



TRENDS
RENEWABLES

Africa pursues the development of renewable energy, despite certain obstacles

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Access to energy is one of the great challenges of the African continent, which has one of the lowest electricity access rates in the world. With global warming calling for an energy transition, the continent has chosen to integrate the development of renewables into its energy policy in order to catch up and to reduce its dependence on fossil fuels. While recent reports show an increase in installed renewable energy capacity thanks to identified funding mechanisms, they also reveal the urgent need for investment in order to reach the objectives set.



DATA OVERVIEW

Renewable generation capacities on the rise on the African continent

According to the International Energy Agency (IEA), more than 600 million people lack access to electricity in Africa, and without additional measures, 565 million people will still lack access to electricity in 2030.¹ The West African population is the most affected, with only 8% of the rural population having access to electricity. Electricity demand across Africa is predicted to increase by 75% by 2030 due to population growth and economic development.² Africa has 40% of the world's potential for renewable energy production, estimated at 2,431,765 terawatt-hours/year (TWh/year).³ The continent has 60% of the world's solar energy resources with a solar irradiance varying between 5 and 7 kilowatt-hours/square metre (KWh/m²) over the course of a year. Yet only 1.3% of the world's photovoltaic generation infrastructure is located on the continent. This industry remains largely untapped but trends show that it is growing, with an increase in infrastructures on the African continent. 22 African countries⁴ already use renewable energy as their main source of electricity and eight⁵ of them generate more than 90% of their electricity from renewable energy. According to IRENA projections, by 2030 renewable energies could account for about 65% of electricity generation in sub-Saharan Africa.⁵

For solar energy, for example, thirteen countries in sub-Saharan Africa (excluding South Africa) now have more than 50 megawatts (MW) of installed capacity.⁶ According to the IEA, solar and wind energy could account for about 27% of electricity generation in 2030.⁷ But while solar photovoltaic installations experienced spectacular growth in Africa in 2019, they fell sharply in 2020 before rising again in 2021.⁸ While the addition of new renewable capacity continued its global growth in 2020, the health crisis significantly slowed the launch of several large projects in Africa due to increased financial risks.

The continent's wind generation potential is estimated at 978,066 TWh/year.⁸ However, according to the Mo Ibrahim Foundation report, wind power is still largely untapped in Africa (at 0.01% of its potential).⁹ The regions that are most suited to large-scale wind energy are North Africa, the Sahel, the Horn of Africa and Southwestern Africa. In terms of installed capacity, South Africa has the largest wind energy market in sub-Saharan Africa. In 2021, this capacity was estimated at 2,956 MW,¹⁰ compared to 2,094 MW in 2019, a jump of 29% in two years. South Africa alone accounts for 40% of installed wind power capacity on the African continent.¹¹

Behind South Africa is Egypt, whose installed wind energy capacity amounts to 1,640 MW (22% of the continent's total).¹² The country plans to reach a 42% share of renewable energies within the total energy mix by 2035, 14% coming from wind energy. Morocco takes the bronze, with 1,435 MW of installed

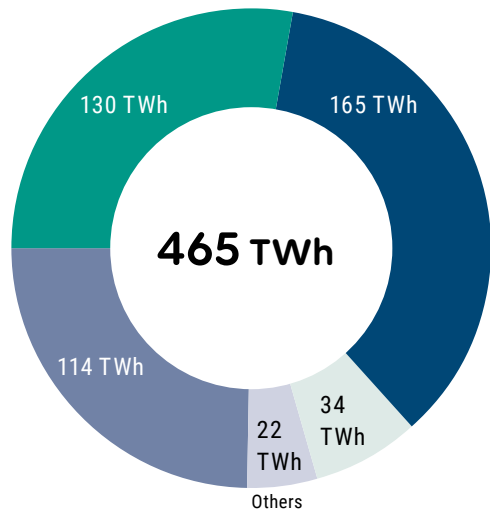
a Central African Republic (96.3%), DR Congo (98.9%), Eswatini (99.8%), Ethiopia (100.0%), Lesotho (99.9%), Mozambique (95.4%), Namibia (91.0%), Uganda (97.7%).

