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Building climate resilience: Opportunities and considerations for Africa in a net-zero future

Part of the *Turning Point* series

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MAKING AN IMPACT THAT MATTERS since 1845

Contents

Foreword

Damage caused by extreme weather events and a changing climate is already being felt across Africa. Climate change has led to loss of lives, destruction of infrastructure, and an increasing imbalance in natural ecosystems, as well as food shortages and major socio-economic challenges. Unless immediate action is taken, the African continent will be among the worst-affected regions in the world. Unchecked climate change will see a marked deterioration in Africa's economic growth, productivity, trade, and competitiveness.

Africa is also faced with a conundrum. While industrialisation is key to eliminating poverty and raising living standards, replicating other countries' path to industrialisation will increase the continent's relatively low greenhouse gas (GHG) emissions, having an even greater impact on the effects of climate change and the cost of transition.

While transitions are never easy – and there are many nuances to the continent's required decarbonisation journey – they also present many exciting opportunities for organisations to change production methods, use inputs more efficiently, reduce waste, and leapfrog traditional development models to more innovative solutions.

Organisations are also coming under growing pressure to move beyond profit as their sole mandate, being challenged to increasingly consider how they are making a positive and sustainable contribution to communities, their clients, and broader society.

Delivering **purpose beyond profit** requires organisations to:

- ensure that **organisational purpose** is reflected in every decision taken, to not only lower emissions and drive sustainable practices, but also have a positive impact on society overall
- challenge the organisation and its people to **go beyond** current thinking by opening hearts and minds to what is seemingly impossible, and face the apparently insurmountable challenges of climate change
- run efficient and **sustainably-profitable** organisations by having bold ambitions and taking purposeful steps to create a safer, more resilient, and more sustainable future.

Addressing challenges with this **purpose beyond profit** mindset will bring about the transformative shifts required to address climate change.

This report was inspired by Deloitte's global *Turning Point* series and defines the challenges and costs that Africa may face due to inaction towards climate change. It also highlights crucial opportunities that underpin the continent's economic potential as Africa shifts towards a net-zero future. The report demonstrates the need for collective action to realise shared prosperity in a low-emissions future. Managed well, Africa's future promises a more equitable and sustainable world.

The window to confront the climate crisis is rapidly closing: Africa's people need to decide how to bring about purpose beyond profit and lead the way to a more sustainable and resilient future for this continent and its children.

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Africa is likely
to experience
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change

The context: The costs of climate inaction in Africa

Over recent years, Africa has suffered the increasingly severe impact of climate change. The continent's mean surface temperature continues to rise faster than that of the rest of the world, with the five warmest years on record taking place over the last dozen years.[1] Unless addressed timeously, climate change will continue to pose physical risks to Africa.

Most economic models and forecasts, however, do not consider the significant and growing costs of climate change, making it hard for the world's decision-makers to fully assess the socio-economic consequences of their choices.

Globally, Deloitte research and economic modelling has sought to explicitly account for the impact of climate change on different continents and regions' economic growth futures. Published earlier in 2022, this research found that if climate change continues unchecked, that is, if global average temperatures rise by 3°C and the world does not achieve net-zero by 2050, the world could suffer losses of around US$178 trillion in net present value (NPV) terms over the five decades to 2070. In this scenario, in 2070 alone, the world economy would lose US$25 trillion in gross domestic product (GDP). The research confirms that every region would be adversely affected.[2]

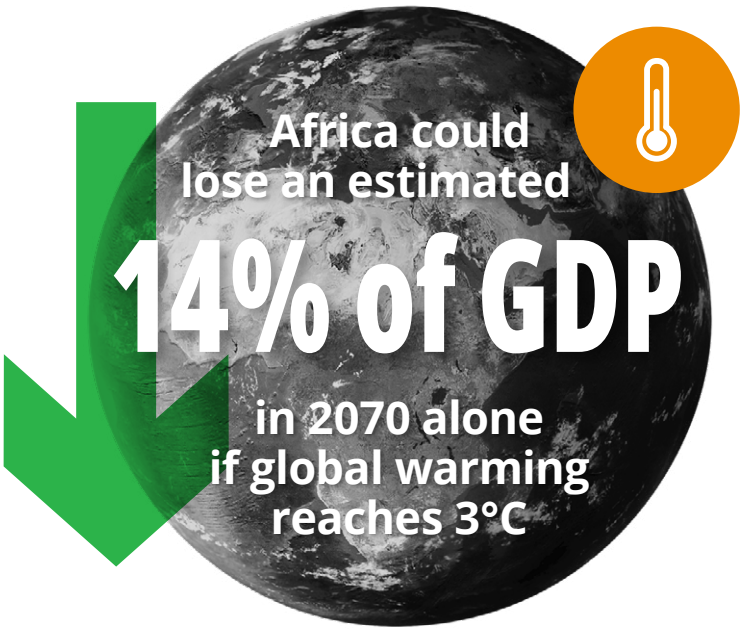
The drag on Africa's long-term growth in a world of climate inaction

Africa is likely to experience some of the worst effects of climate change. The continent could lose US$16 trillion in NPV terms between 2021 and 2070. In 2070 alone Africa could lose 14% of GDP (or US$2.1 trillion) relative to a world without climate change, according to Deloitte's global analysis.[3] A loss of this scale is larger than the current combined economies of Egypt, Kenya, Morocco, Nigeria, and South Africa.[4]

Figure 1. Global economic losses associated with unchecked climate change

Region	NPV, 2021-2070 (US$trn)	GDP impact in 2070 (US$trn)	GDP impact in 2070 (%)
Asia Pacific	-96	-16	-9.4
Europe	-10	-1	-1.5
Americas	-36	-4	-5.7
– South America	-17	-2	-12
Total (modelled regions)	**-138**	**-20**	**-6.8**
Africa, Middle East and Rest of World (estimate)	-40	-5	-14.7
– Africa (estimate)	**-16**	**-2.06**	**-14**
Global	**-178**	**-25**	**-7.6**

Source: *Deloitte, 2022a[5] and Deloitte 2022b[6], with additional calculations for Africa by the Deloitte Economics Institute, 2022*



Other studies have also found that Africa could be one of the worst-affected regions on earth. For example, research by Swiss RE in 2020 found that in a 2.6°C warming scenario, GDP in Africa and the Middle East could reduce by between -4.6% and -21.5% in 2050 (versus, for example, Europe by -0.8% to -8.0%, South America by -1.4% to -13%, and North America by -1% to -7%).[7] Similarly, in 2018, Kompas et al. found that sub-Saharan Africa (SSA) could lose up to US$2.9 trillion in GDP per year between now and 2100 in a 3°C warming scenario, with the fall in GDP growth for countries near the equator being particularly dramatic.[8]

Last year, the Global Centre for Adaptation (GCA) noted that "the compounded effect of climate impacts is currently estimated to range between US$7 billion and US$15 billion per annum". It further indicated this could rise to about US$50 billion per annum by 2040, which could lower Africa's GDP by up to 3% by 2050.[9] The latest *State of Climate in Africa 2021* report notes "that by 2050, climate impacts could cost African nations US$50 billion annually".[10]

Similarly, by 2030, 118 million extremely poor people (defined as living on under US$1.90 per day) will be impacted by exposure to drought, extreme heat, storms, and floods if no adequate response measures are put in place.[11] According to the African Development Bank (AfDB), climate change effects are currently eroding up to 15% of Africa's annual GDP per capita growth.[12]

Ultimately, climate change has already had a significant impact on the African continent and is set to negatively impact African countries more than the rest of the world. Although Africa is estimated to contribute only 3% of global emissions (despite being home to 20% of the world's population), it is the region expected to bear the brunt of climate change over the long term.[13]

To better understand how climate change impacts the African continent, this thought piece explores the current physical damage caused by a changing climate, and outlines the impact on crucial sectors. The report goes on to consider the socio-economic implications and escalating challenge of unchecked climate change, particularly where no measures are put in place to build climate resilience. It then defines seven opportunities for African countries in a global net-zero future, linked to the continent's industrialisation and development aspirations, as well as decarbonisation goals under the Paris Agreement. Finally, the thought piece provides key considerations to help enable these opportunities.


Africa will experience an increase in physical impacts in the absence of adequate response measures

The impacts of climate change in Africa

Physical impacts

Since the 1970s, Africa has experienced more frequent and extended heatwaves, a tripling of droughts, a quadrupling of storms and cyclones, and a tenfold increase in flooding.[14] Floods alone have accounted for two-thirds of disasters in Africa since the 2000s, with predictions of an increase in the frequency and intensity of rainfall for most of tropical Africa. Higher-frequency rainfall and storms have resulted in inland and coastal flooding.[15] The last decade was the warmest on record, with average temperatures in the 2020s being 1.2°C higher than the 1981-2010 average.[16] Given warmer ocean temperatures, cyclones are expected to affect wider parts of Africa.[17]

As the longer-term changes in weather patterns, including frequent and severe weather events, result in rising temperatures and sea levels, African countries will experience an increase in physical impacts and chronic risks in the absence of adequate response measures and concerted efforts to move to a low-carbon future.

