Forging Sustainable India-Africa Partnership through Green Transition

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Executive Summary

A transitioning and diverse continent with huge trade and investment potential, Africa has made remarkable progress in a range of economic and development areas over the past two decades. With an estimated collective GDP of US$ 2.98 trillion in 2022, Africa is expected to cross US$ 3 trillion GDP by 2023. Well-endowed with abundant natural resources and diverse ecosystems, Africa offers a great market potential in the coming years. The continent accounts for about 30% of all global mineral reserves – including 42% of gold, 60% of cobalt, 80-90% of reserves of precious metals like chromium and platinum and 60% of the arable land. The continent contributes substantially to the global annual production of six key minerals - 80% of platinum, 77% of cobalt, 51% of manganese, 46% of diamonds, 39% of chromium, and 22% of gold. This is in addition to around 7% of global natural gas and 12% of world's oil reserves. Africa also has the most important of all resources, human capital, with the continent accounting for 16% of the global population; 60% of whom are under the age of 25 years. With about 75% of African countries having access to the sea, the continent also offers massive potential for a blue economy.

Africa's average real gross domestic product (GDP) growth is estimated to have slowed to 3.8% in 2022 from 4.9% in 2021. Africa's estimated growth of 3.8% in 2022 is, however, stronger than the 3% in 2019 (before the COVID-19 pandemic) and the 3.3% average during 2014–18 (the end of the commodity super cycle). Africa's GDP is dominated by its commodity dependent regions, largest being North Africa, followed by West Africa and Southern Africa. Nigeria, Egypt, and South Africa are the largest economies in Africa, accounting for 45.7% of the region's GDP in 2022. The fastest growing economies in Africa in 2022 were Niger, Cabo Verde, Seychelles, Mauritius, Rwanda, Côte d'Ivoire, DR Congo and Egypt, registering growth rates above or close to 7%, respectively.

Inflation remains one of the most pressing challenges of Africa, marked by a slow recovery from the pandemic, rising food and energy prices, and high levels of public debt. The average annual consumer price inflation of 14.3% recorded in Africa in 2022 was much higher than the world average (8.7%), emerging markets and developing countries' average (9.8%) and advanced economies' average (7.3%). Around 20 African countries witnessed double digit inflation in 2022, with 7 countries having inflation above 20%.

Increasing public debt, reaching over 60% of GDP and the heavy burden of debt servicing have been a cause of concern for many African countries. Debt trajectories remained different for countries, mostly depending on the economic structure of concerned countries. Bilateral creditors have offered pandemic-related debt relief and relatively low interest rates to support these economies, however, debt remains unsustainable in several African countries.

Trade and Investment

Africa's trade dynamism is being changed rapidly in an evolving global trade policy landscape, shaped both by geopolitical conditions and climate imperatives. Driven by increased global commodity prices, Africa's trade has recovered to US$ 1.2 trillion in 2021 from US$ 896.3 billion in 2020. Trade peaked at US$ 1.3 trillion in 2022, increasing by 9.7% on a y-o-y basis. Africa's share in global trade also marginally increased to 2.63% in 2022 from 2.61% in 2021. Both exports and imports have recovered following the pandemic, reflecting growth in global commodity prices. Africa's aggregate output remains highly correlated to the commodity cycle, with close to 80% of the countries being commodity dependent. Africa's total merchandise exports increased by 12.2% from US$ 556.2 billion in 2021 to be at US$ 624.1 billion in 2022. Imports also increased by 7.5% to US$ 654.6 billion in 2022 as compared to US$ 609 billion in the previous year. Accordingly, Africa's share in global exports increased to 2.6% in 2022, as compared to 2.5% in 2021, though moderated from 3.2% in 2012. The share of Africa in global imports remained stable at 2.7% in 2022 as compared to 2021, though lower compared to 3% in 2012. Supported by large growth in exports compared to imports, the continent's trade deficit has narrowed to US$ 30.5 billion in 2022, from US$ 52.8 billion in the previous year.

Intra-regional trade in Africa remains low compared to other major regions. Intra-African merchandise exports, which accounted for 16.7% of total African exports in 2012 declined to 15.4% in 2021 and further to 12.5% in 2022. Intra-African imports also moderated from 15.9% of total African imports in 2012 to 12.1% in 2021 and 11.7% in 2022. The overall patterns of Africa's exports to the rest of the world are dominated by commodities while being more diversified and more processed within the region. The AfCFTA is expected to promote export diversification in the continent by facilitating shift in production patterns from dependency on extractives and commodities.

Mineral fuels, oils and its products continue to be the largest export item from Africa, accounting for as much as 44.9% of Africa's total exports in 2022, reflecting the significant share of petroleum crude exports from Africa. Other major items of export from Africa during the same year include pearls and precious stones, ores and slag, copper and its articles, vehicles other than railway and tramway, and electrical equipment. Africa's import basket is relatively diversified compared to its exports. Minerals fuels, mainly dominated by petroleum oils, not crude (19.3% of Africa's imports) and machinery and mechanical appliances (9.4% of Africa's imports) were the two largest import items in 2022, followed by electrical machinery and equipment, vehicles other than railway and tramway, cereals, plastics and its articles, iron and steel and pharmaceutical products.

In 2022, Africa was a net importer of machinery and equipment (with a deficit of US$ 52.3 billion), electrical machinery and equipment (US$ 29.3 billion), cereals (US$ 28.4 billion), vehicles (US$ 21.2 billion), plastics and articles (US$ 20.9 billion) and pharmaceutical products (US$ 15.8 billion).

South Africa, being the major industrialised economy, is the largest exporter among African economies, followed by Algeria, Nigeria, and Egypt. The top four economies in the continent were also the top four merchandise exporters in 2022, accounting for 48% of Africa's exports. The top five importers in the continent, South Africa, Egypt, Morocco, Nigeria, and Algeria accounted for around 55% of imports by Africa during 2022.

China was the major export destination for Africa, accounting for 14.5% of Africa's total exports in 2022, increasing its share from 12.9% in 2021. Other major destinations for Africa's exports in 2022 include Italy (8.7% of Africa's total exports), Spain (6.6%), France (6.1%) and the US (5.7%). India was the 8th largest export market for Africa in 2022, accounting for 3.5% of Africa's total exports (falling from 6% in 2021). During

2017-2021, India was the second largest export destination of Africa. However, India's position has fallen in 2022 owing to India's increased crude oil imports from alternate regions/countries.

China is the leading supplier to Africa, accounting for as much as 20.1% of Africa's total imports in 2022. Other major sources for Africa's imports in 2022 include the US (5.2% of Africa's total imports), France (4.9%), India (4.4%) and South Africa (4.1%). India was the second largest import source for Africa in 2021, accounting for 5.8% of Africa's global imports.

Foreign Direct Investment (FDI) flows to Africa have reached record levels in 2021, increasing by 113.1% to US$ 83 billion from US$ 39 billion in 2020, accounting for 5.2% of global FDI. The share of Africa in the FDI inflows of developing economies increased from 6.0% in 2020 to 9.9% in 2021. FDI in Africa is mainly concentrated in a few countries, with South Africa, Egypt, Mozambique and Nigeria being the top recipients in 2021. FDI to Africa has been increasingly diversifying into manufacturing and services sectors, in addition to extractive sectors.

Green Trade in Africa

Environmental goods exports of a country is considered as a proxy for its green trade. According to the International Monetary Fund (IMF), environmental goods include both goods connected to environmental protection, such as goods related to pollution management and resource management and adapted goods, which are goods that have been specifically modified to be more environmentally friendly or cleaner. Green exports allow countries to foster economic, social and environmental sustainability at the same time.

Africa's exports of environmental goods stood at US$ 12.4 billion in 2021, increasing from US$ 8.3 billion in 2020 and US$ 8.9 billion in 2019. In 2021, share of environmental goods in Africa's total exports was 2.2%, increasing from 2.1% in 2020 and 1.9% in 2019. Togo was the only African country, having environmental goods exports as share of its total exports higher than the world average of 7.3% in 2020.

Africa's imports of environmental goods stood at US$ 37.8 billion in 2021, increasing from US$ 33.8 billion in 2020 and US$ 36.9 billion in 2019. Environmental goods accounted for 6.2% of Africa's total imports in 2021, declining from 6.7% in 2020. In case of environmental goods imports, Nigeria leads among African countries, with 12.6% share of environmental goods in its total imports in 2020, followed by Zimbabwe and Mozambique. Environmental goods imports share of Nigeria and Zimbabwe were above world average of 7.9% in 2020.

Trends in India-Africa Merchandise Trade

India's total trade with Africa grew from US$ 70.3 billion in 2012-13 to US$ 97.9 billion in 2022-23, reaching the highest ever level witnessed by both regions. In line with the global trends, India's trade with Africa moderated in 2020-21, however, trade rebounded in 2021-22, growing by 60.1% and further by 9.3% in 2022-23. India's exports to Africa in 2022-23 were US$ 51.2 billion as compared to US$ 40.3 billion in 2021-22 (y-o-y growth of 27.3%) and US$ 29.2 billion in 2012-13. India's imports were to the tune of US$ 46.7 billion in 2022-23, as compared to US$ 49.3 billion in 2021-22 (y-o-y decline of 5.4%) and US$ 41.1 billion in 2012-13. The fall in imports was mainly due to India increasingly importing crude oil from alternate markets during the year.

While India's exports to Africa accounted for 11.4% share in India's total exports in 2022-23 (increasing from 9.5% in 2021-22), India's imports from Africa accounted for 6.5% share in India's total imports (decreasing from 8% in 2021-22). India was having a persistent negative trade balance with Africa, however, due to fall in imports, India's trade deficit with Africa turned into a trade surplus in 2022-23. India's trade surplus with the region stood at US$ 4.6 billion in 2022-23, as compared to a deficit of US$ 9 billion in 2021-22, and US$ 11.9 billion in 2012-13.