b Worldwide, newly installed photovoltaic capacity has continued to grow, rising from 118 GW in 2019 to 144 GW in 2020 and to 183 GW in 2021. See figures from [Bloomberg New Energy Finance](#) (BNEF)



capacity of onshore wind energy in 2021, i.e., nearly 20% of the continent's total. In its voluntary commitments for 2030, Morocco plans to reach 52% installed renewable electricity capacity by 2030, with 20% coming from wind energy.¹³ In West Africa, deployment of wind energy capacity is slowly moving ahead and is concentrated in the Niger and especially in Senegal,¹⁴ which currently has the largest wind farm in the sub-region (158 MW).¹⁵ The country has set itself the objective of reaching 350 MW of wind power. In East Africa, Kenya is positioned as the leader in wind energy. With an increase of 102 MW in 2021, its installed capacity is estimated at 440 MW.¹⁶ In the Sahel, optimal exploitation of wind potential would increase the power generation capacity of countries such as Chad, Mauritania, Niger, and Mali by up to 30 times.¹⁷

FIGURE 1
GLOBAL CORPORATE SOURCING OF RENEWABLE ELECTRICITY BY SOURCING MODEL
 Source: IRENA, 2018



- Unbundled Energy Attribute Certificates (EACs)
- Corporate Power Purchase Agreements (PPAs)
- Utility green procurement programmes
- Production for self-consumption

Given the prospects it represents for electricity production from renewable sources, Africa is becoming increasingly interested in the production of green hydrogen. In May 2022, six African countries – Egypt, Kenya, Mauritania, Morocco, Namibia, and South Africa – launched the African Green Hydrogen Alliance¹⁸ with the objective of making the continent a key player in the production of green hydrogen. Namibia aims to produce 300,000 tonnes of green hydrogen per year by 2026, while Egypt is planning three green hydrogen production projects with a combined capacity of 300 MW.¹⁹ South Africa is also positioning itself as a future leader of the green hydrogen market with a production target of 500,000 tonnes of green hydrogen per year by 2030. The country could then produce green hydrogen for \$1.60/kg, i.e., one of the lowest rates in the world.²⁰ The South African government is working with the Platinum and ENGIE groups to develop the “Hydrogen

Valley” programme²¹ with the aim of forming an integrated industrial ecosystem for green hydrogen. According to the IEA, Africa could produce 5,000 Mt of hydrogen at less than \$2/ kg, “equivalent to current global primary energy demand”.²²

The overall renewable energy landscape in Africa suggests a rather positive trend. This is in part supported by public investments, which are very costly for African countries. Between 2010 and 2019, African governments tripled public investment in renewable energy, up to 47 billion dollars, from 13.4 billion dollars in the preceding decade.²³ Still, these remain largely insufficient to meet the national production targets that have been set. This situation was aggravated by the pandemic, which slowed the launch of projects due to increased financial risks for countries and the private sector. Several tools are already being used to effectively and adequately direct financial mechanisms and flows into Africa.²⁴ Power Purchase Agreements (PPAs) in particular are attracting much interest in global renewable energy markets (FIG. 1), especially to secure the supply of renewable energy or electricity (Green PPAs). In Africa, the use of Green PPAs is boosting the development of new renewable energy capacities, particularly solar and wind.

 THE OBSERVATORY'S LENS

Africa structures its renewable energy market thanks to renewable power purchase agreements

PPAs facilitate the establishment of independent power producers in Africa and the increase in renewable generation