Droughts in South Africa

In 2018, Cape Town, South Africa, experienced one of the worst urban water crises in recent times. Following three years of drought, lower-than-average rainfall, and rising temperatures, together with population growth and limited water investment, Africa's tenth-largest city was expected to run out of water by April 2018. This was averted largely due to demand-management initiatives. Nonetheless, the multi-year drought and imposed water restrictions adversely impacted key sectors such as agriculture and tourism, resulting in job losses, social unrest in agricultural areas, and public health risks.[18]

Drought and severe weather in the Horn of Africa

The Horn of Africa region is experiencing the most brutal drought in almost 50 years and, as a result, more than 18 million people across Ethiopia, Somalia, and Kenya face starvation.[19] Spurred on by severe natural disasters, including floods, cyclones, droughts, and landslides, and resultant climate-induced conflict events, the region has seen progressively more displacements and an interruption of the annual migration patterns of pastoral communities due to internal and cross-border mobility. About 12% of the world's 14.6 million new displacements in the first half of 2020 occurred in this region, with many migrants originating from Ethiopia.[20]

Floods in South Africa

In April 2022, South Africa's KwaZulu-Natal province experienced some of the deadliest floods to hit the country, with rainfall levels reaching a record high of 300 millimetres in just over 24 hours. The ensuing floods and landslides resulted in hundreds of deaths, displacement of over 40,000 people, and the destruction of more than 12,000 homes.[21] Informal settlements were the most vulnerable, given their proximity to rivers and building below flood lines. The flooding impacted critical provincial infrastructure, such as major roads, port operations, water treatment, communication, and electrical systems.[22] The province required more than R1.9 billion (about US$107 million) towards disaster-relief interventions,[23] and the cost of the flood damage was estimated at around R17 billion (about US$960 million) – likely a significant underestimate of the impact on local businesses and households.[24]

Floods in West Africa

Annual flooding along the Niger River in West Africa results in regular loss of life and has displaced an estimated 1.25 million people from Burkina Faso, Mali, and Niger. As temperatures rise, West African countries are at risk of further catastrophic conditions, with the climate-migration nexus likely to shift from intra-regional migration to more northward migration into developed economies.[25]

Floods in Kenya

Recently, Kenya has experienced heavy rains and some of the wettest "short-rain" seasons on record. In 2021, the Endau and Kipsangui Rivers broke their banks, flooded, and damaged several settlements.[26] Heavy rains in 2019 left 17,000 people displaced and 32 people dead, damaging crucial transport infrastructure, with the agriculture sector reeling after crop and livestock losses.[27]

Droughts and floods in Nigeria

Nigeria has suffered droughts and floods due to climate change, impacting the agricultural sector as well as infrastructure. In 2012, 30 of the 36 states were affected by flooding, killing 400 people, and displacing 1.3 million. That disaster cost the country approximately US$17 billion in damages. Flooding again affected more than 270,000 people in 2019 and over 2.3 million people in 2021.[28] At the same time, it is estimated that around 40% of the country's land is subject to periodic drought.[29]

Droughts and floods in Morocco

Between 2002 and 2011, nine of the ten worst natural disasters in Morocco were floods.[30] Four deadly flood-related events occurred in 2019,[31] followed by flash floods in March 2021, which resulted in damage to homes, public buildings, and roads in northern Morocco.[32] In addition, drought has intensified, affecting water supplies and hence agriculture in rural areas. In February 2022, Morocco suffered its worst drought in three decades. The lack of rainfall and decrease in reservoir levels destroyed essential crops, including cereals and legumes.[33]

Cyclones in Mozambique

Mozambique was devastated by two of the most catastrophic tropical cyclones on record in a single season in 2019. Cyclone Idai alone caused at least 600 deaths, 1,600 injuries, and US$1 billion in infrastructure damage.[34] The combined impact of the two cyclones destroyed about 300,000 houses, damaged over 110 health facilities, and left more than 2.2 million people in need of humanitarian aid.[35]

Drought in Madagascar

African island states are severely impacted by climate change. Madagascar, the fourth-largest island in the world, faces a drought-induced food crisis.[36] The four-year long drought has seen thousands of people suffering from starvation and food insecurity. It has also left 70% of the population in the south of the country without access to basic drinking water.[37] The United Nations (UN) has stated that Madagascar is on the verge of experiencing the world's first "climate change famine".[38]

Floods in the Seychelles

The Seychelles has been negatively impacted by climate change, with coastal erosion and massive flooding events destroying airports, ports, desalination plants, electricity and water infrastructure, and hotels. The ocean's coral life has suffered from bleaching, affecting the main tourist attractions. During April 2016, a tropical cyclone that hit Farquhar resulted in US$2.5 million in damages.[39]

Rising sea levels in Mauritius

Mauritius is experiencing sea level rises of 5.6 millimetres per year, compared to the global average of 3.3 millimetres. As a result, some areas' beach width has reduced by 20 meters over the last decade. There has also been an increase in the frequency of flash floods. These factors have negatively influenced the economy and local communities.[40]

Wildfires in North and South Africa

About two-thirds of the more than 4.2 million km^2 of woodland or savannah affected by wildfires each year are in Africa.[41] Droughts in Morocco this year have given rise to wildfires in the northern parts of the country, resulting in thousands of families having to be evacuated.[42] In Algeria, droughts and heatwaves – an annual occurrence due to climate change – have caused about 100 fires in August 2022 alone, destroying thousands of hectares of forest, woodlands, and farmland, and resulting in loss of life and injuries.[43] In 2017, the coastal towns of Knysna and Plettenberg Bay in South Africa saw devastating wildfires destroying thousands of hectares of plantations, fynbos, and properties in urban areas, following warm weather, a decrease in rainfall, low humidity, depleted soil moisture, and drought.[44]


The impact of unchecked climate change will be felt across industries in Africa

Sector impacts

The impact of unchecked climate change will be felt across all industries in Africa. Sectors likely to bear the greatest burden over the next few decades include agriculture, the extractives sector, tourism, infrastructure, manufacturing, and healthcare. Hotter temperatures and extreme events affect working conditions, productivity, and overall well-being of workers across many of these sectors.

The scale of transition risk faced by African countries and the lack of resilience in key sectors poses the very real risk of being "left behind" and non-competitive in the global market.

Agriculture

The crucial contribution of agriculture to GDP, employment, and livelihoods makes African economies particularly vulnerable to extreme weather events and climatic variation. In Southern and Eastern Africa, agriculture, fisheries, and forestry contribute close to 15% to GDP and make up about 60% of employment.[45]

Africa's agricultural production fluctuated throughout the 2010s,[46] with persistent droughts, changes in seasonal rainfall, wildfires, flooding, and erosion threatening access to water and food resources: an estimated 95% of the continent's food production is rainfed.[47] Small-scale farmers (especially food, pastoral, and subsistence farmers) are particularly vulnerable. These farmers are far from resilient in mitigating and adapting to climate change because they lack the resources to invest in climate-smart approaches without support from the government or financial incentive schemes. Tragically for Africa, 80% of the continent's agricultural production relies on these very farmers.[48]

Besides the direct impact climate change has on crops and livestock, the higher temperatures and humidity also affect farmworkers' well-being and, in many cases, provide potential breeding grounds for new pests.[49] If not addressed, these trends will intensify over the coming years.

Extractive industries

Water scarcity and rising temperatures will dramatically impact the "ways of work" for the mining, and oil and gas (O&G) value chains. Furthermore, the coal and O&G sectors face one of the biggest disruptions in the global transition towards a clean energy future, and achieving net-zero emissions. According to the International Energy Agency (IEA), fossil fuel consumption will need to decline rapidly to reach the goals of the Paris Agreement.[50]

Along with the phasing out of all unabated coal and oil power plants by 2040, there is likely to be reduced global demand for new internal combustion engine (ICE) passenger cars by 2035.[51] While this shift will have a positive impact on global emissions, it will also have a profound impact on the respective value chains and the communities surrounding these resources.

Africa's extractive sector is an important driver of growth, exports earnings, and employment in many African countries. But activities are concentrated in upstream production with limited value addition across commodity value chains.[52] Mining, oil, and gas exports accounted for 60% or more of the merchandise export basket of 24 African economies in 2021.[53]

Tourism

Africa's tourism sector is famed for its rich biodiversity and varied biomes; however, environmental degradation caused by climate change events is likely to have a significant impact on the attractiveness of many destinations and dramatically affect local communities who depend on the tourism sector.[54]

Wildfires and droughts will affect national parks, towns, and cities alike, while rising sea levels and extreme weather events will impact coastal towns and beaches. For example, water shortages in Cape Town during the 2016-2018 drought dramatically reduced the number of international tourists visiting the city, with only a slow recovery.[55]

Infrastructure

Africa's ageing infrastructure is increasingly vulnerable to climate-related damage. Cyclones, floods, landslides, and wildfires destroy critical public service buildings like hospitals and schools, as well as physical infrastructure, such as bridges, roads, ports, railway lines, pipelines, electrical grids, broadband, and communication systems. These visibly dramatic effects also play out in far-reaching socio-economic disruptions to communities.

Longer-term changes in weather patterns and rising sea levels also damage transport infrastructure, directly influencing economies' ability to trade, and to attract investment.[56] With many African countries having

a high percentage of unpaved or below-standard paved road networks, climate change's threat to road infrastructure in Africa is devastating, compared to other regions.[57] African governments already struggle to invest in the minimum infrastructure needs to diversify economies, and promote private-sector activity, industrialisation, and employment creation for Africa's growing labour force.[58]

With the costs of extreme weather events escalating, governments not only face the challenge of bridging the infrastructure deficit, but also carrying the cost of damages and relief efforts. Communities need to navigate the socio-economic fallout of damaged infrastructure, which is further exacerbated if essential infrastructure is not swiftly repaired and restored.

Manufacturing

Besides the physical impact of climate change on manufacturing facilities (such as drought and water restrictions, and damage to facilities), extreme weather conditions can wreak sporadic havoc on global supply chains.[59] This chaos will further exacerbate the challenges already faced by the sector around logistics bottlenecks and increased prices of goods. The recent Covid-19 pandemic and the conflict in Ukraine have both highlighted the fragility of global supply chains, but climate change is likely to bring about increased factory and supply chain disruptions.[60]

Africa's nascent manufacturing sector, however, faces a dilemma. With ambitions to diversify economies into value-adding and job-generating sectors, the continent cannot replicate the industrialisation pathway of other regions without increasing its relatively low GHG emissions. Also, the increasing global emphasis on sustainable supply chains will put further pressure on Africa's manufacturing sector to lower its carbon and water footprints. This does, however, present an opportunity to potentially leapfrog traditional stages of development to more innovative solutions.

Policy-driven commitments to accelerate the introduction of electric vehicles (EVs) in major markets in Europe and the United States (US)[61] have implications for the automotive manufacturing and assembly industry in key markets. Not keeping up with the rapid global transition to EVs, for example, could see South African-based manufacturers and suppliers at risk of exclusion from these vital markets, and hundreds of thousands of job losses.[62]

Healthcare

The African continent faces a high disease burden, which climate change will further exacerbate. New public health challenges could also result, including infectious diseases, disaster-related injuries and deaths, and environmental contamination of food and water. These climate-related health impacts will inevitably contribute to surges in demand and resource utilisation, overloading an already under-capacitated medical system.[63]

Extreme weather events are also likely to impact health infrastructure through interruptions to power and water to hospitals and clinics, heatwaves affecting the correct functionality of medical equipment, as well as necessary changes in cold-chain requirements for transporting medicine and vaccines.