During 2022-23, South Africa remained the leading destination for India's exports to Africa, accounting for 16.5% of India's exports to the region. Other major export destinations include Togo, Nigeria, Egypt, Tanzania, and Kenya. There has been a sharp increase in India's exports to Togo in recent years, majorly driven by exports of refined petroleum products.

As regards India's imports from Africa, South Africa dominated with a significant share of 22.3% of India's imports from the continent during 2022-23, followed by Nigeria, Guinea, Angola, Morocco, Tanzania, and Mozambique. However, among the major import partners, India's imports from South Africa, Nigeria, Guinea, Egypt and Equatorial Guinea witnessed a fall in 2022-23 compared to 2021-22. While India's imports of unworked non-industrial diamonds and manganese ores and concentrates witnessed a major fall in case of India's imports from South Africa; India's crude petroleum, liquefied natural gas and urea imports from Nigeria and Egypt witnessed a marked decline in 2022-23.

Among African economies, India has the largest trade surplus with Togo, Kenya and Egypt and the largest trade deficits with Angola, South Africa and Republic of Congo.

Petroleum products are the largest items in India's export basket to Africa, contributing 37.6% to India's total exports to Africa during 2022-23. Other important items of exports to Africa in 2022-23 include vehicles other than railway or tramway, cereals, pharmaceuticals products, machinery, sugar and confectionery, electrical machinery and equipment, plastics and articles, and cotton.

Mineral fuels and products (mainly crude) accounted for almost half of India's total imports from Africa during 2022-23. Other major imports from Africa include natural or cultured pearls, precious or semiprecious stones, inorganic chemicals, copper and articles, fertilisers, edible fruit and nuts and salt; sulphur; earths and stone. While India's major imports from Africa such as crude oil, unwrought gold, liquified natural gas, non-industrial unworked diamonds, manganese ore and urea undergone a sharp decline, products such as coal, phosphoric acid, cashew nuts, diammonium phosphate and natural calcium phosphate witnessed an increase in 2022-23.

India-Africa Green Trade

India's exports of environmental goods to Africa stood at US$ 1.7 billion in 2021, increasing from US$ 1.4 billion in 2020, and US$ 1.5 billion in 2019. Environmental goods accounted for 4.6% of India's exports to Africa, moderating from 5.2% in 2020 and 5% in 2019. In 2021, Africa accounted for 10% of India's overall exports in environmental goods. Environmental goods accounted for 24% of India's exports to Algeria in 2021, witnessing a sharp jump from 9.7% share in 2020. Algeria was followed by Burundi, Seychelles, and Ghana. African countries such as Lesotho, Botswana, Togo, Comoros and Chad had the lowest share in environmental goods exports from India in 2021.

India's imports of environmental goods from Africa stood at US$ 296 million in 2021, increasing from US$ 158.6 million in 2020, and US$ 193.8 million in 2019. Africa accounted for a meagre 0.9% of India's global imports of environmental goods in 2021. Similarly, environmental goods accounted for a marginal 0.7% of India's total imports from Africa, increasing from 0.6% in 2020 and 0.5% in 2019. Environmental goods accounted for 7.2% of India's imports from Algeria in 2021, witnessing a sharp jump from 3.3% share in 2020. Algeria was followed by Libya, Seychelles, and Egypt.

Indian Investments in Africa

According to data from the Ministry of Finance, Government of India, and the Reserve Bank of India (RBI), approved cumulative India's investments in Africa during April 1996 to March 2023 amounted to US$ 75.2 billion. Mauritius, Mozambique, Sudan, Egypt, and South Africa were the top destinations of India's investments in the African region. India's approved investments in Africa have largely been concentrated in Mauritius, with a share of 85% in India's total overseas direct investments to Africa, due to its status as a low-tax jurisdiction and the Double Taxation Avoidance Convention. During 2022-23, the largest FDI recipients were Mauritius, Mozambique, Gabon, and South Africa, among the 32 African countries that received Indian investments. Africa's manufacturing sector attracted the highest Indian investments during April 2010 - March 2023. Other major sectors attracting Indian investments include financial, insurance, real estate and business services, agriculture and allied sectors, transport, storage and communication services.

The critical drivers of FDI inflows into Africa are mostly the availability of natural resources, market size, GDP, infrastructure development, trade openness covering imports and exports of goods and services – both intra-regional and extra-regional, and the strength of local currency.

FDI inflows to India from Africa have been dominated by investments from Mauritius that accounts for 25.8% of India's overall FDI inflows. Other African countries investing in India include South Africa, Seychelles, Morocco, and Kenya, among others.

Climate Financing in Africa

Africa accounts for the lowest share in terms of CO_2 emissions globally which has increased marginally from 3.5% in 2000 to 3.8% in 2020, whereas it accounts for 16% of the world's population. According to the United Nations, Africa remains the most vulnerable to impacts of climate change. Africa faces challenges ranging from lack of energy access to water scarcity, to acute food insecurity, and others, which have been aggravated by the COVID-19 pandemic, Russia-Ukraine conflict, rising debt, and climate change-induced severe weather conditions. Green economy investment is one of the ways through which Africa can achieve economic growth that is sustainable, inclusive, and transformative.

According to the Climate Policy Initiative Africa 2022, the total cost of implementing Nationally Determined Contributions (NDCs) in Africa is estimated at US$ 2.8 trillion over 2020-2030. Of this, African governments have committed to providing US$ 264 billion (about 10%), with the remaining US$ 2.5 trillion identified as climate finance needs. An annual average of US$ 29.5 billion in climate finance was committed to Africa in the years 2019 and 2020. This represented only around 11% of the estimated US$ 277 billion of climate financing needs annually to implement Africa's NDCs and climate goals by 2030.

Public climate finance flows to Africa grew from US$ 22.3 billion in 2019 to US$ 24.3 billion in 2020. In Africa, climate finance flows have been allocated with 49% (US$ 14.6 billion) towards mitigation efforts,

39% (US$ 11.4 billion) for adaptation measures, and 12% (US$ 3.5 billion) for initiatives that cater to both measures. This distribution differs from other regions worldwide, where adaptation typically accounts for only 7% to 16% of the total climate finance.

Loans comprising project level market debt and low-cost project debt were the most preferred instruments for climate financing in Africa, accounting for over 54% of total climate finance in the region, followed by grants accounting for a share of 30%. Energy systems accounted for the highest climate financing received in Africa, followed by agriculture, forestry, and other land use (AFOLU), and water, wastewater and waste sectors.

Multilateral Development Financial Institutions (DFIs) were the largest source of public climate finance in the continent (around 40% of total international public climate finance flows) during 2019-2020, followed by bilateral development partners including bilateral DFIs (22%), international governments (16%) and climate funds (4%). 52% of the financing from multilateral DFIs went towards adaptation activities; 46% towards mitigation; and the remaining 2% towards projects with both measures. Private finance in Africa remains concentrated in a few countries with more developed financial markets.

Climate-related projects in Africa received US$ 4.2 billion in private investments during 2019-2020, representing only 14% of the total climate finance flows. Countries like South Africa, Nigeria, Kenya, Morocco, and Egypt accounted for over 50% of private finance, while LDCs received 24% of total private financing, with Mozambique, Ethiopia, and Burkina Faso being the largest recipients. Approximately 81% of Africa's private climate finance flows were directed towards mitigation projects, including renewable energy, energy efficiency, and sustainable transport. Limited private finance was allocated to adaptation initiatives due to perceived risks and low, unstable returns. Africa's largest share of private climate finance, amounting to US$ 3.1 billion (74%) was invested in energy systems, primarily renewables. Buildings and transport infrastructure received US$ 0.3 billion (7%) of private climate finance.

Opportunities in Green Business for India-Africa Trade and Investment

Africa has been receiving considerable investments during the past decade due to its abundant resources and growing markets besides enormous development needs. Renewable energy accounted for 24% share in sectors attracting envisaged capital investment in Africa between 2013 to 2022. However, these investments remain insufficient for Africa's green transition. Post-Covid Africa's special needs in supporting climate resilience amidst its quest for a just energy transition has become more significant. As global investments in Africa are extending beyond extractives and other traditional sectors, opportunities are flourishing in new value chains, from sustainable agribusiness to renewable energy. Despite these potentials, the continent has been underperforming in green trade, green innovation, and green investment. It is an opportune time for African countries to invest in infrastructure that lays the foundation for low carbon and climate resilient economies. Climate-proofing the trade and investment regimes, in Africa is critical to ensuring a just transition and achieving the broader goal of sustainable development. India, being a trusted development partner for the region, is exploring newer avenues to strengthen and advance its engagement with the African region, with a focus on green transition to combat and mitigate climate change impacts. African countries and India can forge mutually useful collaborations in the following areas.

Investment in Clean Energy

Africa accounts for only 3.8% of global greenhouse gas emissions, in contrast to 23% in China, 19% in the US, and 13% in the EU. However, the region remains highly vulnerable to climate change and continues to suffer its consequences in the form of regular droughts and floods, leading to food insecurity and threat to life and livelihoods. Africa has enormous energy potential to harness in addition to natural gas. It has significant quantities of other resources, including forests and minerals, arable land, water, and wind, and thus, the continent is capable of producing enough clean energy to meet the needs of its people and to industrialize, while supporting sustainable development. Achieving Africa's energy and climate goals means more than doubling energy investments in this decade.

