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Boosting the energy transition in Africa

The regional path towards decarbonization and the opportunities for international cooperation

Position Paper

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The energy transition in Africa

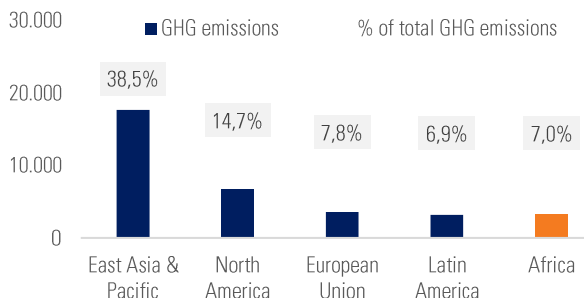
Starting from the second half of the 19th century, the **temperature of the planet has been increasing** at an unprecedented rate. The observed global warming is unparalleled on both a human and geological scale, with the current temperature level being higher than that of the warmest period over the last 100,000 years at least. The phenomenon is undoubtedly of **anthropogenic origin**: the human influence is the main and only driver behind higher temperatures, mainly due to **greenhouse gas emissions** induced by human activity.

A warmer planet is a more violent planet. The effects of climate change on the planet will bring about an increase in frequency and intensity of extreme climate phenomena. In the 1.5°C temperature increase scenario (the most optimistic goal set with the Paris Agreement in 2015), **extreme temperature events** will be four times more frequent and almost twice as intense compared to the pre-industrial baseline setting of 1850-1900. As a result, **rainfall events** will be almost twice as frequent and with the percentage of rainfall increasing by over 10%.

This will result in massive economic losses due to climate change. Over the past twenty years alone, the **direct economic damages** caused by extreme weather events have exceeded **\$4 trillion**. In 2020 alone, losses amounted to \$268 billion. Of those, 80% can be attributed to tropical cyclones, floods and fires.

1.5°C, by the end of the century. However, even the most ambitious policies currently in place are not enough to meet this goal. Current climate policies are estimated to result in an increase of 2.9°C within 2100. On the contrary, it is estimated that CO₂ emissions must decrease by 5.5% annually until 2030 in order to contain the increase in global temperature within the 1.5°C limit—a massive shift in the way the world produces and consumes resources.

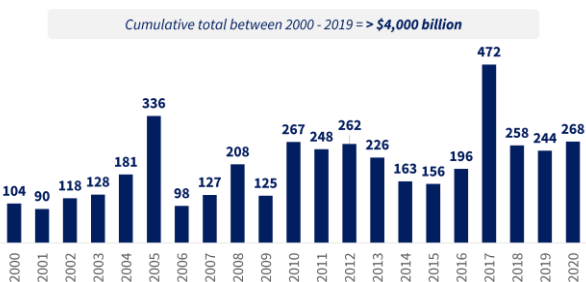
This essential energy transition will necessarily take different pathways in different regions of the world. Representing only 5% of the global GDP and 15% of the total population, the **African continent** contributes only **7%** of the world's total greenhouse gas emissions. By contrast, the East Asia and Pacific region is the greatest emitter with 38.5%, followed by North America (14.7%) and the EU (7.8%).



Greenhouse gas emissions (Mt of CO₂ equivalent) and contribution to the total (%) in world regions, 2018.

Source: The European House – Ambrosetti elaboration.

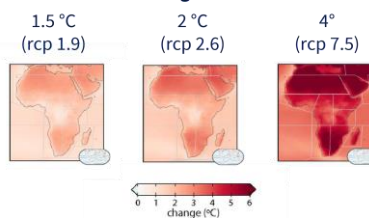
Nevertheless, Africa carries a **heavier burden in terms of climate change-induced effects** compared to other regions of the world. In terms of **temperature change**, mean temperatures and hot extremes have risen across the African continent, with the surface temperature rising more rapidly than the global average. Under a global warming scenario of 4°C, Northern and Southern Africa will experience between a 5°C-6°C increase in maximum temperature, leading to widespread aridity, droughts and pressure on ecosystems and society.



Economic losses from extreme weather events (in US\$ billion, current prices), 2000-2020. Source: The European House – Ambrosetti elaboration.

