



GLOBAL SOLAR
COUNCIL

Africa Market Outlook

for Solar PV

2025-2028



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Acknowledgements

Global Solar Council would like to extend special thanks to all the stakeholders who contributed their knowledge and experience to this report. This would never have been possible without their continued support. We would like to especially thank our report supporters GET. invest – *GET.invest is a European programme which aims to mobilise investment in renewable energy, supported by the European Union, Germany, Norway, Sweden, the Netherlands and Austria* – and the Rocky Mountain Institute, as well as all the national and regional associations who contributed to the report, including:

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The Global Solar Council (GSC) is the united voice of the solar industry worldwide. As a non-profit trade body, our vision is to create a fair and sustainable world with solar at the heart of a new energy economy. Driven by our passion for a cleaner, more just world, we work as a community to ensure everyone's voices are heard, advocating for swift progress to be made in the battle for the climate. We advise governments on the pressing issues central to the solar transition, including finance, grids, skills and supply chains.

Representing every part of the solar PV value chain, we provide our corporate members with policy advice, greater visibility for their brands, support for market expansion, and B2B and B2G networking. For our association members, GSC delivers international advocacy opportunities to solve challenges in their markets, policy briefings and an enhanced value proposition to their own members. Get involved at www.globalsolarcouncil.org and follow us on [LinkedIn](#), [WeChat](#), and [X](#).

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GET.invest is a European programme that mobilises investment in renewable energy. Services are primarily aimed at private sector companies, project developers and financiers in sustainable energy markets in sub-Saharan Africa, the Caribbean and the Pacific. The programme provides tailored access-to-finance advisory for clean energy developers, a funding database, market information, and financial sector support to increase local currency financing. Additionally, GET.invest collaborates with industry associations on events and networking opportunities. Together with the Access to Energy Institute, the programme implements the data and transaction platform Prospect. Since 2022, GET.invest serves as the Team Europe One Stop Shop to help developers navigate and access European support and financing instruments. The programme is co-funded by the European Union, Germany, Norway, the Netherlands, Sweden and Austria. Find out more at www.get-invest.eu.

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DFI: Development Financial Institution

FOCAC: Forum on China-Africa Cooperation

ICE: Internal Combustion Engine

IEA: International Energy Agency

IFC: International Finance Corporation

IPP: Independent Power Producer

GDP: Growth Domestic Production

JETP: Just Energy Transition Partnership

MW: MegaWatt

REIPPPP: Renewable Energy Independent Power Producer Procurement Program

PAYG: Pay-As-You-Go

PIDA: Program for Infrastructure Development Africa

PPA: Power Purchase Agreement

PPP: Public-Private Partnerships

PV: Photovoltaic

SADC: Southern African Development Community

SDG: Sustainable Development Goal

SHS: Solar Home System

SSA: Sub-Saharan Africa

TOC: Total Cost of Ownership

WACC: Weighted Average Cost of Capital

WAPP: West Africa Power Pool

List of Acronyms

AfCFTA: African Continental Free Trade Area

AFD: French Development Agency

BESS: Battery Energy Storage Solution

BSS: Battery Swap Station

CBAM: Carbon Border Adjustment Mechanism

C&I: Commercial & Industrial

EAPP: Eastern Africa Power Pool

ECOWAS: Economic Community of West African State

ESMAP: Energy Sector Management Program

ESIF: Ecowas Special Intervention Fund

EU: European Union

Foreword



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Africa is blessed with an extraordinary energy resource: the sun. With 60% of the world's highest solar potential, the continent has the power to generate abundant, affordable, and clean electricity for its people and industries. Yet today, over 600 million Africans still lack access to reliable power—limiting economic growth, job creation, and essential services like healthcare and education.

This must change.

Unlocking Africa's solar potential is not only about achieving Sustainable Development Goal (SDG) 7—**universal access to clean energy**—it is about driving economic transformation across the continent. Solar can power industries that create jobs, electrify schools and hospitals, boost agricultural productivity, and strengthen businesses. With energy access comes economic opportunity, and **Africa's energy future must be built on its most abundant and cost-effective resource—solar.**

At the same time, the world cannot afford to overlook Africa in the global energy transition. At **COP28 in Dubai, the international community committed to tripling renewable energy capacity by 2030**—a target that is essential to keeping the world on a **1.5°C pathway** and avoiding the worst impacts of climate change. Achieving this goal is simply not possible without Africa. The continent is the next frontier for renewable energy growth, and realizing its full solar potential will be critical—not just for Africa, but for the world.

Across the continent, solar is already driving a new wave of industrialization and economic transformation. The expansion of commercial and industrial solar is making African businesses more competitive. Off-grid solar and mini-grids are delivering energy access to communities faster and more affordably than ever before. Utility-scale solar is now among the cheapest forms of electricity generation worldwide, as long as the cost of capital is kept as low as possible. As costs continue to fall, African countries have a unique opportunity to leapfrog expensive and polluting fossil fuels and build a modern, sustainable energy system for future generations.

But to fully unlock this future, we must address the greatest challenge: **access to affordable finance.** The high cost of capital remains a major barrier to scaling up solar in Africa. De-risking investment, mobilizing concessional finance, and deploying innovative financing models will be essential to attracting both domestic and international investors. With the right policies and financial mechanisms, Africa can become the world's most competitive solar-powered economy.

This report presents a roadmap for unlocking Africa's solar market and driving forward a clean energy future. The time to act is now. By investing in solar, we are not only transforming Africa's economies—we are securing the world's energy future and ensuring a sustainable, equitable, and climate-resilient world for generations to come.

Executive Summary

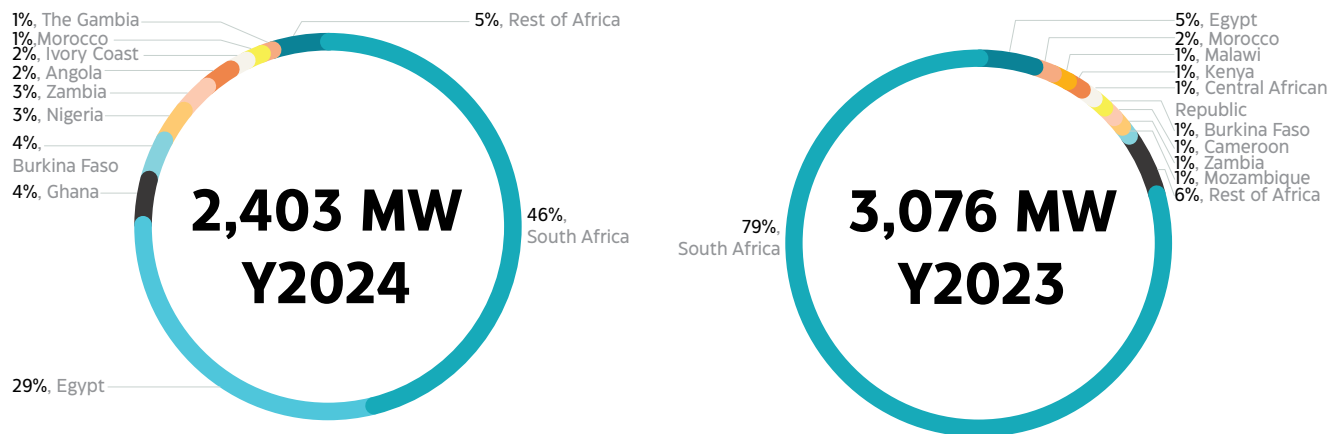
For a just transition, Africa will be critical in leaving no one behind and achieving the goal of tripling targets for global renewable energy capacities by 2030. For the improved socio-economic conditions, energy access rate, and reduce climate change impacts including multi-year droughts, flooding and lower crop yields, Africa needs rapid clean energy transition implementation which should be led by hefty financial support.

So far, African leaders have set the target of at least 300 GW of renewable generation capacity by 2030 as part of Nairobi Declaration issued in 2023. African solar deployment has been central to deliver full energy access and grown since the last decade based on in national climate strategies and Nationally Determined Contributions.

Africa as a whole installed 2,402 MW in 2024, slightly less than the 3,076 MW installed in 2023 majorly because the leading African solar market, South Africa, returned to normal annual solar installation rate in 2024 after a boom in 2023 and delayed project development especially in North Africa.

Thanks to these three trends that shaped solar growth in 2024, a rebound in the share of utility-scale projects, growing solar installations to tap its versatile application-based potential and most importantly, the beginning of a market diversification among the African markets. This report further deep dives to showcase 2024 market trends at regional and national level including the top ten African markets (Figure) and market segment wise solar deployment rate.

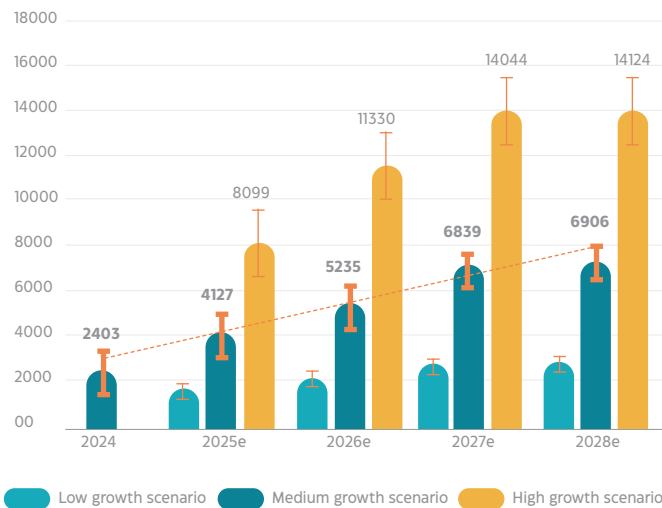
Figure 1: New Solar Installations (%) in 2023 and 2024 (in MW)



Chapter 1 of this report further provides a scenario-based outlook for new annual solar additions in Africa between 2025 to 2028. Each scenario encompasses assumptions of overall market health and policy support with number buffers as this report has favored data with a high level of certainty which may have unaccounted some projects for 2024.

GSC Market Intelligence forecasts total 9.2 GW new solar additions for Africa in low-growth scenario and ~47 GW in highly optimistic high growth scenario. **The most likely, medium growth scenario depicts solar installation growth in Africa at 30% CAGR by 2028 with total 23 GW of new solar capacity addition between 2025 to 2028.** It would be mainly dominated by utility-scale projects, boosting the installation trend at a pace never seen before.

Figure 2: Forecast Solar PV installation Africa 2025-2028 in MW



Harnessing solar to the maximum level could efficiently address Africa's energy needs and offer various electrification possibilities with affordability and scale. As Africa encompasses multiple geographies, yet some macro-trends can be identified, especially when it comes to key drivers for solar deployment as well as challenges. Declining cost in solar PV and batteries with a business case for solar plus storage projects is a powerful driver of large-scale solar deployment.

African countries also need to tackle market-specific challenges to narrow down the power demand-supply gap. These challenges are mainly inadequate grid infrastructure, lack of scalability, load shedding issues, three times higher cost of capital than developed countries, currency risks, weak buying power for small-scale solutions and more. While the political will is strong in many African markets to create an enabling framework and attract investors, long term planning on grid, power market reforms, setting solar targets, and international cooperation sharing technical expertise and supply chain is crucial.

Chapter 2 of this report takes a closer look at the issues within several markets, namely: Angola, Burkina Faso, Ghana, Kenya, Morocco, Mozambique, Nigeria, Senegal, South Africa and Uganda. They have been selected based on their market potential, policy intervention needs, successes, challenges including language diversity as well.

Despite the large solar and renewable opportunities, one of the largest impediments in Africa's energy transition is mobilizing finance due to limited participation of private sector investors, lack of low cost finance availability at scale and utilization of new financing instruments. Chapter 3 delves deeper into market barriers and opportunities to tap better financial instruments with policy solutions. Currently, high risk perceptions, limited project pipelines, and weak financial infrastructure often deter private investors despite blending with public finance, make it difficult to scale renewable energy projects in Africa.

Present African green finance landscape is dominated by the public sector, mainly multilateral Development Financial Institutions (DFIs) accounting for 82% of finance through concessional finance, development aid, and grant funding slowing down the pace of Africa's energy transition. Hence, there remains a significant climate finance gap to be accessed through solutions such as reducing market risk through de-risking instruments and innovative finance, improving the capacities of domestic financial institutions, creating an enabling policy and regulatory framework for solar, streamlining permitting for fast-track project approvals and capacity building.

For the emerging market opportunities of renewable hydrogen and e-mobility, solar would be key renewable source in African countries. Chapter 4 of this report provides the snapshot how solar can lead to generate market opportunity of E-mobility and green hydrogen production.

While the EV industry is nascent in Africa, the political will across the continent regarding EVs is noteworthy. [Twelve countries have established targets pertaining to EVs¹](#). However, two central barriers are the availability of sustainable cost-competitive electricity to power the EVs and grid reliability. [In 2018, the transport industry accounted for 15% of the ultimate energy consumption in SSA.](#) With the uptake of EVs across the region, this demand is going to be met with electricity and is likely to increase. Integrating solar power into the grid helps decarbonize the grid, reducing the carbon footprint of e-mobility, aligning with broader climate goals.

Regarding the renewable hydrogen sector, as of January 2025, Africa is advancing very slowly with 41 projects expected to reach the Financial Investment Decision (FID) over the next five years. Again, the main challenge is a significant financing gap to tap this potential. Currently, there is no production of renewable hydrogen in Africa, but several projects should come online by 2027 and even more by 2030. Nonetheless, these projects, although representing just a small fraction of Africa's renewable hydrogen potential, would more than double Africa's installed solar capacity if they are realised.

Overall, the first edition of Africa Solar PV Market Outlook Report 2025 by Global Solar Council (GSC) calls for massive efforts to tap vast African solar potential through investments and collaboration by showcasing the market status, outlook for the next four years, trends, supply chain, key drivers and challenges, financing overview and solutions, emerging solar based opportunities in sections with policy recommendations.

¹Energy for Growth Hub (2024), Africa EV Readiness and Impact Index 2024. <https://energyforgrowth.org/article/africa-ev-readiness-and-impact-index-2024-desktop/>

2.4 GW OF SOLAR PV INSTALLED IN **2024**

NEW SOLAR INSTALLATIONS WILL INCREASE BY **42%** in 2025

ADDITIONAL **23 GW** TO BE INSTALLED BY 2028

3% OF AFRICA'S ELECTRICITY GENERATION WAS MET WITH **SOLAR PV IN 2023**

SOLAR IS THE **2nd BIGGEST RENEWABLE ENERGY SOURCE IN AFRICA**

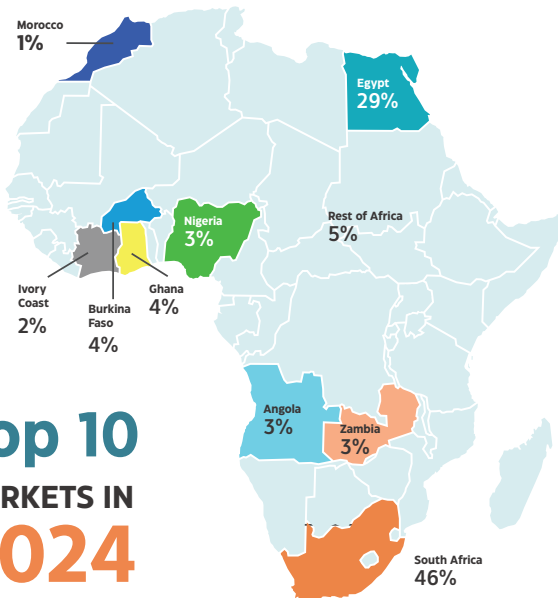
18 COUNTRIES HAVE THE POTENTIAL TO INSTALL OVER **100 MW OF SOLAR PV IN 2025** – COMPARED TO 2 IN 2024

2024 MARKET TRENDS

A rebound in the share of utility-scale installations

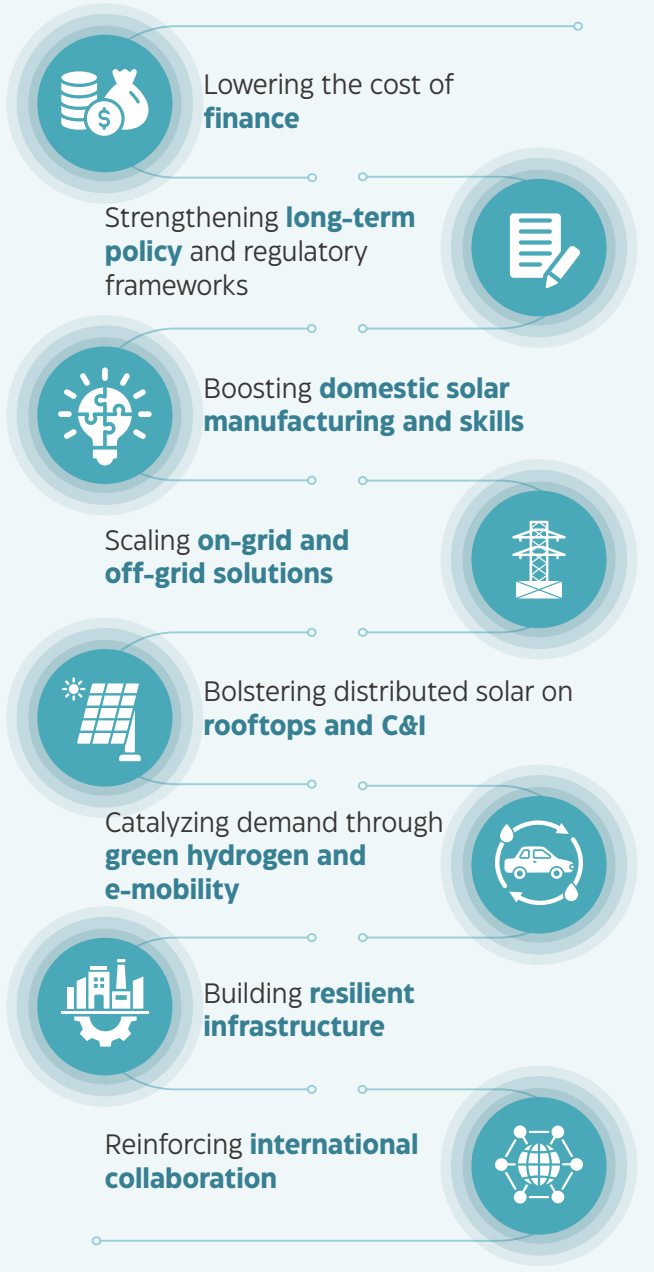
Leveraging new innovations and versatile PV applications

Market diversification powering more solar in more countries

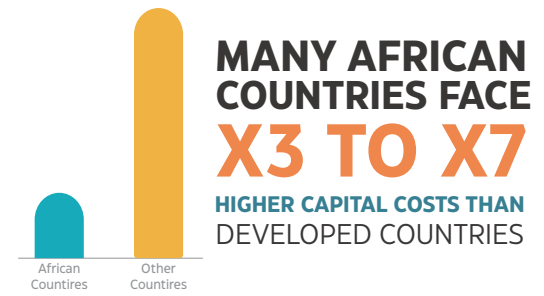


Top 10 MARKETS IN 2024

THE ROAD TO UNLOCKING AFRICA SOLAR PV POTENTIAL



URGENTLY SCALING UP FINANCE FOR SOLAR PV IN AFRICA IS CRITICAL TO MEET CLIMATE AND SUSTAINABLE DEVELOPMENT GOALS



CLEAN ENERGY INVESTMENT REACHED **\$40 BILLION IN 2024**
DOUBLING INVESTMENTS LEVELS FROM 2020

AFRICA ACCOUNTS FOR **ONLY 3% OF GLOBAL ENERGY INVESTMENT**
 THIS NEEDS TO DOUBLE TO OVER **\$200 BILLION PER YEAR** TO ACHIEVE ENERGY-RELATED DEVELOPMENT GOALS



Chapter 1

Africa Solar PV Market
Status and Outlook

1.1 Solar Growth Across Africa



A turning point in African energy landscape and clean investments need

As of January 2025, 600 million people in Africa lacked access to electricity². As the continent's population continues to grow, achieving universal energy access demands urgent and sustained efforts in electrification and broader energy development. Additionally, climate impacts are profoundly shaping Africa, both in terms of living conditions and the energy landscape. To mitigate the worst effects of climate change - loss of lives, declining food production, worsening water scarcity, slow economic growth, and widespread biodiversity loss, decarbonizing its energy system is essential.

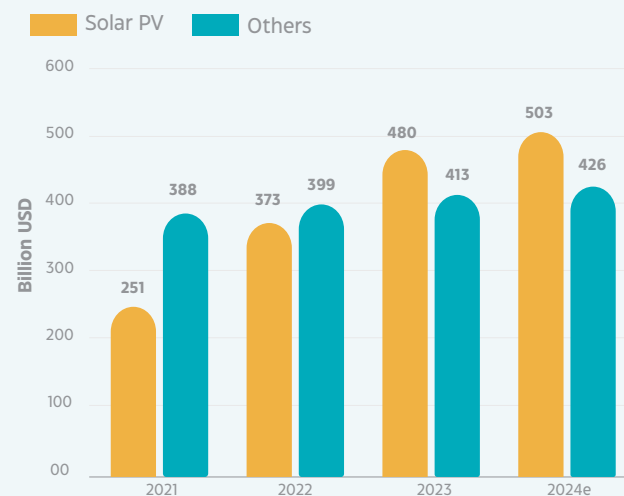
Today's investment and energy planning will have major consequences for the next decades, posing a risk of carbon lock-in and stranded assets. The clean energy transition is the opportunity for Africa to improve socio-economic conditions. However, such a transition is of course capex intensive.

Although Africa accounts for one-fifth of the global population, the region currently attracts only 3% of global energy investment. Energy investment in Africa totaled USD 110 billion in 2024, of which clean energy investment amounted to USD 40 billion, nearly doubling those in 2020. While it is set to grow even more, in line with the COP29 pledge - promising at least \$300 billions of climate finance per year by 2035, investments are not reaching sufficient levels³. By 2030, its energy investment needs are to double to over USD 200 billion per year to achieve all their energy-related development goals, including universal access to modern energy, while meeting their nationally determined contributions on time⁴.

Solar PV plays a crucial role in Africa's energy transition by delivering immense benefits such as energy security, resilience, jobs, and economic opportunities. Solar is critical to achieve Sustainable Development (SDG) Goal 7 laid out by the United Nations: universal

access to sustainable energy by 2030. Globally, investments in solar PV in 2023 surpassed all other generation technologies combined, highlighting the appetite of investors. More largely, global clean investment is set to rise to \$2 trillion by 2035⁵, from \$700 billion in 2024.

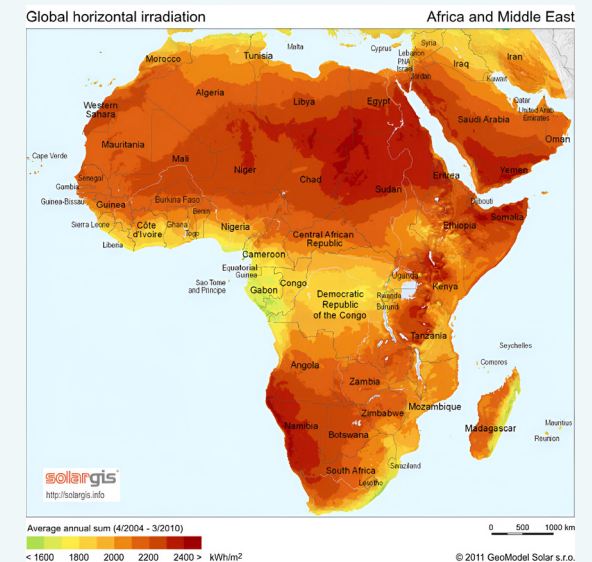
Figure 3: Global Annual Investment in Solar PV and Other Technologies 2021-2024



Source: IEA (2024)

Notes: 2024e = estimated values for 2024. Other = electricity generation from all other technologies including coal, oil, natural gas, wind, hydro and nuclear.

Figure 4: Africa Solar Insolation



Source: Solargis (2011)

²IEA (2022), Africa Energy Outlook 2022, IEA, Paris <https://www.iea.org/reports/africa-energy-outlook-2022>

³IEA (2024), World Energy Outlook 2024, IEA, Paris <https://www.iea.org/reports/world-energy-outlook-2024>

⁴IEA (2023), Financing Clean Energy in Africa, IEA, Paris <https://www.iea.org/reports/financing-clean-energy-in-africa>

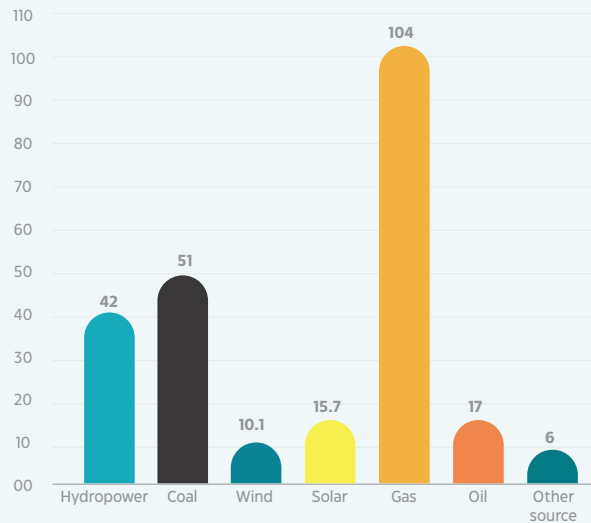
⁵IEA (2024), Energy Technology Perspectives 2024, IEA, Paris <https://www.iea.org/reports/energy-technology-perspectives-2024>

Despite increasing interest in solar PV from global and regional investors, African leaders and society, Africa remains an important untapped market for the industry. It constitutes a missed opportunity both for access to sustainable electricity and decarbonization of the continent, as well as clean jobs creation.

For a just transition, Africa will be critical in leaving no one behind and achieving the goal of tripling targets for global renewable energy capacities by 2030. The heat map of Africa highlights African solar resources with more than 80% of the continent reaching 2200 kWh/m² insolation level. Despite being the 2nd biggest potential region with renewable energy sources, renewables and solar are behind in the race to support the electricity transition.

As of end of 2024, only 3% of Africa's electricity generation was met with solar PV in 2023⁶. Harnessing solar to the maximum level could efficiently address Africa's electricity challenges, offering various electrification possibilities with affordability. Solar energy is the second biggest renewable energy source in Africa already, surpassed only by hydropower with 42 GW.

Figure 5: Total Installation by Source in Africa, December 2024, (in GW)



Source: GWEC (2023,2024), Energy for Growth Hub (2023), International Hydropower Association (2024), Global Solar Council, BNEF

Political support for solar energy is strong at regional and national levels. The Nairobi Declaration, during the inaugural Africa Climate Summit, issued in 2023, set a target of at least 300 GW of renewable generation capacity by 2030, from 56 GW in 2022. This target for a fivefold increase is an unprecedented market signal. Additionally, solar is increasingly relied on in national climate strategies, is critical to energy access.

Additionally, the Africa Climate Summit 2.0 that will be held at the end of the year 2025 could be a catalyst to enhanced renewable action. More and more countries are seeking to develop solar PV manufacturing capacities as well, to boost employment and lessen import dependence. Solar PV positions itself as the fastest growing energy both on the continent and globally, predicted to be the dominant source of electricity by 2035⁷. These conditions constitute a powerful enabler, pushing for the right market conditions in a lot of countries, making Africa more attractive than ever for solar.

Solar has a bright future ahead and 2024 showcased that Africa has started to tap its versatile application-based potential: (a) utility-scale solar, (b) C&I solar which provides both cheap, sustainable electricity as well as back up supply needed for some businesses suffering from load shedding, (c) residential solar which cuts electricity bills for households and (d) mini-grid schemes and solar home systems which deliver electricity to areas struck by loadshedding, rural areas without access to the grid and contribute to electrification.



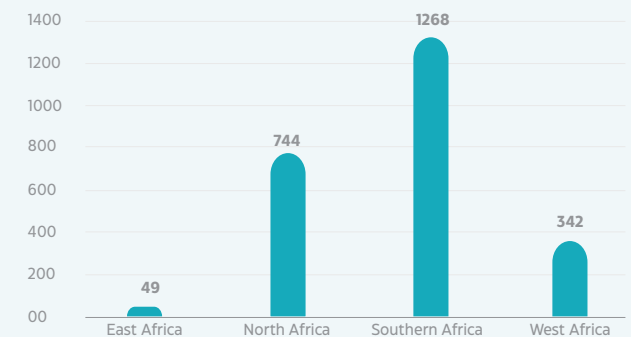
1.1.1 Solar has grown significantly across Africa in 2024

The world reached the milestone 2 TW of cumulative solar capacity in September 2024. While markets are growing fast, the installation rate is not evenly distributed in the world. China leads global photovoltaic (PV) installations, contributing 253 GW out of the total 447 GW added in 2023, and installed 277 GWac⁸ in 2024 – close to 332 GWdc. However, Africa's share in the global installation rate is poised for significant growth in the coming years.

Africa installed 2,402 MW in 2024, slightly less than the 3,076 MW installed in 2023, according to Global Solar Council Market Intelligence. If installing 674 MW is less than last year can be seen negatively, this decrease can be explained by a slowing of deployment from traditionally large markets and a shift towards new markets, with several new countries making serious steps forward in their solar deployment, strengthening the overall health of the continent's solar prospects.

Three main trends shaped 2024's growth: a return to normal installation rates by South Africa after a boom in 2023, delayed project development especially in North Africa and most importantly, the beginning of a market diversification among the African markets.

Figure 6: Solar PV Installation by region in Africa, 2024 (in MW)



⁶Ember (2024), Africa, Last modified October 9, 2024. <https://ember-energy.org/countries-and-regions/africa/>

⁷IEA (2024), World Energy Outlook 2024, IEA, Paris <https://www.iea.org/reports/world-energy-outlook-2024>

⁸Shaw, Vincent, China Hits 277.17 GW of New PV Installations in 2024. pv magazine International, January 21, 2025. <https://www.pv-magazine.com/2025/01/21/china-hits-277-17-gw-of-new-pv-installations-in-2024/>; China hits 277.17 GW of new PV Installations in 2024 – pv magazine International

Similar to previous years, the Southern African region took the lead with 1.3 GW new solar installation in 2024. This performance is mainly due to South Africa's lion share contribution of 87% within the region, although it is less than its share 90% in 2023. Its main factor of deceleration in 2024 is the stabilization of its installation rate to annual average rate, reaching 1,108 MW, compared to a staggering 2,340 MW in 2023.

Nevertheless, the South African market has been booming since 2022-2023 due to a surge in private installations, which showed total installations growth from 2,264 MW in July 2022 to 6,165 MW by October 2024, to address the recurring load shedding. It is followed by Zambia and Angola in the region, representing most of the rest of the market, with minor contributions comparatively from Namibia and Zimbabwe.

Africa suffered delays in project completion across the continent in 2024, which prevented the rest of the countries filling in the gap left by South Africa's staggering installation rate in 2023. However, we observed the early period of market diversification, where the growth is more evenly distributed. 2024 is expected to be the last year to experience installation slowdown, except major adverse events.