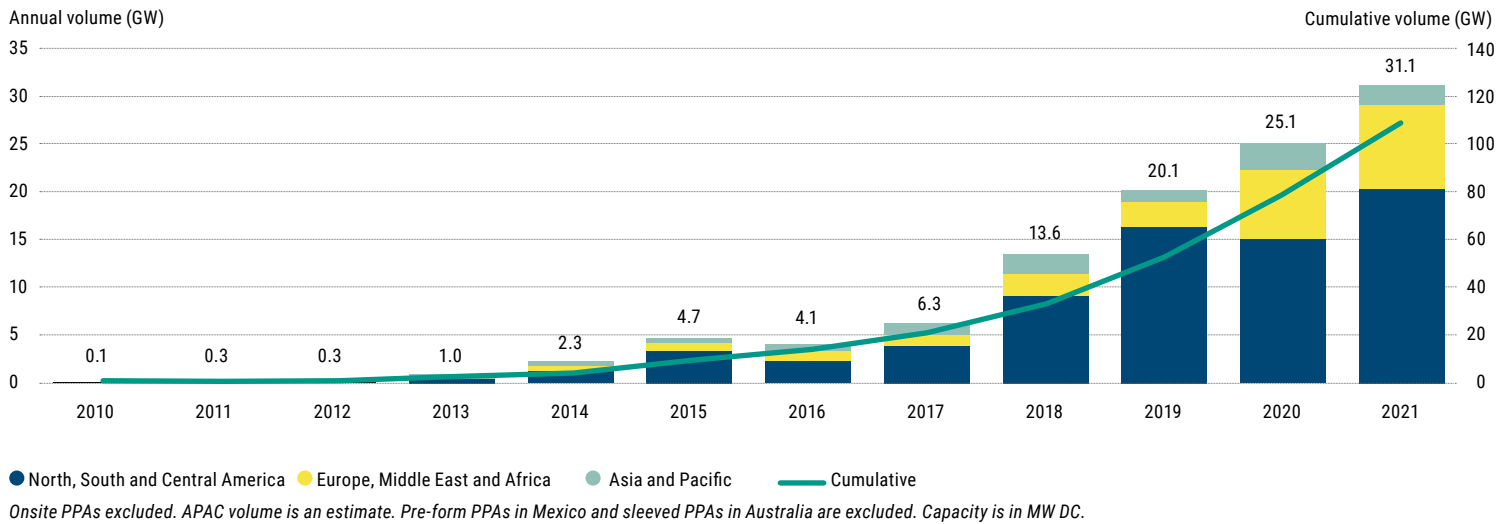
The energy generation sector is the main source of GHG emissions in Africa due to the massive use of fossil fuels. To remedy this, African countries are turning to renewable energies. In most of the NDCs (Nationally Determined Contributions) submitted by African countries within the framework of the Paris Agreement, there are promises of an energy transition that make it possible to achieve both the objectives of reducing emissions and the objectives of universal access to electricity. To achieve this, an increasing number of tools are being developed in Africa that effectively contribute to the achievement of these objectives. This is the case for Green Power Purchase Agreements, electricity purchase contracts binding a producer to a consumer,²⁵ which are being increasingly used in Africa (SEE BOX 1). According to IRENA, these contracts “have proven their ability to support the energy transition”²⁶ on the continent.



FIGURE 2

GLOBAL CORPORATE PPA VOLUMES, 2010-2021

Source: *BloombergNEF, 2022*



BOX 1 • KEYS TO UNDERSTANDING

THE DIFFERENT TYPES OF PPAs

The term PPA indicates an electricity purchasing mode which, in reality, covers several types of different contracts, depending on local legislative contexts and the organisation of different electricity markets.

Most PPAs concern off-site installations which are geographically disconnected from the buyer, contrary to on-site installations which can be the subject of PPAs, but are also sometimes quite simply the property of the business or the municipality, and thus count as self-consumption. PPAs can also be cross-border, involving actors that do not operate on the same electricity markets. In that case, an agreement may be reached with the grid operator for the transmission of electricity, but most of the time, cross-border PPAs are “virtual”. The producer sells electricity on their domestic market, the consumer continues to buy its electricity from the supplier in its own market, and it compensates for any potential fluctuations in prices on the producer’s market via the PPA. In this case, the two markets are not necessarily physically linked.

PPAs can also be drawn up via an intermediary, often the energy service provider who is in charge of bringing together different producers to form an installations portfolio, supplying them with any potential electricity that is lacking, selling surplus electricity or even insuring different risks concerning producers or consumers. This constitutes a sleeved PPA.