In this scenario, concrete action and policy measures are urgently needed to preserve the wellbeing of present and future generations alike. The United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP21) held in Paris in 2015, reached the landmark agreement to limit global warming “well below 2°C”, preferably **below**

Global warming scenarios - 2100



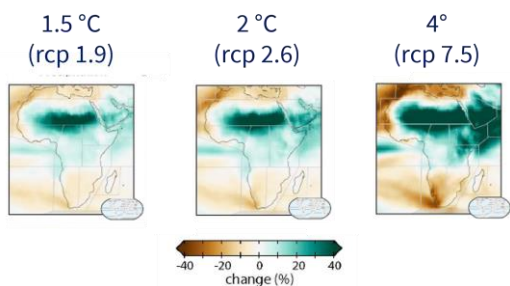
Projected changes in annual maximum temperature at different degrees of global warming compared to 1851-1900. Source: The European House – Ambrosetti elaboration.



Observed increases in heat waves and decreases in cold waves are projected to continue over the 21st century, whereas, starting in the 20th century, marine heat waves have become more frequent.

In terms of precipitation trends, an increasingly **uneven distribution of rainfall patterns** is expected. Under a global warming scenario of 4°C, Northern Africa will experience an intensification in heavy precipitation, pluvial flooding and monsoon seasons, while in Southern Africa, fewer rainfall events will bring more dryness and pressure on water availability. Moreover, the relative sea level has increased at a higher rate than the global mean sea level around Africa over the last thirty years, contributing to an increase in the frequency and severity of coastal flooding in low-lying areas and to coastal erosion along most sandy coasts.

Global warming scenarios - 2100



Projected changes in annual mean precipitation at different degrees of global warming compared to 1851-1900. Source: *The European House – Ambrosetti elaboration.*

Addressing climate change in Africa should envision a twofold approach: mitigation and adaptation. **Mitigation** consists of actions aimed at reducing emissions and stabilizing levels of heat-trapping greenhouse gas in the atmosphere by improving energy efficiency through the deployment of modern fuels and sources for cooking, heating, and lighting, exploiting renewable energy thanks to the vast endowment of natural resources including hydro and solar power, and promoting efficient means of transport (e.g., electric and hybrid vehicles).

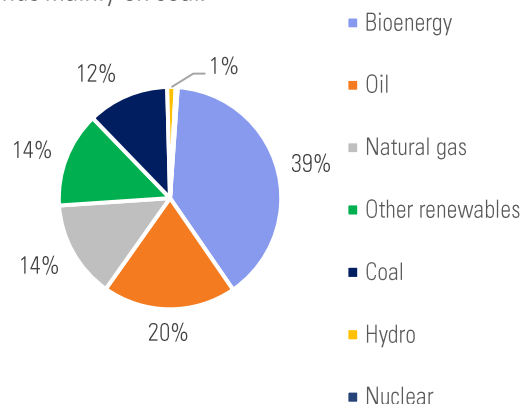
Adaptation measures involve adjusting to the climate change already in-progress to reduce vulnerability to its consequences, such as mapping and early warning systems for rainfall events, sustainable urban development, construction of hard flood-protection infrastructure, landscape restoration and reforestation,

wildfire management, flexible and diverse agricultural cultivation through stress-tolerant crop varieties and enhanced observation systems.

Energy transition in Africa requires a **pragmatic approach**, through leveraging newly- discovered resources to complement the deployment of renewables. The region needs to find a balance between human development goals and sustainability. Newly-discovered resources in the region, particularly **natural gas**, which has a lower carbon footprint and greater operational flexibility, can facilitate the transition towards a greener energy mix. **Interconnection** is key to unleash the energy transition in the region and increase resilience against climate volatility.

The African energy system today

Africa’s current **energy demand** is met mostly through a mix of **bioenergy** (biomass and waste) and **fossil fuels** (oil, natural gas and coal). Compared to other regions, Africa uniquely relies on bioenergy, involving almost 40% of total demand, because of its percentage of rural population. In comparison, the primary sources of energy in Europe and North America are oil and natural gas, while Pacific Asia depends mainly on coal.

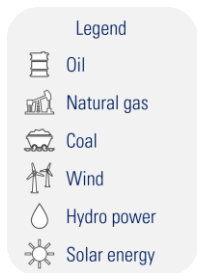


Energy demand in Africa by source (%), 2019. Source: *The European House – Ambrosetti elaboration.*

However, Africa is a highly-diverse continent and there is significant **heterogeneity** in energy demand also **within Africa**. For example, South Africa depends on coal (75%), Nigeria on bioenergy (72%) and Senegal on oil (53%).