India possesses a significant advantage as a pioneer in harnessing Africa's solar resources through its involvement in the International Solar Alliance (ISA). Currently, the ISA comprises the majority of African nations, with 33 countries from the continent being members. The dynamics of solar sector exchanges between India and Africa are shaped by the fact that African countries possess abundant solar resources but lack the necessary technology. India, therefore, can play a vital role in establishing a collaborative platform by providing technology transfer, capacity building, and even employment opportunities. India has implemented various initiatives to leverage its expertise in solar power within the framework of the ISA programs.

Climate Smart Agriculture

The agriculture, fisheries and other land uses sector is a major source of employment for Africa and accounts for 57% of the continent's emissions. The annual cost of action on climate adaptation of agriculture and food systems in Sub-Saharan Africa is estimated to be US$ 15 billion. Further, this sector has high implications for food security, gender, biodiversity, and water security, among others. In order to promote climate-smart agriculture, three pillars need to be followed - (i) sustainably increasing agricultural productivity to support equitable increases in incomes, food security and development; (ii) adapting and building resilience to climate change from the farm to national levels; and (iii) developing opportunities to reduce GHG emissions from agriculture compared with past trends.

Precision agriculture utilizes digital technologies such as sensors, drones, and satellite imaging to monitor crop health, optimize resource use, and enhance productivity. By incorporating weather data, farmers can make data-driven decisions tailored to local climatic conditions. Africa's diverse crops and regions require crop-specific models based on climate variability data to predict yields, mitigate risks, and optimize resource allocation. Training programs and extension services can build farmer capacity in using digital tools and interpreting weather data, ensuring accessibility and affordability for all farmers. Leveraging digital technologies and building capacity promote sustainable and climate-resilient agricultural practices. Financing plays a crucial role in accessing and adopting these best practices.

Smart farming offers an opportunity to integrate digital and physical infrastructures, benefiting small farmers. Indian agro-based start-ups can play a crucial role by providing viable and cost-effective solutions to Africa's small and marginal farmers. By bridging the gap between technology and small farmers, these start-ups can enable access to digital tools and help improve the efficiency and profitability of their farming operations. India and Africa could collaborate for increasing investment, promote research and development, facilitate

technical cooperation and apply innovative, appropriate and reliable technologies in the agricultural sector for enhancing productivity to ensure food security.

Water and Wastewater Management

According to the World Resource Institute, many African countries are at extremely high risk considering multiple factors like vulnerability to droughts and floods, seasonal variability and competition for available water. Already, one in every three people across Africa face water scarcity. According to the UNICEF, nearly 418 million people in Africa are denied even basic drinking water supply. Achieving the SDG targets in Africa will require a 12-fold increase in current rates of progress on safely managed drinking water, a 20-fold increase for safely managed sanitation and a 42-fold increase for basic hygiene services. While climate is an important factor driving water stress in Africa and around the world, poor management of water resources and services remains the biggest challenge. As climate change makes rainfall more erratic and increases the risks of floods and droughts, investing in better water management and infrastructure is becoming even more important. These investments can strengthen economies by alleviating poverty, supporting jobs and growth, and reducing vulnerability to climate change. Securing safe drinking water, sanitation, and hygiene for all in Sub-Saharan Africa would require US$ 35 billion per year.

Delivery of water investments across Africa is below the target levels to meet the continent's growing needs. Currently, only US$ 10-US$ 19 billion is invested in the sector each year. There is a need for increased investments at domestic level, international level, and by private sector investors to close the financing gap by 2030. India and Africa could collaborate in areas like water recycling, water sanitation and treatment to enhance Africa's resilience in access to clean water.

Investments in Green Minerals for Clean Energy and Sustainable Transport

African economies have a significant economic opportunity in their natural resources, including oil, gas, and minerals. While the global shift towards low carbon sources may eventually lead to reduced demand for Africa's oil, gas, and coal resources, the timing and scale of this decline are uncertain and could take several years or even decades. However, there is a growing demand for minerals essential for the clean energy transition, such as lithium, cobalt, copper, platinum, and manganese, many of which are abundant across Africa and crucial for technologies like batteries and electric vehicles. Africa is rich in the commodities needed to support renewable energy development for domestic energy access and to accelerate the low carbon transition.

The African Continental Free Trade Area (AfCFTA) can play a vital role in leveraging these resources by enabling countries to build regional clean energy value chains, along with supporting the global EV transitions, particularly considering infrastructure and capital constraints. By harnessing these resources and developing sustainable and responsible mining practices, African countries can benefit from the increasing demand for minerals required for the low carbon transition. India could play a significant role in the African mining value chain to optimize benefits from the demand for battery and electric value chain.

Strategic Collaboration in Green Fuel

Green hydrogen could be an alternate to grey hydrogen which is produced through coal or lignite gasification and/or steam methane reformation of natural gas or methane. Green hydrogen, widely known as the fuel of

the future, is the hydrogen produced from renewables-based electricity through water electrolysis. Hydrogen produced in this sustainable way, i.e. without emitting carbon dioxide into the atmosphere, can be the basis for a decarbonised economy. Efficient electrolysers will be the key to the penetration of hydrogen in industries and the adoption of hydrogen fuel cells. Green hydrogen production is expected to reach approximately 25% of global energy sources by 2050, with Africa having the potential to take a significant share. Several African countries, in particular South Africa, Egypt, Morocco and Namibia, have the potential to develop fully sustainable hydrogen economies. Realizing the immense opportunity offered by green hydrogen, these countries have already started working towards developing green hydrogen technology. The African Hydrogen Partnership, a continent-wide umbrella association dedicated to developing green hydrogen, hydrogen-based chemicals, and fuel cell technology was established in 2018.

India is aiming to become the world's largest hydrogen hub. Hydrogen demand in India is expected to grow more than fourfold by 2050, representing almost 10% of global hydrogen demand. Given the abundant renewable energy resources in Africa and India's distinct advantage in terms of low-cost renewable electricity, complemented by rapidly falling electrolyser prices, a major avenue for cooperation between India and Africa could be collaborating on the adoption and expansion of green hydrogen, thus, creating a mutually beneficial hydrogen ecosystem. A hydrogen value chain can be established by India and African countries, extending from production to consumption. Indian companies could set up Power-to-X (P2X) plants in the region for converting electricity into carbon-neutral energy carriers. India and Africa could cooperate on technological development to scale up the production, enable exports of green hydrogen, supporting research and development to develop more efficient and cost-effective technologies and setting up transnational partnerships. Transporting green hydrogen to Europe has huge potential, and India can work together with Africa to develop the required infrastructure.

Mainstreaming the Circular Economy

Looking ahead to 2030, Africa's projected exponential increase in consumer demand, particularly in urban areas, presents both opportunities and challenges. To effectively meet these demands while minimizing resource waste and environmental impact, transitioning to a circular production model is crucial. The circular production model emphasizes the reuse, recycling, and repurposing of materials, allowing for optimal resource utilization and reducing the need for extracting new raw materials. This transition will involve implementing practices such as recycling, upcycling, and incorporating renewable materials into production processes. It will also require investment in infrastructure, technology, and skills development to support circular production systems. By adopting a circular production model, Africa can achieve several benefits. Firstly, it can contribute to sustainable development by reducing resource depletion and minimizing environmental degradation. Secondly, it can create opportunities for job creation, economic growth, and innovation in areas such as waste management, recycling, and sustainable manufacturing. Thirdly, it can enhance resource efficiency, reducing production costs and improving competitiveness in both domestic and international markets. To facilitate this transition, collaboration is essential among governments, businesses, civil society, and international partners. Knowledge sharing, capacity building, and technology transfer can further accelerate the adoption of circular production methods.

The growth in funding for the circular economy in India reflects the notable advancements made in technology and commercial viability, along with a supportive policy environment and the establishment of standardized frameworks over the past decade. Therefore, Indian companies can invest and collaborate with various African

companies across sectors like consumer goods, textile and fashion, and electronics, among others to develop circular economies and waste management. Similarly, Indian mining companies have been increasingly using high technology for the automation of processes and has started integrating technologies across the value chain to reduce waste, increase resource efficiency, and drive-up productivity, while promoting the harnessing of renewable energy sources. There are also many Indian companies involved in lithium battery recycling, where these companies extract critical metals such as lithium, cobalt, nickel, graphite, and manganese and recycles them and then exports the output to gigafactories manufacturing battery cells outside of India. Recycling spent batteries will be crucial for the continuous supply of lithium and would make EVs affordable for all sections of society. India and Africa could collaborate in recycling and repurposing of spent batteries to manufacture more batteries, which would reduce the dependency on imports of lithium.

Chapter

1

Overview of Africa's Macroeconomic Performance

A transitioning and diverse continent with huge trade and investment potential, Africa has made remarkable progress in a range of economic and development areas over the past two decades. Though the socio-economic and development performance of African economies varied, the progress achieved by the region in the recent years, made many African economies more resilient and better placed to cope with harsh external conditions than before. With an estimated collective GDP of US$ 2.98 trillion in 2022, Africa is expected to cross US$ 3 trillion GDP by 2023. Africa is the second largest and the second-most populous continent in the world, with a population of 1.38 billion people. Africa's population is expected to be at 1.42 billion in 2023.

Well-endowed with abundant natural resources and diverse ecosystems, Africa offers a great market potential. The continent accounts for about 30% of all global mineral reserves – including 42% of gold, 60% of cobalt, 80-90% of reserves of precious metals like chromium and platinum and 60% of the arable land[1]. The continent contributes substantially to the global annual production of six key minerals - 80% of platinum, 77% of cobalt, 51% of manganese, 46% of diamonds, 39% of chromium, and 22% of gold. This is in addition to around 7% of global natural gas and 12% of world's oil reserves. Africa also has the most important of all resources, human capital, with the continent accounting for 16% of the global population; 60% of whom are under the age of 25 years. With about 75% of African countries having access to the sea, the continent also offers massive potential for a blue economy. Africa has vast resource potential in wind, solar, hydro, and geothermal energy. Over the years, there has been a shift in focus from investment for the extraction and export of natural resources to people based and manufacturing-based investments such as telecommunications, retail, and services as well as renewable energy sectors.