Climate change
will have
far reaching
socio-economic
impacts in
Africa

Socio-economic impacts

Extreme weather events will have an increasingly harsh physical impact on the continent; by affecting essential sectors such as agriculture and water, weather will also influence African people's livelihoods, given their dependence on land and natural resources for food production. Human development also faces critical challenges from the destruction of socio-economic infrastructure, as well as displacement and related migration.

In 2015, the World Economic Forum's (WEF) *Global Risks Report* identified water as the world's greatest socio-economic challenge. The predicted changes in rainfall, along with rising temperatures and sea-levels, are expected to influence the quality and quantity of water resources in Africa.[64] Coupled with increasing water consumption, these changes will put additional pressure on already scarce water resources and will trigger migration and ignite conflict.

Lower living standards and increased poverty

Africa is home to more than half of the world's extremely poor population. With rapid population growth, stagnant income growth, and changing weather patterns, this number is expected to increase from an already estimated 490 million people in 2021.[65] Poverty will largely impact the rural poor who are dependent on subsistence farming, and have limited or no capacity to adapt to climatic hazards, with the aged, women, and children the most vulnerable.

As Africa has one of the fastest-growing and youngest populations globally, industrialisation and job creation will be fundamental to elevating living standards and eliminating poverty. As the world looks at decarbonisation strategies, African economies will need to find ways to create jobs while transitioning to more value-adding activities in climate-resilient industries.

Climate change-related conflict, displacement, and migration

While migration is not a new concept and is well-entrenched in some African regions, demography, security (terrorist and jihadist insurgencies), and climate-related livelihood challenges have exacerbated population flow.

For example, water stress alone could displace up to 700 million people in Africa by 2030.[66] As noted earlier, extreme weather events have given rise to displacement, with migration a coping mechanism for socio-economic loss. The climate-migration nexus is likely to see an even greater shift to more northward migration into developed economies, particularly Europe.[67]

Those left behind, however, may be exposed to increased risks of resource-related conflict, poverty, and inequality.[68] The risk of conflict, also driven by socio-economic factors like local tensions, xenophobia, and poor governance structures, is exacerbated by the effects of climate change, and causes further displacements. Studies have found a link between the increase in temperature and an increase in conflict. In the case of Mali, for example, increased extremist recruitment success during periods of low rainfall illustrates the risk of conflict caused by climate change.[69]

Hunger and food insecurity

Over the past few decades, the world has made great progress in reducing hunger and malnutrition. The global share of the population that is undernourished fell from 23.3% in 1991 to 12.9% in 2015.[70]

More recently, however, disruption to food production and distribution, and higher food prices due to unstable and unreliable climatic conditions have increased malnutrition and hunger. The number of those facing acute food insecurity has increased by more than 150% since 2019.[71] Since 2015, the uptick in malnutrition has been particularly prevalent in Africa,[72] where more than one in four (or about 340 million) people face starvation.[73]

As crop failures, water and food shortages, and food prices increase, and agricultural and food production decreases, the spectres of hunger, malnutrition, food insecurity, social unrest, and conflict loom large in Africa's future.

Greater disease burden

Climate change will also put the health of Africa's people at risk. Flooding, reduced air quality, and malnutrition all endanger human health. The rise of infectious, insect-borne, and waterborne diseases, and a shift in the disease burden, given rising temperatures which affect vector-borne disease transmission, are also challenges to health.

On average, deaths associated with non-optimal temperatures averaged 1.2 million per year between 2000 and 2019.[74] Together with population movements, such as migration and urbanisation, the impact of climate change will place greater stress on public health systems that are already highly under-capacitated.[75]

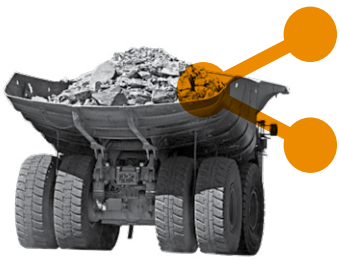
Figure 2. Sector and socio-economic impacts

Major socio-economic impacts
Lower living standards and increased poverty leading to climate change-related conflict, displacement, and migration

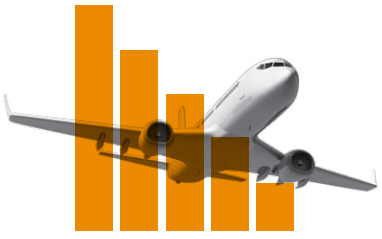
Agriculture loss and food insecurity
Reduced agricultural yields from changing climate patterns

Damaged Infrastructure and capital
Stalling productivity and investment

Human health
Increased incidence of disease burden and mortality



Impacts on extractives and manufacturing sectors
Shifting global demand, supply chain challenges and ways of work



Lost tourism
Environmental degradation and impact on biodiversitty, disrupting tourism

Source: *Deloitte Africa research and analysis, 2022*


There is
another way

Opportunities to build climate resilience in a global net-zero future

As the world embarks on a path to decarbonisation and seeks to achieve net-zero emissions by 2050, Africa is in an interesting quandary: the continent has one of the planet's fastest-growing and youngest populations and will have the largest working-age population by the mid-2030s.[76] Yet, it remains the last region to industrialise: 34 of the world's 48 least-developed countries are in Africa.[77]

Industrialisation and job creation are key to eliminating poverty and elevating living standards across the continent. However, growth and industrialisation aspirations are often hindered by simply not having "the basics" in place. The lack of universal electricity access is but one example. While about half of Africa's population is without electricity access, the continent's energy demand is expected to more than double and even triple by 2040 under different demand scenarios.[78]

At a time when the rest of the world is implementing strategies to decarbonise, African economies will need to find ways to industrialise and transition without significantly increasing the emissions profile of the continent. Naturally, replicating the path of industrialisation followed by other countries will increase the continent's share of GHG emissions.

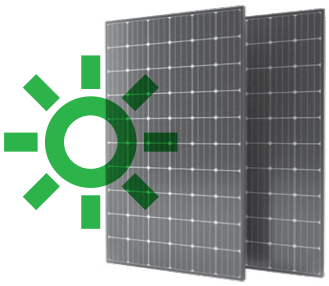
Like many other disruptive events, climate change creates opportunities for innovation. Pursuing mitigation and adaptation strategies will see African countries significantly improving macroeconomic stability, economic transformation and job creation, while reducing the negative impacts of climate change on development.[79]

Opportunities for Africa that link to its own diversification and industrialisation needs in a global net-zero future include investing in a greener energy mix; supplying commodities that are vital for a clean energy future; investing in climate-resilient industry (including changing to production methods that reduce waste, embrace the circular economy, and use inputs more efficiently) while leapfrogging to new technologies; and harnessing Africa's natural capital to offset carbon emissions.

Similarly, African countries should take advantage of opportunities to prioritise programmes that support adaptation and build resilience. In the African context, the most critical adaptation opportunities would include city planning and infrastructure upgrades, adapting agricultural practices to better ensure food security, and advancing healthcare systems and early warning systems to ensure the health, safety and well-being of African citizens.

Figure 3. Opportunities for Africa in a global net-zero future

Mitigation



Investing in a greener energy mix

Supplying the commodities for a clean energy future

Mitigation and Adaptation

Prioritising green manufacturing and climate-resilient industry

Adapting agricultural practices and ensuring food security

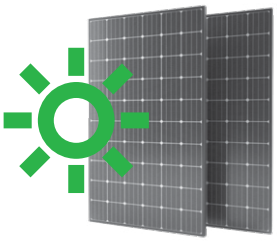
Harnessing Africa's natural capital for adaptation and mitigation

Adaptation

City planning and infrastructure upgrades

Adaptation strategies for health and safety

Source: *Deloitte Africa research and analysis, 2022*



Opportunity 1. Investing in a greener energy mix

The first opportunity links to the transition away from coal and other GHG-intensive feedstock to renewables in Africa's energy mix. Renewable energy integration into national generation capacities forms a key part of global efforts to reduce carbon dioxide emissions and achieve net-zero emissions by 2050.

All 54 African countries signed the Paris Agreement and submitted ambitious Intended Nationally Determined Contributions (INDCs) to help achieve low-carbon and climate-resilient pathways by mid-century. At least 40 countries have already included renewable energy targets in their voluntary NDC submissions, while the most recent submission of updated NDCs by 38 of Africa's 54 countries highlights a significant improvement in the ambition to reduce emissions.[80]

In response, African governments, energy and resources companies, financiers such as banks, asset managers and multilateral organisations, as well as development partners of the continent have supported the opportunity to transition to renewable energy.

Expanding the energy mix with renewables generation capacity is also supported by simple economics: although in 2009 a unit of coal was, on average, more affordable than renewable energy, both wind and solar have been the more economic options since 2020.[81]

However, achieving this transition also requires investment in systems and solutions that will provide universal access and energy security. For example, in Nigeria – Africa's largest economy – only an estimated 55.4% of the population has access to electricity. For SSA as a region, this drops to 48.4%, compared to 99.9% for countries belonging to the Organisation for Economic Co-operation and Development (OECD).[82] As generation capacity increases, greater investments in power transmission will need to be made to support a greener energy mix and achieving universal access.[83]

Stranded assets, however, pose a significant risk to economies producing fossil fuel feedstock and place an additional burden on these African countries who already face developmental and growth challenges. There has also been great debate around the role of gas in the world's future energy mix. Many have suggested that Africa should cease any investment or development in natural gas whereas others point to the continent's widespread energy poverty and the fact that a renewables-only power mix is unlikely to meet those needs, therefore advising that gas should be seen as a "transition fuel" in Africa's energy mix.[84]

As this debate unfolds, the good news is that with the right enabling policies and capital investment, Africa has the potential to install 310GW of renewable power generation capacity by 2030 – half its current electricity generation capacity, and an estimated quarter of its future needs by 2030. To unlock this potential, an estimated US$70 billion per annum in renewable energy project investments over the 10 years from 2020 to 2030 is required.[85]

Countries such as South Africa (accounting for 18% of Africa's GHG emissions in 2018[86]), Egypt (13%), Nigeria (12%), Morocco (3%) and Kenya (3%), among others such as Ethiopia, and Tanzania, are leading on large-scale clean energy adoption, ranging from wind to solar and geothermal generation technologies. Investment in new renewable technologies such as concentrated solar power (CSP), green hydrogen, geothermal as well as decentralised mini-grids could be a differentiator for the region's economic diversification and development.