The second most dynamic leading region in 2024, North Africa installed 31% of the total new installation in continent. Egypt contributed with more than 94% through the commissioning of two utility-scale power plants representing 700 MW. Furthermore, small additions by Morocco (34 MW) and Algeria (10 MW) were also notable. North Africa is characterized by utility scale projects and mega-tenders, which are different from what is observed in East Africa and West Africa for instance, with smaller projects. Several delays in projects expected to come online by 2024 slowed down the expected growth for this region.

The third region with the best installation rate in 2024 is West Africa, culminating at 342 MW. Ghana led this development with 94 MW of new installations, closely followed by Burkina Faso with 87 MW, Nigeria 73 MW and Ivory Coast 37 MW, and The Gambia 23 MW capacity.

The region that installed the least solar PV, 49 MW, in 2024 is East Africa. Installations are distributed between Kenya, Mauritius, Madagascar, South Sudan and Comoros. Kenya led the regional growth with 17 MW of new solar installations, followed by Mauritius with 13.9 MW. It is absolutely imperative that steps are taken to accelerate deployment in these markets in particular. Unfortunately, the delay in the commissioning of four projects amounting to 72 MW by Qair in Mauritius has prevented a better growth in 2024.

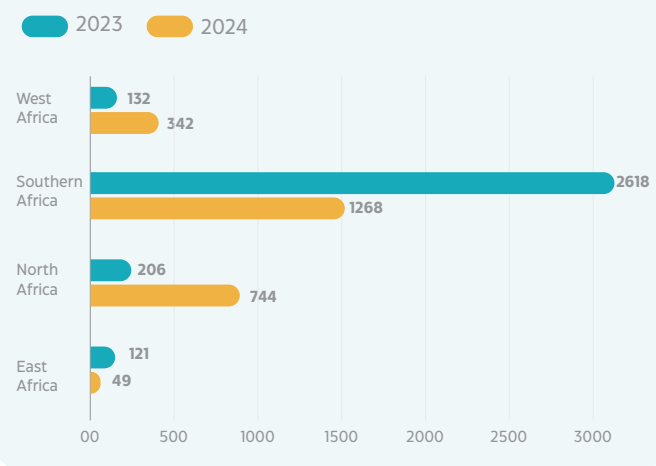
The first utility-scale project of Djibouti, a 30 MW solar plant developed by AMEA Power in Grand Bara region, is in construction phase. This project, with a PPA signed in 2023 with Electricité de Djibouti, will significantly boost the share of solar energy in the country's energy mix, and will contribute to the region's overall growth.

Overall, South Africa remained the primary driver of solar installations for the region. However, 2024 marked a pivotal year for the region as growth is becoming more distributed and continues for the years to come. Several countries had impressive year-on-year growth like Burkina Faso, Ghana and Zambia. This trend led to a more diversified market in 2024 compared to 2023.

2023 vs 2024: Regional New Solar Installation Overview

At a regional level, North Africa and West Africa increased their new solar installations capacity by 3.6 times and 2.6 times, respectively, than the year 2023. Thanks to Egypt (installed 700 MW in 2024) in North Africa and distributed efforts of Ghana, Burkina Faso, Nigeria, Ivory Coast, The Gambia, Togo and to a lesser extent, Benin, and Cape Verde in West Africa.

Figure 7: Regional New Solar Installations 2023 vs 2024 (in MW)

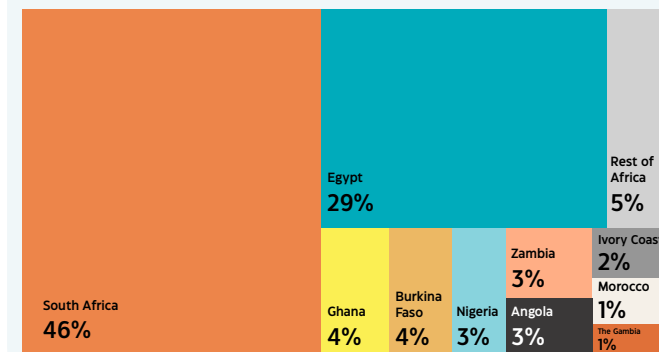


Unsurprisingly, new solar installations in Southern Africa decreased by 51% in 2024 compared to the year 2023 as the annual growth in South Africa returned to normal rate and regional residential market decelerated. Similarly, East Africa experienced a 60% decrease in new solar installations mainly due to delays in few solar projects in Kenya (Kisumu Solar plant of 48.3 MW which would have doubled the region's installed capacity through one single plant) and Madagascar. Lastly, Uganda and South Sudan both installed more than 20 MW with the commissioning of two solar power plants in 2023, similar growth hasn't been replicated in 2024.

Top Ten African Solar Markets in 2024

In 2024, the top ten markets accounted for 95% of the total new installed solar capacity in Africa.

Figure 8: Top 10 African solar markets by new solar installation (%) in 2024



South Africa continues to be the leading contributor to annual growth, making up 46% of total new installations. However, the country saw a decrease of 33% in its market share compared to 2023. With a 29% share, Egypt witnessed an impressive 700 MW coming online from two commissioned projects of 500 MW and 200 MW capacity by ACWA Power and AMEA Power, respectively. Unsurprisingly, these two countries (South Africa, Egypt) accounted for more than two-thirds of the installed capacity in 2024 in Africa, home to 54 countries. Positively, the year 2024 saw the rise of various countries contributing to the continent's overall solar growth.

Ghana became the third largest market, installing 94 MW in 2024 which includes 45 MW land based solar plant at the Bui dam. Additionally, a rooftop solar programme of 16.8 MW, funded partly by the International Finance Corporation (IFC), has enhanced this segment. Similarly, the C&I sector has been a growing factor in the growth, especially in the light of load shedding that has affected the country. For instance, Barry Callebaut's chocolate factory has been equipped with solar panels on the roof, on the ground and the carport to make production more sustainable. Additionally, the 5 MW Bui solar park has been commissioned, which will be the first floating PV project in the country and the largest in West Africa. Overall, these projects significantly contributed to Ghana's pledge to reach net zero by 2026.

Burkina Faso, the fourth biggest market of 2024, installed 87 MW new capacity. This has displayed an impressive 129% growth year-on-year, via the commissioning of three major power plants, boosting the installation share to 4% of the continent's total.

Nigeria became the fifth largest installer in 2024, with 73 MW. The Maigurdy University solar plant has geared up the utility scale portfolio of the country. There are various utility scale projects in the pipeline which would play the dominant role in Nigeria, a significant shift for the country in next years. Additionally, the diesel price and the sudden removal of the fossil fuel subsidies have contributed to a better uptake of solar in the country, in which residential and off-grid systems are traditionally dominant.

Zambia successfully commissioned 69 MW in 2024 via two major solar plants coming online, a 116% growth rate year on year. These power plants will contribute to Zambia's strategy to diversify the electricity mix, amid an energy crisis due to a severe drought that has undermined hydropower production. However, two new coal-fired units received approval in the country⁹, constituting a risk as coal assets may become stranded as the country continues its green transition.

Angola, the sixth largest market in 2024, installed ~60 MW in 2024 after a slower year in 2023. The target of 60% access to electricity under the strategic plan "Visao 2025" has driven the country's electrification. The growing project pipeline is expected to propel Angola to a GW-

scale market in Southern Africa, tripling the total installed capacity once realized, for instance the 500 MW Solar Energy Project and the 150 MW project planned by Masdar.

Ivory Coast installed 37.5 MW in 2024 with the commissioning of the first utility scale project of the country to break the ground. The first phase of the Boundiali solar PV plant has been achieved, and the plant could reach 80 MW by 2025 already, which would mark a significant addition to the small solar capacity of the country. The expected commissioning of other solar plants next year could propel Ivory Coast higher in the installer ranking. The effort to design a stable framework is coming to fruition.

Morocco added 34.4 MW solar capacity in 2024 representing a negative growth compared to 58 MW in 2023. That is mainly due to delays in major projects which are now expected to progress in 2025.

Finally, completing the top 10, The Gambia has reached a milestone with the commissioning of its first utility project of 23 MW capacity. This achievement underscores its determination to reach its target of 50% renewable-based power production by 2030.

Solar Growth in Rest of Africa in 2024

2024 is also a year wherein the major projects failed to compensate South Africa's performance because of the various commissioning delays, marking a missed opportunity for the continent to showcase a higher degree of maturity.

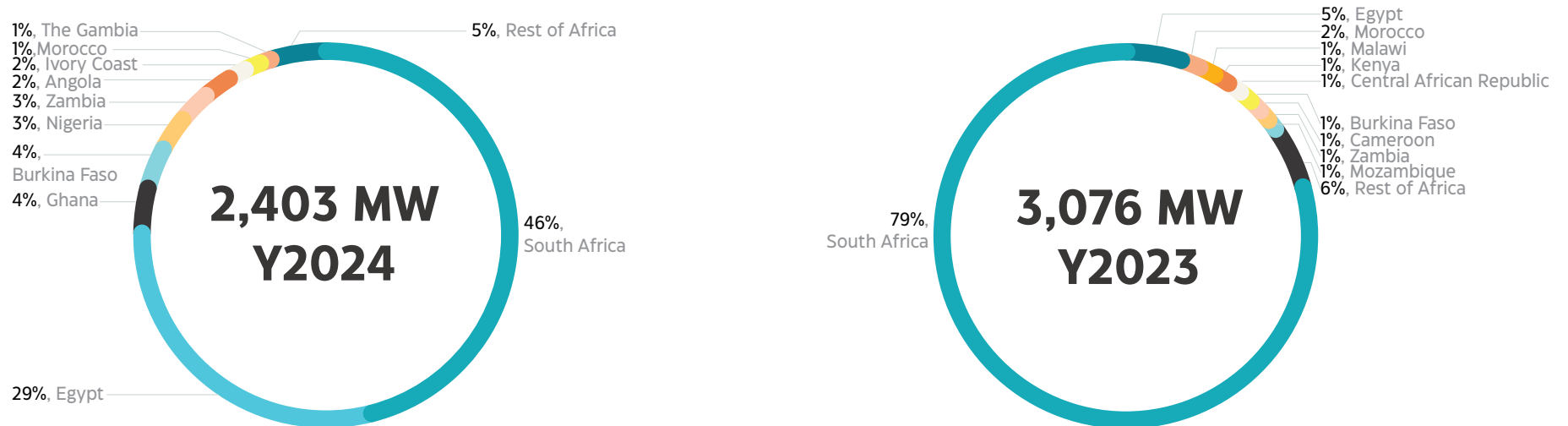
Eswatini had a highly anticipated 100 MW project, set to come online in 2024, which has not yet been commissioned. Kenya installed only 16.9 MW in 2024, less than the 44 MW in the previous year. The delay in the commissioning of the Kisumu Solar Park played a major role in this result, as it would have otherwise added 48.3 MW, positioning the country in the top ten list.

Mauritius would have made it in the top ten if it was for Qair Stor'Sun completion of the four solar plants, previously announced for 2024. Madagascar missed out on being in the top ten by only adding 9 MW in 2024, after an impressive 27.5 MW capacity installation in 2023. This is mainly due to the delay in the 30 MW Chidobe Mizpah plant. Additionally, Algeria is not in the top ten markets this year, but expected to be in 2025 as major projects are expected to come online. Overall, these various delays position the year 2025 as a promising year for solar in Africa.

2023 vs 2024: Top Ten Markets Overview

The top ten markets of 2024 accounted for ~95% share of the total new solar installation which is marginally higher by 0.7% than the year 2023. The leading African market, South Africa's share was down by almost 33% in 2024 (1.1 GW) than 2023 (2.4 GW) mainly because it returned to its average annual installation rate. Justifiably, 2023 saw boosted installation in South Africa due to rise in the non-utility sector, to counter the load shedding striking the country.

Figure 9: New Solar Installations (%) in 2023 and 2024



⁹IEA (2024), Coal 2024, IEA, Paris <https://www.iea.org/reports/coal-2024>

The top two market leaders, South Africa and Egypt continue their position in the 2024 with combined installation share of 75.2% but have been joined by new market players. While the loss of share by South Africa has been partly compensated by Egypt, the rest of the countries are taking a growing share. It is a sign of the African market becoming more and more mature across the continent and we expect this promising trend to be reinforced in the coming years.

Furthermore, other markets have seen impressive growth rates, with various awaited projects coming online contributing to the beginning

of a more distributed growth. Ghana is the most blatant example of this. While it did not make it into the top10 list in 2023, it secured the third position in top 10 list of 2024. Burkina Faso displayed a 129% of growth rate year on year, moving from the seventh place in 2023 to the fourth in 2024. Similarly, Zambia went from ninth place to becoming the sixth best installer in 2024, with a 103% growth rate. Zambia is expected to stay in the top 10 2025 list, with the commissioning of a 100 MW solar plant, currently under construction. The recent MoUs signed in the end of 2024 between Zesco and PowerChina¹⁰ should also sustain Zambia's exponential growth.

Interestingly, 5 new markets entered the top 10 list of 2024: Nigeria, Angola, Ghana, Ivory Coast and The Gambia. Nigeria, indeed, entered the top 10, with an impressive 73 MW installed capacity. This capacity is the most underestimated one due to two compounding effects: Nigeria has a high share of non-utility PV which is harder to track, and PV demand has been enhanced by the price spikes in fossil fuel. In 2023, Nigeria was close to be in the top 10, but other analysis might suggest otherwise. Detailed country deep dives for Nigeria and other top 10 markets can be found in chapter 2.

Countries that missed the top 10 list in 2024

Malawi has seen a relatively poor growth compared to 2023 as it installed only 46 MW, losing its place in the 2024 top 10 list. However, several projects in construction such as the 10 MW Salima solar project are expected to come online in 2025.

Niger has also left the top 10 by only installing 10.4 MW Dosso Solar PV Park in 2024. Nonetheless, three power plants are supposed to come online in 2025, bringing the installations back to 2023 (>30 MW) level.

Cameroon, after commissioning two solar plants of total 35 MW capacity in 2023, hasn't commissioned enough plants to stay in the top10 2024 list. However, after a bullish year, the country is poised to install new solar projects, with the support of the World Bank and an ambitious renewables target.

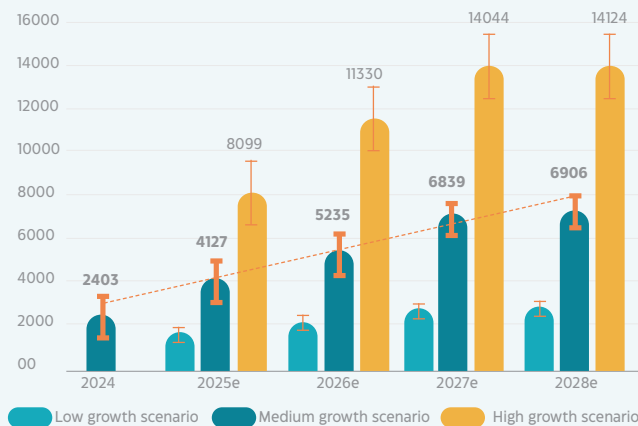
In addition to the utility-scale projects mentioned above, more deployment of course took place in the small-scale, rooftop and off-grid markets.

1. The **low growth scenario** assumes deteriorating market conditions and unsuccessful policies leading to a decrease in investment, delays in projects commissioning, and lack of political will. While it may only happen in the worst case, this scenario displays a lowered growth rate for Africa with missed opportunities to tap the solar potential.
2. In the **medium growth scenario**, seen as the most likely, the market conditions are sound but not ideal, with delayed project development and some planned ones that never break ground. It considers policies that are planned, such as awaited tariff injections would boost C&I installation in Morocco.
3. The **high growth scenario** showcases exponential growth by assuming excellent market conditions supported by a stable and incentivizing policy and regulatory framework, and on time commissioning of the announced or planned projects. While this scenario may seem unrealistic, as delays are announced in every market in the world, it is found heuristic as it gives an indication of investors' interest in Africa. It shows a possible future by considering the projects that could be announced within the next 4 years.

The most likely, medium growth scenario depicts installation growth at 30% CAGR by 2028. That means, Africa is expected to cumulatively install 23 GW of new solar capacity between 2025 to 2028, more than doubling its 2024 cumulative installed capacity in only four years. It will likely be dominated by utility-scale projects, boosting the installation trend at a pace never seen before.

- Major projects are expected to be launched in the coming year, for instance, Nour Midelt II and Nour Midelt III, each with a capacity of 400 MW⁶ in Morocco. Notably, pre-qualification for companies involved in Nour Midelt III was completed in 2023.
- Algeria's Sonelgaz, the state-owned utility in charge of electricity and gas, has awarded two tenders for 3 GW solar capacity in March 2024.
- In Tunisia, despite a change in the developer from Engie Nareva to Voltalia, which delayed the 130 MW Gasfa Solar Project, it is supposed to come online in 2026. Furthermore, Tunisia has launched a 200 MW PPA based tender in October 2024, which will complete the soon-to-be-commissioned Tozeur solar plant and Kairouan solar plant in Metbassta, both are currently in the construction phase. Tunisia's total installed capacity is also boosted by the ongoing tendering of 1.7 GW of renewables – of which 1.1 GW of solar is planned – contributing to the region's growth.
- Similarly, Libya is expected to install new solar capacity rapidly from 2025 onwards. Its first utility-scale 50 MW Bani Walid Solar PV project is under construction and expected to be commissioned during 2025. Additionally, the Sadada project, developed by Total Energies, should propel the solar capacity of Libya by 500 MW in 2028.

Figure 10: Africa New Solar PV Installation Outlook, 2025-2028 (in MW)



1.1.2 Africa Solar PV Outlook 2025-2028

Three scenarios have been constructed to forecast the installation for the next four-year period 2025-2028. We have introduced buffers for each scenario as this report has favoured data with a high level of certainty which may have unaccounted some projects for 2024. Detailed methodology is given in Annex.

The scenarios depend on the successful completion of the various solar projects with assumptions on its overall market health and policy support:

Africa Solar Outlook for 2025

2025 is forecasted to increase new solar installation in Africa by 42% than the year 2024, partly because major projects delayed in 2024 are highly expected to get commissioned in 2025. For instance, 2025 should see a wave of projects getting installed in Algeria through the series of tenders coming online. And Morocco, Ghana and

¹⁰ Copperbelt Katanga Mining (2024), ZESCO and PowerChina Sign MoUs to Boost Zambia's Solar Energy Capacity, Last modified [insert date if available]. <https://copperbeltkatangamining.com/zesco-and-powerchina-sign-mous-to-boost-zambias-solar-energy-capacity/>

Mozambique would also take a bigger part driving the market growth.

Unsurprisingly, South Africa and Egypt should remain the top two leaders, although the gap between the two of them would narrow. However, the diversification trend should be solidified in 2025. Both Botswana and Mauritius could support the growth by more than 100 MW, due to various projects at the construction phase. Zambia has three solar plants in construction of total 180 MW, which should contribute to delivering the country's plan to develop renewables to 30% in the energy mix (excluding hydro) by 2030. Algeria is foreseen to install 820 MW in 2025, sensibly contributing to the growth of solar capacity in the continent. Similarly, Tunisia is expecting continued growth over the coming years with awaited projects supposed to come online which should rapidly increase its solar capacity.

Malawi should also contribute to the overall growth of the continent in 2025, with a highly anticipated 50 MW Bwengu Solar PV Park Project by Quantel Renewable Energy Ltd and the expansion of the Nkhotakota park to 38 MW capacity from the original 21 MW by Phanes Energy Renewable. It would represent a great growth trajectory, only a few years after commissioning its first utility scale project in 2021. It will complement the Off-grid Market Development Fund, aiming to make solar power affordable for low-income households, supported by the World Bank. Similarly, Benin, after commissioning its first utility scale project in 2022, has started the construction of two plants: 25 MW Forsun Plant and one in Pobè, which would come online in 2025/2026. It will contribute to the country's target of 150 MW of solar by 2025.

In conclusion, no less than 18 countries would have the potential to install above 100 MW of solar energy in 2025 compared to two in 2024, solidifying the trend of diversification of installers across the continent.

African countries to drive solar growth until 2028

2025 onwards, continent's growth is expected to be led by major African countries, few are set to become GW market. Libya would be a major contributor, especially if the recent 2 GW solar project agreement by W Solar Investment is realized. Zimbabwe could also install 1 GW by 2028. Despite being a traditionally less utility-scale based market, Nigeria could see its new solar installed capacity ramping up as the Kebbi state government allotted 200 hectares of land to a private investor to set up a 5.6 GW solar power plant in the state. Additionally, the Lafia Solar PV Park and the Gombe Solar PV Park could add 600 MW up to 2028 in Nigeria. Mali may become a GW market by adding a significant planned utility-scale solar PV by 2028.

Major countries like Angola, and Mali are expected to announce projects for 2028. Furthermore, Morocco's important solar program is expected to be implemented by 2027, including the recent tenders

the country has awarded. Therefore, the country has a low forecasted installation in 2028, which seems unlikely. The GW project signed in 2022 between Huawei and Meiner Technology might mark a significant stride in Ghana's solar installed capacity and it may become a West African Power Pool (WAPP) leader. Zambia could also become a GW market by 2027, depending on the completion of the Masdar PV project and the Green Giant Zambia project.

Ivory Coast has the ambition to become a regional leader in West Africa with the successful tendering of 678 MW launched in 2024 by the government. This long-term planning with an official off-taker through PPA can provide a solid framework to attract investors and bolster the roll out of PV.

However, the estimated forecast for Africa for 2028 is only higher by 1% margin than 2027. While this can seem counterintuitive in a dynamic continent such as Africa, subject to an increasing interest in solar by policymakers, investors, and institutional actors, several reasons can explain this slowdown in growth. Furthermore, since the report is aiming at providing quality data, some projects have been assuming some delays and rolled over 2029, which therefore aren't shown in the forecasts for 2028. Since this report is mainly looking at utility-scale projects, this slowdown highlights the need for tenders planning to ensure stable and continued growth in the market.

The African market is marked by diversification and more dynamism and is set to diversify even more in the coming years, with various countries' policies ramping up their tenders and awaited projects coming online. A clear growing installation rate is visible for this region in 2025, 2026, and 2027: solid ambitious energy planning with regular tenders would send positive market signals and contribute to sustaining this trend. Other signals with a positive impact could be the implementation of the African Continental Free Trade Area to broaden domestic markets for African energy firms or utilities.

On a broader energy landscape, with the completion of all the hydropower plants by 2030, hydropower could reach 60 GW¹¹. In the high scenario, solar energy could reach that amount by 2028 and become the biggest renewable energy source in Africa.



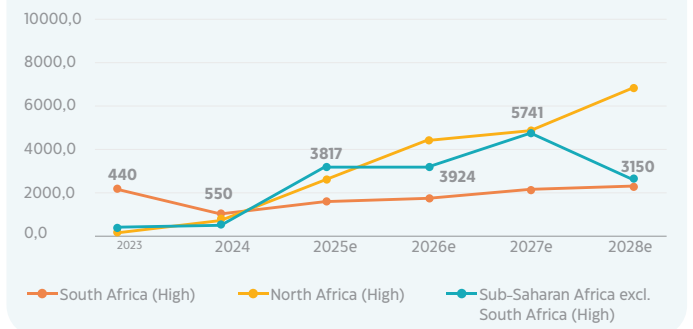
Focus on the future of Sub-Saharan Africa

While Africa can be traditionally divided into 4 or 5 regions, the landscape for solar in Africa brings another perspective. Sub-Saharan Africa is home to the majority of the 600 million people without access to electricity in the world. While solar PV is an increasing solution to alleviate the lack of electricity access in this region, Sub-Saharan Africa still has fewer solar panels than the German region of South Bavaria.

We estimate that Sub-Saharan Africa excluding South Africa could be the leading installing region in 2025, an unprecedented effort. Furthermore, it could consistently install more than the South Africa over the next few years. However, its forecasted decline in 2028 seems likely to indicate a lack of market visibility and energy planning, which is crucial to investors.

The figure below shows the high growth scenario-based outlook for African regions, to take into consideration the vast pipeline of projects in the various regions. *It estimates North Africa would witness the greater and fastest new solar installation growth from 2026-2028.*

Figure 11: High Scenario Outlook Comparison: Sub-Saharan Africa (excl. South Africa) vs South Africa and North Africa (in MW)



The new solar installations in Sub-Saharan Africa are majorly supported by Ghana, Zimbabwe, Zambia, Mozambique, Angola and Nigeria positioning themselves as leaders of the 48 countries composing this region. Burkina Faso also displays a steady growth rate until 2027.

Other countries with ramped up capacities and political support to develop solar like Togo could tender bigger projects, which would contribute to the growing forecast of the region. Similarly, Tanzania has finalized its National Renewable Energy Strategy, aiming at 750 MW of renewable energy capacities by 2027.

¹¹IEA (2022), Africa Energy Outlook 2022, IEA, Paris <https://www.iea.org/reports/africa-energy-outlook-2022>.

1.1.3 Trends across market segments

This report focuses mainly on the utility-scale solar PV segment. Undeniably, C&I (commercial and industrial) and residential segments are shaping Africa's solar landscape and are harder to track. Therefore, we have considered markets with a higher share of installation for both the segments.

Utility-scale

We observed a rebound in the share of utility-scale projects in 2024, driven by several new projects coming online, limiting the trend seen in 2023 when utility-scale installations were overtaken by C&I. The utility scale share is foreseen to increase, as major projects and programs are implemented and will come online in the next four years. For instance, Morocco's target of 1.1 GW of solar by 2025 as well as the announcement of 678 MW of solar by 2030 from Ivory Coast are World Bank programs which would boost the adoption of utility-scale projects. The first utility-scale project of 30 MW will soon start its construction in Guinea Bissau, via the Solar Energy Scale-Up and Access Project. Additionally, the World Bank's Scaling Solar program has contributed to the commissioning of a 54 MW solar plant in Zambia in 2019, laying the foundation for the Itimpi solar plant of 60 MW commissioned in 2024 by the Copperbelt Energy Corporation.

Commercial & Industrial (C&I)

Many businesses are turning into reliable and low-cost solar plus storage for their power needs in Africa. Hence, commercial rooftop solar has experienced huge growth which is incentivized by both component price decreases as well as spiking electricity prices in various countries.

For instance, C&I segment has surged in South Africa, supported by the severe energy crisis instances that lead to electricity blackouts, sometimes for ten hours. Although load shedding has decreased in the country, small-scale C&I is forecasted to keep rising between 8% to 15% in the next two years.

In Ghana, a major commercial & industrial market player Mirova Gigaton Fund committed USD 20 million in long term debt financing to ManoCap Energy¹². This fund will contribute to expand its business to neighboring countries such as Ivory Coast, Nigeria, Guinea, Liberia and Togo.

A stable regulatory framework regarding PPAs is necessary to take advantage of the potential of PPAs. For instance, Kenya's position regarding PPA has been fluctuating over the past year. The country recently missed the opportunity to lift the moratorium on PPAs, late 2024. Nonetheless, Equinor Energy has installed at least 6.2 MW of C&I project in the country in 2024 that were agreed before the moratorium, contributing to the competitiveness of various factories across the country and helping with the growing electricity demand.

Another driver of the C&I market is the Carbon Market Adjustment Mechanism (CBAM), a carbon tax at a European level, supposed to be enforced in 2026. Under this measure, companies must lower the carbon footprint of their product rapidly if they want to lower the cost of the carbon tax on their product and keep exporting to Europe. This incentive has peculiarly drove the solar market in Morocco this year. Additionally, incentivizing policies can have a real impact on the uptake of C&I, as the injection tariffs are highly awaited in Morocco.

Residential solar

There is often a corresponding rise in residential PV installations as a solution to frequent electricity blackouts. For example, demand for residential solar power generation often goes up as the blackouts in South Africa and other markets tend to peak between May to June every year.

Intermittent and unreliable supplies have also contributed to a wider adoption of residential solar, a trend similar in markets where power prices have surged.

Nigeria has for instance hiked the electricity tariff, to cut subsidies, whereas it had one of the cheapest electricity prices in 2023. Mauritius, similarly, planned 10 MW of rooftop solar through its national power utility the Central Electricity Board, and already 2,000 homes equipped with solar systems in 2024. The direct benefit from these installations is the decrease in electricity bills, which can go as far as halving them.

Solar mini grids

Mini grids are one of the best solutions to electrify the remote areas where grid is not available. The Economic Community of West African States (ECOWAS) has launched the ECOWAS Special Intervention Fund (ESIF) designed to roll out clean energy projects. A 40 kWp and a 150 kWh battery energy storage system have been inaugurated in Cabo Verde, to bring electricity to approximately 800 inhabitants. ECOWAS has planned to inaugurate several projects in Nigeria, Ghana, Senegal, and Benin in the coming months. According to the Mini-grid Partnership, there was a significant rise in total committed funding, exceeding USD 2.5 billion in 2023, as well as a sixfold increase in private investment from less than USD 100 million in 2015 to nearly USD 600

million in 2022¹³, enabling millions of households to access affordable and reliable electricity for the first time. Additionally, between 2018 and 2024 there was a significant decline in the share of diesel capacity in mini-grids, plummeting from 42% to 29%¹⁴.

Mini-grids usually represent a first step towards grid connection, in the long run. However, one of the main challenges for mini-grids is always the risk of the grid arriving one day in that community, thereby undermining the business model of the mini-grid and sometimes making the infrastructure completely obsolete.

To avoid these concerns, it is advisable to do spatial planning and divide territories into four zones by energy authorities for proper planning:

- Those that are currently grid-connected, where the grid requires reinforcement and residential solar can supplement. Provide back up and an additional source of generation.
- Areas that could soon be grid-connected.
- Areas where a grid connection is not economically viable but where a mini-grid would be the best and permanent solution for electrification.
- Households, areas, and communities where a mini-grid is not viable and Standalone Home Solar systems (SHS), building by building, will be the best solution (combining PV and storage).



¹² Mirova Gigaton Fund provides USD 20 million debt funding to West Africa renewable energy specialist ManoCap Energy | Mirova
¹³ Mini-Grid Partnership (2024), State of the Global Mini-Grids Market Report 2024, <https://www.minigrids.org/global-market-report-2024/>
¹⁴ Ibid

Case Study

Solar Mini-grids Benefitting Rural Africa,

Provided by: Husk Power Systems

To accelerate rural electrification in Sub-Saharan Africa, solar mini-grids have been identified by the World Bank as the most cost-effective pathway to electrifying 380 million people, using localised solar generation, battery storage, and last-mile transmission and distribution (T&D). This will require 160,000 mini-grids and will herald an unprecedented leap forward in the history of global rural electrification.

Private sector mini-grid companies such as Husk Power Systems (“Husk”) are meeting this challenge at both scale and speed by building, owning and operating hundreds of mini-grids across the continent, while also creating thousands of local jobs and displacing expensive and carbon-intensive diesel generation that dominates the rural African economy.