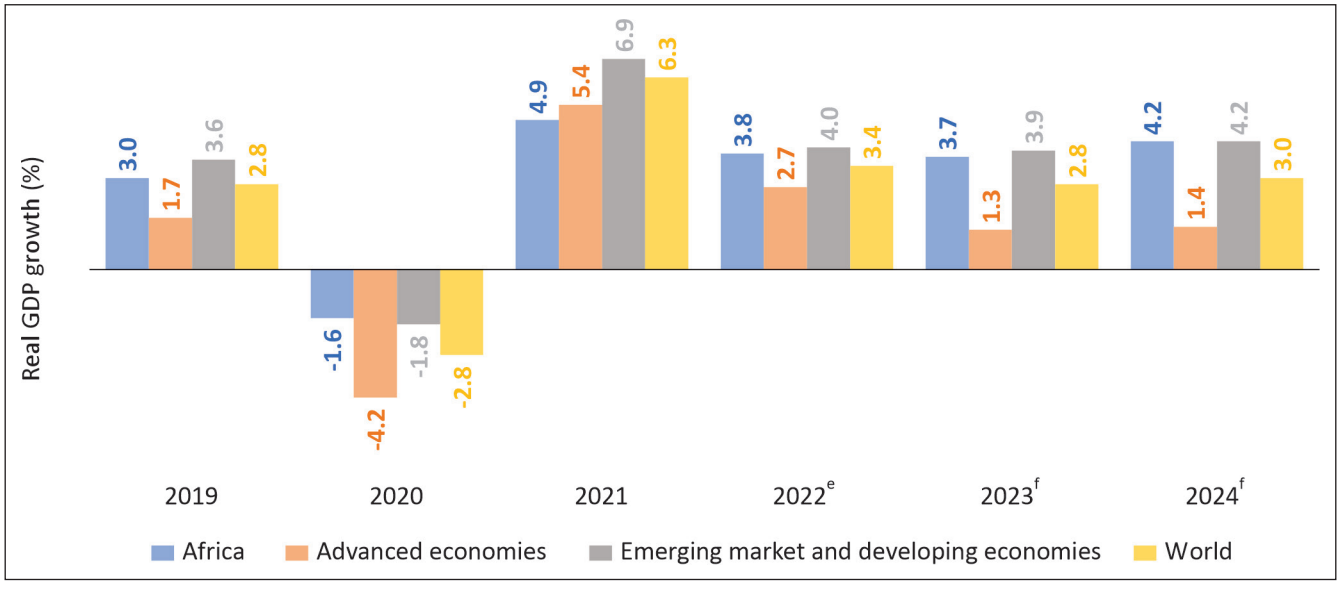
Prior to the pandemic, Africa was already facing challenges including a global economic slowdown, increasing protectionism and tariff wars among large economies, and evolving contours of international trade involving Global Value Chains (GVCs) and development of disruptive labour-saving technologies. The pandemic resulted in a recession in the continent, leading to contraction of output by 1.6% in 2020; however contraction remains lower compared to emerging market and developing economies and the world average. Africa's average real gross domestic product (GDP) growth is estimated to have slowed to 3.8% in 2022 from 4.9% in 2021 **(Chart 1.1)**. The combination of higher global interest rates, elevated sovereign debt spreads, and exchange rate depreciations, among other factors, has created a funding shortage for many countries in Sub-Saharan Africa. This challenge comes on top of policy struggles from the ramifications of the COVID-19

[1] African Union

pandemic and the cost-of-living crisis. Reflecting these considerations, economic activity in the region will remain subdued in 2023, with growth at 3.7% before rebounding to 4.2% in 2024, predicated on a global recovery, subsiding inflation, and the winding down of monetary policy tightening[2].

Africa's estimated growth of 3.8% in 2022 is, however, stronger than the 3% in 2019 (before the COVID-19 pandemic) and the 3.3% average during 2014–18 (the end of the commodity super cycle). The stabilized medium-term growth largely reflects policy support in Africa and global efforts to mitigate exogenous shocks and rising uncertainty. China's reopening after three years of zero-COVID policy and the stable growth outlook for Asia could bolster Africa's growth in the medium term[3].

Chart 1.1: Africa's Growth Outlook



Note: The figures are subject to downside risks due to the evolving geo-political developments

Source: Data Mapper, IMF, April 2023 and India Exim Bank Research

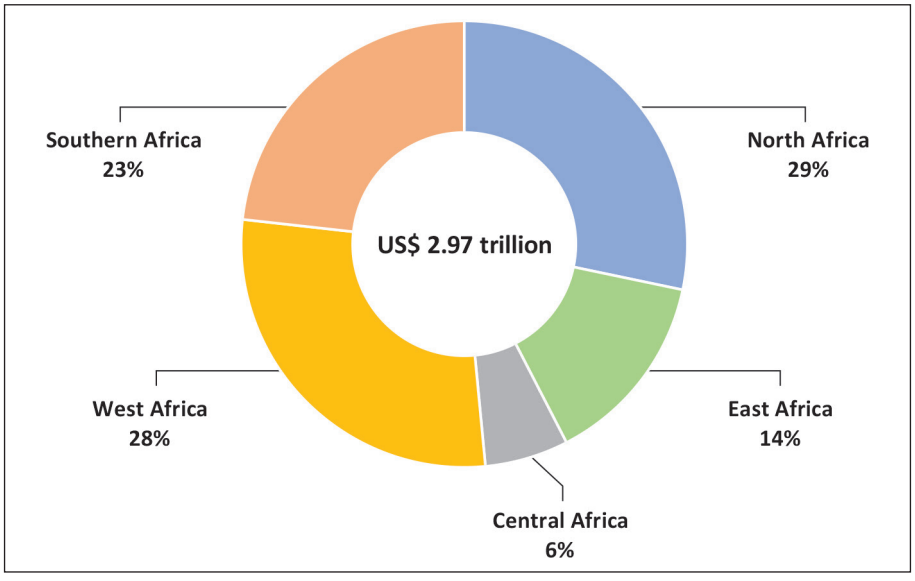
Regional Growth in Africa

Africa's GDP is dominated by its commodity dependent regions, largest being North Africa, followed by West Africa and Southern Africa **(Chart 1.2)**. Among countries, Nigeria, Egypt, and South Africa are the largest economies in Africa, accounting for 45.7% of the region's GDP in 2022. Other large economies in Africa include Algeria (6.6% of GDP in 2022), Morocco (4.6%), and Angola (4.1%). The fastest growing economies in Africa in 2022 were Niger, Cabo Verde, Seychelles, Mauritius, Rwanda, Côte d'Ivoire, DR Congo and Egypt, registering growth rates above or close to 7%, respectively.

[2] IMF WEO April 2023

[3] Africa's Macroeconomic Performance and Outlook, African Development Bank (AfDB), January 2023

Chart 1.2: Africa's Regional Nominal GDP Size in 2022



Note: Regional classification based on African Development Bank's Classification are as follows - North Africa: Algeria, Egypt, Libya, Morocco, Mauritania, and Tunisia; East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Seychelles, Somalia, South Sudan, Sudan, Tanzania, Uganda; West Africa: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo; Central Africa: Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Equatorial Guinea, Gabon, Republic of Congo; Southern Africa: Angola, Botswana, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, São Tomé and Príncipe, Zambia and Zimbabwe.

Source: IMF, WEO April 2023 and India Exim Bank Research

According to the African Development Bank (AfDB), growth in North Africa is estimated to have declined to 4.3% in 2022 from 5.4% in 2021, reflecting the sharp contraction in Libya and the effects of the drought in Morocco. Growth in the region is projected to stabilize at 4.3% in 2023, supported by the expected strong recovery in Libya and Morocco. In contrast, Egypt's growth almost doubled from 3.3% in 2021 to 6.6% in 2022, boosted by expanded infrastructure investments, higher gas production, and higher vessel traffic through the Suez Canal. Similarly, Mauritania's growth more than doubled from 2.4% in 2021 to 5.0% in 2022, supported by a rebound in household consumption, greater production of iron ore and gold, and increased investment in natural gas and renewable energies.

Central Africa was the most resilient and fastest growing region in the continent in 2022. The growth in Central Africa is estimated to have increased to 4.7% in 2022 from 3.6% in 2021, benefitting from high commodity prices for a region with net exporters of crude oil, minerals, and other commodities. Growth in 2022 was driven by DR Congo and Cameroon. However, the regional growth is expected to decline to 4.3% in 2023.

Growth in East Africa is estimated to have moderated to 4.2% in 2022 from 5.1% in 2021 and is projected to rise to 5.0% in 2023. While the production structure is relatively diversified, countries in the region are largely net importers of commodities and bear the brunt of high international prices in addition to recurrent

climate shocks such as drought, particularly in the Horn of Africa. The slowdown in 2022 was therefore attributed mainly to effects of these shocks, exacerbated by disruptions to global supply chains. The top growth performers in 2022 were Seychelles (8.8%), Rwanda (6.8%), and Kenya (5.4%). Rwanda is projected to lead growth in the region in 2023 and 2024, benefiting from higher infrastructure spending. Uganda and Ethiopia are also projected to grow strongly in 2023 and 2024, exceeding 5% on account of developments in the oil sector for Uganda and continued infrastructure spending for Ethiopia.