South Africa is the twelfth-largest global GHG emitter, and accounts for about one-fifth of the continent's emissions. Given its coal-dominant energy mix, South Africa's economy is twice as carbon-intensive as the global average.[87] The country's fleet of coal-fired power stations is old, increasingly unreliable, and often contributes to unplanned power outages or load reduction ("load-shedding"). Almost half of the power utility's installed capacity needs to be decommissioned by 2035 and replaced with renewable energy generation and storage capacity.[88]

Through various bid windows under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) launched in 2011, South Africa's power utility has gradually been diversifying its energy mix. By 2019, it had procured about 6.5GW of renewable energy generation capacity under that programme. By 2030, a further 14.4GW of wind and 6.5GW of solar photovoltaic (PV) of a total 29.5GW

in new capacity are planned as per the country's Integrated Resource Plan (IRP) of 2019.[89] In 2021, wind, solar PV and CSP contributed about 10.6% to the country's installed capacity.[90] With the increase in the private energy generation limit to 100MW last year,[91] and increased loadshedding in 2022, more and more private companies are exploring opportunities to produce their own power to enhance energy security; unfortunately, the speed of adoption is hampered by approval processes.

Given its renewables potential and intensifying electricity crisis, South Africa is well-positioned to accelerate investment in renewable technologies. The country possesses high-quality renewable sources, like solar and wind, together with large amounts of land and sufficient water that can provide the country with a cost advantage in producing other clean energy sources, such as green hydrogen.[92]

Unlocking the potential of green hydrogen in Africa

Hydrogen has been touted as a primary energy source that could play a more significant role in the future global energy mix. It is predicted that hydrogen could account for 12% of the world's energy mix by 2050.[93]

Currently, 95% of the world's hydrogen is produced from fossil fuels and is known as grey hydrogen.[94] Hydrogen produced through the combination of natural gas and carbon-capturing technology is known as blue hydrogen, while hydrogen produced through electrolysis using electricity from renewable energy sources is known as green hydrogen. Given net-zero carbon goals and the increasing pressure to decarbonise heavy industries, green hydrogen production would need to be ramped up from its current 0.1% of global hydrogen production.[95]

With its renewable energy potential, Africa could produce an estimated 5,000 megatonnes of hydrogen annually (equivalent to the current global energy supply),[96] becoming a major player in green hydrogen production. This would decrease the continent's reliance on fossil fuels, and provide the chance to become energy independent and a net exporter of green hydrogen. There are several projects being developed to unlock the potential of the green hydrogen economy in Africa.

Namibia has announced a US$9.4 billion green hydrogen production facility, to be completed in 2026.[97] The facility is expected to produce 300,000 tonnes of green hydrogen annually for domestic and international markets.

South Africa conducted a study into the development of a green hydrogen hub in the Northern Cape region, which could produce 400,000 tonnes of green hydrogen annually. The plant aims to start producing its first hydrogen in 2030.[98] South Africa is well positioned to pursue green hydrogen given large reserves of platinum group metals (PGMs), the requisite port infrastructure, as well as heavy industry and transport to stimulate the local demand for green hydrogen. This could see the country being among the largest global exporters of green hydrogen in the future.

Given their renewable energy potential and proximity to Europe, both Egypt and Morocco have ambitious plans to produce green hydrogen for export to help meet European demand.

Africa will, however, need to overcome challenges to make a green hydrogen future a reality. These challenges include limited bankability (due to a lack of market information on return of investment), lack of specialised skills, high operational costs, significant energy losses through the supply chain, a lack of infrastructure to support green hydrogen, difficulty transporting hydrogen, and relatively low domestic demand across the continent.[99]

Despite the challenges, billions of dollars are being funnelled to green hydrogen projects globally. African markets can further unlock this funding and encourage the use of green hydrogen by ensuring strong regulatory and policy frameworks, introducing tax incentives, implementing international trade partnerships with countries where there is a strong demand, and building infrastructure to store and transport green hydrogen.

In East Africa, **Kenya** has made commendable progress to diversify its energy mix. The country commenced its renewable energy development path in 2011, with targets to increase renewables generation capacity (given shortages caused by hydropower generation variability), as a key pillar of its medium-term development plans.[100] Non-hydro renewables already account for more than 65% of Kenya's energy mix, and renewables (with hydro) over 80%. Progress has been underpinned by two important renewable energy projects: the Lake Turkana Wind Farm (300MW power output, making it Africa's largest wind farm) and the Menengai Geothermal Power Station (which draws on Kenya's geothermal potential, estimated to be up to 100GW).[101]

The targets of 100% renewables by 2030 and universal electricity access are backed by a supportive regulatory environment, funding support from development banks and international financial institutions, as well as the vision for Kenya to become one of the top geothermal electricity generators in the world. Challenges do remain, such as the cost of electricity distribution.[102]

Morocco has also become a leader in Africa's renewables sector. The country has a favourable track record in renewable energy development, and a supportive political and business environment that has attracted investor interest in the sector while reducing energy imports. Notable additions to the energy mix will be from solar and wind generation.

For example, a 1GW wind energy programme, which includes five wind parks (totalling 850MW), is expected to be commissioned by 2024. Offshore wind potential is significant, with a possible 10GW capacity for fixed systems and more than 130GW capacity for floating technologies.[103] Morocco also has the world's largest CSP plant which covers 3,000 hectares. In 2020, 37% of the country's energy was produced from renewable sources with the aim of reaching 52% by 2030.[104] Morocco is well-positioned to attract investment from European decarbonisation projects, as well as export clean energy to Europe.

Egypt[105] contributes more than one-tenth of Africa's GHG emissions. With its natural resources, including vast land availability, high levels of sunshine, and high-speed winds, the country has also incorporated renewable energy projects into its 2035 Integrated Sustainable Energy Strategy. The strategy will address its increasing energy demands and help diversify the electricity sector to become more environmentally sustainable. At the end of 2021, Egypt had an installed capacity of 6,220MW of renewable energy production. By 2035, renewable energy supply is expected to increase by 42%, with its energy portfolio expected to consist of wind (14%), solar PV (21.3%), CSP (5.52%), hydropower (2%), and other conventional energy sources (57.33%). Part of Egypt's 2030 goals focus on increasing local content in the renewable energy sector, having achieved 70% local content for wind farms, and 50% for CSP by 2020.[106]

A notable solar project is the Benban Solar Park, established in 2019 in the Western Desert. The 37km^2 project comprises 32 individual plants producing 20-50MW each and generating a total of 1.5GW of power. Various wind projects are being developed under the auspices of the New and Renewable Energy Authority (NREA). The country is exploring feasibility studies for solar-thermal power plants for industrial purposes and using CSP technology for electricity production.

Nigeria has a renewable target of 30% of its energy mix by 2030. The Nigerian government, in collaboration with the German Agency for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit – GIZ), developed the renewable vision platform to enable investment in renewable energy, as well as energy efficiency, electrification, and implementation. The government has also signed an agreement for an electrification implementation roadmap, which will address existing power issues and expand power capacity for the country.[107]

The country is also investing in hydropower, with the largest project being the Chinese-funded Mambilla Power Station which will have the ability to generate 3,050MW once completed. There is also a focus on solar power; working with the World Bank, Nigeria is looking to build 10,000 solar-powered mini-grids in rural areas by 2023.[108]

A notable project completed in 2018 was the Renewable Energy and Energy Efficiency Project (REEEP), which provided more than 260,000 citizens with renewable energy access. The project was conducted by the United States Agency for International Development (USAID) in collaboration with Power Africa. In 2020, the government launched the Solar Power Naija Project, which will provide five million solar-based connections to off-grid communities. The project is still ongoing and aims to target 25 million homes, while creating approximately 250,000 jobs.[109]

Renewable energy and decentralised power generation[110]

Africa largely makes use of electricity supply models that are centralised and highly reliant on national grids. Conventional centralised grids, however, are limited and do not provide access to communities in remote and rural areas (i.e., in areas far from the national grid). Weak transmission systems, ageing infrastructure, and transmission losses put a huge strain on national grids, reducing reliable power access. Power, where it is accessible, comes at high costs, hindering Africa's growth and development.

New innovative solutions in electricity supply models have given rise to the decentralisation of energy. Solutions include virtual power plants, rapid demand response, distributed generation, digital sub-stations, and mini and micro-grids. Decentralised grids aim to integrate, forming a network of grids across multiple locations to address loss reduction, increase the system's flexibility, and ensure reliability. Decentralised power generation options that draw on renewable energy sources help to overcome access issues, as well as the challenges of affordability (cost) and sustainability (clean energy). More widespread and decarbonised electrification of economies in Africa could thus be enabled by decentralised power generation that makes use of renewable energy sources.

Modernising the grid, together with adding decentralised renewable energy generation capacity, will help African economies to attain their emissions targets and universal access goals. This will require increasing the capacity of transmission and distribution systems, as well as digitisation of the grid (e.g., advanced metering), and investing in new technologies like battery energy storage systems that help minimise grid fluctuations. Another requirement is expanding cross-border trade in electricity, both in terms of infrastructure and greater regional harmonisation of, for example, grid codes.[111]

Opportunity 2: Supplying the commodities for a clean energy future

As the world transitions to cleaner energy options, such as wind, solar, green hydrogen, EVs, and related battery storage; Africa can play a significant role in supplying the "critical and strategic minerals" needed for a low-carbon future. These include cobalt, copper, graphite, lithium, nickel, PGMs, rare earth elements (REEs), and vanadium.