Whatever the type of PPA, if it concerns renewable energies (which is more often than not the case these days), the buyer almost systematically couples their contract with the purchase of any corresponding renewable energy certificates. These are either those owned by the PPA production site, or those found elsewhere on the certificate market which are equal to the volume of electricity purchased (fig. 2).

Basically, these contracts are nothing new as they have been used for conventional power generation for a long time. However, after the emergence of energy production from renewable

energy sources and the increase in their attractiveness, PPAs have experienced renewed interest. Green PPAs denote “a contract between a commercial or industrial supplier or customer and a green energy producer for the purchase of energy generated by renewable energy assets”.²⁷ It is usually a contract for a period of five to twenty years. Depending on the renewable energy source used, they are referred to as solar PPAs, wind PPAs, etc. In Africa, solar and wind PPAs are the most common.

Thanks to the new Green PPAs that have been concluded, the number of independent power producers on the continent is increasing.²⁸ Independent power producers (IPPs) are private entities that own, develop, and operate energy production infrastructures based on long-term PPA contracts concluded with power companies or other buyers. IPPs can be local or foreign producers. With the ever-increasing energy demand in Africa, new IPPs are setting up on the continent through Green PPAs in order to meet the demand. In 2016, IPPs were already operating in 18 African countries “accounting for 13% of total regional generation capacity”.²⁹

South Africa remains the largest market for independent renewable power producers. This success is explained by its regulatory framework (in the energy sector) which is favourable to private investors as well as to the development of Green PPAs. South Africa has therefore developed a significant amount of installed energy capacity thanks to IPPs. For example, since 2011, more than 112 projects led by IPPs were registered in the country.³⁰ Egypt is developing a wind power market that is very favourable to the private sector, particularly IPPs. In 2019, an international consortium made up of the French ENGIE group, the Japanese Toyota Tsusho Corporation and Orascom Construction in Egypt, was set up to build Africa’s largest private wind farm, boasting a capacity of 262.5 MW.³¹ In 2021, British renewable energy company Lekela Power, which is behind the 250 MW West Bakr Wind



Farm project, signed a 20-year power purchase agreement with the Egyptian Electricity Transmission Company (EETC), a public operator that supplies electricity to the national grid.

In West Africa, efforts to develop the energy sector require significant investments that the countries cannot afford on their own. Using Green PPAs has become essential for attracting IPPs. Senegal and Nigeria stand out as potential “hubs” in the sub-region. As early as 2016, Nigeria had concluded a solar PPA with a rate considered to be the lowest in West Africa (7.5 ¢/kWh). Both countries have the lowest PPA rates in the sub-region. In 2018, through the World Bank’s Scaling Solar programme, which facilitates the development of large-scale solar projects in developing countries, a new benchmark price for electricity generation in Senegal was established. This price was around 5 ¢/kWh. Thanks to PPAs, Senegal developed 100 MW of solar power plants as well as the largest wind farm in West Africa (158 MW), which is run by IPPs.³²

Legislation on the continent is evolving to facilitate use of Green PPAs and attract private investment

The energy market is still dominated by state enterprises. However, according to some studies, where private sector participation is allowed, private operators outperform public companies in the development of renewables and energy access.³³ Therefore, in order to create a favourable environment for private investors and for the proliferation of Green PPAs, several countries around the world have implemented reforms with positive results. Vietnam, for example, has developed several policies to support the onshore wind sector in recent years. The most emblematic among these is the 39/2018/QD-TTg^c decision which gave new impetus to the wind energy market. In the wake of this reform, more than 140 wind energy projects have seen the light of day through PPAs concluded with the public EVNP company. Thanks to these reforms, the country now ranks among the leaders of the energy transition in Southeast Asia.³⁴

In Africa, countries are gradually moving in this direction. Reforms undertaken by some African governments to establish a legal framework that is suitable and encouraging for the production of renewable energies, are based on a policy framework that stimulates the emergence of the independent energy production sector. Emphasis is particularly placed on attracting IPPs by providing support through specialised structures, tax incentives, and exceptions to the existing regulatory framework. These changes have several primary objectives, such as establishing a legal framework for the development of renewable energies and the diversification of the electricity production mix. They then facilitate the establishment of an incentive framework favourable to the purchase and sale of electricity from renewable energy sources. They also allow the establishment of a remuneration framework for producers of electricity from renewable energy sources.