Growth in Southern Africa is estimated to have remained tepid in 2022, declining to 2.5% from 4.3% in 2021, reflecting persistent weaknesses in South Africa, the region's largest economy and main trading partner. South Africa's real GDP growth declined to 2% in 2022 from 4.9% in 2021, due to subdued global demand, power outages, and devasting floods affecting the industrial output. South Africa's close trade ties with other countries in the region has resulted in transmitting of the shocks to these countries as well. Mauritius' real GDP grew the fastest, at 8.3% in 2022 on the back of sustained tourism inflows. Real output in Angola, the region's second largest economy, expanded by 2.8% in 2022, supported by high prices of oil and other minerals.

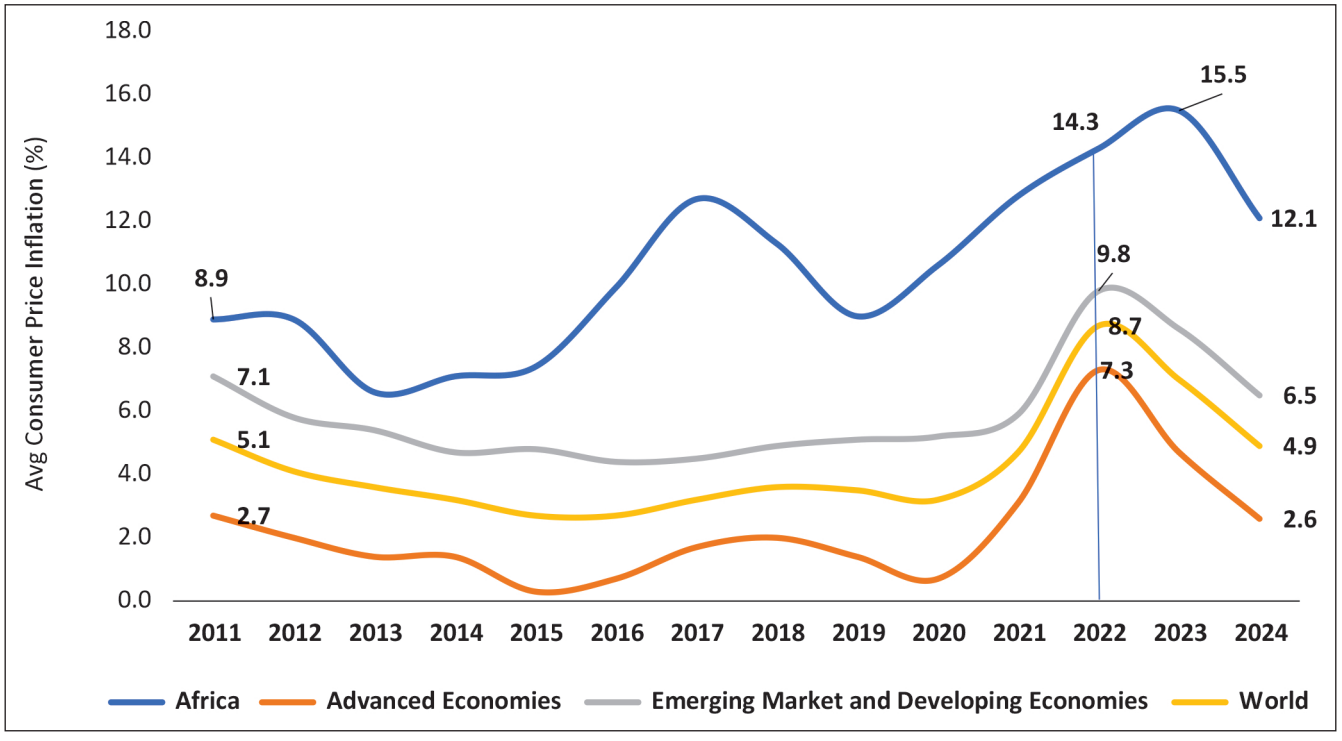
Growth in West Africa is estimated to have slowed to 3.6% in 2022 from 4.4% in 2021. It is expected to recover in the medium term, to 4.1% in 2023 and 4.3% in 2024. In all countries in the region, except Gambia, Guinea, Niger, and Togo, growth decelerated in 2022. Sustained economic performance in the region's more diversified economies is projected to drive average regional growth to 4.1% in 2023 and 4.3% in 2024. Deep macroeconomic imbalances in Ghana, including higher inflation, depreciating local currency, and high public debt, led to decline in growth to an estimated 3.2% in 2022 from 5.4% in 2021. In Nigeria, the region's largest economy, growth is estimated to have declined to 3.3% in 2022 from 3.6% in 2021. Nigeria has suffered from a protracted decline in oil production due to technical inefficiencies arising from aging infrastructure, limiting the gains from high international oil prices. It is also experiencing deep macroeconomic imbalances, underpinned by a costly subsidy on fuel, near 20-year high inflation, and foreign exchange shortages that drove rapid depreciation of the national currency, further eroding citizens' purchasing power.

Inflationary Trends in Africa

Inflation remains one of the most pressing challenges of Africa, marked by a slow recovery from the pandemic, rising food and energy prices, and high levels of public debt. Africa has been recording persistently high inflation historically, which has surged in recent years. Commodity prices rose in March 2022, immediately following Russia's invasion of Ukraine in February, but have since reverted. Inflationary pressures have also adversely affected household consumption. The average annual consumer price inflation of 14.3% recorded in Africa in 2022 was much higher than the world average (8.7%), and that of emerging markets and developing countries (9.8%) and advanced economies (7.3%) **(Chart 1.3)**. Around 20 African countries witnessed double digit inflation in 2022, with 7 countries having inflation above 20%. Zimbabwe and Sudan had the highest consumer price inflation at 193.4% and 138.8%, respectively.

Notwithstanding the positive impact of the Ukraine crisis for oil-exporting countries in Africa, slowing growth in the European Union and China, the main trading partners of Africa and the leading drivers of global growth, has ramifications for developing economies and commodity exporters, including those on the African continent. The crisis has contributed to soaring food prices, impacting food security of millions. Higher food prices adversely impact consumers' purchasing power and welfare, particularly among low-income households and weigh on domestic demand.

Chart 1.3: Surging Inflation in Africa



Source: Data Mapper, IMF, April 2023 and India Exim Bank Research

Trends in Africa's Foreign Trade

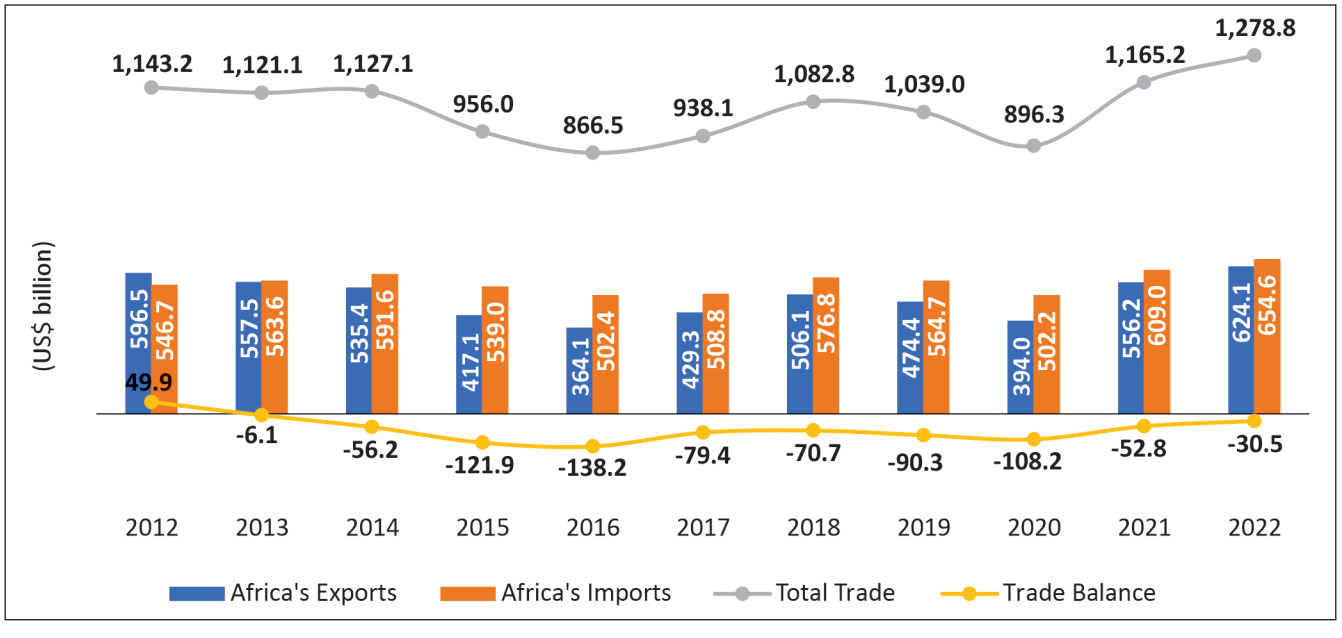
Africa's trade dynamism is being changed rapidly in an evolving global trade policy landscape, shaped both by geopolitical conditions and climate imperatives. Africa's trade remains dependent on the external events of the global economy. African exports dipped sharply during 2013-16 as oil prices and trade in mineral products dropped. After touching a peak of US$ 1.14 trillion in 2012, Africa's trade witnessed a decline, reaching a low of US$ 866.5 billion in 2016, thereafter, it had started recovering. It recovered to US$ 938.1 billion in 2017, and crossed US$ 1 trillion by 2018, with positive trends in both exports and imports **(Chart 1.4)**. Africa's trade recovery is largely driven by a recovery in its oil-exporting countries and expanding trade with emerging economies, especially intra-African trade. However, as a result of the pandemic trade declined to US$ 896.3 billion in 2020. Thereafter, driven by increased global commodity prices trade has recovered to US$ 1.2 trillion in 2021 and peaked at US$ 1.3 trillion in 2022, increasing by 9.7%. Africa's share in global trade also marginally increased to 2.63% in 2022 from 2.61% in 2021.