Digitally-enabled rural energy platforms such as Husk’s are key to addressing electricity supply as well as demand. This is critical because most of the communities that mini-grid companies serve have few if any means to utilise the electricity provided. To fill that gap, and improve mini-grid performance, Husk has been offering appliance sales and credit financing directly to consumers via an e-commerce app and through channel partners. Value-added services such as electric vehicle leasing and battery swapping, and support for local farmers through agri-processing, cold storage and irrigation are also integrated into mini-grid operations.

Rooftop solar solutions for commercial and industrial (C&I) customers are also taking off in Africa. Husk, using its EPC capacity, provides C&I customers in its service area with standalone solar solutions either on a turnkey basis, or using a PPA.



All of Husk’s operations are underpinned by innovative back-end and front-end digital technology. It uses predictive AI, IoT and smart metering to remotely monitor and manage its mini-grids, significantly reducing operational expenses, while also proactively managing load demand. Its consumer-facing mobile app allows customers to monitor, manage and pay for their electricity or purchase appliances. Husk is also piloting its first virtual power plant (VPP) in Nigeria.

Husk, founded in 2008, leads in deploying a digitally-enabled mini-grid platform and world-class EPC capacity. To date, it serves 1.5 million people in Nigeria and India, including more than 30,000 micro, small and medium-sized enterprises (MSMEs) as well as households, health clinics and schools. It has set a target of having 2,500 mini-grids on the African continent by 2030, both in isolated off-grid communities as well as grid-connected communities where last-mile service remains a loss-centre for state distribution companies.

Husk’s example shows that solar mini-grid solutions can bring significant social and economic impact. By mobilising hundreds of millions of dollars in private capital, mini-grid companies also reduce the burden on finance ministries and loss-making national utilities. To date, Husk has:



Avoided more than 15,000 tonnes of CO₂ annually by displacing thousands of diesel generators, which Husk monetises on the voluntary carbon market;



Employed 1,200 people, 90% of whom are hired and trained in the rural communities served by Husk to handle technical, sales and security functions;



Deployed 1 mini-grid per day by developing a containerised “energy-in-a-box” solution called PRISM (Power Resilience and Intelligent System Management);



Surpassed 500,000 downloads of its rural e-commerce app providing appliances and lifestyle products;



Adopted a gender policy that prioritised inclusion of women within the company, as well as women small business owners;



Attracted hundreds of millions of private capital; Husk became the first mini-grid company to announce profitability in Q4 2023;



Maintained the lowest levelised cost of energy (LCOE) in the industry, and the highest utilisation rate of its mini-grids.



Off-grid solar

Off-grid solar solutions such as solar home systems have played a growing role across Sub-Saharan Africa in providing improved energy access for households either as a primary source of energy or as a back-up to the grid. Off-grid solar represented 55% of new connections from 2020 to 2022 in the region¹⁵. Incidentally, a widespread adoption of off-grid solar system has been enabled by the Pay-As-You-Go (PAYG) financing model, with 45% of these products sold through PAYG in 2023. After bouncing back from the COVID-19 pandemic between 2020 and 2022 (39% growth rate), sales growth slowed down in the region to 6% in 2023 as many markets struggled with inflation and currency depreciation and devaluations¹⁶.

Despite the constraining context, off-grid solar sales grew in West Africa in 2023, mostly due to the expansion of SHS sales in Nigeria boosted by rising fuel costs and supportive initiatives such as the Nigeria Electrification Programme¹⁷.

Across East Africa, sales stabilized to a flat growth in 2023, with Kenya and Uganda driving the demand. Load-shedding has been a major factor in multiple markets, and exemption of duty and VAT waivers

facilitate imports of equipment. Kenya for instance reinstated it since 2021.

Over the last few years, off-grid solar has been increasingly recognized for its role in reaching the remote areas with maximum subsidies and result-based finance programs by off-grid solar companies.

Looking forward, the launch of Mission 300 from the World Bank and the African Development Bank, aiming at electrifying 300 million people by 2030 will jolt off-grid solar. According to the Global Electrification Platform, solar off-grid technologies can provide the most effective, least cost and fastest way to reach almost half of the 300 million people targeted (135 m).

Floating solar

Floating solar is gaining traction across Africa. Floating solar installations combined with hydropower plants provide dual benefits of reducing water evaporation from reservoirs and improving the efficiency of solar panels through natural cooling from water bodies.

Several countries have shown interest in floating solar, by either constructing a plant or tendering, namely Seychelles, Mauritius, Ivory Coast, Ghana and Kenya. While these countries exhibit varying levels of hydropower development, they all hold significant potential for integrating floating PV into existing or planned hydropower infrastructure. Ghana and Ivory Coast, for instance, already have established hydropower capacities, making them strong candidates for this hybrid approach.

In contrast, Seychelles and Mauritius may focus more on leveraging floating PV in the sea to optimize their limited land resources and bolster their renewable energy profiles. Mauritius announced a 30 MW plant by 2026 and Kenya is actively pursuing a 40MW floating solar plant at Kamburu Dam¹⁸.

Zambia was looking for consultants in 2024 to explore floating PV on its Kariba Dam and Zimbabwe is seeking to install 250 MW on the same lake. This integration not only enhances energy production but also supports sustainability by conserving water and improving the efficiency of power generation.



¹⁵ Energy Sector Management Assistance Program (ESMAP), Off-Grid Solar Market Trends Report 2024: Outlook (English), Washington, D.C.: World Bank Group.

¹⁶ GOGLA, Global Off-Grid Solar Market Report Semi-Annual Sales & Impact Data, Jul-Dec 2023.

¹⁷ [gogla.org/wp-content/uploads/2024/11/GOGLA_Sales-and-Impact-ReportH2-2023_FINAL.pdf?_gl=1*1lkrcc9*_up*MQ_*_ga*MTgYOTc0MDg0O54xNzQwNTc2NTc0*_ga_S8GXMMHFk*MTc0MDU3NjU3NC4xLjAuMTc0MDU3NjU3NC4xLjAuMA_*_ga_G63VJ49YLW*MTc0MDU3NjU3NC4xLjAuMTc0MDU3NjU3NC4xLjAuMA](https://www.gogla.org/wp-content/uploads/2024/11/GOGLA_Sales-and-Impact-ReportH2-2023_FINAL.pdf?_gl=1*1lkrcc9*_up*MQ_*_ga*MTgYOTc0MDg0O54xNzQwNTc2NTc0*_ga_S8GXMMHFk*MTc0MDU3NjU3NC4xLjAuMTc0MDU3NjU3NC4xLjAuMA_*_ga_G63VJ49YLW*MTc0MDU3NjU3NC4xLjAuMTc0MDU3NjU3NC4xLjAuMA)

¹⁸ Ibid

¹⁹ African Energy Council (2024), KenGen Plans a 40MWP Floating Solar Plant at Kamburu Dam, <https://africanenergycouncil.org/ken-gen-plans-a-40mwp-floating-solar-plant-at-kamburu-dam/>

1.2 Key Drivers and Challenges for Solar Adoption



Africa encompasses multiple geographies, yet some macro-trends can be identified, especially when it comes to key drivers for solar deployment as well as challenges. We think that below mentioned drivers and the challenges will continue to shape the solar demand for the next four years:

Economic growth and Energy Transition

The economic growth of the continent is profoundly tied to its energy growth. Africa accounted for eleven of the world's 20 fastest-growing economies in 2024¹⁹. Overall, gross domestic product (GDP) for the

continent is expected to grow at an average of 3.8% and 4.2% in 2024 and 2025, respectively. This is higher than the projected global averages of 2.9% and 3.2%. The growth will be important for several countries stimulating their energy needs. The top 11 African countries projected to experience strong economic performance forecast are Niger (11.2%), Senegal (8.2%), Libya (7.9%), Rwanda (7.2%), Cote d'Ivoire (6.8%), Ethiopia (6.7%), Benin (6.4%), Djibouti (6.2%), Tanzania (6.1%), Togo (6%), and Uganda (6%).

Furthermore, the IEA forecasts an average annual growth of 4% in total electricity demand of Africa for the 2024-26 period, doubling the mean growth rate observed between 2017 and 2023²⁰. Building a coal or gas plant to meet this energy demand requires significantly more time, making solar PV an attractive alternative. Solar PV stands

out as a cost-effective and rapidly deployable solution, capable of addressing urgent energy needs within a shorter timeframe.

Demand for air conditioning amid temperature rise due to climate change is another driver in Africa as the population emerges from poverty with better standards of living. Solar PV, storage and air conditioning are very well matched in terms of supply and demand profiles. It should be noted however that solar modules and inverters start to degrade in terms of performance around 55°C, so extreme temperature increase could be a climate adaptation threat to PV deployment (this is also true of many other electronics and infrastructure).

“

Solar PV stands out as a cost-effective and rapidly deployable solution, capable of addressing urgent energy needs within a shorter timeframe

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¹⁹ African Development Bank (2024), Africa's Macroeconomic Performance and Outlook, January 2024, <https://www.afdb.org/en/documents/africas-macroeconomic-performance-and-outlook-january-2024>

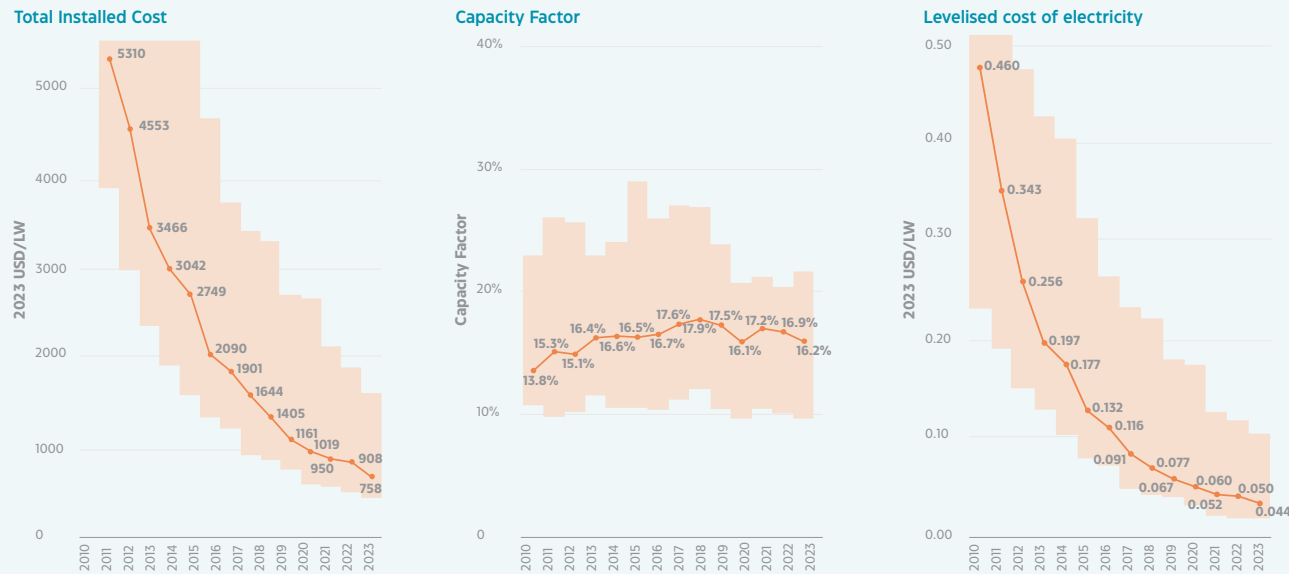
²⁰ IEA (2024), Electricity 2024, IEA, Paris <https://www.iea.org/reports/electricity-2024>

Declining solar PV and battery storage costs

Storage technologies especially battery storage has become a major driver for increased solar installations globally. The cost of battery and solar has been declining to a considerable level since last ten years.

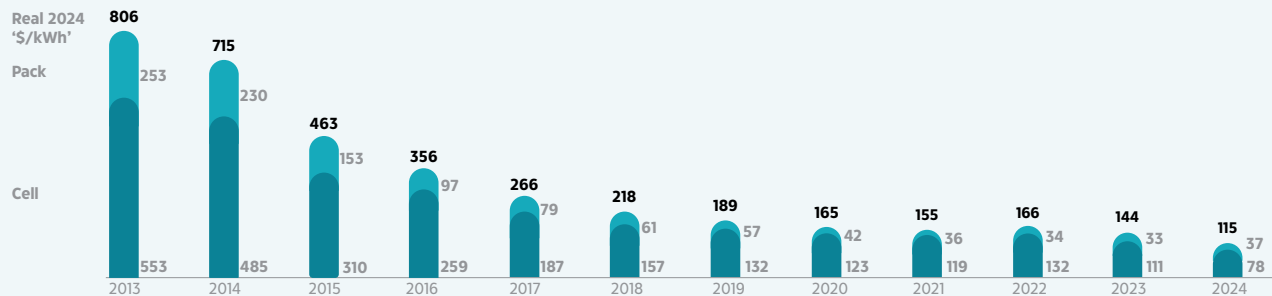
In Sub-Saharan Africa excluding South Africa, the solar module prices dropped from 27 cents to 9 cents per watt between 2022 and 2024 due to the expansion of production capabilities in China according to BNEF²¹. The same analysis estimates that the cost of new solar in South Africa has decreased by 24% from 2023 to 2024 in real US dollar terms.

Figure 12: Global weighted average and range of total installed cost, capacity factors and LCOEs for utility scale solar PV, 2010-2023



Source : Renewables Power Generation Cost 2023, IRENA

Figure 13: Volume-weighted average lithium-ion battery pack and cell price split, 2013-2024



Source : BloombergNEF. Note: Historical prices have been updated to reflect real 2024 dollars. Weighted average survey value includes 343 data points from passenger cars, buses, commercial vehicles and stationary storage.



²¹ESI Africa (2024), BNEF on Levelized Cost of Electricity in Africa, <https://www.esi-africa.com/news/bnef-on-levelised-cost-of-electricity-in-africa/>

Interestingly, battery storage is also gaining a role in load management in South Africa, where the TSO, Eskom, has announced the deployment of 500 MW in BESS projects to address the power outages. Overall, four-fifths of the clean technology manufacturing investment in 2023 went to solar PV and battery manufacturing²². To bolster the uptake of storage across Africa, a key measure governments could choose to set is national energy storage targets, incentivize the roll-out of this technology and show clear positive signals to investors.

However, the cost of the module does not constitute the total installation cost of the project on its own. Projects are subject to various costs that render the project costlier.

High Cost of Finance

The weighted average cost of capital (WACC) is among these crucial barriers that need to be overcome. Many African countries face three times higher cost of capital than in developed countries²³. Given that solar and storage technologies require substantial upfront investment, various actual and perceived risks hinder the widespread deployment of solar energy solutions. For instance, currency risks (e.g. Ghana's currency lost 25% compared to the dollar between January 2024 and November 2024), political instability, and underdeveloped domestic capital markets increase the cost of financing. In some countries, utilities and state-owned energy companies are viewed as having high credit risks, resulting in increased off-taker risks. This perception creates challenges in securing financing for solar projects and scaling up the roll-out of clean power.

However, the financing cost can be reduced. Policies and enabling regulatory framework, concessional finance, risk-mitigation tools, and other derisking mechanisms exist to tackle this issue. As this question requires more than an overview, Chapter 3 of this report is dedicated to Financing Africa's Energy Transition.

Another challenge lies in the lack of economies of scale that increases the cost of the project. Whereas European and American developers and EPCs can use GW-scale pipelines to drive down costs in their suppliers, African developers do not benefit from the same economies of scale. Hence, a robust pipeline of project, with long-term visibility on the market seem crucial both for investors and project developers.

Electricity and Energy access for all

Electrification drive in African countries is another big driver for solar deployment. General research says more than 570 million people are living without electricity access in parts of Africa region.

Many African nations drive demand for solar energy as it's a reliable and scalable alternative. According to SE4All's definitions of energy access, populations in Tier 1 and Tier 2— characterized by minimal and often unreliable power condition —seek solar solutions to meet basic and productive energy needs, such as lighting, refrigeration, and communication. This untapped demand is positioning solar as a critical enabler of energy access in Africa.

However, weak buying power remains a barrier. Despite the declining cost of solar PV, the population that live in rural areas also correlates with having less income unable to afford solar home systems. Financial support is therefore necessary in some parts of Africa to enable universal electricity access. Nonetheless, development aid and grants in the Standalone Solar Home System (known as picosolar) market can endanger the business model of private venture.

Frequent blackouts and load shedding spurring decentralized energy

Load shedding and frequent blackouts have become more prevalent in some countries for various reasons: ageing coal fleet, unplanned outage of power source, lack of generation capacity and geopolitical shifts both within the continent and at global level. For instance, Ghana has recently lost 300 MW of gas coming originally from Nigeria, inducing a three-week power outage late 2024²⁴.

The increasing opportunity to couple solar with storage, stabilizing further a decentralized system is becoming more and more adopted by countries. Mozambique in September 2024 launched a PV + BESS tender which is an example among many of an exponentially growing demand. This solution is also increasingly used by companies, battling with load shedding and higher electricity prices, to regain competitiveness and stability.



²² IEA (2024), Energy Technology Perspectives 2024, IEA, Paris <https://www.iea.org/reports/energy-technology-perspectives-2024>

²³ Clean Air Task Force (2024), High Capital Costs Stalling Clean Energy Investment Across Africa, <https://www.catf.us/2024/10/high-capital-costs-stalling-clean-energy-investment-across-africa/>

²⁴ Graphic Online (2024), Power Outages Due to Gas Supply Issues, GRIDCo and ECG Apologise, <https://www.graphic.com.gh/news/general-news/power-outages-due-to-gas-supply-issues-gridco-and-ecg-apologise.html>

Case Study

The Climate Resilience

Provided by: Solar Sister

The communities Solar Sister serves often face immense barriers to accessing economic opportunities, including gender disparity, economic and political instability, and climate disasters. In response to the devastating 2022 floods in Nigeria, which displaced 1.4 million people and severely impacted women and children, Solar Sister adapted its model to support 50 women in Taraba, Benue, and Nassarawa states. The program removed barriers to entrepreneurship for these women by developing targeted support systems to enable their success.

The initiative provided participants with an initial solar product inventory, digital toolkits, and tailored mentorship. Through Solar Sister's graduated business training, the women gained access to a tested product pipeline, warranty support, and local Sisterhood groups for networking and encouragement. A key aspect of this initiative was securing community buy-in. In many rural areas, women entrepreneurs face skepticism due to traditional gender roles. Solar Sister engaged community leaders and male allies in discussions about the benefits of women-led clean energy businesses.

Impact and Key Data Points

On average, participants sold 6.7 times the initial inventory investment, demonstrating the success of Solar Sister's focus on reducing entry barriers. Over eight months, the 50 women distributed more than 2,000 clean energy products, bringing energy access to 8,000 community members. Additionally, 95% of participants reported increased decision-making control within their families.

This pilot, funded by Acumen and GAC, showcased the adaptability of Solar Sister's model to vulnerable contexts and established best practices for future initiatives.

Support Needs from Government, Policy, and Industry

Government and industry leaders need to integrate gender-inclusive policies into energy access programs, creating a sustainable and inclusive energy sector. This includes engaging communities, addressing biases in public institutions, and ensuring gender-sensitive budgeting. Promoting renewable energy through women's groups, schools, and health clinics will help drive equitable access and adoption. Financial inclusion programs, such as micro-loans and government-backed grants, are essential to helping women expand their businesses beyond the initial support phase.

Collaboration with clean energy manufacturers is crucial to providing affordable, high-quality products while ensuring women are engaged as users, producers, suppliers, and after-sales service providers. Increasing women's representation in executive and decision-making roles within the energy sector will strengthen long-term impact. Investing in digital and physical infrastructure, such as mobile banking services and improved transport networks, will enhance business operations and create more opportunities for women entrepreneurs in clean energy.

“Over eight months, 50 women distributed more than 2,000 clean energy products, bringing energy access to 8,000 community members”



Inter-regional connections for stable power supply and off-take

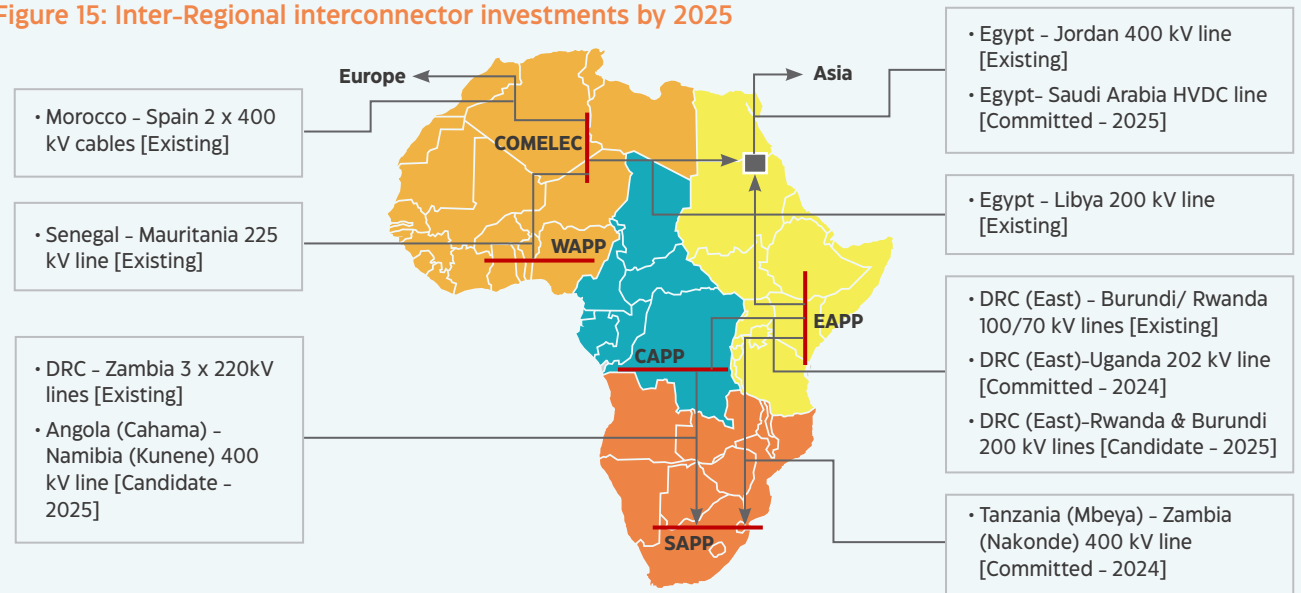
The lack of basic infrastructure remains one of the main barriers to industrial development and increased trade across the continent (AEO 2022), especially for grid capacity. Insufficient grid infrastructure hinders the widespread solar adoption in many parts of Africa. Creating mini grids can add to the cost of the overall project, making it less profitable. There are also anecdotal reports of developers financing their own grid connections, often spanning long distances, to enable solar projects to connect to the grid. This added financial burden further complicates the deployment of solar energy and increases the generation cost, highlighting the need for significant investments in grid expansion and modernization. But some key actions have been put in place to address this challenge and have already come to fruition.

The African Single Electricity Market offer growing off-take models. More recently, thirteen countries of the Eastern Africa Power Pool (EAPP) have expressed their will to strike an agreement on common rules to trade electricity in early 2025, with Tanzania, Ethiopia and Uganda peculiarly attracted by the opportunity of exports. The African Continental Free Trade Area (AfCFTA) is also supporting the development of cross-border renewable energy trade. By connecting regional energy grids, countries can export surplus energy to neighboring states. In practice, the various regional electricity markets remain independent, which the AfCFTA could remedy.

For instance, the Programme for Infrastructure Development in Africa (PIDA), aiming at developing the needed infrastructures, holds 72 energy projects. 60% of those are in Sub-Saharan Africa, and more than two thirds are to increase electricity transmission capacity. These initiatives will back the Africa Single Electricity Market and the Continental Power System Master Plan, which are designed to provide long-term planning for regional electricity networks. In 2025, due to previous investments, 4 out of the 5 power pools in Africa have existing weak interconnections. By 2040, it is envisioned that the five regions will be strongly interconnected.

“The wider adoption of renewables is also sparking a recovery in spending on grids and storage”

Figure 15: Inter-Regional interconnector investments by 2025



Source : Presentation, March 2024, African Union Development Agency (AUDA-NEPAD)

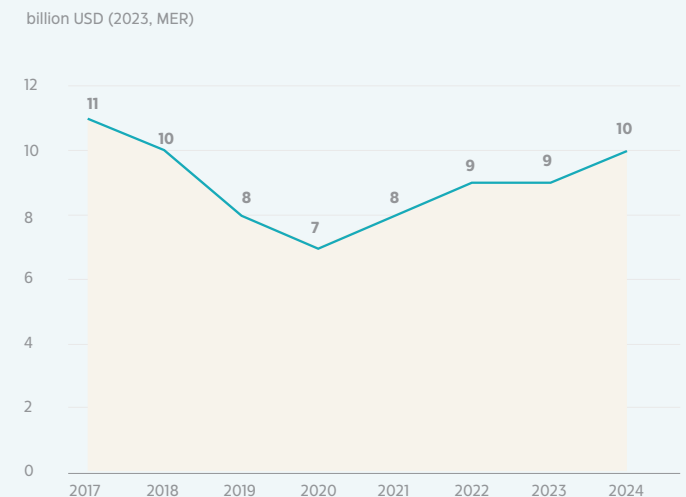
Highlights of continental interconnected network by 2025

- CAPP, COMELEC, EAPP and SAPP grids connected through weak interconnections
- WAPP grid still isolated from other regions expect for the 220kV line that connects Senegal with Mauritania in COMELEC
- DRC network still fragmented, DRC East connected to EAPP, DRC South to SAPP, DRC West to CAPP.
- Interconnector limits are higher than the selected SPLAT capacities - indication technical feasibility of the SPLAT optimisation

Interconnection projects which are already flourishing across Africa. For example, funded Mauritania-Mali 225 kV transmission line is [the first section of a trans-Sahel spine that will link Mauritania to Chad via Mali, Burkina Faso and Niger](#)²⁷. Some cross-border generation projects benefiting various countries within Africa are also observed. For example, Zambia and Zimbabwe are working on joint hydropower projects to supply clean energy to the broader Southern African Development Community (SADC) region.

The wider adoption of renewables is also sparking a recovery in spending on grids and storage, which will only be amplified as more renewables are developed in a virtuous circle.

Figure 16: Investment in power grids and storage in Africa, 2017-2024



Source: IEA (2024)

²⁷ North Africa Post (2024), AfDB Commits \$303M for Mauritania-Mali Electricity Interconnection Project. Last modified [insert date if available]. <https://northafricapost.com/74509-afdb-commits-303m-for-mauritania-mali-electricity-interconnection-project.html>

Strengthened international cooperation for investments and capacity building

International cooperation is a driver for large scale solar deployment opening the doors for investments, technical know-how and for best practices.

During the G20 2024, president of the European Commission Ursula von der Leyen and South Africa President Cyril Ramaphosa, together with Global Citizens launched the “[Scaling up Renewables in Africa^{28*}](#)” campaign to bring clean energy to the communities that need it most. This campaign stems from the EU-Africa Global Gateway Investment package, which supports Africa with 150 billion euros worth of investments, focusing on green and digital transition, sustainable growth and jobs, as well as supporting health systems and improving education and training.

During the Forum On China-Africa Cooperation (FOCAC) in September 2024, China committed to investing in renewable energy projects, with a peculiar emphasis on solar. Another aspect that was highlighted during this summit is the professional training and capacity building because of deeper energy cooperation, the lack of technical expertise, and installers limiting the continent’s growth.

Indeed, lack of expertise and resources in some parts of the continent at various levels (government, agency, project developer...) hinders the continent’s growth prospect. For instance, the need to hire external consultants can add time and costs to projects. Reinforcing technical knowledge in some countries is necessary to unleash the potential of the continent. The Global Solar Council, together with the International Solar Alliance is contributing to this effort via its Global Connect project. Aiming at building capacities within the solar associations across the world and especially in Africa, this project seeks to enhance the best practices sharing and equipped the professionals of Africa with the right tools to help them build their renewable energy mix. Finally, a crucial aspect pertains to the development of a robust policy and regulatory framework to support renewable energy investments.

Regional cooperation is also key to developing solar power in Africa. The Lusophone Renewable Energy Association (ALER) coordinate the Community of Portuguese-Speaking Countries, foster collaboration among Lusophone countries to accelerate the energy transition, mobilize investment, and strengthen policy alignment. This initiative enhances Africa’s role in global climate discussions, promoting renewable energy, climate finance, and regional integration.

Renewable hydrogen from solar is an ideal combination in Africa

Renewable hydrogen and e-mobility are becoming electricity drivers, with several projects that have been announced. Indeed, solar as cheap sustainable energy in a continent of abundant resource makes the designated vector for the electrolysis. *Chapter four of this report is dedicated to renewable hydrogen and e-mobility, which provides more information on how solar and renewable hydrogen are natural partners in Africa.*



²⁸ European Commission (2024), Energy for Africa under the Global Gateway, Last modified [insert date if available], https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/stronger-europe-world/global-gateway/energy-africa_en

A white bird, possibly a egret or heron, is perched on a solar panel. The bird is facing left. Behind the bird is a large, semi-transparent green circle. The background is a teal gradient with a blurred image of a wind turbine. The foreground shows the grid lines of a solar panel.

Chapter 2

Country Profiles

After a first chapter focusing more on the continental level and the trends across Africa, this chapter will deep dive into several markets. They have been selected based on their potential, successes, challenges, and language diversity as well. They have been displayed in an alphabetical order.



Angola

Angola is one of the top ten countries for new solar capacity addition (~60 MW) in 2024. The energy sector is largely state-owned, with private sector participation allowed through concession contracts, and the country has made significant strides in solar PV deployment, while also undergoing economic diversification efforts to reduce reliance on extraction industries and strengthen sectors like agriculture and energy transition. While Angola's economy is heavily dependent on oil exports, interestingly, it's electricity generation is heavily dominated by hydro power and total energy consumption by bio-fuels and waste energy.

Despite Angola's abundant energy resources, including oil & natural gas, and hydropower, the country struggles with power shortages due to underdeveloped grid infrastructure, access to power and economic challenges. Angola's growing interest in solar energy market could reduce these energy challenges.

Angola's energy sector benefits from strong international support, including the G7 Partnership for Global Infrastructure and Investment, the African Development Bank, USAID, and the World Bank. As a member of the Southern Africa Power Pool, Angola has announced plans to interconnect its grid with Namibia and potentially the Democratic Republic of Congo.

Solar energy has been considered as the main driver to achieve a rural electrification rate of 60% by 2025 under Angola's Rural Electrification program, a part of the Long-term vision "Angola 2025". As per GSC Market Intelligence, Angola has installed ~350 MW total solar capacity by end of 2024 and reached its solar target earlier than stated under "Energia 2025" strategy- 100 MW solar by 2025, which is not adequate target for country's energy transition. C&I entities are classified as Non-integrated Electricity Systems under the General Electricity Law, allowing PPAs for self-consumption and excess electricity sales, with systems over 100 kW requiring registration.

The Ministry of Energy and Water identified potential for 16.3 GW solar power, 3.9 GW wind power, and 18 GW in hydropower throughout the country. To address rural demand, the government is pursuing the development of small-scale off-grid projects using solar and other renewable resources.