On the one hand, investment attractiveness of some African mining jurisdictions supplying these or bearing proven reserves is low; on the other hand, Africa's promise of new world-class discoveries of ore bodies with exceptional quality, grade, and size, may position key African mining jurisdictions in clean energy value chains.[112] For example:

- **PGMs** are used as catalytic agents in hydrogen electrolysis and fuel cell applications. South Africa's Bushveld Complex has the largest reserves of PGMs in the world, with Zimbabwe in third position after Russia. South Africa is also the world's largest producer of platinum and palladium.
- **Vanadium** is an input for long-duration battery energy storage applications, specifically Vanadium Redox Flow Batteries (VRFBs). While South Africa produces only about 8% of global vanadium, it has some of the highest-grade vanadium mineralisation in the world.
- **Cobalt** is a feedstock for batteries, as well as solar and wind storage. The Democratic Republic of the Congo (DRC) is the world's most important producer of cobalt at 70%. It is also the only country where cobalt is mined as a primary commodity.
- **Lithium** is vital for EVs, energy storage, and grid applications. West Africa could be a crucial frontier for lithium ore supply as it has mineral-based lithium resources.
- **Copper** has far-reaching applications in electricity networks, wind and solar technologies, EVs, and battery storage. The DRC and Zambia are two of the top producers of copper. With key supply challenges including declining ore quality and higher production costs in major copper-producing countries in South America, there is an opportunity for African producers.
- **Nickel** has important applications in EVs and battery storage, and hydrogen and geothermal technologies. Produced in South Africa and Zimbabwe as a by-product of PGMs, nickel can be upgraded and made suitable for battery use. Tanzania is home to the largest number of nickel projects.

- **Graphite**'s most important application is in lithium-ion batteries. Flake and vein graphite deposits in Mozambique and Madagascar are most suitable for high-grade graphite for lithium-ion batteries. Projects in these countries are in advanced stages or in production already, with projects also underway in Tanzania.
- **REEs** are mainly used in permanent magnets in the electrical motors of wind turbines and in EV motors, with limited substitutes in most of their applications. Although not rare by definition, the metals are considered scarce as this market is dominated by China. Also, only a handful of the 17 elements in the group are considered critical as demand significantly exceeds available supply. REE projects in Africa are in Tanzania, South Africa, and Namibia.

Demand for these commodities will be driven increasingly by their applications in clean energy systems. For example, the IEA reports that "since 2015, EVs and battery storage have surpassed consumer electronics to become the largest consumers of lithium, together accounting for 30% of demand".[113] Similarly, while 90% of mined vanadium is used as an alloying agent in steel, battery-related applications are expected to intensify vanadium demand.[114]

As a result, future energy systems and a cleaner world will depend on the sustainable extraction and supply of these commodities; and more synergies between the extractives and energy sectors are expected to emerge.

Africa's ability to build up its strategic position to reap this opportunity, extract and supply these commodities responsibly, and position for downstream investment in commodity value chains will require strong top-down leadership, improving the mining investment attractiveness of the continent, continuous development of the necessary industrial and logistics infrastructure, and promoting regional networks, collaboration, and alliances.[115]

Transforming Africa's mining sector: Downstream investment, regional value chains and alternate business models[116]

As Africa positions itself to supply inputs into a clean energy future, it should seize opportunities to diversify and expand into greater value-adding, downstream activities. But it is often not feasible to localise all segments of a value chain in-country because it might not have the scale required to attract significant investments.

Regional integration and building cross-border value chains can offer a pragmatic framework to enhance regional collaboration and attract downstream investment. For example, to achieve the shared benefits of regional collaboration in battery manufacturing, a hub-and-spoke model could be applied where different countries in a region (spokes) provide the key mineral inputs into the country that manufactures the battery (hub). This, however, requires improved regional industrial policy coordination, a good understanding of countries' competitiveness, shared economic benefits, and agreements on specialisation, and the resultant division of labour. It is also essential to identify and address challenges that hinder regional value chain creation, including impediments to intra-regional trade.

The African Continental Free Trade Area (AfCFTA) agreement will play an important role in building regional value chains and markets, as well as reducing transaction costs, attracting investment, and supporting economic diversification and industrialisation.

Similarly, new relationships and alliances are being forged, and alternate business models pursued, to mitigate value-chain complexities, reduce risks, and leverage individual companies' strengths. Some automaker original equipment manufacturers (OEMs) are increasingly looking upstream in the value chain, moving into mining, and refining of scarce metals at scale for their own needs; meanwhile, miners are exploring downstream value-adding initiatives, recycling, lease options, or providing a basket of required battery minerals and metals.

Opportunity 3: Prioritising green manufacturing and climate-resilient industry

A third opportunity is green manufacturing and investing in industry that is climate resilient. One example of green manufacturing is embedding circular economy principles into manufacturing investments from the onset, including in key sub-sectors such as food and beverages; petroleum; chemical products and plastics; wood products; paper and packaging; glass and non-metallic materials; textiles and clothing; iron, steel, and mineral products; and motor vehicles.

This includes reducing, reusing, repairing, refurbishing, remanufacturing, and recycling to eliminate waste and lower material and resource consumption; improving the design of products to reduce resource inputs; extracting maximum value from resources while in use through, for example, Industrial Symbiosis (IS): and ultimately reducing GHG emissions while curbing negative environmental impacts and regenerating natural systems.[117] In addition to energy and waste management, cleaner production also includes issues around water and chemicals use.

The evolving landscape of extended producer responsibility (EPR), which can be mandatory or voluntary, both in African and, importantly, international markets, may contribute to and enable the transition to a more circular economy. Building such principles into processes, while focusing on reducing emissions along the value chain (i.e., scope 3 emissions, which could include organisations partnering with upstream suppliers and downstream customers[122]) will curb carbon dioxide emissions across various industries and sectors.

Building climate-resilient industry and green manufacturing capabilities will be particularly important as demand shifts occur in Africa's major export markets. While manufacturing only accounts for about 12% of GDP value added in SSA, and manufactured exports make up 27% of merchandise exports,[123] Africa is expected to see reduced global competitiveness for its exports – both fossil fuel-based commodities and high-end manufactured goods – that are carbon-intensive or that do not meet the growing demand for "green products" in essential export markets.

For example, the EU (European Union) Green Deal: Carbon Border Adjustment mechanism demonstrates that developing countries will feel increasing pressure to export "green products" to developed markets. Border taxes could see additional costs for products that do not comply.[124] If the continent is not able to transition quickly enough, Africa's already limited competitiveness in global markets could be eroded, the demand for African products adversely impacted, and the significant gains made in industries (such as the automotive industry) wiped out.

Transitioning manufacturing to cleaner production in South Africa

More than a decade ago, South Africa implemented the National Cleaner Production Centre (NCPC) – a programme to help drive the country's transition towards green industry by reducing energy, water, and materials use across different sub-sectors within manufacturing. Through this programme, various resource efficient and cleaner production (RECP) interventions have been put in place.[118]

Between 2010 and 2020, the NCPC's industrial energy efficiency programme, working with almost 300 large companies and close to 200 manufacturing small and medium-sized enterprises (SMEs), saved over 6,500 GWh in energy and R5.275 billion (about US$300 million) in direct costs.[119] Between 2015 and 2020, the NCPC helped 80 companies through IS, diverting over 200,000 tonnes of waste resources from landfills, achieving significant savings and contributing to a healthier biodiversity.[120]

Examples of small co-operatives and businesses in South Africa implementing IS have included collecting and crushing used bottles and turning them into beads, which are used for handmade art and craft products; and building steppingstones and paving bricks from recycled plastics. Larger companies have also played a role in closing the resource loop. For example, waste plastic of one company has served as a key input into picture frame manufacturing of another company.[121]

Creating climate-resilient industry in Africa will require significant levels of foreign and local investment. African economies also need access to existing and proven technology to manufacture more efficiently, and to manufacture different products, which means leapfrogging "old technology". This could, for example, include investments in smarty factory technologies that are able to manage and optimise energy, waste and water consumption.[125]

The continent needs more intra-African trade to leverage production complementarities and hubs of specialisation or competitive advantage. The creation of a continental market under AfCFTA has a key role to play in the shift of production patterns, building cross-border and regional value chains, attracting investment and supporting the development of green industry.

For example, leveraging the AfCFTA agreement together with supplying the commodities for a clean energy future could see the development of downstream beneficiation and processing capacity, such as battery manufacturing capabilities, or supplying intermediate and/or final goods into clean energy supply chains globally. With only an estimated 10-15% of the total value generated in the end-to-end commodity supply chain remaining in Africa, the mining industry and the sustainable extraction of clean energy minerals could be a cornerstone for value addition in African economies.[126]

South Africa's role in VRFB manufacturing

Based in South Africa, Bushveld Minerals is a vertically integrated vanadium producer that mines, processes, and sells vanadium. With vanadium a key component in battery technology, the company also manufactures VRFBs. VRFBs are a potentially key technology in the transition to decarbonisation, providing important benefits such as a long battery lifespan, better safety, and lowest cost per kWh compared to lithium-Ion batteries. In addition, the vanadium used in the batteries can be recycled.[127]

Bushveld Minerals, and by extension, South Africa, is an important player in the vanadium value chain: it is one of only three operating primary vanadium producers, and owns two of the world's four operating primary vanadium processing facilities. A vanadium electrolyte production facility with the capacity to produce 200MWh is due to be completed by the end of 2022. Additionally, an innovative business model of renting the electrolyte to VRFB users is also being developed, which will create a sustainable circular economy and a cost-effective option for end users because vanadium electrolytes are easily recyclable once end-of-life is reached.[128]

Opportunity 4: Adapting agricultural practices and ensuring food security

A large part of Africa's agricultural sector (around 80%) is still made up of subsistence and smallholder farmers and rain-fed crops, making it particularly sensitive to climate change and land degradation. As a result, Africa's already vulnerable food security is facing increased risk.

Weather-sensitive domestic food production often results in a substantial reliance on imports (in many cases up to 85%), and, while these imports can provide something of a buffer against weather shocks, inflation and increasing transportation costs mean higher food import costs.[129] The Covid-19 pandemic also highlighted the need for more localised food systems in Africa and less reliance on imports.

Despite these challenges, there are opportunities to innovate, change farming methods, and build a more climate-resilient food system that restores ecosystems, produces nutritious food, and creates job opportunities for youth and vulnerable groups (e.g., women farmers). To realise this opportunity, Africa will have to make a concerted effort to add value to the agricultural sector, while simultaneously investing in the adaptation of related industries, such as food and agro-processing.