Both exports and imports have recovered following the pandemic, reflecting growth in global commodity prices. Africa's aggregate output remains highly correlated to the commodity cycle, with close to 80% of the countries being commodity dependent. Africa's total merchandise exports increased by 12.2% from US$ 556.2 billion in 2021 to be at US$ 624.1 billion in 2022. Imports also increased by 7.5% to US$ 654.6 billion in 2022 as compared to US$ 609 billion in the previous year. Accordingly, Africa's share in global exports increased to 2.6% in 2022, as compared to 2.5% in 2021, though moderated from 3.2% in 2012. The share of Africa in global imports remained stable at 2.7% in 2022 as compared to 2021, though lower compared to 3% in 2012. Supported by large growth in exports compared to imports, the continent's trade deficit has narrowed to US$ 30.5 billion in 2022, from US$ 52.8 billion in the previous year.

Intra-regional trade in Africa remains low compared to other major global regions. Intra-African merchandise exports, which accounted for 16.7% of total African exports in 2012 declined to 15.4% in 2021 and further to 12.5% in 2022. Intra-African imports also moderated from 15.9% of total African imports in 2012 to 12.1% in 2021 and 11.7% in 2022. However, it is noteworthy that intra-regional trade in Africa is more diversified and oriented towards manufactures, particularly light manufactures, than its extra-regional trade. This implies the need to further enhance the continent's intra-regional trade for export diversification as well as in enhancing climate resilience as light manufactures are less intensive in greenhouse gas emissions. The UN Economic Commission for Africa estimates that the AfCFTA has the potential to boost intra-African trade by 52.3% by eliminating import duties, and it could double this trade if non-tariff barriers are reduced.

The overall patterns of Africa's exports to the rest of the world are dominated by commodities while being more diversified and more processed within the region. This is consistent with the limited role of global and regional value chains in the continent's trade, notwithstanding some recent progress with building regional value chains around basic manufacturing especially in countries like South Africa, Egypt, Nigeria, Morocco, Algeria, Angola and Kenya[4]. Africa is primarily involved upstream in GVCs, i.e., providing intermediate products and services within a wide range of global supply chains, through forward linkages. Around 80% of Africa's exports of intermediate products go to China, the EU and the US. More than 60% of African value added in global exports is embedded in European production in part directly in exports to Europe but also indirectly in the exports of third countries to Europe. The pandemic has clearly demonstrated that impact of demand and price shocks are more on countries with high forward linkages than those with backward linkages. The AfCFTA is expected to promote export diversification in the continent by facilitating shift in production patterns from dependency on extractives and commodities. Africa needs to seize the opportunity to build sustainable, green, inclusive and resilient businesses to drive the green transition, which has become increasingly important in the context of climate change.

Chart 1.4: Africa's Foreign Trade



Source: ITC Geneva, based on COMTRADE Statistics and India Exim Bank Research

[4] Trade Integration in Africa, IMF, May 2023

- **Africa - Major Export Items**

Africa's exports are skewed towards primary commodities, making the continent vulnerable to adverse price shocks. Mineral fuels, oils and its products continue to be the largest export item from Africa, accounting for as much as 44.9% of Africa's total exports in 2022, reflecting the significant share of petroleum crude exports from Africa. Mineral fuels witnessed increase in its share compared to 34.3% in 2021 due to rise in international crude oil prices fuelled by geo-political uncertainties. Other major items of export from Africa during the same year include pearls and precious stones, ores and slag, copper and its articles, vehicles other than railway and tramway, and electrical equipment **(Table 1.1)**.

Within mineral fuel, oil and its products, Africa majorly exports crude oil (HS 2709). Nigeria, Angola, Libya, and Algeria are among the leading global exporters of crude oil, with a combined share of 12.3% of the global crude petroleum exports (and 80.2% of Africa's crude petroleum exports) in 2022. Africa's export of crude petroleum stood at US$ 170.4 billion in 2022, increasing from US$ 127.2 billion in 2021. Crude oil prices significantly influence crude petroleum exports from Africa.

Table 1.1: Commodity-wise Major Exports of Africa

HS Code	Products	2020 (US$ bn)	2021 (US$ bn)	2022 (US$ bn)	% Share in 2022
	Africa's Total Exports	**394.0**	**556.2**	**624.1**	**100.0**
27	Mineral fuels, mineral oils and products of distillation	111.6	190.8	280.2	44.9
71	Pearls and precious stones and metals	67.2	84.0	49.5	7.9
26	Ores, slag and ash	24.0	32.2	33.4	5.4
74	Copper and articles	18.2	25.9	24.5	3.9
87	Vehicles other than railway or tramway rolling stock	13.1	17.0	19.1	3.1
85	Electrical machinery and equipment and parts	12.0	14.4	16.5	2.6
31	Fertilisers	6.4	10.8	15.8	2.5
08	Edible fruit and nuts; peel of citrus fruit or melons	10.5	12.1	11.7	1.9
72	Iron and steel	6.1	11.5	11.6	1.9
28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals	7.1	12.7	9.9	1.6
18	Cocoa and cocoa preparations	9.1	10.8	9.2	1.5
84	Machinery and mechanical appliances	7.2	9.3	9.2	1.5
62	Articles of apparel and clothing accessories, not knitted or crocheted	5.4	6.8	8.4	1.3
09	Coffee, tea, maté and spices	4.5	5.4	6.7	1.1
25	Salt; sulphur; earths and stone; plastering materials, lime and cement	3.4	4.9	6.6	1.1

Source: ITC Geneva, based on COMTRADE Statistics and India Exim Bank Research

- **Africa - Major Import Items**

Africa's import basket is relatively diversified compared to its exports. Minerals fuels, mainly dominated by petroleum oils, not crude (19.3% of Africa's imports) and machinery and mechanical appliances (9.4% of

Africa's imports) were the two largest import items in 2022, followed by electrical machinery and equipment, vehicles other than railway and tramway, cereals, plastics and its articles, iron and steel and pharmaceutical products **(Table 1.2)**. This implies that most of Africa's consumer and capital goods are imported.

Table 1.2: Commodity-wise Major Imports of Africa

HS Code	Products	2020 (US$ bn)	2021 (US$ bn)	2022 (US$ bn)	% Share in 2022
	Africa's Total Imports	**502.2**	**609.0**	**654.6**	**100.0**
27	Mineral fuels, mineral oils and products of distillation	60.2	91.8	126.6	19.3
84	Machinery and mechanical appliances	56.6	61.9	61.5	9.4
85	Electrical machinery and equipment	38.5	44.3	45.8	7.0
87	Vehicles other than railway or tramway	37.1	44.3	40.3	6.2
10	Cereals	25.4	30.5	30.5	4.7
39	Plastics and articles	21.1	26.7	27.3	4.2
72	Iron and steel	14.7	19.6	19.6	3.0
30	Pharmaceutical products	18.5	22.0	17.5	2.7
73	Articles of iron or steel	12.6	13.6	15.6	2.4
15	Animal or vegetable fats and oils	9.7	13.3	13.8	2.1
38	Miscellaneous chemical products	9.1	10.0	10.1	1.5
90	Optical, medical or surgical apparatus	9.1	10.1	9.8	1.5
48	Paper and paperboard; articles of paper pulp	6.9	7.8	9.4	1.4
28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals	5.2	6.5	9.3	1.4
31	Fertilisers	4.8	5.9	8.6	1.3

Source: ITC Geneva, based on COMTRADE Statistics and India Exim Bank Research

In 2022, Africa was a net importer of machinery and equipment (with a deficit of US$ 52.3 billion), electrical machinery and equipment (US$ 29.3 billion), cereals (US$ 28.4 billion), vehicles (US$ 21.2 billion), plastic and its articles (US$ 20.9 billion) and pharmaceutical products (US$ 15.8 billion).

- **Africa – Major Exporters and Importers**

Africa witnessed a significant growth in exports in 2022 growing by an average of 12.2% as compared to previous year. South Africa, being the major industrialised economy, is the largest exporter among African economies. The top four economies were also the top four merchandise exporters in 2022 accounting for 48% of Africa's exports **(Table 1.3)**.

Table 1.3: Africa - Major Exporters

Country	2020 (US$ bn)	2021 (US$ bn)	2022 (US$ bn)	% Share in Africa's Exports in 2022	% Share in Global Exports in 2022
Africa's Total Exports	**394.0**	**556.2**	**624.1**	**100.0**	**2.6**
South Africa	85.7	123.7	123.6	19.8	0.5
Algeria	22.5	38.7	64.4	10.3	0.3
Nigeria	33.4	47.6	63.3	10.1	0.3
Egypt	26.8	40.7	48.1	7.7	0.2
Angola	21.0	33.7	46.3	7.4	0.2
Morocco	27.7	36.6	42.3	6.8	0.2
Libya	9.5	32.9	38.6	6.2	0.2
DR Congo	14.1	22.3	22.5	3.6	0.1
Tunisia	13.8	16.4	19.4	3.1	0.1
Côte d'Ivoire	12.5	15.4	16.4	2.6	0.1
Ghana	14.2	15.4	14.2	2.3	0.1
Zambia	8.1	11.2	11.7	1.9	0.05
Equatorial Guinea	3.2	5.2	9.3	1.5	0.04
Congo	5.0	2.4	8.6	1.4	0.04
Gabon	7.4	8.1	8.5	1.4	0.04

Source: ITC Geneva, based on COMTRADE Statistics and India Exim Bank Research

South Africa is also the largest importer of the continent **(Table 1.4)**. The top five importers, South Africa, Egypt, Morocco, Nigeria, and Algeria accounted for around 55% of imports by Africa during 2022.