The sources of energy in Africa are highly heterogeneous across countries and regions. North Africa is very diversified thanks to oil, solar, hydro, wind and natural gas. West Africa relies mostly on oil, hydro and natural gas. Central Africa is dependent on oil and hydro, similarly to East Africa with wind, oil and hydro. Southern Africa is quite varied with coal, natural gas, oil, hydro, wind and solar energy. The **mixed set of energy resources** will ensure Africa's **resilience** against climate change-induced volatility

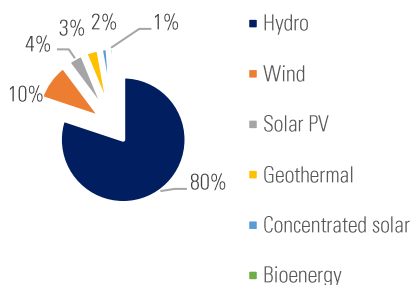


Sources of energy in Africa by type, 2021. Source: *The European House – Ambrosetti elaboration.*

Regional **electricity production** is very **polarized**, with South Africa and Egypt creating 53% of the continent's total electricity. As with the energy mix, current electricity production among African countries is very diverse, with each country relying on locally-available resources. For instance, South Africa generates electricity from coal (89%), Nigeria from natural gas (73%) and Senegal from oil (90%).

In electricity generation, renewable sources play a significant role, accounting for around one-fifth of the total. In the mix, **hydroelectric power** represents the bulk of renewable energy in the region (80%), followed by wind energy (10%) and solar photovoltaic (only 4%). In terms of deployment of renewable energy sources, South Africa and Egypt lead the continent, each accounting for 12% of the total capacity.

Composition of the electricity generation mix from renewable sources in Africa (%), 2019. Source: *The European House – Ambrosetti elaboration.*



Regional energy diversity can become a lever to increase resilience against climate change-induced volatility and to boost regional energy transition. However, this requires that the continent complete the **integration of what are currently separate energy and electrical systems**. For instance, in the Southern Africa Development Community, only 7% of electricity is traded across borders. An interconnected grid would increase national and regional resilience against climate change, leveraging natural and renewable resources available in the region in the context of a high polarization of electricity demand. More interconnectors make it possible to harness the region's hydropower potential, which is essential to match supply and demand and buttress more volatile wind and solar photovoltaic systems. Reviving the **Southern Africa Power Pool** is key to unlocking regional potential: SADC member states should not waver in building an integrated electricity market. The European experience as the world's most integrated energy market can prove critical in speeding up this process. Furthermore, greater integration would also make it possible to tap the potential of the continued **discovery** of resources, especially **natural gas**, off the coasts of South Africa, Namibia, Mozambique and Uganda.

Lastly, the energy transition in Africa needs to be **inclusive** and aimed at improving access to energy and electricity, which has experienced a positive growth trend at a rate of 2% since the 1990s. However, while access to electricity is almost universal in North Africa, more than 50% of Sub-Saharan Africans do not have adequate access. In this sense, and more than anywhere else in the world, the energy transition in Africa is a powerful means to boost human, social and economic growth.

COP 26 and the future of decarbonization in Africa and the world

A turning point in the fight against climate change was expected at **COP26**, which took place in Glasgow, UK, in November 2021 and brought together more than 190 world leaders. Held in the aftermath of the Covid-19 pandemic, the world leaders gathered in Glasgow amid a growing sense of urgency involving the green transition. The **Glasgow Climate Pact**—the final document of COP26—introduced some notable achievements, despite the widespread view that much more could have been done.



Countries and parties committed themselves to urgently increase the scope of **decarbonization plans** as outlined in their Nationally Determined Contributions (NDCs) and, specifically, to strengthen their emissions-reduction targets for 2030 **by 2022**, rather than by 2025 as set out under the Paris agreement of 2015. This means phasing down unabated coal power and inefficient fossil fuel subsidies, to the disappointment of many of the participating countries who aimed at a complete phase-out of the use of coal.

Significant achievements were reached to end and reverse **deforestation** by 2030, with a pledge worth \$19 billion signed by 110 countries which, together, represent about 85% of the world's forests. Funding will come from public and private entities and will be earmarked for developing countries to restore damaged land, tackle wildfires and support indigenous communities.

Another important result involves **methane**, one of the most potent greenhouse gases, with the introduction of a scheme to cut 30% of current emissions by 2030.

A surprising announcement was the **agreement between the United States and China**, pledging to boost climate cooperation over the next decade on methane emissions, the transition to clean energy and de-carbonization.