A first step to ensuring Africa's food security through a stable food supply is boosting the resilience of both smallholder and commercial farmers.[130] This means improving their ability and capacity to adapt and respond to unpredictable and extreme weather events. While commercial farmers have already started investing in more resilient infrastructure (e.g., shade for orchards and drip irrigation), smallholder farmers lack the resources to invest in climate-smart approaches.[131]

The smallholder and subsistence sector will require access to finance via social assistance, private investment, micro-finance, and public-private partnerships (PPPs) to adopt sustainable, adaptable models of agriculture. Besides the need for financial investment, smallholder farmers will require access to technology, knowledge transfer, and skills development around adaptation strategies. Digitalisation also plays a crucial role in the sector, as it provides farmers with access to early warning systems and opens new avenues for trade.

Examples of sustainable adaptation strategies in the agriculture and agro-processing sector that will reduce GHG emissions, ensure efficient use of water resources, and strengthen the resilience of rural livelihoods include:

- **Adopting regenerative agricultural practices** with benefits especially for small-scale or rural farmers. These practices include promoting biodiversity, eliminating or decreasing tillage, reducing the use of artificial fertilisers, and using regenerative grazing management for livestock.[132]
- **Planting drought and heat-resistant varieties,** which includes planting varieties and species of crops with increased resistance to heat stress, shocks, and drought.
- **Employing water-efficient practices, technologies, and water-wise irrigation systems,** such as mulching to improve water retention of the soil, modifying irrigation techniques (e.g., the drip irrigation system), and adopting technologies to "harvest" water, conserve soil moisture, and reduce siltation and saltwater intrusion.
- **Adopting intercropping planting practices and integrating crop-livestock-forestry systems,** thereby regenerating soils and increasing the ability to adapt to climate change by not focusing on one kind of production.
- **Restoration and rehabilitation of degraded lands** includes recovering degraded pastures by sustainably planting indigenous grasses and trees, thereby avoiding soil erosion, enhancing biodiversity, and strengthening two vital carbon sinks – soil and grasslands.
- **Planting agroforestry systems** by integrating trees and crops into an intentionally designed system allows farms to be productive, stores more carbon, and ensures income for farmers throughout the seasons.
- **Upgrading and adapting storage technology, transportation infrastructure,** and planning to minimise post-harvest and food losses.[133]
- **Adaptation options in the fishery sector** could include improving fishing infrastructure and technologies, the introduction of new species, aquaculture, as well as better control of overfishing by introducing and enforcing fishing permits.[134]

Sustainability in dairy manufacturing: the case of Woodlands Dairy[135]

Woodlands Dairy is one of the largest manufacturers of UHT milk in South Africa, also producing cheese, butter, cream, custard, milk powder, and yoghurt. In operation since 1995, the company has been setting the benchmark for sustainable activities in the dairy manufacturing industry, resulting in decarbonising both its operations and value chain.

Woodlands Dairy has put measures in place to reduce emissions, energy, and water usage. For example, in 2017, a wastewater treatment plant (biodigester) was commissioned to purify wastewater. This process captures biogas, which is then reused as an on-site power source.

Woodlands Dairy also installed a biomass plant to help offset the use of fossil fuels – biomass continues to be the most-used energy source at the plant. The demand for biomass has increased, resulting in the installation of another biomass plant, to be completed by the end of November 2022.

New solar PV installations were commissioned during 2021 to reduce emissions from and reliance on coal-produced electricity. Tracking devices were also installed in Woodlands Dairy's tanker trucks and sales vehicles to monitor driving habits and vehicle performance. This has helped ensure optimal usage of fuel and vehicles.

These interventions have resulted in several positive environmental and economic impacts. For example, Woodlands Diary's total carbon footprint per 1,000 litres of milk has reduced by 68.2% since 2012. Diesel usage in fleet vehicles has reduced by almost 30% since 2017. Financial and economic benefits have thus included reducing operational costs, offsetting carbon tax emissions and liability, and providing energy security.

Woodlands Dairy also plays a significant role in driving sustainable dairy farming in South Africa, and across its value chain. In 2014 it implemented the Woodlands Dairy Sustainability Project, in partnership with an independent agricultural sustainability company.

The project aims to help producers to measure and track various sustainability indicators on their farms, including soil health, water-use efficiency (irrigation and product water-use efficiencies), farm carbon footprint, and nutrient management (with specific focus on nutrient inputs and outputs), and energy utilisation on farms. Farmers can use this information to improve their farming activities, become more sustainable, and track future performance. Farm-level interventions also include regenerative agriculture practices, soil carbon sequestration, and water monitoring and saving.

Opportunity 5: Harnessing Africa's natural capital for adaptation and mitigation

Africa's abundance of natural capital, in the form of virgin forests and favourable growing conditions, offers a significant opportunity for the continent to monetise bio-diversity assets to support the world's growing demand for carbon offsets. It also presents an opportunity to contribute to socio-economic development in local communities, boost tourism, and help to fund countries' energy transition.

One such opportunity is the preservation of carbon sinks. Given the amount of carbon they absorb, ecosystems like forests and peatlands are important carbon sinks. The **Congo Basin rainforest**, for example, is the second-largest rainforest in the world and absorbs 4% of global carbon dioxide emissions every year, representing 1.1 billion tonnes of carbon dioxide. This offsets the African continent's annual emissions, making conservation of these biomes critically important.[136]

Linked to this is the opportunity to create new carbon sinks. Around 45% of the African continent is impacted by desertification[137] and it is therefore crucial to fight land degradation and further mitigate the effects of climate change.

The **Great Green Wall** initiative is an ambitious megaproject led by the African Union Commission, aiming to restore over 100 million hectares of degraded land by growing 8,000km of plants and trees across the entire width of Africa.[138] By 2030 it is hoped that the Great Green Wall will sequester 250 million tonnes of carbon and create 10 million jobs in the rural areas of the Sahel. The project was launched a decade ago and is already starting to benefit people and the environment across the Sahel region, improving food security, jobs, and stability. Once completed, it could cover an area three times the size of the Great Barrier Reef.[139]

Carbon offsets provide a means to channel much-needed finance to nature conservation and sustainable development, while reducing climate emissions. Countries like South Africa are already forging ahead with a framework for a carbon offset programme. South Africa's framework aims at building in carbon tax allowances for polluting companies if they finance projects that would support the country in meeting its international climate commitments through mitigation.[140]

In theory, offsets provide another step towards mitigating global emissions; however, if managed poorly, carbon offsets allow heavy emitters to avoid cutting emissions while still being able to claim they have achieved (or are at least advancing towards) carbon neutrality.[141] Detractors argue that poor-quality and non-verified carbon offsets can be used as greenwashing tactics for companies: because there is no single globalised carbon offset standard,[142] questions around the additionality, permanence, and double accounting of offset projects have brought the offset issue under even greater scrutiny.[143]

Carbon offsets can become more credible by meeting key criteria and project standards, undergoing third-party verification, and providing transparent reporting.[144] Remote sensing and geospatial datasets can also be used to independently evaluate the effectiveness of forest carbon offset projects by evaluating carbon trends, carbon sequestration, and harvesting rates.[145] These datasets can be linked to distributed ledger technologies, such as blockchain, to execute on smart contracts containing all the prerequisite conditions that need to be met before issuing a carbon offset. Use of this technology could help restore trust in carbon offset projects.

Tourism impacts

As explored in the previous chapter, climate change and the increase in extreme weather events will dramatically impact the fauna and flora of national parks and seaside towns, reducing destinations' attractiveness and negatively affecting the tourism sector. It is therefore critical for tourism-dependent African countries to focus efforts on adaptation strategies and conservation efforts to reduce the impact of climate-driven degradation and disruption to ecotourism, cultural and natural heritage tourism sites.

According to the World Wildlife Fund, only 17% of the world's gorilla population lives in protected regions, and vast areas of gorilla forest has already been lost.[146] Carbon offsets could hold the key to protecting these carbon sequestering habitats, and importantly, the future of gorillas. Africa stands a substantially better chance of preserving its natural capital, by combining gorilla ecotourism with carbon offset programmes across these equatorial countries.

Opportunity 6: City planning and infrastructure upgrades

Many cities around the world and across the African continent have been focusing for some years on mitigation strategies like retrofitting buildings to make them more energy efficient, adopting renewable energy sources, and introducing more sustainable transport systems, such as bus rapid transit (BRT).

African cities will however need to adapt infrastructure and city planning to a warming climate and more volatile weather events. Faced with an ever-increasing infrastructure gap, an important factor is the care and maintenance of existing infrastructure. An activity as simple as cleaning refuse and waste from blocked stormwater drainage systems or water reticulation systems to prevent flooding can ensure this infrastructure functions as planned.

Also, adapting roads to deal with the effects of climate change stressors during road maintenance and expansion can decrease climate event damages at a relatively low cost; for example, roads can be constructed using asphalt mix and permeable road surfaces, as these are better suited to tolerating high temperatures and heavy rainfall.[147]

Improving Africa's water infrastructure and the management of water resources will reduce the climate vulnerability of people across the continent. Taking advantage of opportunities in green and grey water infrastructure and using nature-based solutions, such as restoring wetlands, removing invasive species, and introducing buffer zones and retention ponds, not only has the benefit of reducing operating and construction costs, but also results in improved quality and security of water, and enhanced climate resilience and flood protection.[148]

Governments and organisations need to work with climate scientists and design engineers in "climate-proofing" physical infrastructure. This includes adopting climate change scenarios into urban planning and infrastructure design to understand high-risk areas and how environmental impacts may change over time; developing technical guidelines on the integration of climate change into the planning and design of infrastructure in climate-sensitive sectors; building infrastructure to "protect" cities (like sea walls in coastal towns); and embracing nature-based solutions in infrastructure projects.[149] This could see a return of US$4 for every US$1 invested in infrastructure that prioritises future-focused resilience, compared to a return of US$1.5 for every US$1 invested in business-as-usual infrastructure.[150]

Opportunity 7: Adaptation strategies for health and safety

Countries, cities, businesses, and communities are feeling the impact of climate change. The increasing frequency and severity of acute weather events continue to impact the health and safety of Africa's people, including unacceptable loss of life, disruption to public services and operations, as well as large financial burdens in rebuilding infrastructure.