South Africa was an early adopter of energy sector reforms through the Renewable Energy Independent Power Producer Programme (REIPPP), earning it pioneer status in policy and regulatory reforms for energy efficiency and renewable energy.³⁵ Thanks to this, it obtained a RISE^d (Regulatory Indicators for Sustainable Energy) score³⁶ of 82 in renewable energy,³⁷ one of the highest scores on the continent.^e RISE scores place Tunisia as Africa’s leading country in terms of policies and regulations for energy access, energy efficiency and renewable energy deployment, indicating an environment that is generally favourable to renewable energy and private investments.³⁸ It obtained a RISE score of 84 in 2019, higher than that of other developed countries.

Currently, stimulating competition in electricity supply and attracting private investment have been prioritised in several African countries. Some utility companies are being called upon to build new plants through untendered proposals and single-source power purchase agreements, which has sometimes led to excessive purchases and pricing, resulting in suspicions of corruption, as in the case of Ghana.³⁹ Some governments have thus been compelled to intervene in order to renegotiate certain contracts. Although private participation in production has gradually increased in Africa, Zambia is still the only country where private sector operators are represented in the entire supply chain, from production to transport and distribution. Although the benefits of private sector participation are obvious, public financing, development finance institutions and development banks will be needed to mitigate project risks, especially in their early stages.⁴⁰

Furthermore, auction systems for the distribution of new capacity have proven to be effective in reducing supply costs, especially for large-scale renewable energy projects such as those in Ghana. Other models aimed at introducing competition and private sector participation depend on concessions and the creation of regulatory exceptions that would allow grid or mini-grid operators to build or even operate facilities set up by utility companies, subject to conditions. This model and others have also been studied in Nigeria. Private companies operating grids under concession have already proven successful in Uganda, where Umeme, a private company, concluded an agreement with utility company UEDCL to operate almost the entire grid in the country.⁴¹

The adoption of PPAs by heavy users, like the mining industry, is nascent in Africa

Green Corporate PPAs make it possible for companies, regardless of their sector of activity, to decarbonise their energy consumption while stabilising their long-term supply costs. There are two types of green energy supply contracts: offsite and onsite (**SEE BOX 1**). “Offsite” contracts are when energy generation equipment is not installed at the energy consumer’s location, in contrast to “onsite” PPAs where the renewable energy production facilities are installed at the

c Decision available [online](#)