Table 1.4: Africa - Major Importers

Country	2020 (US$ bn)	2021 (US$ bn)	2022 (US$ bn)	% Share in Africa's Imports in 2022	% Share in Global Imports in 2022
Africa's Total Imports	**502.2**	**609.0**	**654.6**	**100.0**	**2.7**
South Africa	68.7	93.6	111.9	17.1	0.5
Egypt	60.3	73.8	79.7	12.2	0.3
Morocco	44.5	58.7	72.8	11.1	0.3
Nigeria	53.0	52.4	60.5	9.2	0.2
Algeria	34.8	37.2	32.4	5.0	0.1
Tunisia	18.4	21.8	21.7	3.3	0.1
Kenya	15.4	19.3	21.1	3.2	0.1
Côte d'Ivoire	10.5	14.0	18.0	2.7	0.1
Ghana	16.9	21.4	17.8	2.7	0.1
Libya	12.4	17.7	17.0	2.6	0.1
Ethiopia	14.1	15.3	16.5	2.5	0.1
Mozambique	6.4	8.6	14.5	2.2	0.1
Tanzania	8.5	10.9	13.4	2.1	0.1
Angola	9.3	11.4	12.6	1.9	0.1
Senegal	7.8	8.3	12.1	1.9	0.05

Source: ITC Geneva, based on COMTRADE Statistics and India Exim Bank Research

- **Africa - Major Export Markets and Import Sources**

Historically, African countries observed higher trade with the European countries, compared to any other region in the world. However, during the last few decades, this trend has been gradually shifting, with the rise of the developing world, especially Asia, enabling Africa to accelerate the geographical diversification of its trading partners. China was the major export destination for Africa, accounting for 14.5% of Africa's total exports in 2022, increasing its share from 12.9% in 2021 **(Table 1.5)**. China surpassed the US to become the largest destination for Africa's exports in 2012. Other major destinations for Africa's exports in 2022 include Italy (8.7% of Africa's total exports), Spain (6.6%), France (6.1%) and the US (5.7%). India was the 8th largest export market for Africa in 2022, accounting for 3.5% of Africa's total exports (falling from 6% in 2021). During 2017-2021, India was the second largest export destination of Africa. However, India's position has fallen in 2022 owing to India's increased crude oil imports from alternate crude oil exporting regions/countries.

Table 1.5: Africa's Major Export Destinations

Country	2020 (US$ bn)	2021 (US$ bn)	2022 (US$ bn)	% Share in Africa's Exports in 2022
Africa's Total Exports	**394.0**	**556.2**	**624.1**	**100.0**
China	53.7	71.6	90.4	14.5
Italy	14.8	28.6	54.3	8.7
Spain	19.9	30.3	41.3	6.6
France	19.7	27.4	37.9	6.1
USA	16.5	29.8	35.4	5.7
Netherlands	13.2	18.6	30.4	4.9
Germany	14.5	23.5	26.4	4.2
India	20.0	33.5	21.7	3.5
UK	9.7	17.1	20.6	3.3
Switzerland	17.1	16.6	17.3	2.8
Belgium	8.4	11.7	14.2	2.3
South Korea	3.9	6.7	12.8	2.1
Japan	5.5	11.4	12.6	2.0
Turkey	7.5	8.1	10.6	1.7
Indonesia	2.1	4.5	9.0	1.4

Source: ITC Geneva, based on COMTRADE Statistics and India Exim Bank Research

As regards imports, traditional markets such as the US, France, Germany, and Italy, remained major sources for Africa's global imports. However, China emerged as the leading supplier to Africa, accounting for as much as 20.1% of Africa's total imports in 2022 **(Table 1.6)**. Other major sources for Africa's imports in 2022 include the US (5.2% of Africa's total imports), France (4.9%), India (4.4%) and South Africa (4.1%). India was the second largest import source for Africa in 2021, accounting for 5.8% of Africa's global imports.

Table 1.6: Africa's Major Import Sources

Country	2020 (US$ bn)	2021 (US$ bn)	2022 (US$ bn)	% Share in Africa's Imports in 2022
Africa's Total Imports	**502.2**	**609.0**	**654.6**	**100.0**
China	95.6	109.6	131.8	20.1
USA	26.1	29.2	33.8	5.2
France	25.4	26.9	31.8	4.9
India	26.6	35.4	28.6	4.4
South Africa	20.6	25.9	27.1	4.1
Germany	21.3	23.5	24.3	3.7
Turkey	16.0	19.7	22.6	3.4
Italy	16.8	18.8	22.5	3.4
Spain	17.0	20.0	20.2	3.1
Belgium	10.3	16.1	19.8	3.0
Saudi Arabia	11.7	18.3	19.8	3.0
UAE	17.9	25.3	19.3	3.0
Netherlands	12.6	15.3	17.9	2.7
South Korea	6.0	8.0	13.8	2.1
Brazil	8.6	9.5	12.2	1.9

Source: ITC Geneva, based on COMTRADE Statistics and India Exim Bank Research

Green Trade in Africa

Trade is an underlying driver of greenhouse gas emissions globally. The transition to a low-carbon economy depends, among other things, on the development, adoption and diffusion of environmental goods, services and technologies. According to the IMF, environmental goods include both goods connected to environmental protection, such as goods related to pollution management and resource management, and adapted goods which are goods that have been specifically modified to be more "environmentally friendly" or "cleaner." Industrial air filters, wastewater treatment products and renewable energy technologies such as solar panels or wind turbines are examples of environmental goods. Trade and investment liberalization in environmental goods will help African economies access vital environmental technologies at lower cost, which in turn will facilitate their use and benefit the environment.

According to the AfDB, the continent's share of exports of environmental goods to total exports, a proxy for green trade, was the world's lowest, at 1.5% on average over 2010–20, below an average of at least 3% in other world regions. According to the IMF definition of environmental goods, Africa's exports of environmental goods stood at US$ 12.4 billion in 2021, increasing from US$ 8.3 billion in 2020 and US$ 8.9 billion in 2019. In 2021, share of environmental goods in Africa's total exports was 2.2%, increasing from 2.1% in 2020 and 1.9% in 2019[5]. Togo was the only African country, having environmental goods exports as share of its total exports higher than the world average of 7.3% in 2020

[5] The IMF has identified 223 HS Codes at 6-digit level to include in the definition of environmental goods.

(Table 1.7). Togo was followed by South Africa, Egypt and Eswatini. South Africa is leader in specific niche areas such as management of mine waste, mine rehabilitation and conservation and biodiversity management, offering huge scope for exports. In travel and tourism, a priority sector in many African countries, environmental services can help manage the environmental impact of tourism.

Table 1.7: Environmental Goods Exports as Share of Total Exports (%) - Top African Countries

Country	2016	2017	2018	2019	2020	2021
Togo	9.0	9.0	9.7	9.8	11.8	10.8
South Africa	5.2	4.6	4.5	4.6	5.0	-
Egypt	3.8	4.9	5.0	3.4	4.1	4.5
Eswatini	2.1	1.9	1.7	2.0	2.2	-
Morocco	1.7	1.9	1.9	2.0	2.0	1.8
Kenya	2.5	1.9	1.8	1.9	1.8	2.0
Mauritius	1.4	1.4	1.6	1.2	1.7	1.5
Namibia	0.8	0.8	1.7	1.3	1.5	-
Malawi	1.4	0.8	0.5	0.8	1.2	-
Benin	1.1	1.2	4.4	0.7	0.8	0.5
Uganda	1.1	0.6	0.9	0.6	0.7	-
Niger	0.3	1.1	0.2	0.6	0.7	-
Rwanda	1.0	11.1	7.2	1.0	0.7	1.9
Botswana	0.3	0.2	0.3	0.3	0.7	0.2
Ethiopia	0.3	0.3	0.4	0.4	0.6	-

Note: '-' implies not available

Source: IMF and India Exim Bank Research

Africa's imports of environmental goods stood at US$ 37.8 billion in 2021, increasing from US$ 33.8 billion in 2020 and US$ 36.9 billion in 2019. Environmental goods accounted for 6.2% of Africa's total imports in 2021, declining from 6.7% in 2020. In case of environmental goods imports, Nigeria leads among African countries with 12.6% share of environmental goods imports in its total imports in 2020, followed by Zimbabwe and Mozambique. Environmental goods imports share of Nigeria and Zimbabwe were above the world average of 7.9% in 2020 **(Table 1.8)**. Most of the African countries are also net importers of infrastructural environmental services.

Environmental goods are currently susceptible to high customs tariff. According to recent estimates, lowering tariffs on a broad set of environmental goods could reduce CO_2 emissions as much as 10 million tons by 2030, while increasing world trade by 1.1%. By creating an intra-African market, the AfCFTA provides businesses the opportunity to develop green technologies, goods, and services, thereby building intra-African value chains that minimize the continent's dependency on imported green technologies, goods, and services from outside the continent. Climate-proofing Africa's trade has become a necessity for all the African economies as environmental goods serve to improve environmental outcomes.