One opportunity to adapt the health sector to the impacts of climate change is by reinforcing public health systems and providing more healthcare facilities (fixed and mobile) to address the needs of communities severely impacted by climate change.[151] The next step is investing in adaptation strategies and programmes related to health and safety, including protecting physical health infrastructure from the impact of extreme weather events, considering the health implications of climate change on patients, and embracing proactive innovations (such as digital tools) to advance healthcare equity for populations across the continent.[152]

Climate-related digital solutions (e.g., data mapping and predictive analytics) are vital for awareness and tracking to maximise preparedness and resilience to climate-related health risks and reduce the impact of physical weather events. For example, a mere 24 hours' warning of an impending storm or heatwave can reduce damages by up to 30%.[153]

Unfortunately, the rate of implementation of Multi-Hazard Early Warning Systems is lower in Africa than in other parts of the world. At present, only four African countries provide end-to-end drought forecasting or warning services[154] and the UN's Office for Disaster Risk Reduction indicates that 60% of people across Africa are still not covered by early warning systems.[155]

Investment is needed in the collection of climate and meteorological data, biophysical monitoring, and early warning, preparedness, and response mechanisms. These strategies will support and prepare populations for the inevitable impacts of climate change events,[156] save lives and livelihoods, and create more resilient economies.[157]


Change begins
with what
we believe is
possible

Key considerations to achieve Africa's transition

As African countries position for climate-led opportunities, they will have to navigate and align several challenges inherent to the transition towards a lower-carbon future. At the same time, Africa needs to enable economic growth, create jobs for a rapidly growing working-age and urbanising population, and address high levels of abject poverty and inequality through a just transition.

This requires that the right policy frameworks are in place, funding mechanisms to support Africa's energy transition opportunities are effectively mobilised, secured and deployed, the transition underway in economies is just and fair, and collaboration and the right partnerships are pursued for creating shared prosperity.

Consideration 1: Strengthening Africa's climate policy frameworks

Over the last three decades, there has been a sharp increase in climate-related policy and regulatory actions, specifically a tenfold rise in the number of laws and policies passed.[158] The Paris Agreement, adopted at the Conference of the Parties (COP21) in 2015, is one of the most significant global climate agreements to date and has arguably helped accelerate much of the policy activity.[159]

Climate-related policies across African countries vary in their focus and depth. For example, **Morocco** has made its energy transition a national priority and has put some of the more ambitious plans and policies in place to reduce its national emissions.[160] Notable policies include the 2030 National Climate Plan of 2019, the Exemplary Administration Pact, and the National Strategy for Sustainable Development 2030. As shown, the country's National Energy Strategy calls for 52% of electricity production to come from renewable sources by 2030, increasing to 80% by 2050.[161]

Much of the focus across the continent has been on mitigation policies. **Nigeria,** for example, needs to change its energy profile to provide the electricity needed for socio-economic development, passing its Climate Change Act in November 2021. The Act has set the West African country on a course to reduce GHG emissions and achieve sustainable growth.[162] The country's Energy Transition Plan was released in August 2022 and developed to serve as the pathway towards achieving the 2060 net-zero target. The plan includes solar expansion and recognises the role natural gas would play in Nigeria's short-term baseload energy capacity needs.[163] The plan also highlights the need for a just and equitable energy transition.

The International Panel on Climate Change (IPCC) report emphasises the need globally for stronger climate policies which better integrate and mainstream adaptation to climate change into development planning.[164] While mitigation policies are critical for supporting a transition to renewable energies, countries like **Egypt** are also looking at implementing adaptation policies to help them build resilience, promote their green economy, and catalyse private-sector investment.[165]

South Africa has, at times, led the way in promulgating green policies aimed at both mitigation and adaptation.[166] These include the National Climate Change Response Policy White Paper, the Climate Change Bill, the National Development Plan, the National Energy Efficiency Strategy, and the National Climate Change Adaptation Strategy. The most recent is the Just Energy Transition Framework, which defines the principles and policy areas required to achieve a just transition. The country has faced political challenges in recent years, resulting in a lack of implementation of many of the impressive climate programmes, frameworks, and policies.

Call to action:

While most African states have ratified their NDCs, considering the long-term implications of these for their national development goals and plans is important. However, there are instances where NDCs do not align with national needs.[167] Measures and costs associated with the specific NDC pathways need to be integrated into national development plans and climate change policies to reduce misalignment and drive cohesion.

Overall, African countries should focus their macro and micro-level efforts on solid mitigation and adaptation policies, with strong governance and a reliable and expanding energy mix to ensure an investor-friendly environment.[168] Policies should be designed to reinforce principles of a just transition that fosters generational prosperity and our natural biomes.

Furthermore, they need to take deliberate steps to implement these plans and move towards building more resilient economies and communities, while also reducing emissions as part of targets set. This implies the need to understand developments in global policy trends and explore regional and multilateral collaborations to "transition together", avoiding being left behind as the global economy restructures and transforms.

Without the necessary international resources and financial support, as well as strong leadership taking deliberate steps to implement policies, African countries run the risk of not achieving set climate targets under corresponding policy frameworks.[169]

Consideration 2: Mobilising and deploying adequate climate funding

A notable challenge to Africa's clean energy transition is access to adequate funding on the right terms. Mobilising domestic funding is difficult, given other pressing socio-economic issues and competing priorities, as African countries seek to balance developmental goals with reducing (or at least limiting increases in) GHG emissions.[170] It is implausible to expect any African country to finance the entire cost of its NDC using national government resources alone.

As such, there is significant dependency on the developed world to honour prior COP commitments and on development partners to help fund the decarbonisation of the developing world. However, the current levels of climate finance in Africa fall far short of what was previously committed and what is needed to shift to greener technologies and adapt to the effects of climate change.

According to a recent report by the Climate Policy Initiative, it will cost around US$2.8 trillion between 2020 and 2030 (approximately US$250 billion per year) to implement Africa's NDCs and achieve the goals set out in the Paris Agreement. African governments have thus far committed around 10% towards the required cost, which means US$2.5 trillion will need to come from international public sources, as well as domestic and international private investors.[171] The report further indicates that the continent is only currently receiving around 12% of the required funds.[172]

Of the US$250 billion estimated to meet annual climate finance needs, mitigation makes up 66%, while adaptation accounts for only 24% (with the remaining 10% being unspecified). Given Africa's vulnerability to the impacts of climate change, there should be a stronger emphasis on finance for adaptation measures.

As noted previously, the growing frequency and volatility of climate-related disasters is costing African countries about US$7 billion to US$15 billion a year,[173] and the World Meteorological Organization suggests that without the requisite finance, and under a 2°C warming scenario, the impact of extreme weather events will likely escalate to US$50 billion annually by 2050.[174] The IPCC also points to a considerable gap, compared to other regions, in financing for climate adaptation research and climate resilience projects for the continent.[175]

The Africa Adaptation Acceleration Programme (AAAP) was recently formed by the GCA and the AfDB. Over the next five years, the AAAP aims to mobilise US$25 billion to help accelerate and scale climate adaptation action across the continent.[176] At a national level, revenue from carbon taxes could also be used towards country-specific adaptation projects rather than being used for other fiscal funding programmes.

Several other funding mechanisms have been established to help African countries adapt to the effects of climate change. One of the more notable, announced at COP26, is an agreement between **South Africa** and the US, EU, Germany, France and the United Kingdom (UK) to unlock US$8.5 billion of climate funding for South Africa to transition away from its heavy dependence on coal.[177] South Africa intends to utilise the agreed funding to re-purpose older coal-fired power plants for renewable energy, and to develop the EV industry and green hydrogen projects.

Similarly, the EU recently pledged US$1.4 billion in climate funding to **Nigeria** to support agriculture, climate, and digital projects, and to help the continent's largest oil producer "achieve low carbon, resource efficient, and climate-resilient development, creating jobs for youth and economic growth."[178]

While this is a small percentage of the finance required to fund the overall transition, these agreements nonetheless signal greater collaboration between developed and emerging countries on energy transition goals.

Funding, however, continues to be hindered by the perception of risk, governance issues, underdeveloped green finance markets, rising global borrowing costs, and local technical and policy constraints.[179] Funding can also be stalled due to complexities around the types of finance and the terms and conditions attached to funds.[180]

Call to action:

The way forward requires a combination of international, subnational, and private-sector funding sources for climate mitigation and adaptation projects.[181] It requires innovative and catalytic financing mechanisms including the strategic deployment of blended finance to help mobilise much-needed private finance across the continent.[182] Funding provided by, for example, development finance institutions (DFIs) can help de-risk projects and crowd-in private resources and funding. Public green funding may be strategically positioned as viability gap funding for projects delivered via PPP arrangements, and in turn attract private funding such as private equity (PE).[183]

Green bonds have been a feasible financing instrument for African green projects.[184] Governments and institutes such as the AfDB and the Development Bank of Southern Africa (DBSA) have launched green bond facilities for climate change mitigation and adaptation projects in Africa.[185] PE firms with an increased capacity in green finance can further pioneer private sector-led green bonds or funding schemes.

Notably, developments such as South Africa publishing its first Green Finance Taxonomy earlier in 2022 will help unlock access to financing instruments such as green bonds and other sustainable finance and investment for projects classified as green, social, and sustainable assets, in line with international best practice.[186] Egypt has also issued the region's first sovereign green bond to finance projects in clean transportation and sustainable water management.[187]

Innovative financing mechanisms and the strategic deployment of public capital will help to mobilise much-needed private investment across the continent. This will need to be coupled with strong political leadership, regulatory and institutional arrangements, improved partnerships between the public and private sector for funding and delivery, and attracting capital into new markets, technologies, and businesses while creating new opportunities for job creation.

Consideration 3: Ensuring a just and fair transition

The global need to act now and transition to a clean energy future is clear. If managed well, the transition could be a global net job creator.[188] However, if managed poorly, the transition to a cleaner means of production, especially the move away from coal and other fossil fuels, could see African economies at a competitive disadvantage, stalling their economic growth and development, and risking their part in a diversified green economy. This would have serious socio-economic consequences, such as increasing poverty and inequality, threatening social stability and organisations' social licence to operate, and disrupting African economies.[189]

The pace of decarbonisation required in some economies could easily eliminate livelihoods and incomes that are currently dependent on the very sectors that need to decarbonise. About 50% of SSA's export value came from fossil fuels in 2021. Meanwhile, the fossil fuel production sector employs an estimated 2.1 million people.[190] Knock-on effects of job losses and transformations will be felt across many other industries, as multiplier effects play out and as climate change alters economic structures.[191] These structural changes are occurring in tandem with those introduced by the Fourth Industrial Revolution (4IR). The latter, and specifically what is defined as work, the way work is done, and where work is done, is already disrupting the workforce, industries, and economies.[192]

While definitions of a just transition differ, the concept is "both a principle and process that aims to address the fact that climate-driven economic change may disrupt, transform, or eliminate entire industries, workforces and professions. Left unchecked, it could create unjust and enduring economic and social effects."[193] Embracing a just transition creates opportunities to address historic inequities and existing socio-economic challenges.