Although the government committed to 200 MW of renewable energy installation in the Angola 2025 Plan, the National Development Plan 2018-2022, raised the renewable generation goal to 700 MW with a possible consideration to 1 GW. As a result, several solar projects are being rolled out by government alongside foreign partners and developers, to name a few- 45 MW Quilemba Solar Project by Italian Sonangol, TotalEnergies, and Greentech is expected to begin operations

by late 2025 or early 2026; 150 MW Solar Project agreement signed by Masdar in December 2023 aims to power 90,000 homes; 500 MW Angola Solar Energy Project involving the installation of two solar PV facilities funded by a \$900 million agreement with the U.S. Export-Import Bank in June 2023; and 296 MW Solar Projects encompassing 48 mini-grid solar PV systems across multiple provinces through \$1.44 billion funding under Standard Chartered Solar Initiative in July 2023.

Angola faces several challenges and delays in solar projects development which are similar to any emerging developing country. It is important that Angola focus on establishing strong financial mechanisms to reduce the capital cost, improving grid infrastructure in all areas, enhancing regulatory frameworks, streamlining lengthy bureaucratic process especially land acquisition challenges, fostering local expertise, social awareness, enhanced regional and international collaboration for attracting needed investments and ensuring stable political and economic conditions.

Considering the policy developments and market dynamics, GSC Market Intelligence expects total 450 MW of new solar capacity additions in Angola under the medium growth scenario forecast period 2025-2029. We think that setting long-term solar and RE targets through energy and infrastructure planning for is crucial for visibility to investors. These steps can help unlock the Angola's maximum solar energy potential and meet its long-term energy goals.

Burkina Faso

Burkina Faso solar market is one of the most mature of West Africa region, while the country traditionally relies on imports for its electricity. As of December 2024, its total solar installed capacity is closed to 200 MW, including off-grid capacity. By 2026, Burkina Faso should have 225 MW of utility-scale solar.

The first Burkinabè grid-connected solar utility scale project, the Zagtoui solar plant was commissioned in 2017. The project was the result of a PPA with the Burkinabè power-utility Sonabel (Société Nationale d'Électricité du Burkina Faso), with a donation from the European Union (EU) and a loan from the French Development Agency (AFD). The same year, the government created various institutions such as Renewable Energy Agency of Burkina Faso for liberalising its electricity market and feed-in tariff mechanism.

From 2018, solar was put at the core of the energy policy with the aim of developing 100 MW through public-private partnership via PPA. This policy attracted various IPPs, such as Urbasolar, Qair, and Green Yellow. The results were the completion of various solar plants in the recent years, boosting the utility scale segment of Burkina Faso. A part of utility-scale project is completed for commercial use to decarbonise gold mine, such as the 15 MW Essakane Power plant commissioned by Wartsila in 2017 and the Zina solar Power Plant completed in 2024 by AMEA Power. The cumulative installed capacity is poised to increase further from 2025 onwards with the expected commissioning of the previously delayed solar projects. A part of utility-scale project is completed for commercial use to decarbonise gold mine, such as the 15 MW Essakane Power plant commissioned by Wartsila in 2017 and the Zina solar Power Plant completed in 2024 by AMEA Power.

The share of utility-scale solar will keep rising in the coming years due to the launch of a tender for 130 MW, for the first time with BESS in early 2025.

The World Bank announces the launch of the first solar and BESS tender in Burkina Faso

The World Bank is supporting the Government of Burkina Faso, through the [Solar Energy and Access Project \(P166785\)](#)²⁹ by developing regional solar parks with a total capacity of 300 MWp that is expected to become operational by 2030. The Ministry of Energy, Mines, and Quarries (Ministère de l'Énergie, des Mines et des Carrières), announced the upcoming tender for the first phase of the regional solar parks, with a 75 MWp solar park in Konean and a 45 MWp solar park in Kouritenga. The procurement of a third solar park in Kaya, with 30 MWp, is expected to follow in coming months. A second phase of the regional solar park tender is expected to be launched in coming years for 180 MWp in Kouritenga.

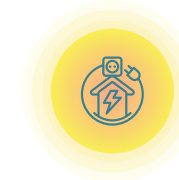
The Sustainable Renewables Risk Mitigation Initiative (SRMI) has provided funding and advisory to Burkina Faso to competitively procure an Independent Power Producer (IPP), who will be handling financing, construction, and operation for 25 years for the regional solar parks.

This would have been not possible without CTF's³⁰ 93 million USD funding to the Solar Energy and Access Project, which is financing critical grid infrastructure to absorb this additional solar capacity. This project marks a significant step towards the development of sustainable energy development in West Africa and variable energy resources integration.

Additionally, Burkina Faso has adopted a decree to boost domestic manufacturing in April 2024 which mandates out of every three imported solar panels one must be produced nationally. The government seek to capitalise the Faso Energy, the national manufacturer founded in 2020, to capture a part of the value chain.

Off-grid solar and rural electrification

Burkina Faso has one of the lowest electrification rates of the region. To tackle this issue, the government has published its National Rural Electrification Strategy in September 2024. This strategy highlights two major targets:



The national rural electrification rate will be increased to 50% in 2028, compared to 5.49% in 2022.



The national coverage rate will be raised to 80% in 2028, compared to 50% in 2022.

This will boost the dynamism of the off-grid and mini-grid sector, especially since the strategy considers the private sectors need. Indeed, while the fear of being connected to the national grid one can threaten an off-grid business model, the concession will remain under the private owner.

Further strengthening public-private partnerships to attract investment, expanding microgrid and off-grid solutions for rural electrification, enhancing local capacity through technical training programs and implementing policy-based targets would be critical for this market to increase the pace of solar deployment. Considering the overall policy developments and market dynamics so far, GSC Market Intelligence expects total 158 MW of new solar capacity additions in Burkina Faso under the medium growth scenario forecast period 2025-2029.



²⁹ World Bank (2024), Burkina Faso Solar Energy and Access Project, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/98810162458651735/burkina-faso-solar-energy-and-access-project>
³⁰ Climate Investment Funds (2024), Clean Technologies, <https://www.cif.org/topics/clean-technologies>

Ghana

Ghana's solar journey started when the government announced a solar rooftop program to relieve 200 MW of peak load on the national grid in 2015. Ghana's Renewable Energy Act, 2011 (Act 832), provides the legal foundation for renewable energy development, promoting efficient and sustainable utilization of resources. As agriculture accounts for 69% of Ghana's land area, the Renewable Energy Master Plan targeted for 6,000 solar irrigation systems (\$30 million investment) and 80 solar crop dryers (\$160k investment) deployment by 2020.

The National Energy Policy of Ghana aims for 10% renewables in total energy mix by 2030. In August 2024, the Ministry of Energy disclosed that it aims for 2 GW solar project initiatives scalable to 10 GW by 2030. This goal is part of the country's Renewable Energy Master Plan and Energy Transition Framework, alongside the Government Goes Solar initiative to install solar systems in remote communities. By 2060, it plans for 150 GW solar PV capacity expecting \$550 billion investment and become net zero as per the Energy Transition and Investment Plan (ETIA) developed with Sustainable Energy for All.

While these ambitious policy developments set a stage for solar in

the Ghana and in July 2024, Ghana unveiled the first phase of its ambitious 1 GW rooftop solar project to supply power to companies within the free zone enclave, bolstering industrial growth and energy self-sufficiency. During 2024, country ranked third in the top ten countries for new solar addition of ~94 MW. GSC Market Intelligence expects more than 575 MW of new solar capacity additions in Ghana under the medium growth scenario forecast period 2025-2029.

Notably, new government came in January 2025 faced enduring issues including a looming power crisis with arrears exceeding \$2.5 billion. Hence, it aims to implement massive investments in agriculture and infrastructure to stimulate economic growth and address the energy sector's deficiencies. Public-private partnerships and international investments would be a key in overcoming these barriers and accelerating market growth.

Like other African markets, Ghana faces several challenges in addition to conventional and insufficient grid. There are instances of solar project construction delays due to high upfront costs, limited access to financing, and logistical and regulatory hurdles.

However, the opportunities abound in off-grid and mini-grid solar solutions, especially for rural and underserved communities. The African Development Fund granted \$27.39 million to Ghana for the renewable energy development in the mini grid and net metering space. The project involves the development of 35 mini grids, standalone solar PV systems in 400 schools, 200 units in healthcare centers and 100 units for community energy services centers in the Volta Lake region. It will also deploy up to 12,000 units of roof-mounted net-metered solar PV systems for public institutions, small and medium-sized enterprises and selected households.

To expedite the growth, a multifaceted approach by government can create a conducive environment for solar deployment in Ghana such as integrate intermittent renewable sources like solar and wind into the grid, upgrade the national grid to evacuate the power; develop innovative financing solutions to attract investment and mitigate perceived risks; build and invest in local expertise and infrastructure and last but not the least streamline the regulatory processes by offering incentives.



Kenya

Kenya is transforming its energy sector for economic growth. It aims to reach 100% electricity access by 2030 and expand its grid connections and off-grid solutions through off-grid solar, mini-grids, and last-mile grid connections to reach remote rural areas. So far, its electricity access grew from 32% in 2013 to 84% due to government-led programs and private sector involvement.

The country has set an important role of solar energy to achieve its 100% clean energy target by 2030 and net zero by 2050. 2023 statistics indicated that renewable energy powers 90% of Kenya's national grid mainly by Geothermal (over 45%) generation, Kenya is one of the lowest-cost geothermal power developers globally, followed by hydro (~20%), wind (~16.6%), and solar (3.3%). For closing remaining 10% gap, Kenya needs grid flexibility for stable power supply, integration of more variable renewables, and diversified energy matrix.

Kenya Power & Lighting Company (KPLC) is the sole distribution company in Kenya which has been assisted by the Rural Electrification and Renewable Energy Corporation (REREC). REREC, focused on connecting major town centres, schools, and hospitals to the grid and off-grid solutions for diesel-fired power plants, has been issuing tenders to convert these plants to hybrid solar PV plants.

Off-grid solar in Kenya

It has championed in installing per capita off-grid solar systems globally and secured several international funding to support the projects. For example,

- The World Bank funded Kenya Off-Grid Solar Access Project aims, in partnership with the private sector, to electrify 14 low-density, remote, and traditionally underserved counties that represent 20% of the population. This will be achieved through the construction of 120 mini-grids and the sale of 250,000 standalone solar systems.
- The European Union is supporting the Kenya Green Mini Grid Facility
- The European Investment Bank invested in two 40 MW solar power plants in Eldoret and France financed a 42 MWp solar power plant

The policy and regulatory developments play huge role in driving solar growth in Kenya. This includes scale-up of net metering and Feed-in Tariffs, public-private partnerships, Pay-G model, tax exemptions and reduced import duties on solar equipment to attract investment, strengthening grid infrastructure, and national standards for solar equipment to ensure quality and safety of products.

However, overcoming the market challenges is an important aspect to accelerate solar deployment in Kenya which are mainly;



Frequent policy and regulatory changes that influence incentives, tariffs, licensing requirements and implementation of net metering and PPAs



Project development challenges related to permitting and land acquisition, alignment with local stakeholders, high upfront costs, grid connection limitations, maintenance and infrastructure support, quality products and skilled technicians



Financing and Access to Credit- while PAYGo models have helped, high interest rates and limited access to credit slow down adoption.



Capacity building at various administration levels

In between the solid market competition for off-grid solar systems in Kenya, there are high investment opportunities to develop utility-scale solar farms, C&I solar, supply chain, mini-grid solar solutions with storage, and investments for developing de-risk mechanisms. Considering the overall policy developments and market dynamics so far in Kenya, GSC Market Intelligence expects more than 600 MW of new solar capacity additions under the medium growth scenario forecast period 2025-2029.



Morocco

Morocco has been a pioneer in renewable energy in Africa, with its commitment solidified through the “National Energy Strategy for 2030”, first implemented in 2009 and revised in 2015. A key objective is the ambitious expansion of renewable energy, targeting 52% of electricity capacity from renewables by 2030—comprising 20% solar, 20% wind, and 12% hydropower—and 80% by 2050. The strategy aims to secure energy supply while ensuring affordability.

According to the Moroccan Agency for Sustainable Energy (Masen), the installed solar capacity in 2024 amounts to 857 MW. This installed capacity is poised to increase exponentially by 2028, with various mega-projects progressively coming online. Considering the market dynamics, GSC Market Intelligence expects more than 2.2 GW of new solar capacity additions in Morocco under the medium growth scenario forecast period 2025–2029.

Public-Private Partnerships have played a crucial role in attracting international investment for large-scale projects, with tenders being managed by the National Office of Electricity and Drinking Water (ONEE) and the Moroccan Agency for Sustainable Energy (MASEN). A flagship example of Morocco’s solar initiatives is the Noor Solar Complex in Ouarzazate, one of the world’s largest concentrated solar

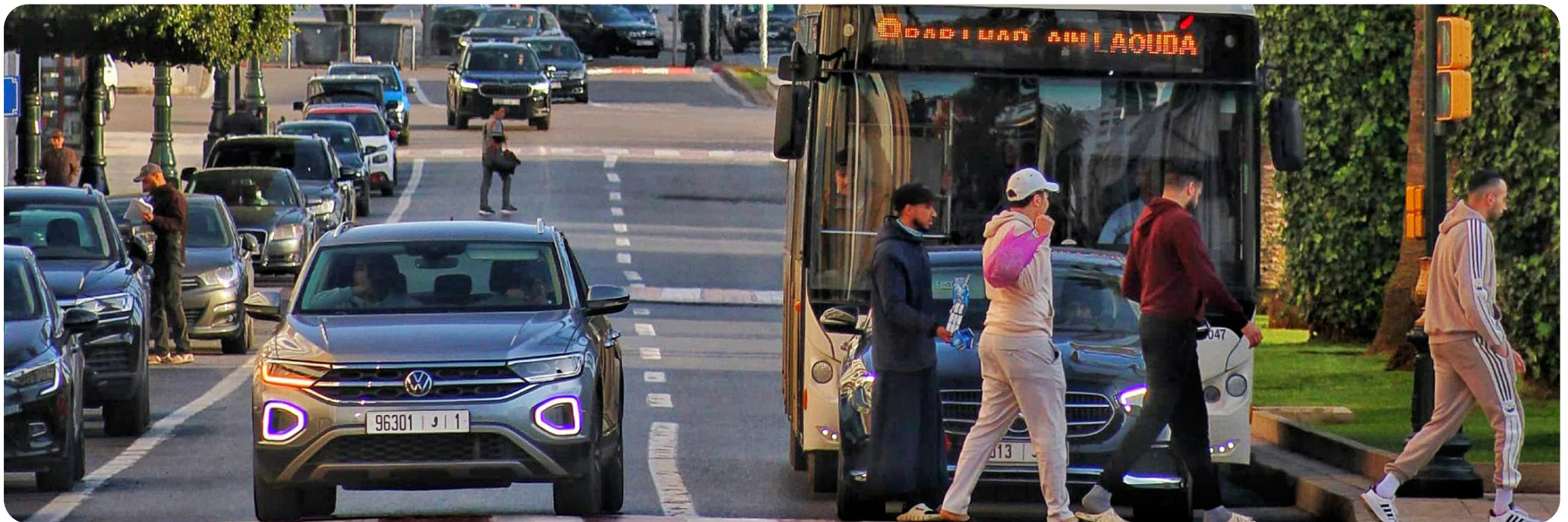
power (CSP) facilities. Expanding beyond Ouarzazate, MASEN launched Noor Midelt, a hybrid CSP-PV project targeting 1,600 MW capacity. Noor Midelt I, awarded to a consortium led by EDF Renouvelables, Masdar, and Green of Africa, has 800 MW solar capacity with 5 MWh storage. Noor Midelt II and III are progressing, incorporating PV and battery storage solutions.

The Noor PV program complements the efforts with Noor Boujdour and Noor Laayoune I adding substantial PV capacity. The Noor PV II initiative aims to develop 400 MW across seven sites, fostering participation from small and medium enterprises. Notable projects include Noor PV Bejaad (48 MW), Noor PV Taroudant (36 MW), and Noor PV Ain Beni Mathar (69 MW), managed by companies such as Enel Green Power, AMEA Power, and Voltaia Maroc respectively.

Since 2022, MASEN has overseen additional projects, including Noor Tafilalet (120 MW) and Noor Atlas (200 MW), further diversifying Morocco’s renewable energy mix. These developments, supported by a robust policy framework, have positioned Morocco as a leader in Africa’s transition to sustainable energy, demonstrating the effectiveness of long-term strategic planning and investment in solar power.

The Moroccan solar development is supported by a robust regulatory framework. Several laws have contributed to the structuration of the energy market. The Law 13-09 (2010) has opened the market for private-sector participation in renewable energy production and marketing. The law 37-16 (2016) has expanded the Moroccan Agency for Solar Energy’s mandate to encompass all renewable sources. In 2021, law 40-19 (2021) was passed, refining the legal and regulatory framework governing private sector renewable energy projects. The promotion of greater transparency and access to information on investment prospects, as well as simplification of authorisation processes have improved the market conditions for investors.

Additionally, the nation is actively encouraging the installation of distributed solar systems especially in remote or underserved areas. The country has been successful in the electrification strategy, boasting 99.8% of its inhabitants having access to electricity. Morocco now seeks to utilize this experience and contribute actively to the Mission 300, aiming at providing electricity to 300 million people in Sub-Saharan Africa.



Mozambique

Mozambique's energy sector is undergoing a significant transformation, with solar energy playing a key role in the country's universal electrification target by 2030 up from 44% in 2022. The changes in the legal and regulatory framework will enable the country to seize the opportunities arising from global trends towards the decarbonization, decentralization, and digitalization of power systems and the prioritization of the use of renewable energy sources.

The country traditionally more reliant on hydropower aims to ramp up solar PV capacity to 1 GW by 2030 and [7.5 GW by 2050](#)³¹ as part of its broader Energy Transition Strategy (ETS) released late 2023, which also seeks to enhance energy access and meet growing energy demands by investing \$USD 80 billion by 2050 to incentivise large scale renewables project. The strategy focuses also on grid, to ensure that these projects will not face additional risks. As of December 2024, Mozambique has ~111 MW installed solar PV capacity. GSC Market Intelligence further expects close to 700 MW of new solar capacity additions in Mozambique under the medium growth scenario in the forecast period 2025-2029.

Mozambique's electricity sector story has two sides. On one hand, the country has access to a vast range of energy resources, including substantial natural gas reserves and a large share of renewable electricity generation, primarily driven by hydroelectric power plants, both existing and planned. This resource wealth is a cornerstone of Mozambique's economic development. On the other hand, electrification rates remain low. However, Mozambique has been making notable progress in improving electrification rates through a combination of grid expansion and increased investment in mini-grids and off-grid solutions. At the same time, the country continues to advance its energy sector both on-grid and off-grid through the establishment of a regulatory authority and the ongoing development of policies and legal frameworks to align with broader industry trends.

Currently, Mozambique, boasts more than 10 solar projects at various stages, ranging from land acquisition to construction, which should dramatically enhance its installed capacity by 2030 reaching the 1,000 MW target. Indeed, some projects are in construction and should be completed within the next two year, such as the 40 MW project Dondo led by TotalEnergies. This project is the first result of the Renewable Energy Auction Programme (PROLER) in 2020. This program co-financed by the French Development Agency (AFD) and the EU, creates an attractive investment framework by derisking the technical, environmental and social aspect of a project. It was designed to tender 120 MW of solar.

Under this framework, the second tender in 2022 has led to the planning of two additional solar plants of 30 MW, in Manje and Lichinga. To sustain this momentum, the government has already identified key areas in Dondo, Lichinga, Manje, Cuamba, and Zitundo for solar project development.



In parallel, other developers have invested in the country outside the tendering process. COP28 has been instrumental in this wave of investments. AMEA Powers is working with Hidropower to develop the Matambo project, a solar power plant with 125 MW to 200 MW capacity, with the support of the Mozambique's National Investment Bank. MoU has also been signed with the Africa50, an investment vehicle of the African Development Bank for three projects: the 100 MW Montepuez solar power plant in Cabo Delgado Province; the 60 MW Angoche solar power plant in Nampula Province with a BESS; and a 100 MW floating solar PV project is planned for Manica Province, utilizing the surface of the Chicamba hydropower plant reservoir for power generation.

Despite these positive developments, Mozambique's solar sector faces several challenges of reliability and quality of supply, and only 51.3% of the population has access to electricity, with 44.7% having access to the national grid, and the remaining 6.6% using solar home systems and diesel generators³². One of the primary obstacles is the complex regulatory approval process. While the government has set ambitious targets, lengthy and bureaucratic procedures can delay project implementation, creating uncertainty for potential investors. Streamlining of procedures would ease the attraction of foreign capitals.

Mozambique is also doubling down on off-grid. With strong governmental backing through policies like the Energy Transition Strategy and off-grid electrification initiatives, there is a clear sense of commitment to expanding renewable energy. The *Off-Grid Energy Regulation (2021)* plays a pivotal role in expanding energy access, particularly to underserved communities. This regulation supports the development of off-grid solutions, such as mini-grids (up to 10 MW) and solar home systems, which are crucial in reaching remote areas that remain disconnected from the main grid. Furthermore, a tender has been launched in July 2024 under the GET.Fit Program, aiming to strengthen the institutional capacity for renewable energy

procurement. This tender should see deployment of 5 to 15 MW solar projects and greatly contribute to the electrification of the country, close to 32% as of early 2025.

Additionally, the Mozambican Renewable Energy Association (AMER), and the Integrated Electrification Planning and Coordination Unit within Ministry of Mineral Resources and Energy, a department that is responsible for coordinating and planning the process of electrifying Mozambique, have established a platform that allows for better coordination, collaboration, and strategic planning in accelerating Mozambique's electrification efforts. By fostering data-driven decision-making, aligning regulatory frameworks, and streamlining project implementation, the initiative enhances the deployment of decentralized renewable energy solutions such as mini-grids and solar home systems. Additionally, it helps attract investment, mobilize climate finance, and ensure that electrification efforts contribute to economic development, energy access, and sustainability goals. Through this collaborative approach, Mozambique is strengthening its renewable energy sector, improving access to clean electricity, and advancing its commitment to universal energy access.



³¹ PV Knowhow (2024), Plans for New 110.6 MW Solar Project Revealed, <https://www.pvknowhow.com/plans-for-new-110-6-mw-solar-project-revealed/#:~:text=With%20plans%20to%20install%201%2C000%20MW%20of%20solar,the%20country%27s%20%20goal%20of%20universal%20electrification%20by%202030>

³² ALER and AMER, 2023, Briefing: Renewable in Mozambique 2023. Available at: <https://www.aler-renovables.org/en/activities/publications/market-summaries/briefing-renewables-in-mozambique-2023/>

Nigeria

The most populous country and largest economy on the continent also emerged last year as a solar powerhouse, ranking fourth African country in terms of installed solar capacity, with an added 63.5 MW. As of 2024, Nigeria's cumulative installed solar capacity reached 385.7 MW. Nigeria's performance is more remarkable as it occurs in a context of fuel subsidies removal^{33,34}, which triggered a shift towards solar and solar-plus-storage systems considered as cost-effective alternatives to diesel generators. Nonetheless, The International Renewable Energy Agency (IRENA) estimates Nigeria's solar PV potential remains largely under exploited as it could technically reach 210 GW³⁵, assuming only 1% of suitable land is used for project development. Therefore, this growing adoption of solar energy is only at its burgeoning stage. Yet, it conceals significant disparities for the different solar energy segments.

The Rise of Distributed Renewable Energy

The observed trend is underpinned by a massive growth of investments in solar Commercial and Industrial (C&I) installations, as well as residential and mini-grid segments. Indeed, distributed renewable energy is gaining momentum as illustrated in the 2024 edition of the State of the Global Mini-Grids Market report which provides an overview of mini-grid markets on the continent. As of 2022, it already highlights Nigeria as a hotspot as per the below table:

Figure 17: Mini-grid market per selected country

Country	Number of Mini-Grids	Total Installed Capacity (MW)	Average Size (KW)
Madagascar	357	20	55
India	280	N/A	N/A
Nigeria	117	14	143
Benin	108	14	132
Zambia	72	5	73
Sierra Leone	71	7	92
Kenya	36	4	111

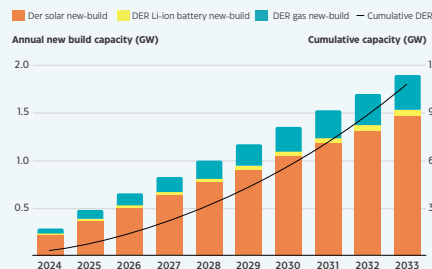
Source: State of the Global Mini-Grids Market 2024

Similarly, the solar C&I market segment has been growing at an unprecedented pace: In 2018, there was an estimated 39 MWp of solar installations for C&I and residential customers. According to the International Finance Corporation (IFC), [C&I installations are projected](#)

to reach between 494 MW and 1,457 MW by the end of 2025³⁶. As per GSC Market Intelligence, more than 550 MW of new solar capacity additions in Nigeria is expected under the medium growth scenario in the forecast period 2025-2029.

In parallel, Nigeria is also a hotbed for solar business model innovations. Profitable business models and demonstration pilots for interconnected Distributed Energy resources (DERs) have emerged during the recent 2-3 years, adding to the boom already experienced. Also defined as Utility-enabled DERs, they present a unique and compelling opportunity for electricity distribution companies (DisCos) to increase access to electricity, augment power supply, and reduce system losses in their territories. At the same time, DERs reduce dependence on the national grid and transmission infrastructure, increase the share of renewable energy, reduce customer defection, and improve DisCo revenue collection. DERs offer a win-win-win model for developers, utilities, and customers. Leveraging the momentum generated by initial "first-wave" of Utility-enabled DER projects, RMI [strategic roadmap](#) established in coordination with 5 Nigerian DisCos demonstrates a 20 GW market opportunity is for rapid expansion of utility-enabled DERs across Nigeria over the next 10 years.

Figure 18: Annual DER Market Size Across Five DisCos, Base Case



These significant upward trends in distributed solar adoption in Nigeria, herald substantial growth opportunity for solar projects in the coming years.

Persisting bottlenecks for utility scale solar

In contrast, utility-scale solar development in Nigeria appears to be limited due to the poor grid infrastructure. There are ongoing efforts to revive utility-scale solar through [Nigeria Green Vision \(30:30:30\)](#). It is estimated that utility-scale solar in Nigeria could potentially reach 5 GW by 2030 and 25 GW by 2050 in line with [Nigeria's Renewable Energy Roadmap](#). However, to fulfil such vision persistent challenges are yet to be addressed: Plans for 14 new solar farms³⁷ situated across northern and central Nigeria, which were expected to generate about 20% of Nigeria's current electricity grid capacity, have faced

challenges due to government reluctance to offer critical guarantees to developers.

A Transformation in the Regulation Landscape

The evolving regulatory landscape has been a key enabler for renewable energy - and solar growth more particularly - for a decade. The [National Renewable Energy and Energy Efficiency Policy](#) (NREEEP) enacted in 2015 sets out the blueprint to increasingly harness the country's vast renewable energy potential and establishes policy objectives for solar electricity contribution to attain 6% by 2030. It has been pivotal policy to catalyse solar growth in Nigeria. Concurrently, feed-in tariffs Regulations have been approved in 2015 under the Electric Power Sector Reform Act 2005, with the aim to stimulate renewable energy investment. They opened up the sector to competition and unleashing small producers and the rise of decentralized solar adoption.

More recently, in 2023, the National Electricity Regulatory Commission (NERC) issued mini-grid regulations replacing the 2016 version and governing the development of mini-grid electricity generation (0-100 KW to 1MW) in Nigeria. It aims to accelerate electrification in unserved and underserved areas, particularly rural and peri-urban communities.

These regulations, aligned with the Nigeria Renewable Energy Master Plan (REMP) signal Government of Nigeria's commitment to significantly increase solar capacity as part of its broader goal to boost renewable electricity generation in the country. Specifically for solar energy, the REMP targets an installed capacity of 500 MW for solar PV by 2025 and an increase in the share of renewable electricity from 13% in 2015 to 23% by 2025 and 36% by 2030.

Additionally, to support the development of solar and other renewable energy sources, the REMP introduced key measures such as:

- Short-term initiatives such as a moratorium on import duties for renewable energy technologies
- Long-term plans for tax credits, capital incentives, and preferential loan opportunities for renewable energy

It is worth noting that the REMP is complemented by other initiatives like the Nigerian Electrification Project (NEP), which supports the expansion of grid-connected and off-grid solar solutions. By implementing these regulatory changes and incentives, Nigeria has paved the way to diversify its electricity mix with a substantial increase in the contribution of solar power. Nigeria is definitely the place to go with promising solar opportunities.

³³ United Nations (2023), Nigeria Ends Oil Subsidy, Invests Savings in Infrastructure Development, <https://www.un.org/africarenewal/magazine/august-2023/nigeria-ends-oil-subsidy-invest-savings-in-infrastructure-development>
³⁴ The Conversation (2023), Nigeria's Fuel Subsidy Removal Was Too Sudden: Why a Gradual Approach Would Have Been Better, <https://theconversation.com/nigerias-fuel-subsidy-removal-was-too-sudden-why-a-gradual-approach-would-have-been-better-222224>
³⁵ Nigeria Energy (2023), Nigeria Energy Roadmap Report, <https://www.nigeria-energy.com/content/dam/markets/emea/nigeria-energy/en/2023/docs/NE23-NigeriaEnergyRoadmap-Report.pdf>
³⁶ IFC (2021), Nigeria Distributed Solar Market Assessment, Last modified May 4, 2021, <https://www.ifc.org/content/dam/ifc/doc/mgrt/nigeria-distrib-solar-market-assessment-fig-05042021.pdf>
³⁷ SolarQuarter (2024), Nigeria's Solar Ambitions Stalled: Challenges in Sub-Saharan Renewable Energy, <https://solarquarter.com/2024/12/20/nigerias-solar-ambitions-stalled-challenges-in-sub-saharan-renewable-energy/>

Senegal

The [Scaling Solar Program](#) has been foundational in propelling a solar revolution in Senegal with two solar PV plants commissioned in 2021 in Kael and Kahone (Western Senegal) representing a total capacity of 60 MW at one of the most competitive electricity tariffs³⁸ in Sub-Saharan Africa (4 US cents per kWh).



This achievement paved the way for renewed commitment from the Government of Senegal to accelerate on solar energy deployment and implement policies and incentives to promote solar energy adoption. As part of the Plan Senegal Emergent (PSE) which aims to transform the country into an emerging economy, Government of Senegal has pledged to increase its renewable energy share to 40% of the total installed capacity by 2030 thus leveraging its abundant endowment in solar energy resource. This dynamic is further illustrated by recent solar plus battery projects underway: the 60 MW Kolda solar PV project in southern Senegal led by Axian Energy and valued at €105 million will include 72 MWh of battery storage. It is scheduled to be commissioned in 2026 and will be the largest planned solar plant with BESS in West Africa to date. Additionally, the 20 MW Eramet Grande Côte solar PV power plant³⁹ scheduled for completion in 2025 will also include an 11 MW/11MWh battery storage capacity. Furthermore, in its

latest IRP and 2021-2025 strategic plan⁴⁰, the national utility Senelec anticipates an additional 350 MW of utility-scale solar capacity to be developed and connected to the grid by 2030.