Furthermore, developed countries were **“urged” to increase funding for adaptation in developing countries**. However, shortcomings have been found in the failure to step up **financing for vulnerable and poorer nations** to fund clean development, protect their populations against the impacts of global heating, and compensate for the damage already being done. In this regard, the promise made ten years ago by developed countries to transfer **\$100 billion a year** to developing nations has not been entirely fulfilled.

Finally, South Africa was actively involved at the conference with the **Political Declaration on the just energy transition in South Africa**, in partnership with the governments of France, Germany, the United Kingdom and the United States, as well as the European Union. The Declaration aims at supporting the transition to a low carbon economy and a climate resilient society in South Africa. Partner countries will mobilize an initial **\$8.5 billion** over the next three-to-five years through a range of

instruments, including grants and concessional financing, to support the implementation of the revised NDCs, investment in renewable energy and development of new sectors such as electric vehicles and green hydrogen. The funding will provide a significant boost to investment and growth while ensuring Eskom can access resources to finance repurposing of coal-fired power stations due for decommissioning over the next fifteen years. The agreement establishes a task force comprised of South Africa and international partners, to outline, enable and implement a program of work.

Overall, in the aftermath of COP26, African countries will be part of the **global trend towards decarbonization**:

- prospective oil and gas projects in Africa will no longer be pursued as overseas markets and financing for it will shrink;
- the continent's vast renewable energy potential, especially hydropower and solar, will become increasingly bankable and highly attractive to investors.

In this context, African countries updated their NDCs in view of COP26 to make sure they are on track for the global goal of 1.5°C, both in terms of unconditional targets (i.e., voluntary and implementable without outside support) and conditional targets—depending on either financial support or climate-related policies pursued by other countries. The following paragraphs will outline the major changes in the NDCs of major African countries presented within the context of COP26.

The updated NDC of **South Africa** revised mitigation targets from the original value of 398-614 Mt CO₂ equivalent to a range of 398-510 Mt CO₂ equivalent by 2025 and 350-420 Mt CO₂ equivalent by 2030. Greenhouse gas emissions are due to decline by 2025, while in the previous NDC it was set to be by 2035. In addition, the NDC mentioned a call for proposals for Eskom to repurpose Komati Power Station in Mpumalanga with photovoltaic panels and battery storage, together with feasibility studies on repurposing other power stations scheduled for decommissioning (including Hendrina, Grootvlei and Camden coal power stations). According to the Climate Action Tracker, South Africa submitted **stronger NDC targets** compared to the previous NDCs.



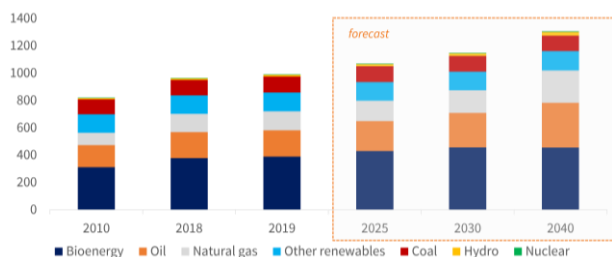


Important efforts have been introduced also by **Nigeria** in its revised NDCs, which also submitted stronger targets compared to the previous one. By 2030, it commits to an unconditional reduction of carbon emissions by 20% below the Business-As-Usual (BAU) scenario and aims at increasing the target of conditional reductions to 47%, against 45% in the previous NDC. Furthermore, the plan includes an enhanced contribution by the water resources sector and waste management, which were not included in the 2015 NDC due to a lack of reliable data. As an oil producing state, Nigeria could become an international model for transition from fossil fuels to low-carbon, climate-resilient pathways embodied in global climate goals with the shift in non-oil revenues and investments in infrastructure and power.

Ethiopia commits to a conditional contribution of a 68.8% reduction (i.e., 277 Mt CO₂-equivalent) below a revised BAU scenario by 2030, against 64% in the 2015 NDC. Of these, 20% are unconditional while the remaining 80% are conditional on international donors. These changes have been possible thanks to significant improvements in methodology and detailed adaptation baseline.

By 2030, **Tanzania** commits to reduce greenhouse gas emissions by around 30-35% relative to the BAU scenario. Under this commitment, about 138-153 Mt CO₂-equivalent gross emissions are expected to be cut. In doing so, it will implement economy-wide actions prioritizing targeted sectors including energy, transport, forestry and waste management.

