easier to pay off the debt in domestic currency as the project progresses and generates matching domestic income; the outcome is more sustainable without putting a strain on consumers.

Figure 5: The structure of a local currency loan hedged with a cross-currency swap



Source: TCX

6. CONCLUSION

Improving the flow of long-term finance to adequate infrastructure investment is key to accelerating the green energy transition in Africa. The availability of long-term financing in local currency can therefore be a solution to encourage such investments in African countries where currencies are subject to various fluctuations. Funds specializing in currency hedging can therefore play a fundamental role in helping to promote knowledge sharing, appropriate financial instruments for climate risk mitigation and climate finance flows in Africa, particularly in local currency. In addition, the Long-Term Finance database, scoreboard, and country analysis provided by ALTFI can also provide more information on opportunities and availability of long-term financing and help improve their intermediation²². By combining all these factors, it should be possible to improve the adoption of sustainable green financial products and services on the continent. This will make the market attractive to borrowers, provide sustainable solutions and at the same time meet the demand for these tailored green financial products that is now more than necessary for the continent.

²¹ <https://www.iisd.org/system/files/publications/currency-risk-project-finance-discussion-paper.pdf>

²² <https://www.mfw4a.org/our-work/africa-long-term-finance-initiative-altfi>