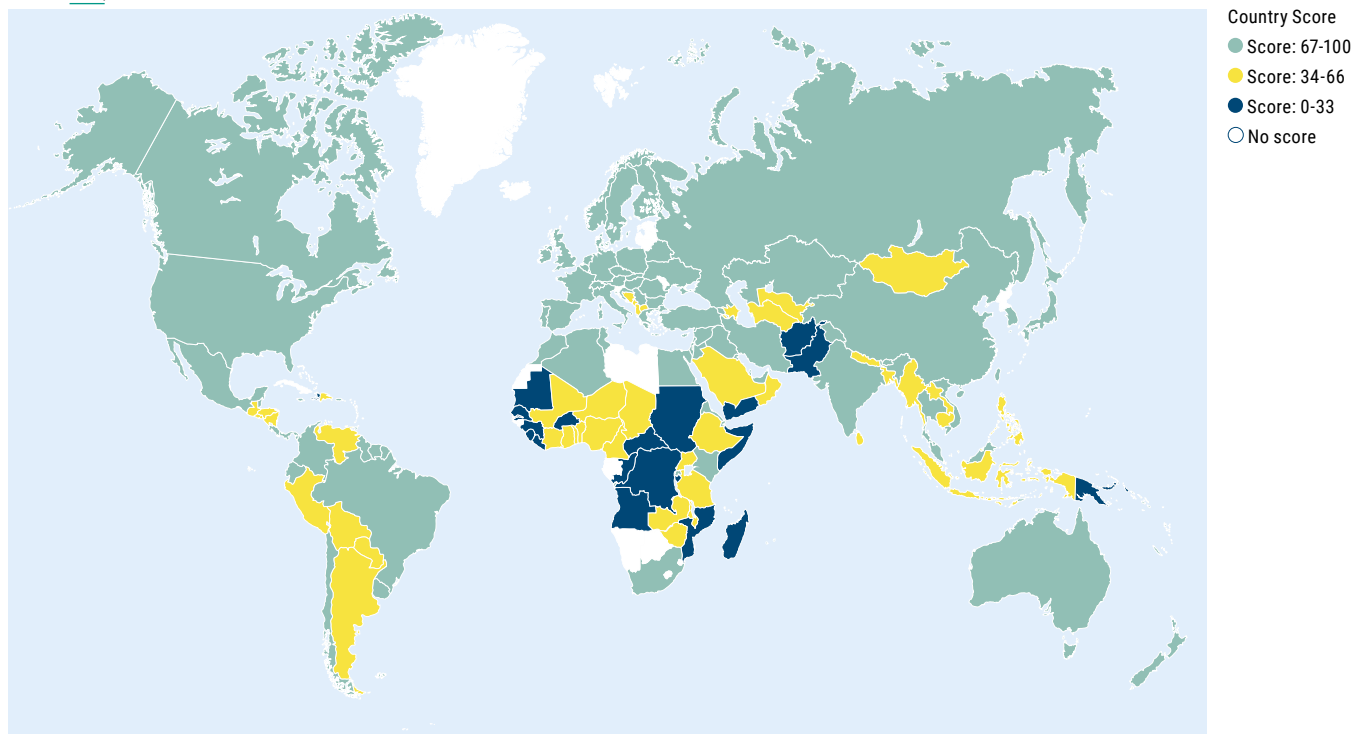
d This is a set of indicators for comparing national sustainable energy policy and regulatory frameworks.

e South Africa’s overall score is 71.

FIGURE 3

REGULATORY INDICATORS FOR SUSTAINABLE ENERGY

Source: [RISE, 2019](#)



user’s location. The advantage of offsite contracts is that they make the development of high capacity wind or solar farms possible, and they benefit from the best locations for the most cost-effective electricity generation.

The PPA market is primarily dominated by large companies, especially those in the digital sector. In 2020 Amazon was identified as the leader in this market (FIG. 4), with 35 declared PPAs amounting to 5.1 GW, bringing the total contracted by the company to 7.5 GW.^f In 2021, Amazon continued this trend with 44 offsite PPAs announced in nine countries, amounting to 6.2 GW. This brings its total renewable energy PPA capacity to 13.9 GW. Microsoft and Meta complete the list of market-leading companies with 8.9 GW and 8 GW⁴² respectively.

In 2021, thanks to Green Corporate PPAs, companies bought 31.1 GW of renewable energy worldwide, an increase of almost 24% compared to the previous year.⁴³ Supply to businesses in Europe, the Middle East, and Africa have increased by 19% to 8.7 GW.⁴⁴ While already common in North America, the Nordic countries and Europe,⁴⁵ Green Corporate PPAs are becoming increasingly popular in Africa, mainly due to the fall in the production costs of green energy.⁴⁶ In Africa, PPAs are increasingly used by companies to boost their production of renewable energy. This is especially the case for the mining sector in South Africa, where the Richard Bay Minerals (RBM) mining company signed a 20-year solar PPA contract with the Voltalia renewable energy company.⁴⁷ The company will supply up to 300 GWh of annual solar PV generation capacity to the RBM smelting and processing facilities in KwaZulu-Natal.