This momentum for solar PV in Senegal culminates with the [Just Energy Transition Partnership \(JETP\)](#) announced in June 2023 setting an objective of EUR 2.5 billion in resource mobilization to support Senegal's efforts in achieving its renewable energy targets.

With a total installed solar capacity nearing 270 MW by end of 2024, the energy sector in Senegal undergoes a spectacular transformation as solar power gains prominence. This soaring capacity spans from utility-scale solar farms to distributed renewable energy, mostly solar mini-grids. Considering the market dynamics, GSC Market Intelligence expects more than 200 MW of new solar capacity additions in Senegal under the medium growth scenario in the forecast period 2025-2029.

Conducive Policies

To drive the solar deployment and its broader renewable energy strategy, Senegal implemented several conducive policies over the past decade. The Renewable Energy Law (Loi n° 2010-21) enacted on December 20, 2010 is the founding policy document establishing the overarching framework for Senegal's renewable energy sector.

Notably, it mandates the Ministry of Petroleum and Renewable Energies to establish and regulate incentive schemes for renewable energy development, including feed-in tariffs. It allows self-generation of electricity from renewable sources under licensing thresholds and also introduces tax exemptions for the purchase of domestic renewable energy generation equipment including solar panels. This law has now been repealed and superseded by the [Electricity Code of 2021](#), which encompasses renewable energy provisions.

The vast majority of solar projects installed in the country are operated by Independent Power Producers (IPPs). The existing framework for utility-scale solar projects requires a tender overseen by the national regulator (CRSE) and the signature of a power purchase agreement with Senelec.

However, several challenges are experienced in the solar sector. For instance, permitting delays due to lack of coordination and alignment between several local and government authorities in charge of approvals and land access, are slowing down application processes. Besides, international actors underscore uncertainties and difficulties over the applicability of some tax incentives and procedures to be reimbursed of VAT on solar products.

Finally, it is worth noting that Senegal does not have a policy framework in place for decentralized energy: solar rooftop development, commercial and industrial (C&I) installations. To date, this market segment is overlooked and could blossom with the implementation of dedicated feed-in tariffs combined with battery purchase incentives.

Establish an Enabling environment to attract Investments

The renewable energy sector in Senegal – and the solar sector more particularly, stands out- as it attracts significant financing from multilateral and bilateral institutions (International Finance Corporation, United States International Development Finance Corporation, European Investment Bank, World Bank, KfW, African Development Bank), which have provided guarantees and risk management funding for solar projects^{41, 42, 43}.

There remains however a large investment gap that could be filled by public-private sector partnerships. Senegal's strategic sovereign wealth fund FONSIS has paved the way for innovative approaches by finance utility scale solar by [partnering with leading European utility ENGIE and the Meridiam private investment fund](#) thus bringing long term visibility, and reducing the financing risks.

To further attract investments and since there is no longer a dedicated law for renewable energy, Government of Senegal currently considers an investment framework as part of the JETP discussions to ensure the acceleration of solar power deployment in Senegal. Among with the different leads explored one is trajectories for auctions and/or renewable energy zones. Such development could boost a sector already poised for growth.



³⁸ European Investment Bank (2021), Scaling Solar: Two PV Plants Bring Clean Energy to More than 500,000 in Senegal, <https://www.eib.org/en/press/all/2021-183-scaling-solar-two-pv-plants-bring-clean-energy-to-more-than-500000-in-senegal>.

³⁹ Eramet (2024), Senegal: A Solar Power Plant to Reduce CO2 Emissions from Our Mining Operations, <https://www.eramet.com/en/news/senegal-a-solar-power-plant-to-reduce-co2-emissions-from-our-mining-operations/>.

⁴⁰ ECOWAPP (2024), Tome 4, https://www.ecowapp.org/sites/default/files/tome_4.pdf.

⁴¹ U.S. International Development Finance Corporation (2024), Generating New Energy Sources in Senegal, <https://www.dfc.gov/investment-story/generating-new-energy-sources-senegal>.

⁴² African Development Bank (2024), L'Initiative Desert Power de la Banque Africaine de Développement, <https://www.afdb.org/fr/news-and-events/linitiative-desert-power-de-la-banque-africaine-de-developpement-71073>.

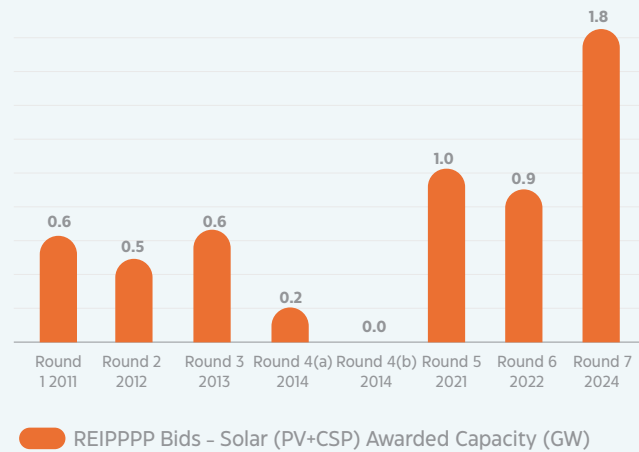
⁴³ KfW Entwicklungsbank (2024), FEI Energy Fonds, <https://www.kfw-entwicklungsbank.de/SDG-portal/SDG-7/FEI-Energy-fonds/>.

South Africa

South Africa's solar energy market has matured largely due to the inclusion of solar in the country's energy planning that is currently dominated by coal. The Integrated Resource Plan (IRP) 2010 paved the way for utility-scale solar power procurement through Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) that replaced Feed-in-tariff in 2011.

The current IRP 2019 targets 8.3 GW solar capacity installation by 2030. However, the latest draft IRP 2023, yet to be adopted, aims for lower solar PV installations 5.9 GW by 2030 and focuses on 2031-2050 long-term electricity generation planning with pathways to achieve a net zero electricity sector by 2050.

Figure 19: Awarded Solar Capacity in REIPPPP rounds



Source: GSC Market Intelligence, March 2025

The first utility scale 7 MW RustMo1 Solar Project commissioned eleven years ago was allotted under Bid Window 1 of the REIPPPP. As of December 2024, total 5.5 GW solar capacity has been allocated in seven bidding rounds of the REIPPPP with 20-year power off-take contracts and tariff has reduced to 22.7 USD/MWh. If all of the awarded capacity commissioned on time it would reach IRP 2023 easily, however, it will still be insufficient growth that South Africa could aim for clean electrification. The trend within REIPPPP showed increased competitiveness, inclination towards solar amongst renewable resources, co-locating projects to optimize margins and economies of scale (~240 MW) amongst developers.

South Africa also leads in storage solutions. Projects are awarded mainly through bids under Battery Energy Storage Independent Power Producer Procurement Programme (BESIPPPP). So far, two bid rounds are completed (360 MW/1440 MWh in round 1 and 615 MW in round 2) and third (for 616 MW/2,464 MWh) is planned to be awarded in 2025.

Over the past few years, several policy and regulatory reforms unveiled by South African government will continue to improve solar deployment rate. This includes removal of generators licensing thresholds, tax incentives for investors in renewables, reduced local content requirement for solar panels from 100% to 30% in bids to alleviate supply constraints, upgraded national utility ESKOM, grid code developments (underway), and streamlined permitting to improve its lengthy and bureaucratic process.

Now, large scale solar projects in low-to-medium environmental sensitivity areas are exempted from environmental approval as per the Solar Exclusion Norm. Also, the technology's fivefold growth rate and low-cost debt finance availability in the country have reduced investment risk making utility scale solar affordable. Considering the policy developments and market dynamics, GSC Market Intelligence expects around 6.5 GW of new solar capacity additions in South Africa under the medium growth scenario in the forecast period 2025-2029.

As per Bloomberg NEF, South Africa was responsible for virtually all of the small-scale solar investment tracked in the Southern region in 2023. South Africa's [Just Energy Transition Investment Plan](#) for 2023-2027, estimates 98.7 billion USD funding requirements to achieve its decarbonisation commitments and create jobs. It shows large scale potential of the inter-regional and international collaboration and partnerships opportunities.

In Draft IRP 2023, the government notes that power supply-demand deficit will remain until the end of the decade. It is mainly due to older and underperforming generation asset that creates load shedding problems and outages from the main grid. Minister of Finance 2024 budget noted that large deployment of rooftop solar, C&I installations would be a solution to reduce such supply threats at households level.

However, a large investment gap needs to be filled by public-private sector in South Africa to strengthen ESKOM's capacity, modernise and uplift the grid capacity, bring new solar and renewable energy projects integrated with storage solutions, and further lower the cost of finance and import of supply. Tailored policy support for residential solar, C&I and storage, compensatory norms for uncontrolled project delays in utility scale solar and long-term energy planning can further boost the trust, visibility, and reduce the risk of finance and energy security.

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Uganda

Uganda government aims to reduce poverty and reach upper-middle-income status by 2040. Modernising the energy systems play a critical role to expand the economic growth rapidly for any nation. Hence, Uganda unveiled its new Energy Transition Plan (ETP) at COP28 outlining a pathway to reach net zero emissions by 2065.

While its current electricity grid mix already has 99% renewable, the plan considered solar energy as the leading low-cost power source, alongside hydro and geothermal for the future. Notably ETP analysis observed that Uganda has higher quality solar resources across the country than global leaders such as Spain. The current total solar installation capacity stands at 84 MW and GSC Market Intelligence further expects close to 300 MW of new solar capacity additions in Uganda under the medium growth scenario in the forecast period 2025-2029.

The plan also states to reach universal energy access by 2030 that means almost 800k households to be grid connected. To do that, country will have to reach \$8 billion annual clean energy investments

by 2030 with ~90% directed at improving energy access and clean energy expansion and ultimately reach net zero by 2065 as per ETP.

With over 70% of Ugandans living off-grid, there is a substantial business opportunity for mini-grid/off-grid solar application in rural areas including residential and commercial solar PV. To enhance energy access especially in underserved communities, pay-as-you-go (PAYGo) model enabled consumers to pay for solar systems in instalments, making it more affordable. Today, Uganda has become a leading market for PAYGo solar energy, improving access for both citizens and refugees.

Several recent developments shows continued interest in Uganda's solar market. For example, the African Management Institute and the Uganda Solar Energy Association partnership funded by UKAID aims to enhance leadership and management skills within the solar industry and expand energy access across Uganda. The Emerging Africa & Asia Infrastructure Fund committed \$18 million for 20 MW

solar PV plant in northwestern Uganda and reached financial closure in December 2024.

To further expand solar effectively in Uganda, the market specific solution are needed to tackle challenges of limited access to affordable financing options in rural areas; high loan interest rates; inadequate grid infrastructure and reliability; low rural electrification; solar project delays due to lengthy bureaucratic process, unclear regulations and conflicts over land use and social acceptance; high cost due to import taxes and tariffs on solar components; PAYGo model limitations such as high repayment default rates and limited digital literacy; an influx of low-quality and counterfeit solar products, and most importantly shortage of trained technicians.

Overall, it is crucial that government of Uganda plan a periodic solar installation target for market visibility and attract large pool of investments through national and international collaboration and partnerships. Also, incentives could be substituted from fossil and hydropower to solar plus storage solutions given its greater benefits.





Chapter 3

Financing Africa's
Energy Transition

3.1: Overview of the green finance landscape in Africa

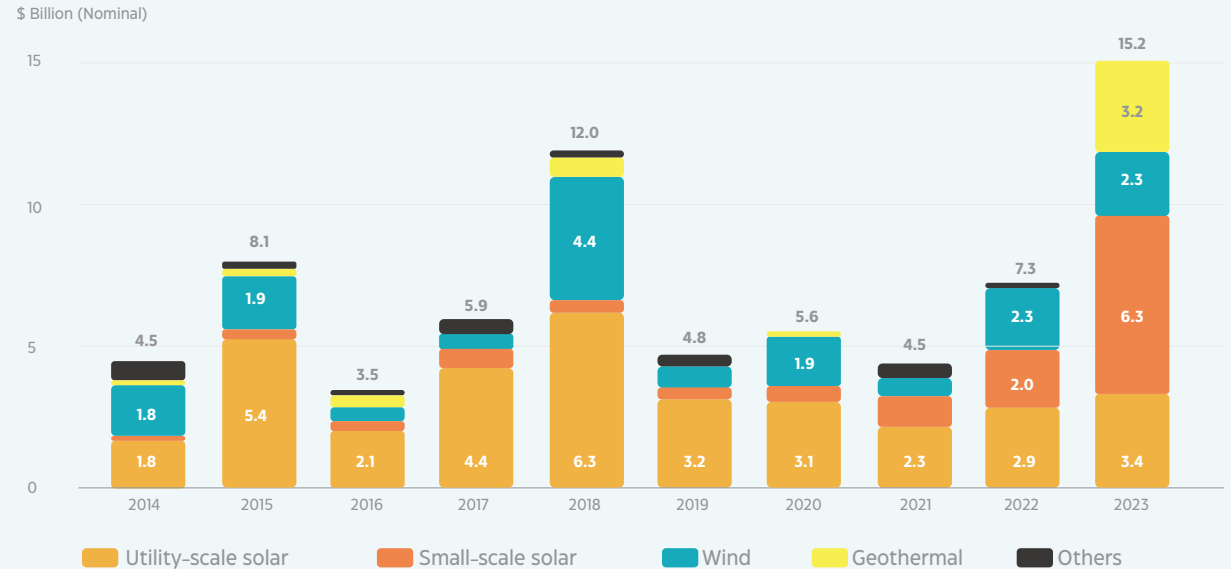
As the energy transition begins to shift the landscape of countries' economic development, geopolitical power, and social indicators, Africa stands at a pivotal moment. Renewable energy can lead the continent to seize these opportunities due to the potential from solar, wind, and hydropower projected to meet 76% of Africa's electricity needs by 2040⁴⁴. Solar in particular presents an enormous opportunity as Africa holds 60% of the world's best solar resources⁴⁵.

Despite this potential and opportunity, African countries face the access to finance for renewable energy projects. While international commitments, such as the \$100 billion annual pledge under the Paris Agreement, recently increased to \$300 billion at COP29, aim to mobilize finance for developing economies, African countries continue to struggle to access these resources. High risk perceptions, limited project pipelines, and weak financial infrastructure often deter private investors, making it difficult to scale renewable energy projects. As a result, most investments still rely heavily on concessional finance, development aid, and public funding, slowing down the pace of Africa's energy transition⁴⁶.

COVID-19 had a strong impact on renewable project investment across the continent, causing green finance in Africa to stall with the continent receiving 1.5% of global renewable energy investments in 2020, falling even further to below 1% in 2021 and 2022.



Figure 20: Renewable Energy Investment in Africa More Than Doubled in 2023, Driven by Small-Scale Solar



Source: BNEF

⁴⁴ African Development Bank (2024), Africa Must Optimise All It Has to Achieve Universal Energy Access, Says African Development Bank Head, <https://www.afdb.org/en/news-and-events/press-releases/africa-must-optimise-all-it-has-to-achieve-universal-energy-access-says-african-development-bank-head-64099>
⁴⁵ IEA (2022), Africa Energy Outlook 2022, IEA, Paris <https://www.iea.org/reports/africa-energy-outlook-2022>

However, in 2023 and 2024, that trend began to reverse as more investment was attracted to African markets⁴⁷. In 2023, the continent accounted for USD 15 billion, 2.3% of global investments. This resurgence was largely driven by solar energy, which accounted for 63% of all renewable energy technology investment in Africa in 2023. This growth was predominantly led by utility-scale solar and small-scale solar, delivering around 10 GW of capacity. The latter more than tripled investment to USD 6.3 billion in 2023, making up 41% of energy investment in Africa.

Utility-scale solar contributed to 22% of all renewable energy investment with USD 3.4 billion. 500 MW Angola Solar Energy Project involving the installation of two solar PV facilities funded by a \$900 million agreement with the U.S. Export-Import Bank in June 2023; and 296 MW Solar Projects encompassing 48 mini-grid solar PV systems across multiple provinces through \$1.44 billion funding under Standard Chartered Solar Initiative in July 2023. South Africa, Nigeria, and Morocco have championed the PV growth on the continent by attracting 96% of small-scale solar investments, highlighting the role of enabling policy in accessing finance.

South Africa introduced tax incentives for businesses investing in renewables; Morocco advanced net metering and legal frameworks for self-consumption; and Nigeria's fuel subsidy removal drove demand for alternative power sources⁴⁸.

Africa seeks to accelerate its clean energy transition by attracting private sector finance. Currently, much of the green finance landscape is dominated by the public sector, mainly multilateral Development Financial Institutions (DFIs) and government-backed funding, accounting for 82% of sources of funding. Africa has seen

continued increase in financial flows from the private sector, doubling since 2019 to 18% of the continent's renewable energy investments. Despite this upward trajectory, there remains the lowest mobilisation share of private sector investment for renewable energy in Africa and around the world. This low share is constrained by high interest rates, low credit ratings, and the perceived risks of investing in emerging markets⁴⁹.

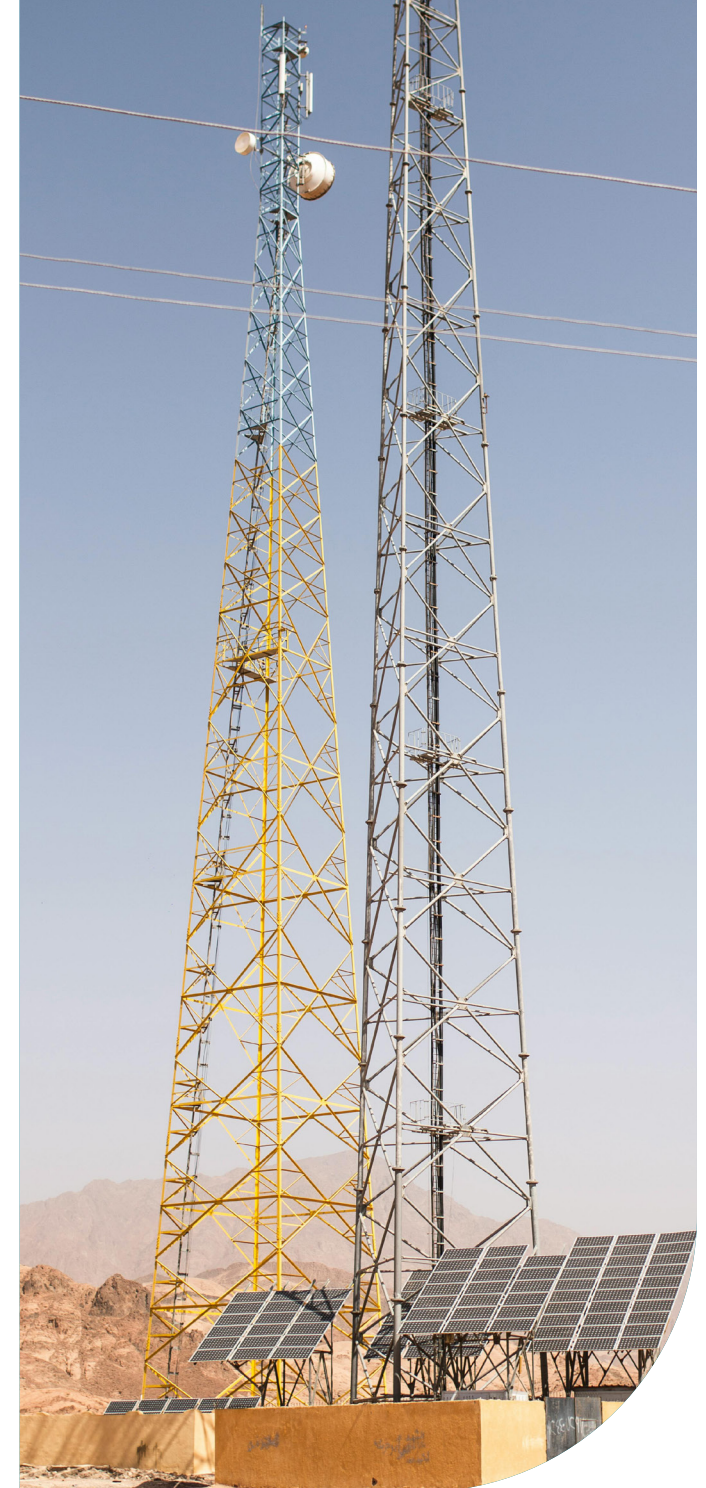
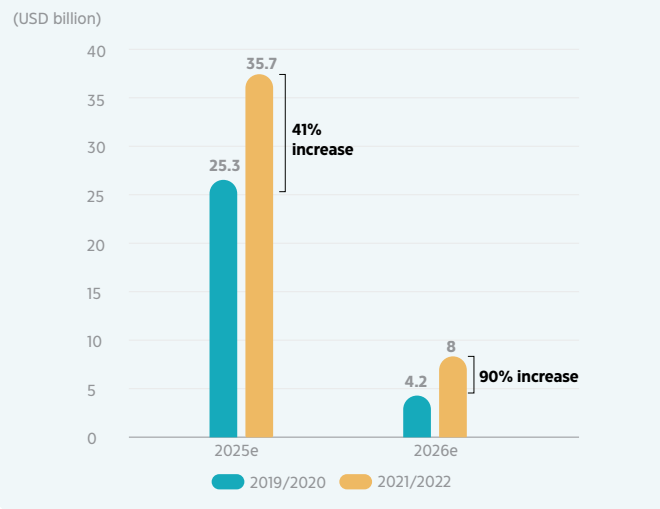


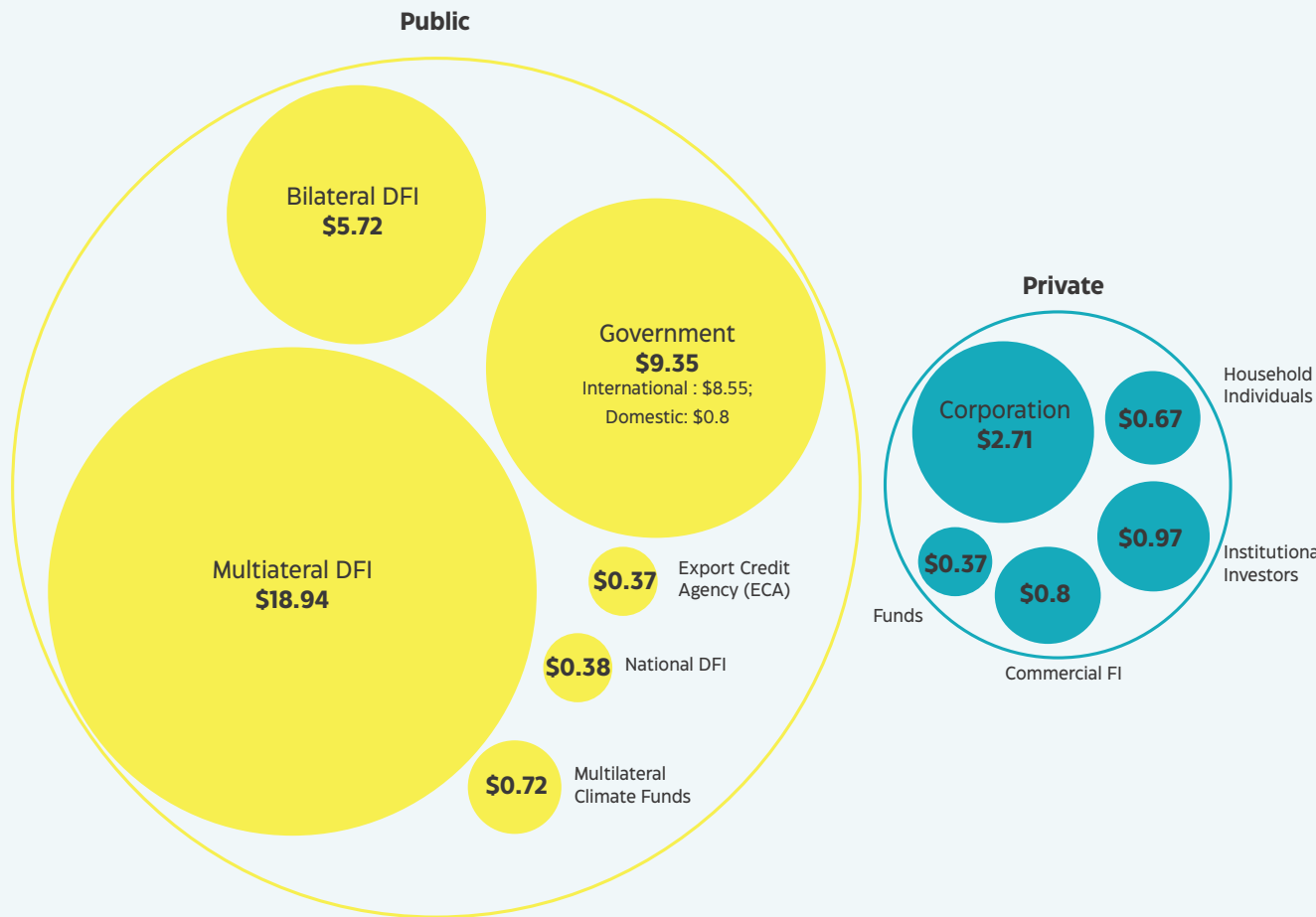
Figure 21: Climate finance by public and private sources



⁴⁷ International Renewable Energy Agency (2024), Sub-Saharan Africa: Policies and Finance for Renewable Energy Deployment, <https://www.irena.org/Publications/2024/Jul/Sub-Saharan-Africa-Policies-and-finance-for-renewable-energy-deployment>
⁴⁸ BloombergNEF (2024), Africa Power Transition Factbook 2024, <https://assets.bbhub.io/professional/sites/24/Africa-Power-Transition-Factbook-2024.pdf>
⁴⁹ Climate Policy Initiative (2024), Landscape of Climate Finance in Africa 2024, <https://www.climatepolicyinitiative.org/publication/landscape-of-climate-finance-in-africa-2024/>

Figure 22: Climate finance sources in 2021-2022

(USD billion)

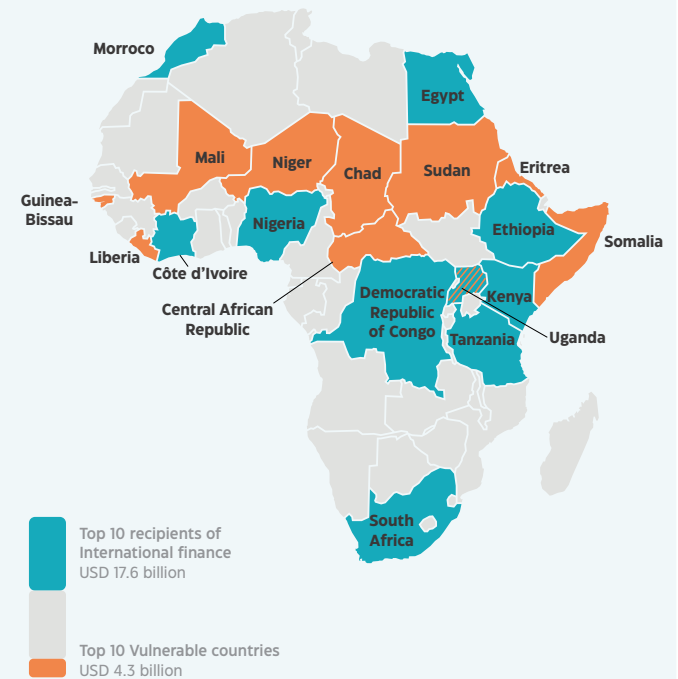


Source: Climate Policy Initiative, 2024

While these positive trends inspire optimism for green finance in the continent, it also captures a stark picture of uneven distribution. Investment to date has been concentrated in ten countries. Morocco, Egypt, Côte d'Ivoire, Nigeria, Ethiopia, Democratic Republic of Congo, Kenya, Uganda, Tanzania, and South Africa make up 50% of all of Africa's green finance received. In contrast, 30 other African nations collectively receive just 10% of green finance flows, leaving many critically underfunded for their energy transitions⁵⁰. Even across these

10 markets, the investment is not distributed equally. Looking at the breakdown of data available for seven of these countries, of which they make up over 50% of energy investments, South Africa leads with 19% of investments followed by Egypt and Nigeria with 19% and 13% of energy investments, respectively. The next largest contributor is Nigeria with 6%, while Ethiopia receives 5% of investment, and Kenya and Côte d'Ivoire each receive 4%⁵¹.

Figure 23: International Climate Finance Flows to Top 10 Recipients vs. Most Vulnerable African Countries



A significant reason for this investment concentration is the presence of proven success factors. Policies, regulatory certainty, capacitated local professionals, scalable business models naturally attract more capital. Investors tend to favor lower-risk environments where projects have a track record of success, make it easier to secure financing and ensure returns. However, many African markets are still developing these conditions. Limited policy frameworks, gaps in technical expertise, and a lack of financial de-risking mechanisms create significant hurdles for scaling investments in clean energy. Green finance is supposed to bridge these gaps through concessional funding, de-risking instruments, and blended finance models to unlock capital in markets that might otherwise be deemed too risky or unviable. To reach Africa's energy and climate-related goals, it will need an annual investment of USD 200 billion⁵². Yet, despite its potential, several systemic barriers continue to restrict this annual amount of funds to flow to the continent.

⁵⁰ Ibid
⁵¹ Ibid
⁵² Ibid

3.2: Unlocking Access to Finance



While climate finance has rebounded towards Africa in the last couple of years, there remains a significant climate finance envelope that needs to be accessed. This section covers the implications of the challenges blocking climate finance flows as well as highlights opportune areas to unlock access to financing the energy transition.

1. Reducing market risk and improving investor confidence

Private investors are assessing projects through the lens of risk and how that risk could alter the expected performance of their investment. With higher risks, investors charge a higher interest rate, risk premium, to borrowers to reflect the risk of a project, increasing the cost of capital. Of the 54 African countries, only Mauritius and Botswana are investment grade⁵³. The investment grade of many African countries does not inspire confidence for the private sector to conduct business in the continent. Moreso, private sector investors are often deterred due to concerns over political and macroeconomic stability in countries. However, there is a disconnect from foreign investors between perceived market risks and actual risks. Addressing the perception gap will be critical to unlocking private sector financial flows.

2. Improving the capacities of domestic financial institutions

Despite their strong market presence, many domestic financial institutions lack expertise in structuring green finance products. Limited capacity in pipeline development, risk assessment, and access to de-risking instruments, restricts their ability to finance clean energy projects. This often results in high costs,

short tenors, and additional risks due to currency mismatches between inflows and outflows⁵⁴.

3. Creating an enabling regulatory framework for solar

Many African markets need an enabling environment for clean energy projects to flourish and attract investments. Regulatory uncertainty and the absence of long-term, stable policy frameworks exacerbate the aforementioned risks. Many countries lack well-defined feed-in tariffs, net metering policies, or power purchase agreements (PPAs) that provide confidence in the private sector to invest⁵⁵. Also, investing in internal ESG capacity and leveraging external expertise has helped countries like Nigeria, South Africa, and Kenya build capacity for green bond issuance.