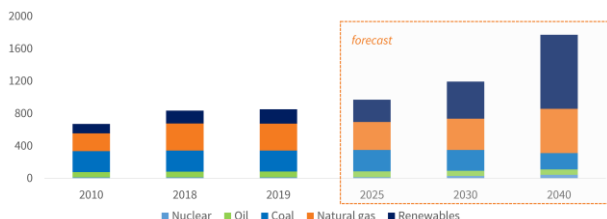
The revised NDC of **Morocco** integrates stronger targets compared to the previous NDC. By 2030, mitigation targets have been revised with an unconditional reduction of 18.3% below a revised BAU scenario, against 17% in the 2015 NDC, whereas the conditional reduction is 45.5% below the BAU scenario, against 42% in the 2015 NDC.



Expected evolution of energy demand in Africa according to the stated policies scenario, (TWh), 2010-2040f. Source: The European House – Ambrosetti elaboration.

As a result of these concerted efforts, Africa’s energy mix is expected to **reduce the dependency on coal** in favor of **natural gas and renewable sources**.

Similarly, in terms of electricity generation, **renewable sources** will increase from 176 TWh to 914 TWh by 2040. According to the stated policies scenario, in the next twenty years, electricity generation will depend by over 50% on renewables. In particular, while **hydropower** will remain the no. 1 source for renewable electricity generation with a share of 35%, **solar photovoltaic panels** will account for 30%, followed by **wind power** with 10%.

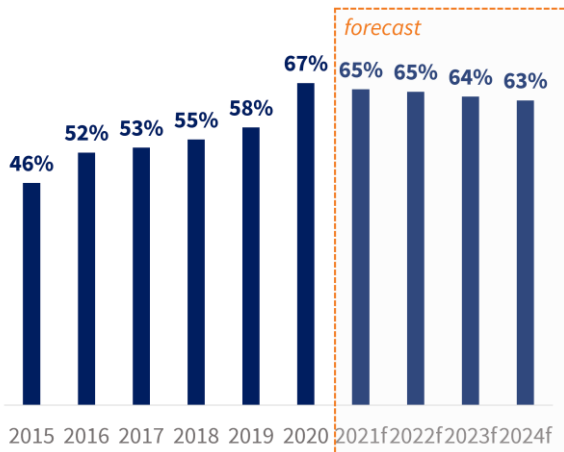


Expected evolution of electricity generation in Africa by source according to the stated policies scenario (TWh), 2010-2040f. Source: The European House – Ambrosetti elaboration.

Looking at **South Africa**, its reliance on coal for over 90% of electricity generation will need to decrease to 40% by 2040. South Africa will diversify its power mix by introducing natural gas and renewables, including concentrating solar power (CSP).

How to ensure a successful energy transition in Africa

Climate finance is one of the most challenging issues for African countries. The energy transition will take place within a context of severe **public finance constraints**, which are hindered by a rising debt burden that has been exacerbated by Covid-19. Debt has been constantly increasing over the last five years, reaching **67% general government gross debt** in 2020 across the continent. In this context, the **Debt Relief for a Green and Inclusive Recovery** is an initiative put forward by the World Bank and the IMF to address the sovereign debt sustainability challenges in developing countries.



General government gross debt in Africa (%), 2015-2024f. Source: *The European House – Ambrosetti elaboration on World Bank data, 2021.*

It aims at debt relief in exchange for progress in green, resilient and inclusive development in line with the climate change goals. Low-income countries will be supported in their financing activities towards a greener economy by linking spending to debt reduction.

Therefore, unlocking private investment is key to achieving a successful energy transition. According to the International Renewable Energy Agency (IRENA), Africa requires an **annual investment of \$70 billion in renewable energy projects until 2030** for a clean energy transformation to take place. Financial markets need to be aligned with the Paris agreement’s goals, and private investment should be channeled into growing climate-friendly sectors in Africa and other developing countries.

Also, the UN Economic Commission for Africa proposed the **Liquidity and Sustainability Facility**, a vehicle for debt management and fiscal sustainability. Ideally financed through seed funding of \$3 billion in special drawing rights, it is intended to de-risk private investment in Africa and help the region increase its share of the global green bond market—currently less than 1%.

The African Development Bank and the Global Center on Adaptation also created the **Africa Adaptation Acceleration Program** (AAP) to help scale up bankable adaptation investment in the region. With a mobilization of \$25 billion, the AAP will be a major step towards investing in the green recovery for Africa.

Unleashing private investment in the African green energy transition does not only require stronger international support, but also **leveraging the best practices in the continent** to scale up the most successful experiences in terms of private/public partnerships. Regarding this, South Africa displays one of the most successful policy experiences in involving private players to implement the energy transition, not only in the African continent, but also compared to other middle-income and developing economies worldwide.