With a growing focus on ensuring a just transition across African countries, **South Africa** has been an early advocate of the approach and was the only country in 2015 to make reference to the just transition in its initial NDCs.[194] It has subsequently elevated the topic to the level of the Presidential Climate Commission and developed and adopted a national Just Transition Framework to start dealing with practical issues related to impacted sectors, jobs, skills, social support, and governance, as the country transitions to a low-emissions and climate-resilient economy.[195]

The necessity of a just transition policy is illustrated via changes to South Africa's coal industry. As the coal industry is the largest contributor to national emissions (about 80%), coal-fired power will need to be phased out in the next two decades to honour the country's Paris Agreement commitment.[196]

However, reducing GHG emissions by phasing out coal will have a direct and adverse impact on the livelihoods and incomes of workers in the industry, and indirect and induced impacts on sectors up and down the value chain.

In 2021, about 93,000 people were directly employed in South Africa's coal sector.[197] A further two to three jobs are dependent (indirect or induced workforce) on every direct job. This could mean that up to 400,000 jobs are at risk linked to this sector alone.[198] With South Africa's excessively high unemployment rate of about 34%[199] and unacceptably high levels of poverty and inequality, managing a transition that is just for workers and sectors in the coal value chain is vital.

Research has shown that the construction, operation, and maintenance of solar PV and wind-generation projects could create more than 800,000 jobs (direct, and up and down the value chain) over the 2020-30 period – double the coal-related jobs at risk.[200] However, while there are possible net job gains, one job in the coal sector cannot simply be transferred to one job in the renewables sector. Furthermore, some of the estimated opportunities are in the construction phase of renewable projects and are thus temporary.

Risks may also arise from policy and regulatory stances taken by governments in third markets and the purchasing decisions of consumers in those markets in line with economies' decarbonisation trends. For example, the European automotive industry is a prime source of export demand for **Morocco** and **South Africa's** respective automotive manufacturing and assembly sectors, making up more than three-quarters of auto exports for both countries.[201] The automotive industry is an important contributor to GDP, employment, and export earnings, while the sector directly employs about 220,000 people in Morocco[202] and about 110,000 people in South Africa.[203] The regulatory move from ICE to EVs in Europe poses a risk to these countries' automotive sectors, with the above jobs (and a further two to three jobs in support industries for each job in the sector) at risk.

In **Nigeria,** the oil sector makes up about 9% of GDP, contributes over 90% to export earnings, and is an important source of revenue for the fiscus.[204] The flaring of gas during commercial oil production has been a challenge for decades, contributing to the country's carbon emissions. As part of its energy transition plans, Nigeria is looking to implement a transition that makes use of its vast gas resources.[205] Due to its capital-intensive nature, the O&G sector is estimated to employ only a small share of the workforce, yet a wide range of sectors offer services to the industry.[206] With a 33% unemployment rate, Nigeria has embarked on an initiative that will design and implement just transition policies, strengthen social dialogue mechanisms for the foundation of a just transition, and pilot these policies for job creation and skills development in green sectors.[207] Some estimate that Nigeria could create 840,000 jobs as part of its green and sustainable energy transition.[208]

Call to action:

The transition to a clean energy future will transform the way people, communities, and businesses operate. As a result, the concept of a just transition will need to be increasingly integrated into economic policies, transition frameworks, and discussions. This process requires dedicated focus, structured programmes, and innovative approaches to create new jobs for disrupted workers. It also requires ongoing dialogue between employees, communities, governments, investors, suppliers, and customers to rebuild economies with communities and explore viable migration options.

A just transition requires a plan of action and specific strategies, both at the national and organisational level. It requires balancing early policy decisions and funding mechanisms with structured programmes for reskilling, upskilling, and acquiring new skills, as well as for industry investment and social support to ensure that no sector or community is left behind.

In the case of the automotive sector, for example, investment in technology, shaping the incentives landscape to attract OEM investment in EVs and related components (such as battery manufacturing), as well as reskilling and retooling the workforce will be important parts of a just transition.

Governments and businesses should take their cues from civil society and affected communities. And while policymakers will have the role of enabling and setting the path forward, businesses will have an important role to play, with a fundamental shift in business models and strategic decision-making that creates the systems change for a low-carbon future.[209]

Consideration 4: Pursuing a collaborative approach to shared prosperity

Amid global inflation, soaring interest rates, and growing debt burdens, many developing countries are finding it increasingly challenging to thrive economically, let alone tackle the climate change agenda with the level of urgency it requires. It also stands to reason that no single government, company, or non-governmental organisation (NGO) can tackle the enormity of the situation in isolation. Now more than ever, there is a need to urgently scale up international cooperation to achieve the UN's 17th Sustainable Development Goal to revitalise the Global Partnership for Sustainable Development.[210]

The urgency of cooperation is driving global partnerships across sectors. The UN's COP summits have stimulated dialogue, transparency, and cross-border collaboration between countries. Similarly, global initiatives like the RE100 are bringing together major companies in a commitment to becoming "100% renewable" and working with other industry-leading companies, non-profit organisations, and coalitions to develop innovative solutions and spur on climate action worldwide.[211] As companies aim for net zero, many are assessing the emissions generated by their partners along the value chain and considering how they can collaborate and innovate to address this challenge.

Governments have fiscal and capacity constraints which will not only necessitate stronger collaboration between countries, but also require innovative PPPs to address the myriad challenges of climate change. While there have been mixed experiences of PPPs across the continent, well-constructed PPPs reduce project risk and can deliver long-term, sustainable outcomes.[212]

A more holistic system-of-systems approach should also be considered to help unlock opportunities and achieve the ambitions set out in the transition to a low-carbon economy. The system-of-systems approach recognises that existing industries will be reconstituted as a series of complex, interconnected, emissions-free systems — energy, mobility, industry and manufacturing, agriculture and land use, and negative emissions.[213] Government, financial services, and the technology sector should play a catalytic role to underpin and enable the emergence of those systems, while demand-side forces (such as stakeholder capitalism and conscious consumption) will help drive momentum.

Call to action:

To transition to a low-carbon economy, a coordinated transformation of multiple, interdependent systems is required. For example, a fleet of EVs produced in South Africa would only be effective in supporting the country's emissions reduction ambitions if they can charge using clean, renewable electricity (rather than coal-fired power) and manufactured with circular, low-waste processes using sustainably extracted raw materials.

Transparent recording and reporting of sustainable business data across networks of suppliers and industry partners can provide the potential for decarbonisation at scale.[214] By adopting a more comprehensive view of the entire emerging low-carbon economy, organisations and governments across the African continent can work more collaboratively to remove barriers, reach critical tipping points, and implement innovative and impactful adaptation and mitigation climate solutions.[215]

Tackling the challenges of climate change and advancing towards a green and resilient transition will require inclusive collective will and partnerships, as well as extraordinary levels of collaboration and coordination across emerging systems and between governments, private sector, civil society, philanthropic organisations, research centres, and communities alike.


Time is of the
essence

Concluding remarks

The cost of global inaction in the face of climate change is significant, particularly for Africa, and the need for action has moved from being a future challenge to an integral part of daily life.

For the world to transition to a low-carbon future, the right choices must be made now to chart the pathway to decarbonisation in different regions and economies. These decisions will determine the future for generations to come.

It is likely that no global region's pathway to a low-carbon future will be the same, in terms of the nature and timing of the transition. Just as much, no African country's pathway is likely to be the same, as economies start from different points of departure. Deloitte's global research has shown that if action is taken now, all regions could be better off in the decades to come.[216]

Undoubtedly, the transition promises to be complex, with many moving parts. All stakeholders will have to collaborate to build the right foundational frameworks, policies, and momentum that will drive change. Furthermore, funding and investments that prioritise low-emissions and climate-resilient industries must be deployed and mobilised. Commitment to this transition will create economies and societies that create jobs, and are greener and grow more quickly than their carbon-intensive alternatives.

As African countries balance the adaptation and mitigation strategies for a low-carbon future with urgent development priorities, a just transition will be critical to address challenges such as food insecurity, unemployment, poverty, inequality, and social stability, while helping economies to diversify and structurally transform.

Unfortunately, Africa's resource wealth to date has not been fully utilised for economic transformation and industrialisation. The transition to a cleaner energy future presents Africa with an unmissable opportunity: to use its natural resources, including metals and minerals, agricultural resources, renewable resources, and bio-diversity assets as a springboard to beneficiate, grow, and diversify, while upskilling a growing workforce, increasing electrification, attracting new technologies and investments, and setting the foundation for climate-resilient industrialisation.

Time is of the essence. Policy and investment decisions made in the next few years will shape the future climate and economy. This narrow window makes it even more important for Africa to take advantage of the opportunities that will help transform and transition the continent in an environmentally and socially sustainable way.

Methodology

This thought piece was inspired by Deloitte's global *Turning Point series* of reports. The report series is underpinned by a modelling framework that involves significant research on climate and economic impacts across the modelled regions, namely Asia Pacific, Europe, and the Americas. This research was used as inputs for Deloitte's Regional Climate Integrated Assessment Computable General Equilibrium Model (D.Climate).

While the African continent was not explicitly modelled as part of this analysis, out-of-model calculations, making use of long-term economic projections for each region and imposing the damage impacts of a similarly modelled region, provide an approximation of the possible scenario outcome for Africa (see *The context: The costs of climate inaction in Africa).*

A combination of desktop research, including bottom-up country-level research, guided by the in-house insights of Deloitte subject matter experts and interviews with decision makers from eleven organisations across key industries and regions (conducted over the period August-September 2022), helped to identify and verify key themes, opportunities and considerations for this thought piece.

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