While many African markets suffer from these challenges, there is no one-size-fits all solution. Given the policy landscape, political will, country size, and other factors, each market will require a different approach. The extent of intervention of solutions largely depends, but key steps to addressing these barriers, and therefore accessing climate finance, include leveraging domestic financing options, creating financial capacity, and incorporating de-risking instrument. At global level, de-risking instruments and innovative finance is projected to save global investments USD 50 trillion through 2050⁵⁶ as interest rates and upfront technology costs are expected to continue decreasing when markets mature.

To ensure climate finance flows into the African markets at scale for large scale solar deployment, actors must leverage de-risking instruments and innovative finance mechanisms to access lower costs of finance in the immediate term. Financial instruments are designed to mitigate risk for technology, markets, or regions, creating cost-competitive projects with lower risk perception for investors. Offtake contracts, green bonds, tax incentives, grants, concessional and blended finance, and debt and equity subordination are proven and the most promising instruments to de-risk clean energy projects. These instruments if leveraged at full capacity, by providing investors friendly environment and often combined to improve the viability of a project, can do wonders to accelerate Africa's electrification and solar deployment ambitions within short-medium term.

Financial instruments explored so far to de-risk solar and clean energy projects in Africa

⁵³ Climate Policy Initiative (2024), Landscape of Guarantees for Climate Finance in Emerging Markets and Developing Economies, <https://www.climatepolicyinitiative.org/publication/landscape-of-guarantees-for-climate-finance-in-emdes/>

⁵⁴ GET Invest (2024), GET Invest Launches EDGE Finance to Support Domestic Financial Institutions in Funding Green Energy, <https://www.get-invest.eu/get-invest-launches-edge-finance-to-support-domestic-financial-institutions-in-funding-green-energy/>

⁵⁵ Climate Policy Initiative (2024), Landscape of Climate Finance in Africa 2024, <https://www.climatepolicyinitiative.org/publication/landscape-of-climate-finance-in-africa-2024/>

⁵⁶ Truby, Philip, and Lorentz (2024), Financing the Green Energy Transition, [Financing the Green Energy Transition: A US\\$50 trillion catch](https://www.climatepolicyinitiative.org/publication/financing-the-green-energy-transition-a-us$50-trillion-catch)

Debt, including concessional and blended financing

Role: These types of debts and concessional financing, often issued by multilateral Development Financial Institutions such as the World Bank, the African Development Bank, the European Investment Bank or the global energy Funders, provide below-market interest rates and often have longer repayment periods.

Successful debt financing

Mozambique had recently commissioned its first large-scale solar plant when the financial closing for its second was finalized in 2020. Located in the Cabo Delgado province in northern Mozambique, French independent power producer (IPP) Neoen partnered with Electricidade de Moçambique, the national power utility, to develop a 41 MWp solar PV plant, along with a 100-meter transmission line and an electrical substation. The project exemplifies successful debt financing under the Renewable Energy Auction Programme (PROLER), launched in 2020. Co-financed by the French Development Agency (AFD) and the EU, PROLER mitigates technical, environmental, and social risks to create an attractive investment framework.

Following a tender for a 25-year power purchase agreement (PPA) with Electricidade de Moçambique, Neoen secured a USD 40 million loan⁵⁷ from the French National Development Bank and its financial arm, Proparco. A portion of the loan was concessional, helping to optimize electricity prices so that EDM could afford it while supporting local and environmental benefits. Additionally, the project was backed by the Government of Mozambique, with a USD 16 million dollars in equity in the joint venture company, the Metoro Solar Consortium. With a total cost of USD 56 million, the project was commissioned in 2022.

This is one example of debt financing, but there are many instruments that serve a similar purpose, such as the AfricaGoGreen provided by Cygnum Capital Group, instruments from CEI Africa, the programme Offgrid.Finance financed by Offgrid.Finance, the Solar Energy Fund by the Bank of Industry limited, Project – Related Financing by the African Export Import Bank.

Blended finance combines public, private, and concessional capital for financing to reduce risks and attract investment for accelerating solar adoption. Few leading examples from Africa are (a) the 54 MW Bangweulu Solar Plant in Zambia was financed under the Scaling Solar program, with support from the International Development Association

and concessional loans from the Multilateral Investment Guarantee Agency (MIGA); (b) Uganda's GET FIT Solar Facility co-financed solar mini-grids and grid-connected projects to expand energy access; (c) Climate Investment Funds co-financed the Menengai Geothermal and Solar Hybrid project supporting solar power expansion alongside geothermal energy in Kenya; (d) In Morocco, the EIB co-financed the Noor Ouarzazate Solar Complex, one of the largest solar plants in the world; and (e) Global Climate Fund funded the Deutsche Bank Universal Green Energy Access Program and provided concessional loans for solar mini-grids in Sub-Saharan Africa.

Equity

Role: Reduces the perceived risk by lowering senior default risk which can improve the risk–return profile for investors.

In 2019 in Malawi, the Golomoti JCM Solar Corporation called for expressions of interest to select its contractors for the planned 20 MW Golomoti Solar PV Park with BESS and a 132 kV transmission line. The electricity would be sold under a long-term PPA to the national utility ESCOM. The project was financially backed by InfraCo, a unit of the Private Infrastructure Development Group (PIDG) and the Canadian private equity firm JCM Power. InfraCo invested USD 8 million to support the project, to bring the project to financial close, and JCM supplied the project development service. The solar PV Plant was commissioned in 2022.

This is one example of equity financing, but there are many instruments that serve a similar purpose, such as the Africa Finance Corporation – Equity financed by the Africa Finance Corporation, the Africa50 Project Finance, supplied by Africa50, the Pioneer Energy Investment Initiative by Acument Capital, the Green Fund provided by the Development Bank of Southern Africa and the Africa Renewable Energy Fund II, by Berkeley Energy, and instruments from the British International Investment (BII) – Equity.

Off-take contracts

Role: Reduce market risks by mitigating missing market risk, revenue risk and cost competitiveness risk, ultimately bringing certainty to sales price and therefore visibility to investors.

Scaling Solar is the one-stop shop program of the World Bank Group led by the International Finance Corporation. It aims at fostering transparent, competitive bid processes combined with de-risking, both inside and outside of the project documents, and a financing offer—to shorten the time-span from project development phase to financial close, and to attract larger developers and international banks. The programme has had successful outcomes in Senegal, Zambia and is currently active in Ivory Coast, Madagascar, Niger and Togo.

A key element of this programme is the off-taker. The programme lead to the creation of PPA with the national power utility. In June 2016, Enel Green Power won the Ngonye project in the first round of the Scaling Solar Programme in Zambia. The company signed a 25 year PPA with the state-owned utility ZESCO. The tender process as well as the PPA contributed to unlocking funds for the project. The financing included senior loans of up to US\$10 million from the International Financing Corporation (IFC), up to US\$12 million from the IFC-Canada Climate Change Program and up to US\$11.75 million from the European Investment Bank (EIB)⁵⁸. The 34 MW project was commissioned in 2019.

PPAs for utility scale project have found a foothold in market with access to commercial finance in Africa, 80% of clean power projects have reached FID in the last five years⁵⁹. While PPAs are not the only way to secure an off-taker, their success demonstrates the importance of having a reliable off-taker. Additionally, the reliability of an off-taker can be enhanced by guarantees for instance. *More detailed are provided below on the spotlight on guarantees.*

Tax incentives

Role: Increase the rate of return on green investments by reducing overall tax burdens which encourages a higher proportion of debt financing. Tax incentives are also useful for small-scale solar, like residential solar. Tax exemption on equipment for instance lessens the cost of a module and makes it more affordable for the population.

Another tax incentive can be through the taxable income. In 2023, the National Treasury in South Africa introduced renewable energy tax incentives to bolster the uptake of clean solutions. The first incentive consisted of an energy tax credit for individuals and the second in deduction for renewable energy for businesses⁶⁰. While the results are being assessed by the National Treasury, these types of measures can play a crucial role in the roll-out of solar.

Grants

Role: A popular instrument in clean energy projects, grants provide direct investment without an expectation of monetary returns by the investor.

Grants can be allocated to a project, to either lessen the financial burden on the developer or to attract IPP. End of 2024, The African Development Bank has approved a funding of EUR 28 million for two solar plants in Chad⁶¹. It includes a €20 million direct investment that combines both a loan and a grant from the Sustainable Energy Fund for Africa, along with an additional €8 million in financial guarantees.

Grants can be given to the developer as a means to unlock financing, but it can also be provided to public bodies, as technical assistance (TA) grant. They contribute to bolstering the capacities of an institution, to better derisk through tender or feasibility studies for

⁵⁷ Proparco (2024), Proparco and AFD Finance the Construction of the Second Solar Power Plant in Mozambique, <https://www.proparco.fr/fr/actualites/proparco-et-lafd-financent-la-construction-de-la-seconde-centrale-solaire-du-mozambique>

⁵⁸ PV Tech (2024), Enel, IDC Sign US\$34 Million Financing Agreement for 34MW PV Project in Zambia, <https://www.pv-tech.org/enel-ids-sign-us34-million-financing-agreement-for-34mw-pv-project-in-zambia/>

⁵⁹ IEA (2024), Clean Energy Investment for Development in Africa, IEA, Paris <https://www.iea.org/reports/clean-energy-investment-for-development-in-africa>

⁶⁰ Engineering News (2024), Businesses Urged to Use Enhanced Deduction for Renewable Energy Incentive Before February 28, 2025, <https://www.engineeringnews.co.za/article/businesses-urged-to-use-enhanced-deduction-for-renewable-energy-incentive-before-february-28-2025-02-20>

⁶¹ African Development Bank (2024), Chad: New EUR 28 Million African Development Bank-Funded Solar Project to Boost Chad's Energy Access, <https://www.afdb.org/en/news-and-events/press-releases/chad-new-eur-28-million-african-development-bank-funded-solar-project-boost-chads-energy-access-79813>

instance. The Sustainable Energy Fund for Africa (SEFA) has granted USD 15.4 to the Green Mini-Grid Electrification Project in Mauritania in 2023, with the aim of deploying 0.7 MW of renewable energy⁶².

These are just examples of grants financing, but many instrument serving the same purpose exist, such as: the Innovation Fund provided by Africa Enterprise Challenge Fund (AECF), the Programme sub-Saharan Africa Grants supplied by Powering Renewable Energy Opportunities (PREO), the Climate and Finance Innovation Alliance by BFA Global, the DEG – Partners in Transformation (Up-scaling Program) by KfW.

Green Bonds

Role: Green bonds often come with lower interest rates and regulatory and tax benefits from the large environmentally conscious investors, including institutional investors and ESG funds which ensure sustainable project development.

To accelerate Africa's energy transition market readiness for green bond is important. In 2023 the African Development Bank signed a joint partnership with the Global Green Bond Initiative to promote green bonds across the continent. While South Africa has pioneered green bonds in Africa, Nigeria dominates the public issuance of green bonds. In 2017, Nigeria issued its first green bond to fund solar power and afforestation projects. This was the first bond certified by climate bond standards, and today Nigeria accounts for approximately 99% of green bonds listed on the Nigerian Stock Exchange. Private firms, such as Access Bank, North-South Power Company and the Infrastructure Credit Guarantee Company, have followed the government's lead. Additionally, the International Finance Corporation and Amundi have launched a USD 2 billion fund to purchase green bonds from emerging markets, including Africa. These instances reflect African institutions' growing recognition of green bonds as vital to unlocking climate finance for solar projects.

Some notable examples of green bonds financing large scale solar projects in Africa are

- African Development Bank (AfDB) issued multiple green bonds to finance renewable energy projects, including the large-scale solar initiatives like the Desert to Power initiative, which aims to generate 10 GW of solar energy across the Sahel region.
- Nigeria Sovereign Green Bond issued in 2017 and 2019 included off-grid and mini-grid solar power installations in rural areas.
- South Africa's Green Bonds, The City of Cape Town Green Bond (2017), funded solar water heater installations and energy efficiency projects. Additionally, South African banks like Nedbank and Standard Bank have issued green bonds to support renewable energy infrastructure, including solar farms.

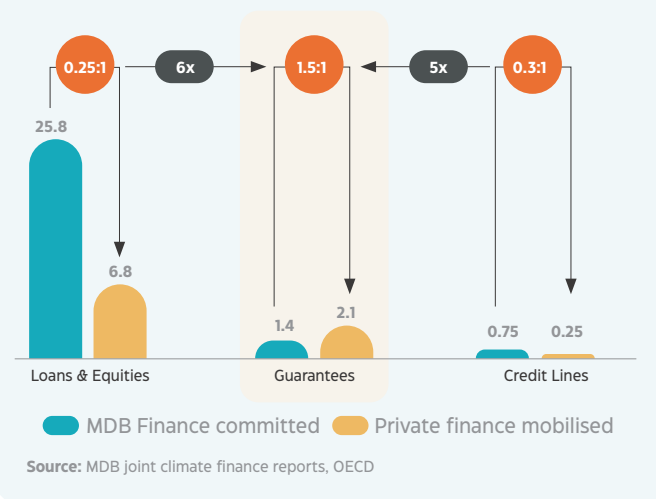
- FMO Green Bond (Dutch Development Bank) – FMO issued green bonds to finance solar power projects in Africa, such as Djermaya Solar (Chad) and SolarNow (Uganda), which provide off-grid solar solutions; and Cleantech Solar Rwanda (10 MW) funded through Climate Investor One
- CFA Franc Green Bond (West Africa) under the Banque Ouest Africaine de Développement (BOAD) issued a green bond in 2021 to finance solar energy and other sustainable projects across West African countries.

Guarantees

Role: Guarantees enhance creditworthiness by providing partial or even full coverage on debt obligations borrowers have. Guarantees improve project credit rating and can support reduce costs of financing while also addressing perceived political and regulatory risks.

While countries should continue to leverage these impactful mechanisms to de-risk projects, countries are underutilizing one catalytic tool; guarantees. An analysis by the Blended Finance Taskforce found the deep impact guarantees can have, mobilizing more private investment than other forms of instruments. Specifically comparing loans and equities, credit lines, and guarantees, the analysis determined loans mobilize 25 cents of private capital per US dollar of public capital, credit lines mobilized 30 cents to the US dollar, and guarantees mobilized \$1.50 to the US dollar.⁶³

Figure 24: Annual MDB climate commitments and private finance mobilisation



Guarantees have an important role to play in the clean energy transition, especially in unlocking climate finance to less mature markets across Africa. The following section discusses these instruments and how they can mitigate different types of risks for African markets.



⁶² African Development Bank (2023), Sustainable Energy Fund for Africa (SEFA) Annual Report 2023, <https://www.afdb.org/en/documents/sustainable-energy-fund-africa-sefa-annual-report-2023>

⁶³ Blended Finance Earth (2024), Making Climate Capital Work, <https://www.blendedfinance.earth/making-climate-capital-work#:~:text=Produced%20by%20the%20Blended%20Finance%20Taskforce%20and%20Stellenbosch,and%20can%20be%20financed%20by%20the%20private%20sector.>

3.3: Role of Guarantees








Guarantees have emerged as a critical financial instrument to unlock private capital and de-risk clean energy investments. While there are many de-risking instruments that can catalyze climate investments, this report is spotlighting guarantees as an important risk-mitigating instruments as they can provide investors with a level of security against specific project-related and macroeconomic risks.

Guarantees are a compelling instrument to use for attracting climate finance. Currently, guarantees have been responsible for 26% of all mobilized private finance between 2018 and 2020⁶⁴. Not only do they provide investors more confidence in investing but when compared to other instruments, guarantees are able to mobilize five times the average mobilization ratio and only represent less than 5% of climate finance instruments⁶⁵. Leveraging guarantees high mobilization power of private capital is crucial to Africa's clean energy transition. Given the limited appetite for investment in Africa because of high perceived risk from investors across the continent's political, regulatory, and currency risks, guarantees can transfer these risks to a guarantor. This transfer will inherently change the risk and rewards an investor faces, making an investment more attractive and reducing the overall cost of capital. As a result, financing costs become more affordable for borrowers, and it reduces the risk weight of investment and associated capital from an investor.

Guarantees are a pivotal instrument that can help address the

challenges, previously mentioned, that African countries face to access climate finance. Many borrowers across Africa are perceived with high credit risk and are unable to attract private finance because of their lower credit rating, limited balance sheets, and weak sovereign credit profiles. Guarantees, however, offer an opportunity to improve creditworthiness as they can provide partial or even full coverage on debt obligations borrowers have. This credit enhancement reduces the borrowers' risk of default, and a project can be perceived as more attractive by investors. Throughout business as usual, African markets face higher costs of financing than Western markets. However, guarantees can support African markets by improving project credit rating and reduce these costs by 40–60%⁶⁶. The Credit risk is not the only challenge that guarantees are able to address. Guarantees are able to mitigate the perceived uncertainty on political and regulatory landscape of African markets. Investors are also hesitant to invest in markets that do not have clear policies on tariffs, subsidies, or power purchase agreements (PPAs) because of government unpredictability. For example, Partial Risk Guarantees (PRGs), protect investors from changes in regulation, contracts, and policies that incur loss. If projects are servicing debt in non-local hard currency, currency depreciation from local currency can amplify the risk of returns to investors due to the project generating revenue in local currency. Foreign exchange (FOREX) guarantees can absorb these currency fluctuations, giving investors more confidence in projects.

Guarantee Type	Function
 Project-specific Guarantee	Cover risks related to individual projects, such as construction delays or technical failures.
 Partial Risk Guarantee	Typically focused on regulator or political risks. These guarantees ensure investors are compensated if the policy landscape changes and impacts a project. These are most commonly seen in Public-Private-Partnership (PPP) projects.
 Sovereign & MDB Guarantees	Often issued or backed by MDBs, these address broader concerns such as currency fluctuations, regulatory unpredictability, and credit risks associated with state-owned utilities, typically for large-scale projects.
 Blended Finance Structures	Leverage concessional capital from MDBs or development agencies to crowd in private sector investment.
 Currency and FOREX Guarantee	Protects against currency depreciation by offering partial coverage on an exchange rate loss, making the option for local-currency financing more attractive.

⁶⁴ Climate Policy Initiative (2024), Landscape of Guarantees for Climate Finance in Emerging Markets and Developing Economies, <https://www.climatepolicyinitiative.org/publication/landscape-of-guarantees-for-climate-finance-in-emdes/>

⁶⁵ Blended Finance Earth (2024), Making Climate Capital Work, <https://www.blendedfinance.earth/making-climate-capital-work#:~:text=Produced%20by%20the%20Blended%20Finance%20TaskForce%20and%20Stellenbosch,and%20can%20be%20financed%20by%20the%20private%20sector.>

⁶⁶ African Development Bank (2024), African Economic Outlook, <https://www.afdb.org/en/knowledge/publications/african-economic-outlook#:~:text=The%20African%20Economic%20Outlook%202024%20is%20being%20published%20as%20a%20response%20to%20the%20invasion%20of%20Ukraine%20and%20the%20climate%20issues%20affecti>

Successful guarantee financing

In September 2023, Cameroon's Minister of Water and Energy, Gaston Eloundou Essomba inaugurated the solar PV Plant commissioned in Maroua and Guider end of 2022. This project was initiated by the historic electricity operator, Eneo, to cope with the load shedding in the north of the country. The two projects totalling 36 MWp were delivered by the specially created joint venture Maroua-Guider Solar Company (MGSC), comprising of the Norwegian IPP Scatec, Izuba Energy and Sphinx Energy. A key hurdle was the potential default risk of Eneo, which could endanger the bankability of the project.

The solution found was a financing through guarantee to secure payment for the energy injected into the grid, regardless of potential cash flow issues at Eneo. To fulfill this requirement, BGFI Bank issued two Stand-by Letters of Credit (SBLC) totaling \$11.6 million (approximately 7 billion FCFA). This mechanism ensured that if Eneo faced financial difficulties, BGFI would cover Scatec's payments up to the guarantee amount of 7 million of FCFA. Eneo will then reimburse the bank later, with an agreed interest rate of less than 3% according to the journal *Investir au Cameroun*⁶⁷. These guarantees were necessary to unlock the CFA 17 million from the consortium.

These are just examples of guarantee financing, but many instrument serving the same purpose exist, such as: the Guarantee Products from the African Export-Import Bank, the European Fund for Sustainable Development Plus (EFSD+), the African Energy Guarantee Facility provided by Sustainable Finance Risk Consulting, The Climate Investment Platform – Guarantee by the International Renewable Energy Agency (IRENA), the [Africa Renewable Energy Scale-up Facility \(ARE Scale Up\)](#) guarantee fund by Proparco.

By absorbing part of the risk, guarantees effectively reduce financing costs for clean energy developers and make projects more attractive to commercial lenders. One of the key barriers to private sector participation in Africa's renewable energy sector is the lack of long-term, affordable financing options. Without guarantees, borrowing costs for many African nations can reach 14% or higher, making large-scale renewable projects financially unfeasible. With a well-structured guarantee, these costs can drop to as low as 4%, significantly improving the bankability of projects. When coupled with regulatory reforms, capacity building, and concessional funding, guarantees can serve as a powerful enabler of climate finance, de-risking markets and mobilizing significant private capital toward sustainable energy development.



⁶⁷ Investir au Cameroun (2024). Électricité : BGFI s'engage dans un projet solaire au Cameroun avec une garantie de 7 milliards de FCFA. <https://www.investiraucameroun.com/finance/0211-17074-electricite-bgfi-s-engage-dans-un-projet-solaire-au-cameroun-avec-une-garantie-de-7-milliards-de-fcfa>

3.4: Funding Support Available for Solar Adoption in Africa

Transitioning to solar energy in African markets requires not only technical expertise but also robust financial and advisory support. Recognizing the challenges faced by project developers, domestic financial institutions, and investors, several international and regional initiatives have been established to provide financing, risk mitigation, and matchmaking services. These mechanisms play a crucial role in de-risking investments, enhancing project bankability, and accelerating the adoption of solar energy across the continent. Below is a list of examples of key support mechanisms available for solar projects in Africa that can be leveraged for seeking support for projects.

The Global Gateway, the strategic compass of the EU for external action, seeks to mobilize 300 billion euros by 2027 to bolster the digital and energy transition in emerging countries. The President of the European Commission, Ursula von der Leyen, announced in 2022 at the Africa-EU Summit that the continent would benefit from half of this funding. This has materialized through various instruments and services, designed to contribute to the implementation of clean projects across various countries in Africa.

The Africa-Europe Green Energy Initiative, part of the EU's Global Gateway, mobilizes technical assistance, concessional finance, and guarantees to expand clean energy infrastructure across Africa. It focuses on large-scale solar projects, mini-grids, and energy efficiency measures, supporting African countries in meeting their clean energy targets.

Team Europe One-Stop-Shop

This project aims to facilitate access to support and financing instruments for green energy in Africa. The Team Europe One-Stop Shop can provide an overview of potential solutions and financing for project developers. Additionally, it provides advisory services for financing instruments. Finance providers can also use this to advertise their products and create a pipeline of viable investees.

ElectriFI

ElectriFI is an impact investment facility from the European Development Finance Institutions designed to catalyze private sector investment in early-stage renewable energy projects by providing equity, quasi-equity, junior/senior debt, or guarantees, both at corporate and project level to solar developers, energy service companies, and financial intermediaries.

EFSD+

The European Fund for Sustainable Development Plus (EFSD+) supports an array of risk-sharing mechanisms of up to €40 billion including instruments like blended finance mechanisms, offering guarantees, loans, and technical assistance. The EFSD+ aims to mobilize €135 billions of public and private financing to help partner countries achieve the Sustainable Development Goals (SDGs). The EIB is the largest partner of the EFSD+.

Additionally, other services exist, providing funding and assistance to energy-related projects.

GET.invest Matchmaking

GET.invest is an EU-supported initiative designed to mobilize investment in renewable energy projects across Africa. A key component of this platform is its matchmaking service, which connects solar developers with financiers, technology providers, and development partners. Through targeted networking sessions and an online matchmaking platform, GET.invest facilitates crucial partnerships needed to drive solar adoption. Eligibility requires project developers to present a well-structured business case with clear financial and technical feasibility. The initiative also supports early-stage project preparation, helping developers refine their investment propositions before approaching financiers.

GET.invest EDGE Finance

EDGE Finance specifically targets domestic financial institutions, such as commercial banks, microfinance institutions, and pension funds, providing them with the necessary knowledge, tools, and networks to support green energy initiatives in their markets. EDGE Finance offers a comprehensive capacity-building packages that includes tailored coaching, training, and advisory services.

GET.invest Finance Access Advisory

GET.invest Finance Access Advisory provides tailored financial coaching and structuring support to renewable energy developers and businesses. By working closely with project sponsors, the initiative helps refine business models, improve financial viability, and prepare projects for investment. This service enhances access to funding by bridging the gap between project developers and financiers.

A galaxy of other actors provide invaluable services and de-risking instruments.

Africa Facility for Energy Inclusion (FEI)

FEI provides debt financing for decentralized renewable energy. With a focus on off-grid solar, small Independent Power Producers (IPPs), captive power and mini-grids, the debt-financing facility provides investment management and financial advisory services in sub-Saharan Africa and other emerging markets.

GuarantCo

GuarantCo provides credit guarantees to enhance the bankability of infrastructure projects, including solar energy initiatives. By offering partial credit guarantees and local currency solutions, GuarantCo helps bridge the gap between developers and financial institutions, thereby enabling access to long-term financing. To qualify, projects must demonstrate strong environmental, social, and governance (ESG) compliance, which in solar can be done with the Solar Stewardship Initiative, financial sustainability, and alignment with local development objectives. Applications for funding must be submitted through GuarantCo's official platform.

Africa Renewable Energy Fund (AREF)

Managed by Berkeley Energy and supported by the European Investment Bank (EIB), AREF is a dedicated equity fund that invests in small to medium-scale renewable energy projects, including solar. The fund targets commercially viable projects across Sub-Saharan Africa, providing both capital and technical expertise. To access AREF funding, projects must demonstrate financial viability, adherence to international ESG standards, and alignment with regional energy policies. The fund primarily supports private sector initiatives, working closely with developers to scale up solar investments and ensure long-term sustainability.

West African Development Bank (BOAD) Climate Finance Facility

BOAD, in partnership with the Green Climate Fund (GCF), offers concessional financing for climate-friendly infrastructure, including solar. Through its investment program, BOAD provides both direct funding and credit lines to domestic financial institutions, thereby improving access to affordable solar financing. Projects seeking BOAD support must align with national climate strategies and demonstrate significant socio-economic benefits, such as job creation and energy access improvements. Additionally, applicants must meet stringent environmental impact assessment requirements to ensure compliance with sustainability goals.

Sustainable Energy Fund for Africa (SEFA)

Administered by the African Development Bank (AfDB), SEFA provides catalytic finance to unlock private sector investments in

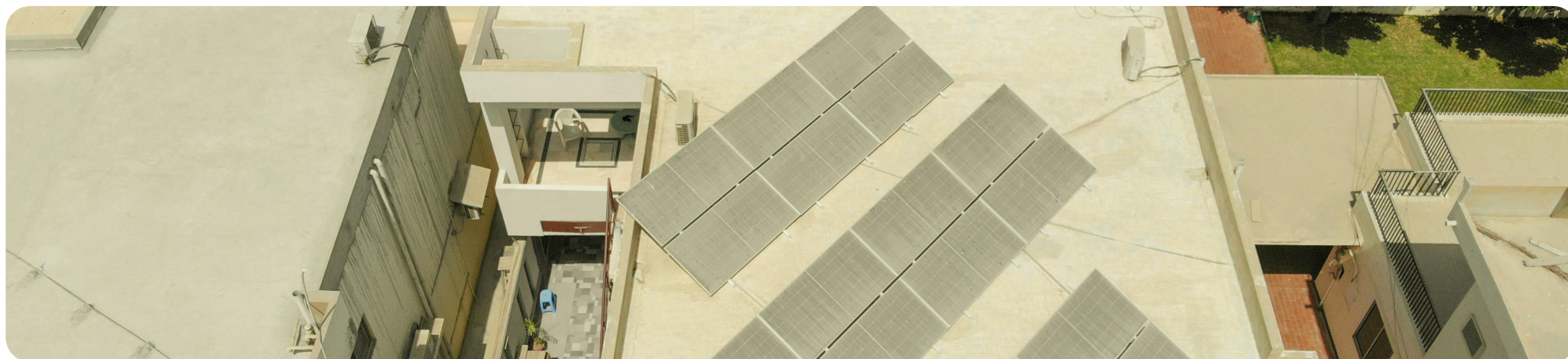
renewable energy. The fund offers grants, equity investments, and technical assistance to support early-stage solar project development. To qualify, projects must present a clear path to financial closure, demonstrate scalability, and contribute to Africa's clean energy transition. SEFA places particular emphasis on innovative business models, off-grid solutions, and projects with strong community engagement components.

Private Finance Advisory Network (PFAN)

PFAN offers technical assistance and investor matchmaking services for clean energy projects. This global initiative supports clean energy entrepreneurs and project developers access private investments through business coaching, financial structuring support, and investor matchmaking. A focus on climate adaptation and resilience within solar projects could also be an advantage. Entrepreneurs, project developers, or businesses can seek funding for commercially viable clean energy ventures but projects need to have a clear business model and demonstrate financial sustainability.

TCX (or the Currency Exchange Fund)

TCX offers swaps & forward contracts that enable TCX's investors and clients to provide their borrowers with financing in their own currency, while shifting the currency risk to TCX. Although this comes at a premium, this seeks to protect investors from currency volatility. It was founded in 2007 by a group of DFIs.



3.5: Recommendations for Mobilizing Investment

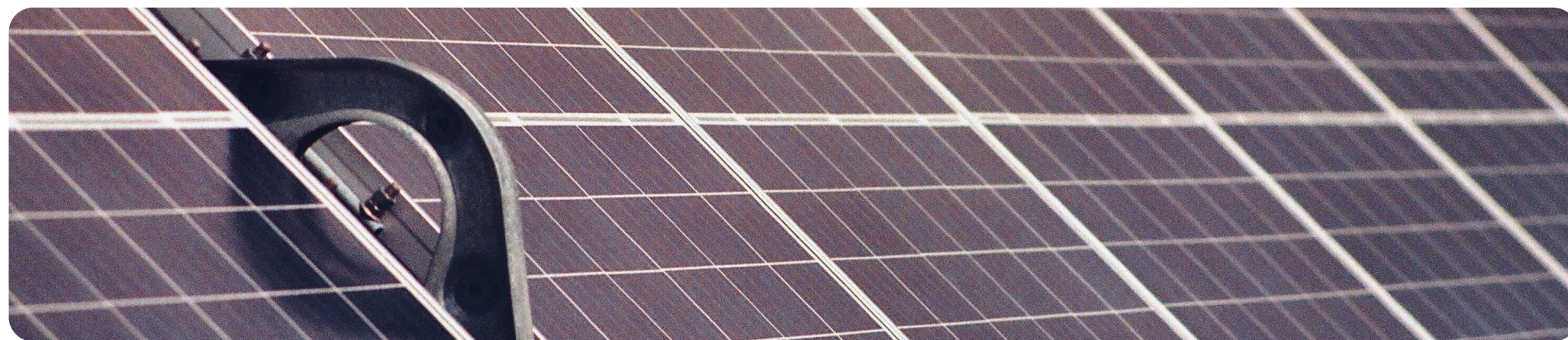
Despite Africa's renewable energy potential, over 600 million people lack access to electricity. Financing efforts must prioritize decentralized solutions such as off-grid solar and mini-grids to reach marginalized communities. Public policies and financial incentives should support last-mile electrification and affordability. In order to ensure electrification, the private capital needs to be increased by lowering the risk-perception of African markets.