Specifically, the **Renewable Energy Independent Power Producers Program (REIPPP)** is an experience that could serve as a model to scale private finance involvement in the continent’s green transition. Launched in 2011, the program consisted of competitive auctions for the allocation of MW to Independent Power Producers (IPPs) at the tariff determined by the auction itself. The success was not only in terms of renewable installed capacity, but also in terms of price competitiveness. Along the first four bid windows, the average contracted price dropped by 67%, from 2.52 Rand per kWh to 0.82 kWh. The program resulted in a significant deployment of renewables resources, equal to roughly 6.4 GW of renewables power capacity in the first four bid windows, held between 2011 and 2016, thanks to the participation of domestic and international investors. The program has found new impetus under the current presidency, which, in April 2021, launched a fifth bid window for a further 2.6 GW of power, which were successfully allocated in late October 2021. Furthermore, the government aims at deploying a further 2.6 GW in the sixth bid window in the near future.

South Africa is not alone: other examples of best practices include Egypt, Ethiopia and Morocco. These countries have introduced measures to hasten the transition towards renewable energy and to improve water management systems to address the shared concern of rising sea levels.

Egypt, threatened by increasing heat waves and rising sea levels causing floods in coastal areas on the northern coasts, has implemented a sustainable plan for the shift towards renewable sources of energy. Today, they represent around 20% of the energy mix and this share will reach 42% by 2035, thanks to the rationalization of energy subsidies.



In addition, means of transportation will become increasingly clean thanks to the expansion of urban underground transportation, rail and electric vehicle networks, and the establishment of smart and sustainable cities. Finally, in terms of water management, there are ongoing projects to rationalize water consumption, canal lining and the integrated management of coastal areas with early warning and monitoring systems to monitor changes in climate and sea levels.

In **Ethiopia**, households in rural areas which do not have access to electricity are forced to use fuel-wood to meet their energy needs, over 85% of which is used for cooking and heating. Thousands of square kilometers of deforestation takes place annually for wood collection and charcoal burning, leading to land degradation and soil erosion. In its efforts, Ethiopia aims at hydropower-based development as a gateway to economic transformation through industrialization and urbanization, and through providing rural areas with access to modern energy. Thanks to the proven technical and technological ease and relatively low cost per MW investment of hydropower, the potential is estimated at up to 45,000 MW, which will be used for domestic consumption with the excess amount to be exported to neighboring countries. Other actions include the construction of hydro dams, freshwater management, climate adaptation services, firm energy, energy storage and other ancillary services.

In **Morocco**, climate change impacts both the agricultural system and fisheries, which together employ half of the population and account for 14% of total GDP. There is also concern about the rising sea level, with 60% of the population and most of the industry living along the coast. To address these problems, the government has focused on water management by bolstering the use of non-conventional water resources, modernizing irrigation systems and constructing dams to move water from northern to arid southern regions. The electricity generation mix will progressively rely on renewable energy, reaching 52% by 2030, of which 20% from solar energy, 20% from wind and 12% from hydropower.

Opportunities for international cooperation

The energy transition challenge in the African continent is unique and requires substantial private investment, together with a strong commitment to make the energy sector more effective and efficient within individual countries. The energy transition in the continent is not only unique because of its great diversity and resource availability, but also in its aim of social justice and empowerment of individuals and communities alike. In this sense, more than anywhere else, the African energy transition is a powerful lever to accelerate social and human development, thus creating endogenous, self-sustaining and sustainable growth.

Such a transition not only provides opportunities for countries and communities, but also for private investors, both domestic and international. In fact, under a risk-return point of view, returns on green investments in African countries are high across all sectors, especially in comparison to more mature markets in North America and Europe. If the right policy ecosystem is deployed, Africa can become the global driver of growth for the future, and the green transition is the most powerful lever for this to actually happen.

However, the continent's green transition means addressing unique challenges to unlock its full potential. First, the business environment should be increasingly conducive to investment by public and private players. This necessity translates into sound financial programs with an adequate regulatory framework and a specific concessionary structure. The resulting clarity would foster and benefit potential investment. In this context, local government can play a pivotal role in boosting business confidence and improving the overall investment environment. Strong and solid government support would diminish the perception of political risk in the country, which, in turn, is a factor hindering investor confidence.

Despite widespread concern, the African continent represents a sound environment that provides investors with positive returns on investment.

The energy transition in Africa could become a catalyst for growth and development across the entire continent. Both governments and businesses need to stay abreast of rapid advances in the energy landscape.