In sub-Saharan Africa where electrical transport and distribution networks are limited, heavy users such as the mining industries habitually generate their own electricity or obtain electricity produced from diesel or heavy fuel oil (HFO), under various forms of corporate PPAs from specialised suppliers. Recently, projects have been developed to replace off-grid production using diesel and HFO with renewable energy or using hybrid solutions combining diesel or gas with renewable energy and battery storage. These solutions reduce fuel and logistics costs as well as carbon emissions from operations.

An example of this paradigm shift is the 15 MWp EREN Renewable Energy and African Energy Management Platform solar farm at Burkina Faso, which was commissioned in March 2018⁴⁸. Production from this project will be sold to the IAMGOLD Essakane SA gold mine as part of a fifteen-year PPA. It will complement the mine’s already existing heavy fuel power plant. This Green Corporate PPA will enable a reduction in CO₂ emissions of approximately 18,500 tonnes and savings of around six million litres of fuel per year.⁴⁹

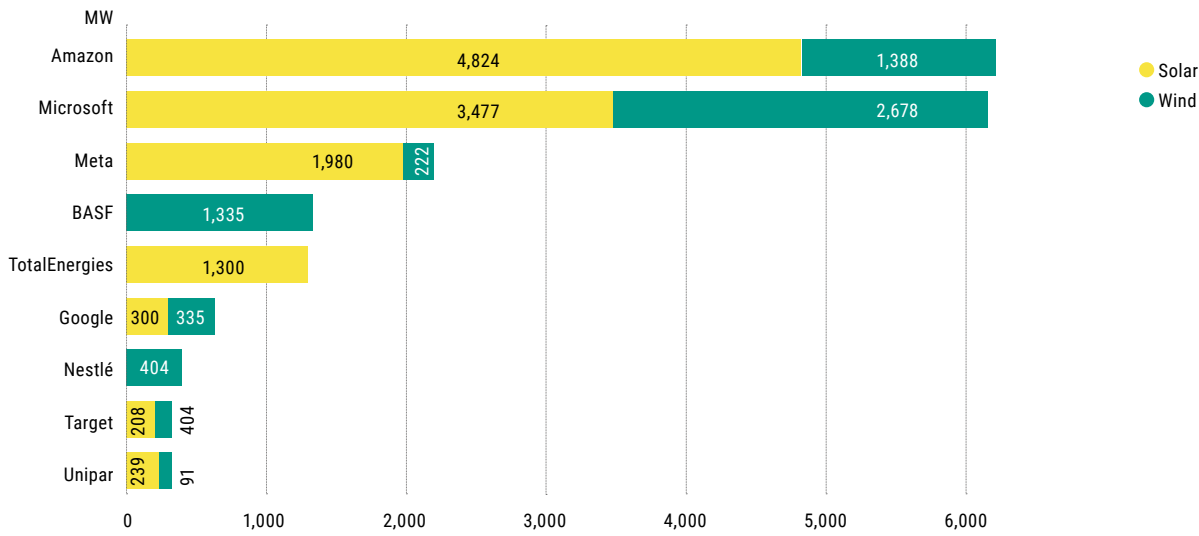
^f To find out more, see Observatory of Non-State Climate Action (2021). [Global report on climate action by sector](#). *Climate Chance* p. 26



FIGURE 4

TOP CORPORATES BUYER OF CLEAN ENERGY IN 2021

Source: [BloombergNEF](#), 2022



KEY TAKEAWAYS

Installed capacity of renewable electricity production is increasing on the African continent, as it is elsewhere in the world, particularly in the solar and wind energy sectors. These production capacities are nevertheless concentrated in a handful of countries. South Africa, Kenya, Tunisia, Morocco, Senegal and Nigeria stand out as being more open to investment from independent power producers. The increase of renewable energy purchase contracts, made possible by a spate of reforms underway in some African countries, promotes the investment and the establishment of these independent producers on the continent. That being said, the overall rate of investment remains insufficient to meet the energy transition objectives that the continent has set for itself. While reforms have already been initiated by some States to attract investment, these must spread to the entire continent, particularly to West Africa, to create an environment conducive to the accelerated development of installed renewable capacities.



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