Enabling domestic capital markets to support the energy transition will be key. African pension funds, insurance companies, and sovereign wealth funds collectively manage over USD 17 trillion in assets⁶⁸. Yet, only a small fraction is directed toward clean energy

projects. Strengthening domestic capital markets such as encouraging pension funds to allocate a portion of assets to green investments, establishing green banks or specialized financing institutions focused on renewable energy can unlock these resources for climate finance.

Local banks play a critical role in financing small- and medium-scale renewable energy projects. However, many lack the expertise and risk assessment capabilities to structure clean energy loans. Programs that provide capacity-building for domestic financial institutions, are essential to bridge this gap. Initiatives should equip local banks with the technical know-how to assess and finance green projects effectively.

Ultimately, an enabling policy environment is fundamental to unlocking finance for Africa's clean energy transition. Governments must prioritize clear and stable renewable energy policies to reduce investor uncertainty; streamlined permitting and licensing processes to fast-track project approvals; tariff structures that ensure cost-reflective electricity pricing while maintaining affordability. By strengthening local financial ecosystems and implementing these structural reforms, African countries can position themselves as an attractive destination for climate finance while fostering a self-sustaining renewable energy sector. Furthermore, carbon credits and climate financing should be encouraged.

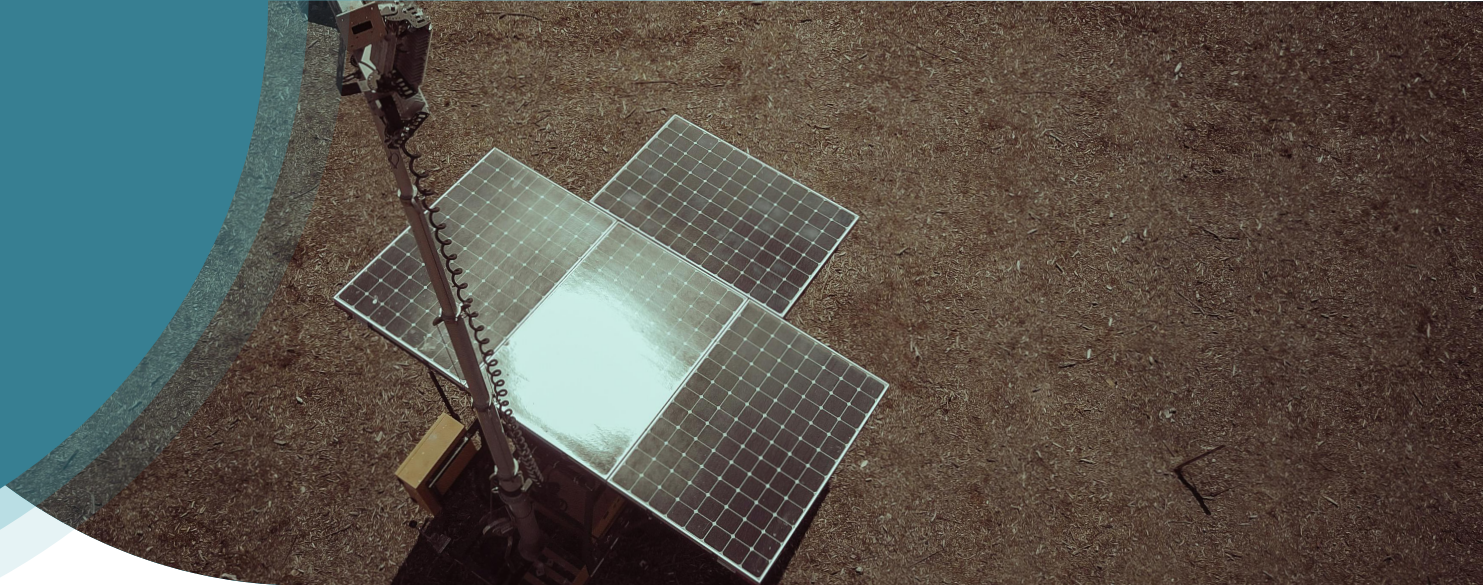


⁶⁸ Blended Finance Earth (2024), Making Climate Capital Work. Last modified [insert date if available]. <https://www.blendedfinance.earth/making-climate-capital-work#:~:text=Produced%20by%20the%20Blended%20Finance%20Taskforce%20and%20Stellenbosch,and%20can%20be%20financed%20by%20the%20private%20sector.>

Chapter 4

Emerging Opportunities
for Solar in E-Mobility
and Renewable
Hydrogen

4.1: Rising electricity demand can be met with solar

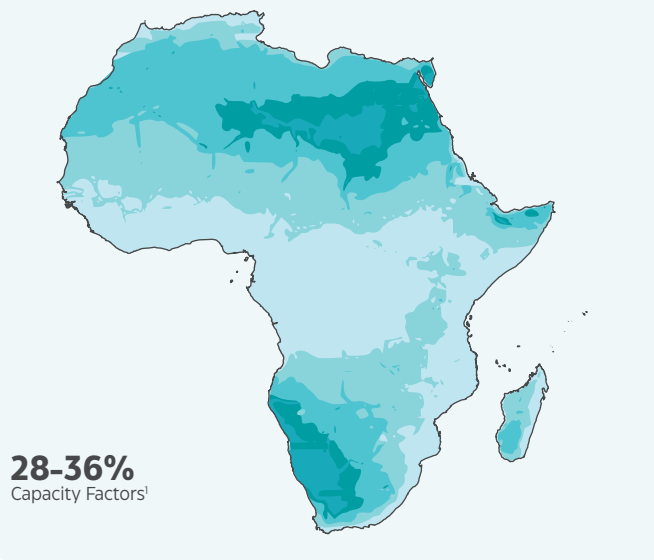


Total electricity demand on the African continent is set to rise by 4% yearly for 2024–2026 according to the IEA⁶⁹ as economies develop and more and more sectors become electrified. Although Africa is home to some of the best energy resources in the world, energy access is still a critical challenge in many regions on the continent, which hinders economic opportunities. That is why the African Union adopted The Agenda 2063 in May 2013, setting a strategic framework designed to transform the continent into a “global powerhouse of the future”⁷⁰. To fulfill this vision, African countries are seizing the opportunity of the clean energy revolution across the continent to power economic growth by creating new industries, investment opportunities and jobs. Two sectors have been the subject of increasing attention and investments, with clear ambitions of becoming a global leader: renewable hydrogen and e-mobility.

These new uses will dramatically increase the need for electricity for the continent. For instance, with commercial electrolyzers, 1kg renewable hydrogen can be produced through 50 MWh of energy⁷¹. To grasp the magnitude, Tunisia only aspires at producing 8,5 million tons of renewable hydrogen by 2050, requiring a formidable energy production.

Figure 25: Solar Power Potential in Africa

Solar power potential, kW hours/kW peak <1,500 2,400



To meet this growing demand, electricity will need to be affordable, reliable, able to reach even rural areas, and fast to deploy. Luckily, Africa is blessed with the highest renewables theoretical potential in the world. It is estimated by IRENA that the technical potential of solar amount to 7,9 TW, for hydro 1,753 TW and 461 GW of onshore wind potential⁷². Comparatively, the global installed solar capacity has reached 2 TW in September 2024. Solar is therefore uniquely placed to fulfil this rising electricity demand in Africa due to its massive potential, affordability, ease and rapidness of deployment, and flexibility.

For the emerging sectors of renewable hydrogen and e-mobility, solar will be key to the success of these sectors in African countries. Due to high-capacity factors and significantly lower CAPEX compared to other energy sources, solar can reduce the cost of electrolysis in the production of green hydrogen and its derivative, lowering the overall cost of the project and output. With utility-scale and decentralised solutions, solar can power e-mobility both in urban areas and more rural locations. In the coming decades, renewable hydrogen and e-mobility will therefore be key drivers of solar's growth, which in return will allow Africa to harness the socio-economic benefits brought by a clean energy revolution.

⁶⁹ IEA (2024), Electricity 2024, IEA, Paris <https://www.iea.org/reports/electricity-2024>

⁷⁰ African Union (2024), Agenda 2063 Overview, <https://au.int/en/agenda2063/overview>

⁷¹ This is a general estimation, production is subject to a lot of parameters which can change this ratio e.g the production of renewable electricity, the size of the electrolyser, its efficiency. To know more: [FAQ - General Green Hydrogen Knowledge](#)

⁷² International Renewable Energy Agency (2022), Renewable Energy Market Analysis: Africa, IRENA, Abu Dhabi. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Market_Africa_2022.pdf

4.2: E-Mobility Landscape and Drivers

The ramp-up of e-mobility across Africa would benefit the climate and the health of the population, in line with the Agenda 2063

The Agenda 2063 lays out the vision for a brighter future in Africa, and seeks to achieve a sustainable urban development. However, globally, [transport emissions grew at an annual average rate of 1.7%](#) from 1990 to 2022⁷³, faster than any other end-use sector except for industry (which also grew at around 1.7%) and land transport emissions in Sub Saharan Africa are among the fastest growing in the world⁷⁴, driven by rapid urbanisation and demographics. This has worsened the impact of air pollution sustained by mobility, [which led to the death of 400,000 people in 2019](#) in Africa⁷⁵. With mobility underpinning a vast majority of economic activities in Africa, the transition of this sector towards electricity is therefore critical both for the climate and health of the population. This transition will also lessen Africa's reliance on fossil fuels and its price instability, making a case of the e-mobility in Africa.

E-mobility is characterised by the replacement of internal combustion engines (ICE) with electric vehicles (EVs), ranging from the bus to the bike, passing by scooters. Hence, Africa encompasses several realities, with various practices, uses of transportation and vehicles. For instance, in SSA, the privately-owned minibus transit “para-transit” is the predominant public transport mode, which differs from the two-

wheelers in Kampala. The UN Environment Programme has identified three uses: personal use, commercial passenger transportation and commercial deliveries. While all the EVs are equipped with batteries, each various transport modes represent a market on its own. While it can be complicated to account for all markets, in each segment, the trend of adoption of EV is clear in Africa.

Quiet revolution driven by expanding markets

Overall, the uptake of EV is growing exponentially across the continent. In South Africa, 407 electric vehicles were sold in 2019, whereas four years later, in 2023, it reached 7.75k. According to Mordor Intelligence, the market size for 2025 is USD 17,41 billion and could reach USD 28,30 billion by 2030, representing a 10,2% CAGR over the next five years⁷⁶. However, the projections for 2030 EV share of expected global sales of both Bloomberg New Energy Finance and the IEA have increased over time, from 15% in 2019 to 35% in 2023 for the latter. Similarly, the United Nations Environment Programme (UNEP) anticipates a significant increase in the sales of both electric and traditional two- and three-wheelers in Africa by 2050⁷⁷.

Africa has seen a spur in EVs projects over the last years, with several players investing in the markets, boosting EVs uptake. The diminishing cost in batteries, the economies of scales from manufacturers, increased private investments, strong policy support as well as new business models have contributed to this growing adoption.



⁷³ International Energy Agency (2024), Energy System: Transport, IEA, <https://www.iea.org/energy-system/transport>.

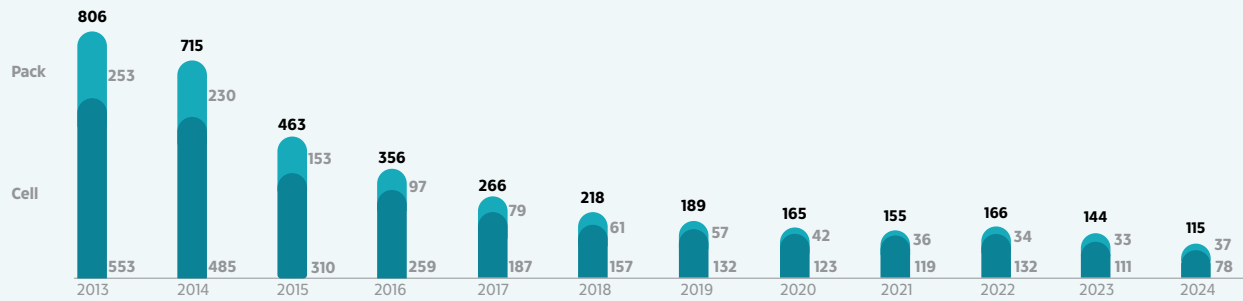
⁷⁴ SLoCaT Partnership (2018), Reports, SLoCaT, <https://slocat.net/reports/>, Transport and Climate Change 2018 Global Status Report (TCC-GSR)

⁷⁵ Boston College (2024), Air Pollution in Africa, BC News, <https://www.bc.edu/bc-web/bcnews/nation-world-society/international/air-pollution-in-africa.html>.

⁷⁶ Mordor Intelligence (2024), Africa Electric Vehicle Market, Mordor Intelligence, <https://www.mordorintelligence.com/industry-reports/africa-electric-vehicle-market>.

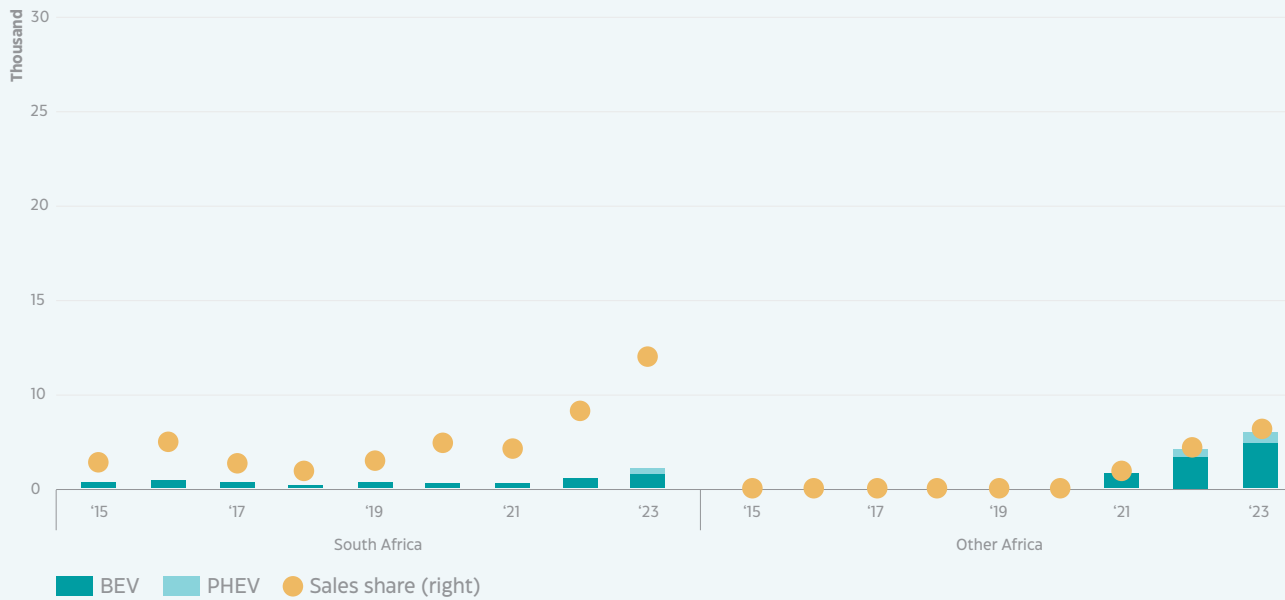
⁷⁷ United Nations Environment Programme (2024), Electric Two- and Three-Wheelers, UNEP, <https://www.unep.org/topics/transport/electric-mobility/electric-two-and-three-wheelers>.

Figure 26: Volume-weighted average lithium-ion battery pack and cell price split, 2013-2024



Source : BloombergNEF. Note: Historical prices have been updated to reflect real 2024 dollars. Weighted average survey value includes 343 data points from passenger cars, buses, commercial vehicles and stationary storage.

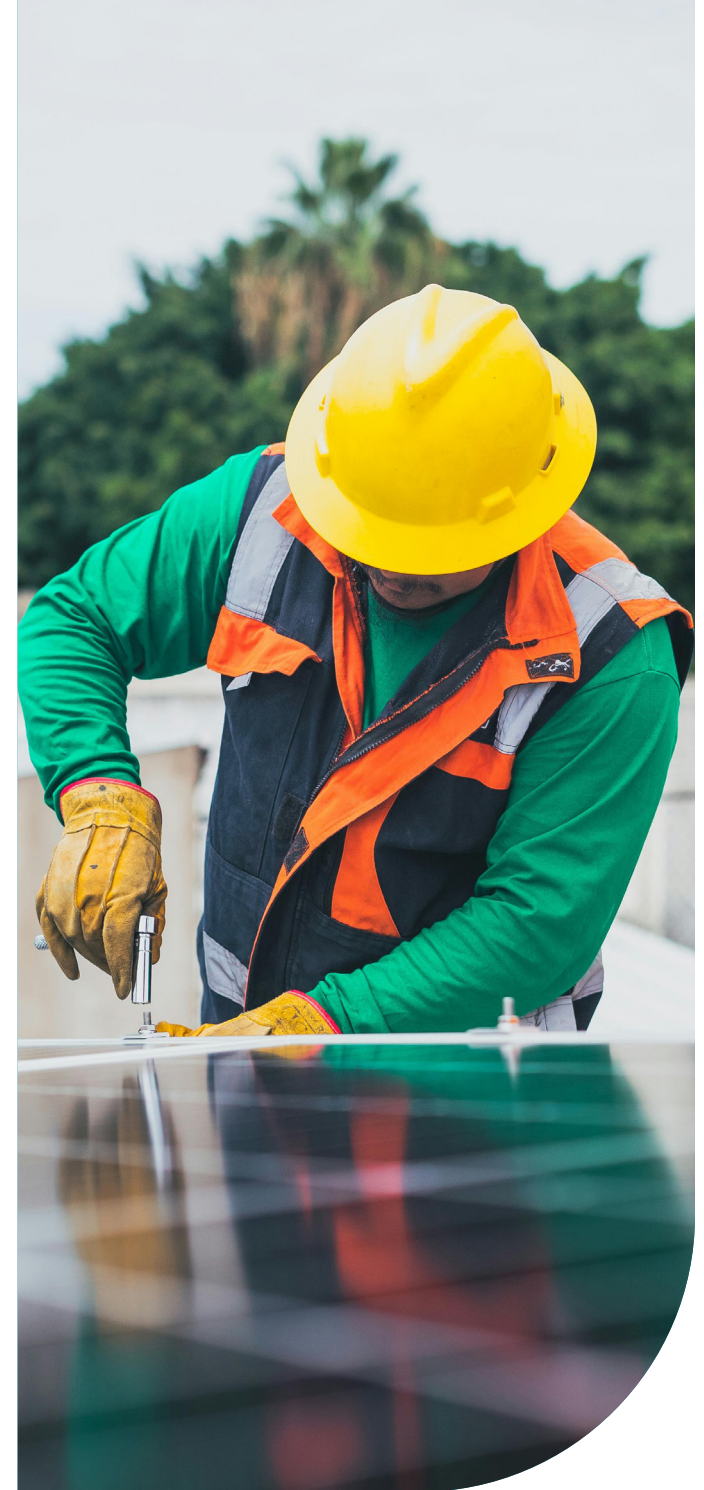
Figure 27: Sales of EV cars in South Africa and the rest of Africa



This combination of factors has contributed to the recent growth over the year in Africa, reported by the IEA. *Global EV Outlook, IEA 2024.*

However, despite the technological advances of battery and their decrease in price, their cost still remains a barrier in the adoption of EV, making them less cost-competitive than an ICE. In South Africa, for heavier models, the battery represents 30% to 50% of the total vehicle costs, mostly due to the raw materials that it contains. The price of EV in Africa for a vast majority is prohibitively high, hindering a wider uptake.

Nonetheless, the IEA indicates that current trends suggest that electric models globally outside of China should reach price parity with combustion engine equivalent for most models in major EV markets by 2030⁷⁸. However, depending on the segments, price parity could be reached earlier. For instance, the removal of subsidy in Nigeria has resulted in Total Cost of Ownership (TOC) parity in the 150-kilometer range two-wheeler segment in high utilisation cases⁷⁹. This shows that clear incentives and bold policies can bolster the uptake of EVs.

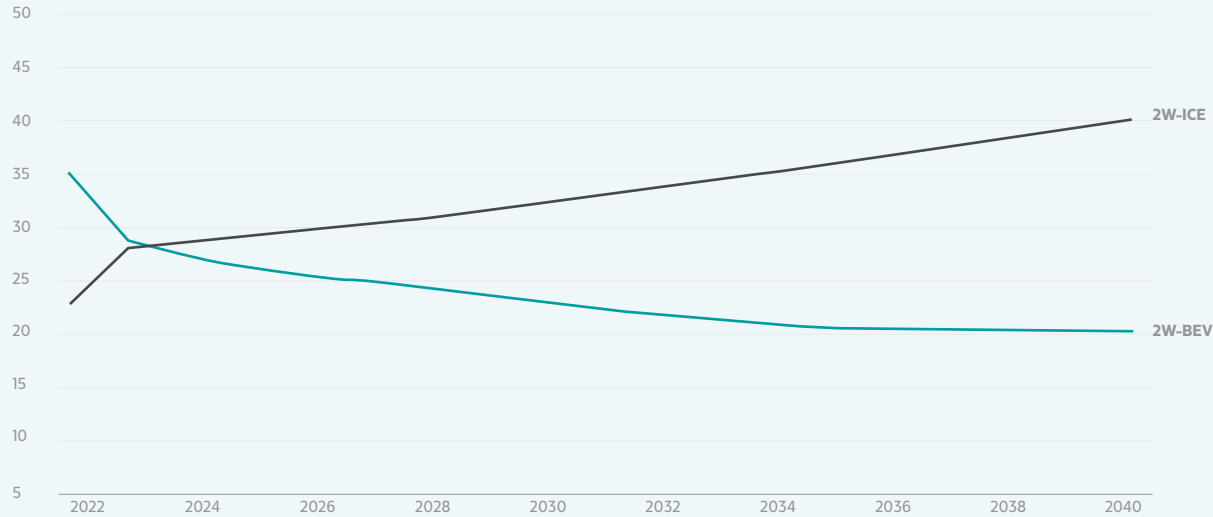


⁷⁸ IEA (2024), *Global EV Outlook 2024*, IEA, Paris <https://www.iea.org/reports/global-ev-outlook-2024>

⁷⁹ Rocky Mountain Institute (2024), *A Vision for E-Mobility in Nigeria*, RMI, https://rmi.org/wp-content/uploads/dlm_uploads/2024/09/a_vision_for_e-mobility_in_nigeria_report-1.pdf.

Figure 28: TCO parity timeline for two-wheelers in Nigeria, RMI

TCO in NGN/Kilometer



2W-BEV represents on electric two wheeler with a 150km range and 6kWh battery

Source : RMI analysis, BNEF, Bob Eco, MAX

Furthermore, several innovative routes to market for EV have spurred across the continent, mainly for two-wheelers. The model of batteries swapping station (BSS) is rising within urban areas in Africa. Instead of charging the vehicle, access is provided to a fully charged battery from a locker. By swapping the depleted battery with the new one, there is no need to wait during the charging process. It also contributes to lessening another barrier of EV, the range anxiety, or fear of not sufficient range to reach a charging station. In the meantime, the depleting battery is filled again and can be used by another customer.

While this method has been disregarded in the US at the early stage of the industry, it is gaining traction in China and Africa⁸⁰. By November 2023, Nio, a Chinese company, had operated more than 2,300 battery swapping stations globally. In Africa, several companies have adopted the same concept. In Rwanda, [Spiro has deployed a dozen of swapping station and cabinets around Kigali, and has planned to expand to other cities in the country](#)⁸¹. In total, [Spiro boasts more than 600 charging stations across Africa](#)⁸². In Kenya, for two-wheelers, BSS can offer cost-competitive advantage compared to ICE⁸³. This solution is increasingly considered, boosted by a dynamic ecosystem of start-ups.



⁸⁰ Harvard Business Review (2024), How One Chinese EV Company Made Battery Swapping Work. <https://hbr.org/2024/05/how-one-chinese-ev-company-made-battery-swapping-work>

⁸¹ AFEMA (2024), AFEMA Technical Brief - Rwanda. <https://africaema.org/resources/AFEMA%20Technical%20Brief-Rwanda.pdf>

⁸² The African Mirror (2024), How Battery Swapping Startups Are Turbocharging Africa's Green Mobility. <https://theafricanmirror.africa/news/how-battery-swapping-startups-are-turbocharging-africas-green-mobility/>

⁸³ BBC (2023), How Battery Swapping is Boosting Electric Motorbikes <https://www.bbc.co.uk/programmes/p0g5pnz4>

Case Study

Tujyane: E-Mobility Transforming Livelihoods in Rural Rwanda

Provided by: Kinvest Impact Foundation

Introduction

Since 2020, Kinvest Impact Foundation (Kinvest) has supported tens of thousands of small business owners in rural Rwanda by providing the critical tools and resources to grow their businesses, create thriving marketplaces, and lift themselves out of extreme poverty. Kinvest has pioneered a rural Energy-as-a-Service model, transforming livelihoods in local communities. By delivering clean, renewable, and reliable energy, Kinvest is increasing incomes, improving community health, and driving climate action. By increasing rural community access to solar power and high-value markets, Kinvest has enabled entrepreneurs to grow their businesses and invest in their communities sustainably.

Among Kinvest's most innovative solutions is Tujyane, meaning 'let's go together,' a rural E-Mobility Program revolutionizing transportation for farmers and entrepreneurs. Tujyane provides affordable electric vehicle (EV) logistics, dramatically reducing costs and expanding market reach. With 60% of Rwanda still off-grid, solutions like Tujyane are reshaping possibilities for rural communities.

Project Implementation

Tujyane's fleet consists of gas-powered trikes converted into high-efficiency electric vehicles. These EVs:

- Travel up to 100 km per charge while carrying 600 kg of goods.
- Operates from Kinvest Solar Market Hubs, which double as a network of EV charging stations.
- Serve 50 clients per month (over 750 clients in first year of operation), unlocking new business opportunities and reducing dependency on expensive fuel-based transport.
- Have a conversion pay-back period of 2 years and a minimum lifespan of 6 years.

Impact and Benefits

Tujyane was designed to harness excess solar energy production while addressing rural mobility challenges. Its impact has been substantial:

- 66% reduction in transport costs, allowing farmers and entrepreneurs to reinvest in their businesses.
- 4x faster than traditional transport, drastically improving supply chain efficiency and access.
- Each vehicle eliminates the use of 4,800L of fossil fuel per year, cutting emissions, driving operational cost savings of \$4,000/year and supporting Rwanda's carbon neutrality goals.
- Job creation: Tujyane fosters new skills and employment opportunities in EV maintenance and logistics.

Market Potential and Challenges

Rwanda's commitment to carbon neutrality by 2050 presents a major opportunity for EV adoption. The country's pro-EV policies, including tax breaks on EV parts, local production incentives, and charging infrastructure investments, are paving the way for rapid expansion.

With 60% of Rwanda off-grid (1.2million households), rural EV solutions like Tujyane are crucial. The emergence of other agricultural EV initiatives (eg. electric tractors) and investment from major automotive stakeholders signals a growing ecosystem, accelerating Rwanda's transition to sustainable mobility.

However, challenges remain:

- Limited rural charging infrastructure: Tujyane leverages Kinvest's Solar Market Hubs to create a scalable EV network, but a lack of broader infrastructure limits the ultimate reach of EVs outside urban areas.
- Upfront costs: Vehicle conversion, staff training, and network charging infrastructure needs to be in place before vehicle fleets can operate.

In 2025, Kinvest aims to expand the fleet by 10 more vehicles, improving technology, efficiency, and impact. Scaling up will unlock further market access, introduce new EV applications such as mobile agro-processing, and enhance rural cold-chain logistics.

Conclusion

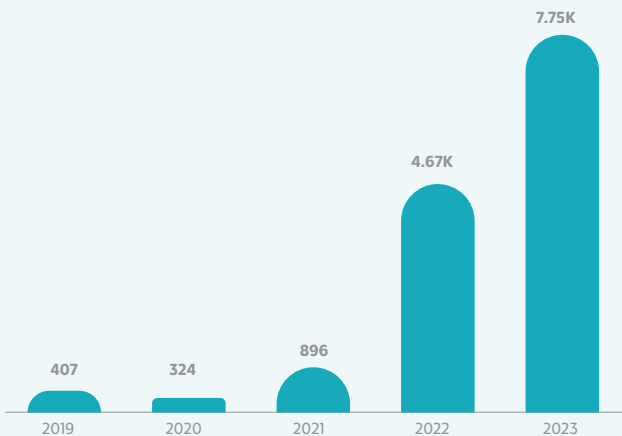
Kinvest's Tujyane EVs are a game-changer for rural mobility, enabling entrepreneurs to tap into larger markets, increase revenues, and break cycles of extreme poverty. More than just transport, Tujyane is fostering Kinvest's expanding Energy-as-a-Service platform, creating jobs, reducing emissions, and building climate-resilient communities.



A strong political will is driving the future of EVs in Africa

While the industry is nascent in Africa, the political will across the continent regarding EV is preparing the market for exponential growth. Twelve countries have established targets pertaining to EV⁸⁵. South Africa is leading the market within the continent, displaying more EV chargers than the UK. Additionally, the president of the country, Cyril Ramaphosa, has expressed his desire to deploy a customer-based policy, with purchase incentive, a long-standing demand from the sector.

Figure 29: African Vehicles Sales from 2019 to 2023 by type (In Units)



Source : naamsas

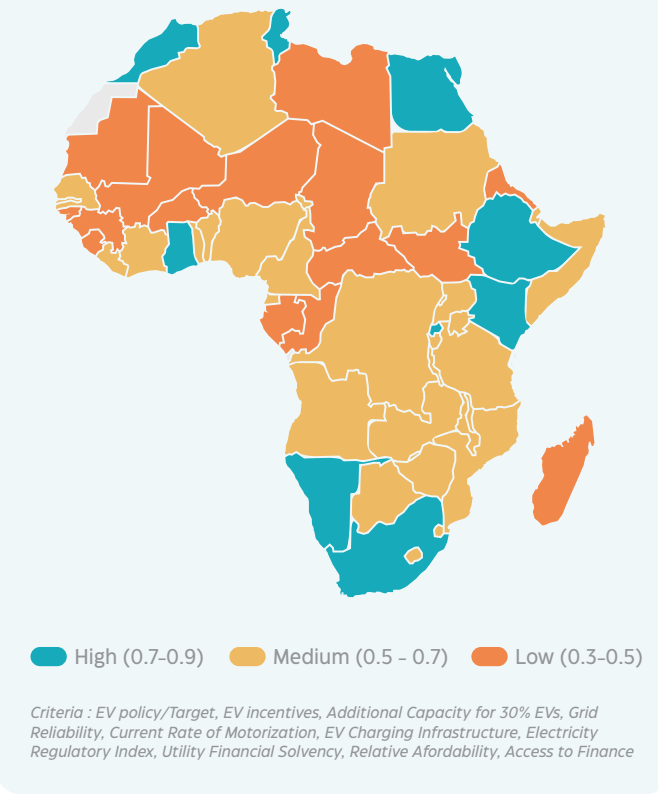
The numbers come from The National Association of Automobile Manufacturers of South Africa and tend to be higher than used by IEA. The EV share in the whole vehicle sale has breached the 1%.

Kenya has made significant strides, with the adoption of its Draft National E-Mobility Policy, a broad framework design to enhance the transition towards e-mobility. The strategy foresees incentives for EV purchases, development of charging infrastructure as well as local manufacturing.

Early January, though without policy, Ethiopia's Minister of Transport establish his ambitions to ban import of non-EVs in the country. Morocco has announced its target to deploy 30 000 charging points for light-duty vehicles (LDV), 2 and 3 wheelers as well as buses by 2030.

These various policies – on manufacturing, tax exemption, targets – create complex set of parameters to take into account to access the market. The Energy for Growth Hub designed a readiness map on the preparedness to adopt EVs at scale in Africa, based on several factors such as EV policy target and incentives, Grid Reliability, EV charging infrastructures.

Figure 30 : Readiness Map to adopt EVs at scale by the Energy Growth Hub



There are 9 countries that have high readiness to adopt EVs at scale, including 5 in Sub-Saharan Africa: South Africa, Namibia, Uganda, Kenya, Ethiopia and Ghana. In North Africa, Morocco, Egypt and Tunisia have high readiness score. The main part of the continent is reported to have a medium readiness score, but various countries will improve over the next years and turn green. It is the case with Algeria and Mozambique for instance.

Furthermore, various countries have shown the ambition to integrate the supply chains of EV and manufacture some components or assembly the final products. This could result in skills development as well as a decrease in the wholesale price. Through its Automotive Production Development Programme, South Africa has announced some specific investment incentives to produce both hydrogen and electric power in 2024. Nigeria, based on its Automotive Industry Development Plan seeks to boost local production of vehicles with the target of 30% of its locally produced vehicles to be electric. Additionally, the recent “High-Level Policy Dialogue on the Development of Automotive Regional Value Chains and E-Mobility” held in Zambia end of December sought to map out opportunities for EV value chains between Morocco, DRC and Zambia.

However, the quiet revolution of e-mobility in Africa has to go alongside a renewables revolution in Africa

This growing adoption of EV is not coming without challenges and barriers. Two central barriers are the availability of sustainable cost-competitive electricity to power the EV and grid reliability. In 2018, the transport industry accounted for 15% of the ultimate energy consumption in SSA⁹³. With the uptake of EV across the region, this demand is going to be met with electricity and is likely to increase.

Solar energy can play a pivotal role in advancing e-mobility in Africa by addressing both these challenges. Integrating solar power into the grid can improve grid consistency and stability, which is crucial for supporting reliable, grid-tied electric vehicle charging infrastructure. Additionally, solar energy helps decarbonize the grid, reducing the carbon footprint of e-mobility, aligning with broader climate goals.

In rural and remote areas, where traditional grid infrastructure is often limited or non-existent, solar provides a decentralized, clean, and affordable electricity source, enabling the electrification of internal combustion engine (ICE) vehicles and promoting sustainable mobility solutions across the continent. For instance, as of 2024, there were four solar-powered EV charging stations in Nigeria. Even in urban areas, solar-powered charging stations can provide a service by decreasing energy consumption from the grid.

While the EV market remains nascent, the African ambitions coupled with the birth of the industrial ecosystem is setting the market for high growth.

⁸⁵ Gicha, B. B., Tufa, L. T., & Lee, J. (2024). The Electric Vehicle Revolution in Sub-Saharan Africa: Trends, Challenges, and Opportunities. Energy Strategy Reviews, Volume 53, Article 101384. <https://www.sciencedirect.com/science/article/pii/S2211467X24000919>.

4.3: Renewable Hydrogen Potential and Applications



A global race for renewable hydrogen has been taking place in recent years, triggering a wave of investments. Currently, more than 40 countries⁸⁶ have adopted national hydrogen strategies, in the hopes of tapping into the investment potential and become frontrunners in this nascent industry. Renewable hydrogen results from the electrolysis (electrospitting) of water into hydrogen and oxygen using renewable electricity. Thanks to its many applications from decarbonisation of hard-to-abate sectors like steel, to load management and production of derivatives like ammonia for fertiliser – renewable hydrogen can play a crucial role in the energy transition. In the IEA's Net Zero Scenario by 2050, it is forecasted that by 2050 10% of the global energy demand could be met with green hydrogen⁸⁷, but recent analyses suggest that two-thirds of this production would be used locally, with only one-third traded internationally (IRENA 2024). Renewable hydrogen currently represents less than 1% of total global hydrogen production today, with the installed electrolyser capacity reaching approximately 5 GW by the end of 2024⁸⁸ (Global Hydrogen 2024, IEA).

Analyses on Africa's renewable hydrogen potential vary from reaching 50 million tons (Mt) by 2035, to exporting 11 Mt by 2050 (Hydrogen Council and McKinsey & Company). The [Africa Green Hydrogen Alliance's](#) analysis has a much more bullish outlook, forecasting 30 to 60 Mt of exports⁸⁹, adding up to \$126 billion to GDP by 2050.

However, with the recent backlog and difficulties⁹⁰ of the renewable hydrogen sector which tend to lower the previous forecasts, one thing is certain: Africa has the political will to become a global leader in renewable hydrogen.

Africa has begun its renewable hydrogen journey and is set to become a key player

Africa, in line with its Agenda 2063, is seeking to harness this potential and become a global hub of renewable hydrogen production. By tapping into this clean energy source, African nations aim to diversify their energy mix while promoting industrialisation, creating job opportunities, and new revenue streams to attract investment. Additionally, an indigenous renewable hydrogen industry could “decrease exposure to geopolitical and oil price instability” and “decrease the cost of energy for countries which depend on diesel”⁹¹.

In December 2024, the Transport & Energy Ministers of the African Union Commission (AUC) endorsed the African Green Hydrogen Strategy and Action plan. This plan acknowledges renewable hydrogen as an important enabler to realise Africa's renewable energy potential,

a “game changer” as once called by H.E. Dr. Amani Abou-Zeid⁹², the African Union Commissioner for Infrastructure and Energy. Moreover, the deepening of the African Continental Trade Area coupled with a dynamic workforce could create an enabling environment for the ramp-up renewable hydrogen in Africa. Africa's hydrogen economy will benefit from coordinated policies across multiple countries. By aligning frameworks such as Mauritania's phased development model, Morocco's land allocation strategy, and Kenya's long-term tax incentives, African nations can strengthen regional cooperation and attract large-scale investment.

As of January 2025, Africa is advancing in the green hydrogen sector, with 41 projects⁹³ expected to reach Financial Investment Decision (FID) over the next five years. This journey is spearheaded by 11 countries, namely Mauritania, Namibia, South Africa, Egypt, Morocco, Kenya, Mozambique, Algeria, Tunisia, Djibouti and Zimbabwe. Currently, there is no production of renewable hydrogen in Africa, but several projects should come online by 2027 and even more by 2030. A pilot project in Namibia using a 5 MW solar plant coupled with a 5 MW electrolyser may even come online as soon as this year, paving the way for larger projects.

⁸⁶ Odenweller, A., & Ueckerdt, F. (2025). The Green Hydrogen Ambition and Implementation Gap. Nature. <https://www.nature.com/articles/s41560-024-01684-7#ref-CRI1>.

⁸⁷ IEA (2023). Net Zero by 2050. IEA, Paris <https://www.iea.org/reports/net-zero-by-2050>

⁸⁸ IEA (2024). Global Hydrogen Review 2024. IEA, Paris <https://www.iea.org/reports/global-hydrogen-review-2024>

⁸⁹ IEA Global Hydrogen (2022). Africa's Green Hydrogen Potential. <https://gh2.org/sites/default/files/2022-11/Africa%27s%20Green%20Hydrogen%20Potential.pdf>.

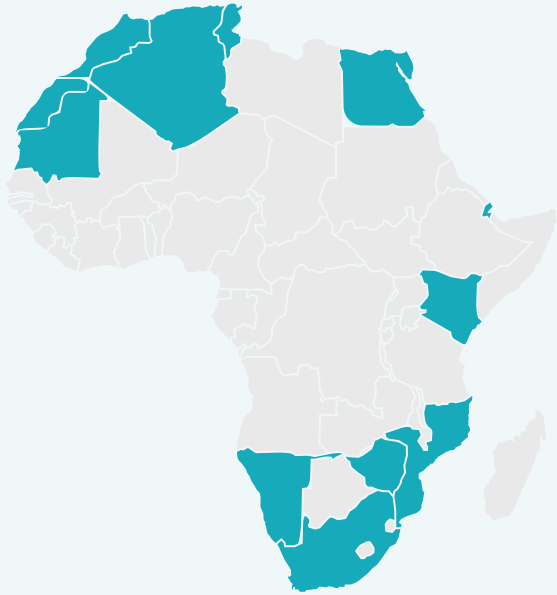
⁹⁰ Odenweller, A., & Ueckerdt, F. (2025). The Green Hydrogen Ambition and Implementation Gap. Nature Energy. <https://www.nature.com/articles/s41560-024-01684-7>.

⁹¹ AbouSeada, N., & Hatem, T. M. (2022). Climate Action: Prospects of Green Hydrogen in Africa. Energy Reports, 8, 3875-3890. <https://doi.org/10.1016/j.egyrs.2022.10.086>.

⁹² African Union (2024). African Ministers Endorse Landmark Strategies Underpinning Climate Resilience. Last modified December 5, 2024. <https://au.int/en/pressreleases/20241205/african-ministers-endorse-landmark-strategies-underpin-climate-resilience>

⁹³ FuelCellsWorks (2025). Africa Set to Lead in Global Green Hydrogen Development, Says EIC Report. Last modified January 22, 2025. <https://fuelcellworks.com/2025/01/22/green-hydrogen/africa-set-to-lead-in-global-green-hydrogen-development-says-eic-report>

Figure 31: Leading countries with Green Hydrogen projects in Africa



Renewable hydrogen is driving renewables demand, especially solar

The trend is clear: the race towards renewable hydrogen is boosting the uptake of renewables, and especially solar, in many countries. For instance, the “Aman” project in Mauritania developed in partnership with CWP Global plans to use 15 GW of solar and 15 GW of wind for renewable hydrogen and ammonia production. Once developed, this project alone would be close to match Africa’s current installed solar capacity. In its national energy target, Morocco aims to install 3 GW of renewables by 2030 dedicated to the production of renewable hydrogen, of which 80% will be solar. South Africa wants to deploy 10 GW of electrolysis capacity by 2030, which will need to rely on renewables. The first pilot project in Tunisia, which aims to be commissioned before 2030, plans to be powered by an 8 GW solar plant.

There is clearly an important role for solar to play in many African countries with renewable hydrogen ambitions, but it is complicated to calculate the exact amount of new solar capacity that will stem directly from and for green hydrogen. This is because many renewable hydrogen projects use a mix of renewable energy sources such as solar, wind and hydropower. Since renewable hydrogen targets are generally technology neutral, it becomes difficult to predict which sources will be used by future projects, as there are a variety of determining factors such as resource availability, cost, skills and financing. Nonetheless, these projects, although representing just a small fraction of Africa’s renewable hydrogen potential, would more than double Africa’s installed solar capacity if they are realised.



Case Study

Namibia's Green hydrogen journey

Provided by the Namibian Government

Namibia is one of the top-five locations globally that is blessed with collocated wind and solar resources, near to sea and land export routes. The development of green hydrogen has therefore been identified as an essential industry to drive economic growth and assist Namibia and the world in achieving global decarbonization goals. This strategy was adopted in Namibia's national growth and economic plan, the Harambee Prosperity Plan II, and the Southern Corridor Development Initiative (SCDI) was conceived by Government for Namibia's first gigawatt scale fully vertically integrated green hydrogen project.

Under a competitive tender process, ~4,000 mk2 of land in the Tsau //Khaeb National Park was allocated for the first projects, attracting bids from international and regional developers. The SCDI, comprising of ~26,000 mk2, has the potential to produce up to 3 million tons per annum of green hydrogen. Namibia was assisted in the adjudication of bids to develop the first project by NREL, a national laboratory of the U.S. Department of Energy and two experts appointed by the European Union Global Technical Assistance Facility on Sustainable Energy. Following the adjudication process and ratification by the Green Hydrogen Council and Cabinet, Hyphen Hydrogen Energy (Hyphen) was selected as the preferred bidder for the first project in November 2021.

The Hyphen project, with an estimated investment of US\$9.4 billion, which will be entirely financed by Hyphen, will at full scale produce ~300,000 tons of renewable hydrogen from solar & wind for regional and global markets before the end of the decade, with first production in 2026.

Hyphen has taken several commitments regarding this project to ensure the value is captured by Namibia:



Namibian employees during construction and operation



of youth participation



SMEs and local companies

Figure 32: Key Project components and phases

	Renewable Energy	Water Supply & Electrolysis	Ammonia Synthesis	Export & End Uses
Value Chain	Solar Wind	Water Desalination Hydrogen Electrolysis	Nitrogen DAC Ammonia Synthesis	SADC NH3 Export NH3 Industrial Chemicals Agricultural Chemicals
Process		$2H_2O \rightarrow 2H_2 + O_2$	$N_2 + 3H_2 \rightarrow 2NH_3$	$NH_2 + HNO_3 \rightarrow NH_4NO_3$ $NH_3 + CO_2 + H_2O \rightarrow NH_4HCO_3$ $2NH_3 + CO_2 + H_2O \rightarrow CH_4H_3O$
Phase 1	Wind = 1,200 MW Solar = 800 MW Transmission = ~80KMs	Water = ~1,4 t/p.a. Electrolysis = 840 MW (120,000 tons H2 p.a.)	Ammonia = 700,000 t/p.a.	Domestic (SADC) = (TBC) International = (TBC)
Phase 2	Wind = 1,800 MW Solar = 1,200 MW (SGW RE cumulative)	Water = ~3,4 t/p.a. Electrolysis = 1,200 MW (300,000 tons H2 p.a. cumulative)	Ammonia = 1,700,000 t/p.a. (cumulative)	Domestic (SADC) = (TBC) International = (TBC)

Key drivers of renewable hydrogen in Africa

Massive renewables potential to power renewable hydrogen

Africa is blessed with abundant renewable energy resources, positioning the continent as a promising player within the international green hydrogen race due to the increased need for affordable and clean energy. This potential has acted as a powerful enabler to catalyse the renewable hydrogen industry, creating a new 'green rush'.

Clear regulatory framework

Fourteen countries have a national hydrogen strategy, a key milestone to pave the way for the growth of the sector. A clear regulatory framework showing long-term visibility as well as public investment helps to attracting foreign capital by bolstering investor confidence. New hydrogen strategies from five African countries were published in 2024, mainly in North Africa (Algeria, Egypt, Tunisia and Morocco) and Mauritania.

Incentivising policies

In addition to a clear roadmap with clear objectives, Egypt, Tunisia and Morocco have implemented incentives to attract foreign investors. For example, Egypt has put in place tax credits of between 33% and 55% for the tax payable on revenues generated by renewable hydrogen production, as well as a total exemption from value added tax (VAT) for equipment, vehicles (other than passenger vehicles) and raw materials used in the production of renewable hydrogen, while Namibia has introduced special investment zones with tax breaks for green hydrogen projects. Mauritania's Green Hydrogen Code offers VAT and export tax exemptions, reduced import duties, and a tiered corporate tax structure with a phased project development approach. Morocco has allocated 1 million hectares for hydrogen projects, providing VAT and import duty exemptions, along with public-private partnerships for infrastructure. Kenya grants duty exemptions on machinery and raw materials, a 10-year withholding tax holiday, and a 25% corporate tax rate for the first decade, followed by a long-term investment deduction scheme.

International support

International partnerships are fundamental for the success of renewable hydrogen projects in Africa to mobilise investment and to transfer technology and knowledge. Mauritania, Morocco, and Kenya have designed investor-friendly policies, including tax holidays and infrastructure incentives, and are offering extensive incentives, tax exemptions, and infrastructure support to attract foreign and domestic investors. These policies, combined with international financing from the EU, the US, and the UAE, such as the recent EU €35 million commitment to South African hydrogen projects, have

positioned Africa as a competitive hub for green hydrogen production. As with any emerging industry, costs will be very high for projects and there will be uncertainty in the early days of building the industry. Forging international partnerships can create more confidence in the industry, learn from other countries' successes and missteps, and ensure projects are developed in line with global standards with the latest innovations. For example, the EU and Namibia have formed a partnership to mobilise 21 billion euros in European private investment⁹⁴, with a strong focus in just transition.

REPowerEU boosting demand

One of the main drivers for renewable hydrogen in North Africa is the REPowerEU plan, which aims to import 10 Mt of renewable hydrogen by 2030. This has catalysed interest in renewable hydrogen primarily in North Africa, due to its proximity to Europe and the SouthH2 Corridor project, a 3,300 km pipeline from North Africa to the heart of Central Europe. This has also helped to forge the partnership for the Tunisian H2 Nortos mega-project led by Total Energies and Verbund, which will lever 5 GW of renewable electricity by 2030.

Socioeconomic benefits in line with a Just Transition

Renewable hydrogen is also an economic promise, with the potential to attract huge amounts of foreign investment, create new industrial opportunities and jobs, and protect economies against price shocks from energy imports such as oil and diesel. It is crucial that as countries develop their renewable hydrogen sectors, a just transition remains a top priority to ensure that it benefits the communities and citizens in the country. In South Africa, out of the R 1.4 trillion investment plan from the Just Energy Transition Partnership (JETP), R 319 billion is earmarked for the hydrogen economy⁹⁵. In Namibia, the renewable hydrogen sector has already created 400 jobs, with 15,000 expected solely for the construction of the Hyphen Hydrogen Energy and 3,000 permanent employees, significantly boosting the local economy.

Challenges for Renewable Hydrogen in Africa

Despite the ambition and potential for renewable hydrogen in many African countries, the deployment of projects remains challenging for several reasons.

Financing

Africa faces a significant financing gap for hydrogen projects, with estimates indicating that the continent's renewable hydrogen finance gap for 2022 and 2023 project is \$19 billion (ESMAP, Financing Hydrogen). This shortfall is exacerbated by the high cost of capital in Africa, which is at least two to three times higher than in advanced economies, making it challenging to attract private investment for large-scale clean energy projects. The lack of a functioning market for renewable hydrogen further complicates financing efforts. The

nascent industry is facing additional risks that hinder the availability of financing. Development Financial Institutions (DFI) and financiers have a role to play, and to leverage these investments, policies need to look beyond fixing today's market and begin to build the market of the future. While financing remains a key hurdle, countries like Mauritania, Morocco, and Kenya have introduced substantial incentives to de-risk investment, including tax breaks, customs exemptions, and infrastructure support. These initiatives aim to lower project costs and attract long-term capital for hydrogen development.

Lack of infrastructure

Renewable hydrogen production could include water desalination facilities, renewable energy plants, electrolysers, port expansions, liquefaction facilities and storage facilities. This infrastructure may not already exist in many African countries and can be very expensive up-front costs which requires high levels of financing. There is an urgent need for a localized approach to renewable hydrogen production, ensuring off-takers are situated near the facilities or supported by a robust export strategy to minimise risk for investors and project developers.

Transportation roadblocks for renewable hydrogen

There are several ways to export renewable hydrogen: through a pipeline, shipping, rail or truck. The optimal delivery depends on various factors, such as the distance, the amount of hydrogen and state in which it is transported⁹⁶. Robust and fit-for-purpose port infrastructure is therefore crucial for export of hydrogen, which can require significant investment if non-existing. For example, the Namibia's "Blueprint for Namibia's green industrialisation" led by the Minister of Industrialisation and Trade, predicts that US\$15 bn is needed for regional connectivity and port development to meet the country's green hydrogen export ambitions.

The export of renewable hydrogen can increase the cost of the project, entailing more complex delivery routes, more logistics and more infrastructure. A consumption close to the production contributes to lessening the overall cost of renewable hydrogen. This is why some companies like Enertrag in Namibia focus on a no-export strategy for the first project. In the long run, renewable hydrogen will be in competition with grey hydrogen, and this cost can make the difference. Green ammonia can be more easily transported by ship, but transforming ammonia back to hydrogen creates a loss of energy that would seriously undermine the project's profitability. Therefore, one solution could be that the demand for renewable hydrogen production would be driven by the demand for ammonia in industries such as fertilizers.

The easiest transport solution is therefore through a pipeline, similar to methane. It is possible to repurpose gas pipelines for the transport of renewable hydrogen. However, this isn't possible in every case and or new infrastructures will be needed, so it will be necessary to construct new pipelines is also necessary to meet production and

⁹⁴ ESI-Africa (2024), Green Hydrogen: Namibia Partners with EU to Unlock Investment, <https://www.esi-africa.com/business-and-markets/green-hydrogen-namibia-partners-with-eu-to-unlock-investment/>

⁹⁵ Mail&Guardian (2024), South Africa Faces Skills Gap in Hydrogen Economy, <https://mg.co.za/the-green-guardian/2024-04-17-south-africa-faces-skills-gap-in-hydrogen-economy-report-finds/>

⁹⁶ European Commission (2021), Assessment of Hydrogen Delivery Options, https://joint-research-centre.ec.europa.eu/system/files/2021-06/jrc124206_assessment_of_hydrogen_delivery_options.pdf

export ambitions, but such projects can take between 10 to 15 years to develop. Repurposing gas pipeline can save time to meet demand sooner, for example the SouthH2 Corridor is expected to be operational as early as 2030, thanks to 70% of the project consisting of repurposed gas pipeline⁹⁷. However, the large investments in renewable hydrogen projects carry more risks than a mature technology, considering it is a new industry, and it is difficult to predict if renewable hydrogen will be able to compete with traditional energy sources it aims to replace such as natural gas.

Water scarcity

Water resources can be a challenge, with many African countries being especially vulnerable to water stress, especially in [North Africa and South Africa](#). The electrolysis needed to produce renewable hydrogen, requires water which could further put pressure on this resource. However, it is also possible to invest in desalination facilities, as it is the case for Egypt. In 2020, the country revealed plans to invest around EGP 134.2 billion⁹⁸ by 2050 to build seawater desalination facilities aimed at generating 6.4 million cubic meters of drinkable water daily. While this solution exists, it is also likely to increase the overall cost of the projects, which can threaten profitability.

Additionality rules

Renewable hydrogen can be produced “off-grid” i.e with its own renewable supply, but a substantial part of the projects is “on-grid”, i.e tied to the grid of the country. This can threaten the label of “green” hydrogen, with an electricity that is not 100% renewables from the national energy mix. Therefore, proving the use of renewables electricity can be a hurdle, with the need to match the production of green hydrogen with the moment during which the grid is the cleanest. The safer option is to opt for producing your own green electricity, which add cost to the overall projects.

Standards & certification

Currently, due to the recency of the industry, there are no common standards, and regulations are being designed around the world. There is a need for the interoperability of the certifications and schemes, to prevent export hurdles for various producers and ease the trade, as green hydrogen is set to be an internationally trade commodity.

Bridging the skill gap for a green hydrogen economy

A major challenge lies in the gap in skills necessary to support this emerging industry. South Africa has recognized this hurdle with a report “Identification of Skills Need for the Hydrogen economy” mapping out the 138 needed skills. The country is taking proactive steps to address it by establishing a Centre of Specialisation for Green Hydrogen which should break ground this year⁹⁹. This initiative is designed to build a skilled workforce capable of driving innovation and growth in the renewable hydrogen sector. For some skills, they

will have to be imported as well, which has to be considered for the development of the nascent supply chain.

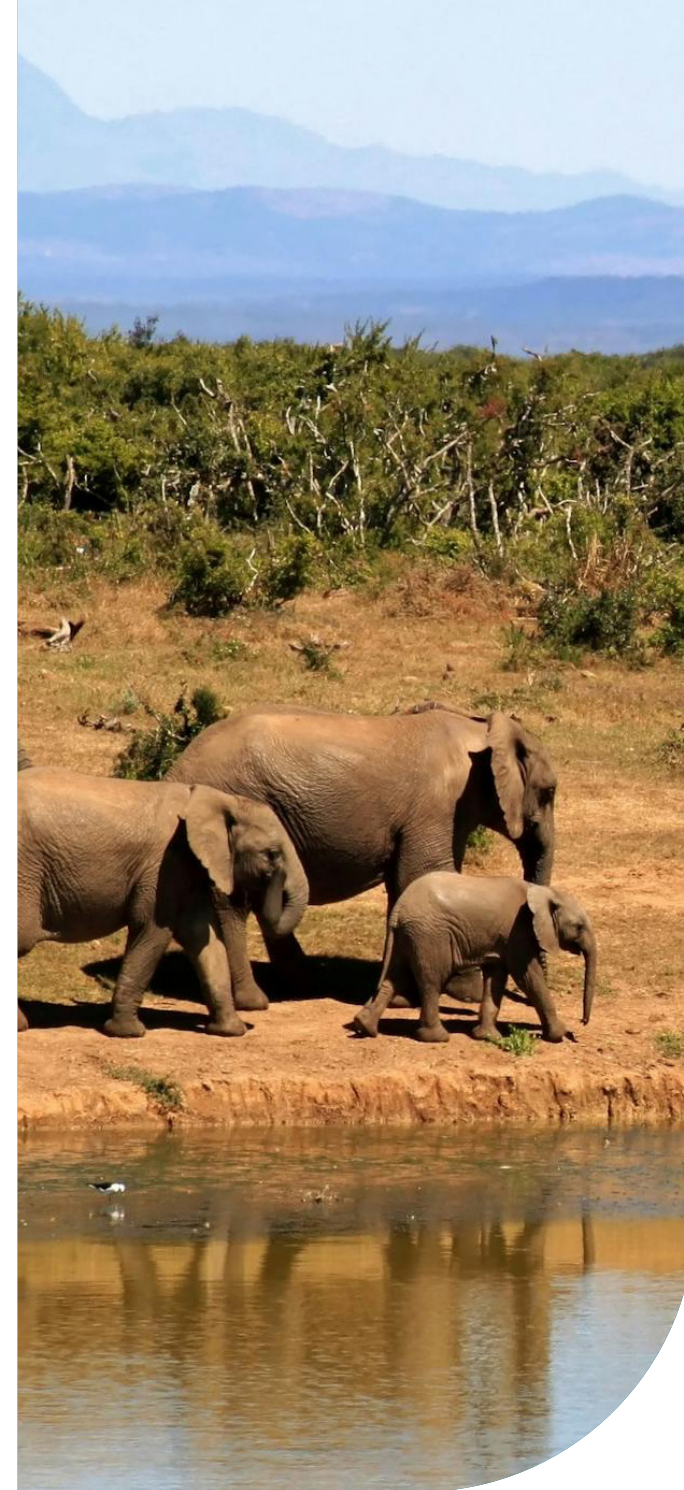
Similarly, Mauritania is also acknowledging the importance of developing local expertise in its national hydrogen strategy. These efforts highlight the crucial need for focused education and training programs to equip the workforce with the knowledge and technical skills required to propel Africa’s renewable hydrogen ambitions.

Policy Recommendations for Accelerating Renewable Hydrogen in Africa from the Green Hydrogen Organisation

- **Infrastructure Development:** Encourage public-private partnerships to invest in renewable energy plants, electrolyzers, and transportation networks.
- **Capacity Building:** Implement training programs to address the skills gap in the hydrogen sector.
- **Financial Incentives:** Governments should introduce tax incentives, grants, and subsidies to attract investment.
- **Regional Collaboration:** Foster collaboration among African nations to create a unified strategy and develop regional markets for green hydrogen.
- **Sustainable Water Management:** Invest in desalination plants in water-scarce regions to support large-scale hydrogen production.

Conclusion

Africa is poised to become a key player in the international renewable hydrogen market. While the production of the first renewable hydrogen through various projects will be a good indicator of who is leading within the continent, the 2030’s milestone will be even more instructive. Although the hydrogen market’s expansion has faced delays, Africa possesses the key resources, policy momentum, and investment interest to emerge as a global leader in renewable hydrogen.



⁹⁷ Upstream Online (2024), Algeria Aims to Repurpose Gas Pipelines for Hydrogen Exports to Europe, https://www.upstreamonline.com/hydrogen/algeria-aims-to-repurpose-gas-pipelines-for-hydrogen-exports-to-europe/2-1-1724635?zephrr_sso_ott=nsimRIK

⁹⁸ Green Hydrogen Organisation (2024), GH2 Country Portal – Egypt, <https://gh2.org/countries/egypt/>

⁹⁹ DFA (2024), South Africa to Establish Green Hydrogen Skills Centre to Plug Skills Gap, <https://dfa.co.za/news/2024-04-21-sa-to-establish-green-hydrogen-skills-centre-to-plug-skills-gap/>

Annex

Methodology

The first edition of Africa Solar PV Market Outlook Report 2025 provides a scenario-based outlook for new annual solar additions in continent between 2025 to 2028. Each scenario encompasses assumptions of overall market health, policy and regulatory framework, targets, auctions/tenders, project development dynamics, and investors support. For the outlook methodology of this report, GSC has taken learnings from the forecast approaches followed by SolarPower Europe and BNEF.

Sources for the report

GSC has built Africa solar installation and project pipeline database using platforms of regional and national solar associations, developers, and social media, which are then alternatively reviewed by industry experts and national and regional solar associations. The data collected is in the vast majority accounting for utility-scale, except for major drivers of C&I like South Africa for instance, to preserve a certain degree of comparability with other analyses.

Project Coverage

As the data in Africa can be scarce or misleading, buffers are applied to represent a high level of certainty to account certain margin of error of unaccounted projects for 2024. This way the latest trends and the potential of the market is captured at best level while acknowledging the necessary unavailability of some accurate data.

The reported growth in capacity is likely underestimated for C&I and residential sectors due to high level project uncertainties and incomplete/imprecise data. Large projects (300MW+) are split into phases to prevent disruptions in forecasts and ensure a smoother growth curve. While some reports include delayed projects, this report adopts “no confirmation, no integration” approach to maintain data accuracy. Projects inactive for more than three years are considered dormant. The forecast extends to 2028 avoiding speculation on projects beyond that timeframe.

Data Adjustments

GSC reports installed and fully commissioned capacity additions and total installations. New installations are gross figures not deducting decommissioned capacity. Total installations are net figures, adjusted for decommissioned capacity. Historic installation data has been adjusted based on the above-mentioned sources. GSC made the adjustments to both new and cumulative installations in 2023 and 2024 for all the markets where updated statistics are available.