Table 1.8: Environmental Goods Imports as Share of Total Imports (%) - Top African Countries

Country	2016	2017	2018	2019	2020	2021
Nigeria	9.9	6.7	6.8	9.3	12.6	7.0
Zimbabwe	5.4	5.4	6.0	6.7	8.3	-
Mozambique	6.8	4.5	6.7	6.0	7.6	-
Morocco	7.4	7.6	6.7	6.7	7.6	7.2
Republic of Congo	3.8	7.1	10.6	9.9	7.4	-
Zambia	5.1	5.2	6.5	6.5	6.6	-
South Africa	6.8	6.0	5.3	5.7	6.4	-
Kenya	6.3	4.8	5.2	5.5	6.3	5.0
Madagascar	6.9	6.5	6.8	6.0	6.2	-
Tanzania	6.4	5.7	6.7	7.0	6.1	5.6
Togo	5.2	4.0	4.0	3.5	5.8	4.7
DR Congo	2.7	3.3	4.4	7.0	5.6	-
Burkina Faso	6.8	7.5	6.5	7.4	5.5	5.5
Senegal	5.1	5.2	4.3	4.2	5.5	5.8

Note: '-' implies not available

Source: IMF and India Exim Bank Research

Update on AfCFTA

The African Continental Free Trade Area (AfCFTA) was operationalised on January 1, 2021, with an aim to boost intra-African trade and creation of a single market for goods, services and movement of people in line with the "Agenda 2063" of the African Union. Being the world's largest free trade area, AfCFTA is expected to ultimately result in a liberalized single market for goods and services, aided by easy movement of people and capital, boosting intra-African production, consumption, and exports. As per the World Bank, potentially, the full implementation of the AfCFTA could boost Africa's income by 7% or US$ 450 billion, speed up wage growth for women, and lift 30 million people out of extreme poverty by 2035[6]. As on April 2023, 54 African countries have signed the agreement and 46 countries out of the 54 signatories (85.2%) have ratified the same[7]. These countries include Ghana, Kenya, Rwanda, Niger, Chad, Eswatini, Guinea, Côte d'Ivoire, Mali, Namibia, South Africa, Republic of Congo, Djibouti, Mauritania, Uganda, Senegal, Togo, Egypt, Ethiopia, Gambia, Sahrawi Arab Democratic Republic, Sierra Leone, Zimbabwe, Burkina Faso, São Tomé & Príncipe, Equatorial Guinea, Gabon, Mauritius, Central African Republic, Angola, Lesotho, Tunisia, Cameroon, Nigeria, Malawi, Zambia, Algeria, Burundi, Seychelles, Tanzania, Cabo Verde, DR Congo, Morocco, Guinea-Bissau, Botswana and Comoros (in the order of ratification).

The 7th Council of Ministers (COM) responsible for trade of the AfCFTA adopted the Ministerial Directive 1/2021 on the Application of Provisional Schedules of Tariffs Concessions (PSTC) on October 10, 2021. This Ministerial Directive provided a legal basis for the 29 countries that had submitted their tariff schedules in accordance with the agreed modalities to trade preferentially amongst themselves. The Ministerial Directive was adopted by the Assembly of Heads of State and Government in February 2022 paving the way for various activities and initiatives towards the start of commercially meaningful trade under the AfCFTA.

[6] The African Continental Free Trade Area Economic and Distributional Effects, The World Bank Group, 2020

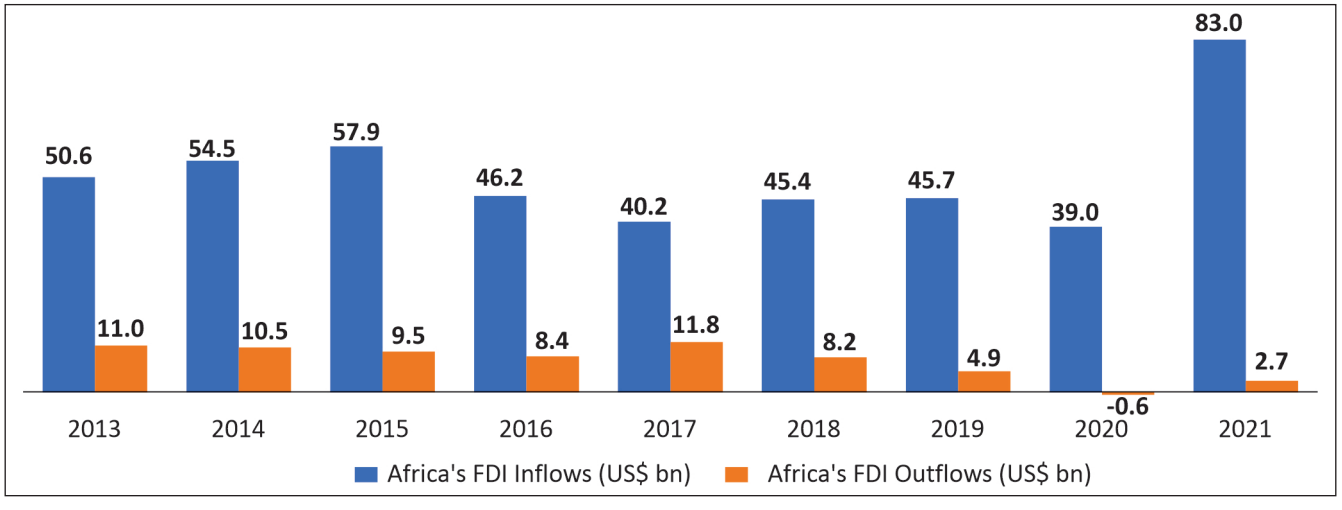
[7] AfCFTA Secretariat Website

During the 9th Meeting of the Council of Ministers held in July 2022, H.E. the Secretary General of the AfCFTA, Mr. Wamkele Mene, announced the AfCFTA Secretariat Guided Trade Initiative (GTI). The Committee on the AfCFTA Guided Trade Initiative has coordinated the participation of national AfCFTA committees, identification of products to be traded under the initiative, organised logistics, identified and addressed customs-related challenges, thus creating an enabling environment for sustainable trade under the AfCFTA[8]. Accordingly, commercially meaningful trade began in October 2022, when eight pilot countries, from the five regions of Africa - Cameroon, Egypt, Ghana, Kenya, Mauritius, Rwanda, Tunisia and Tanzania, started trading a set of goods duty free under the AfCFTA "Guided Trade Initiative." The products earmarked to trade under this initiative include ceramic tiles, batteries, tea, coffee, processed meat products, corn starch, sugar, pasta, glucose syrup, dried fruits, and sisal fibre, among others, in line with the AfCFTA's focus on value chain development[9].

Foreign Direct Investment Flows in Africa

Foreign Direct Investment (FDI) flows to Africa have been growing steadily over the past few years. FDI to Africa has reached record levels in 2021, increasing by 113.1% to US$ 83 billion from US$ 39 billion in 2020, accounting for 5.2% of global FDI. The share of Africa in the FDI inflows of developing economies increased from 6.0% in 2020 to 9.9% in 2021 **(Chart 1.5)**. The number of international projects in renewables in Africa doubled between 2011 and 2021, from 36 to 71, including several megaprojects such as the power-to-x project for the construction of a 30 GW hydrogen plant in Mauritania (estimated at US$ 40 billion).

Chart 1.5: Africa's Foreign Investment Flows, 2013-2021



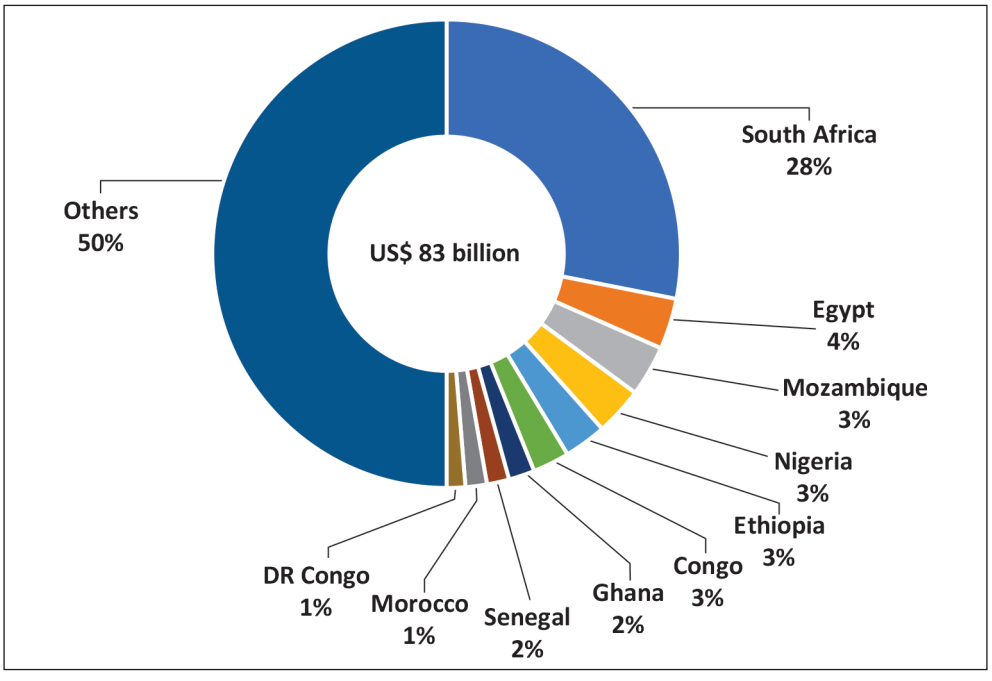
Source: UNCTADstat and India Exim Bank Research

Most recipients saw a moderate rise in FDI after the fall in 2020 caused by the pandemic. The total for the continent was inflated by a single intra-firm financial transaction in South Africa in the second half of 2021. Excluding that transaction, the increase in Africa is moderate, more in line with other developing regions. Southern Africa, East Africa and West Africa saw their flows rise; Central Africa remained flat and North Africa declined. Africa's share in global FDI inflows has increased from 3.9% in 2013 to 5.2% in 2021.

[8] The AfCFTA Secretariat's Guided Trade Initiative has been launched: How will it work and where does trade under AfCFTA rules now stand? Special Trade Brief, Tralac Law Centre.
[9] AfCFTA's Guided Trade Initiative takes off, set to ease and boost intra-African trade, October 2022

FDI in Africa is mainly concentrated in a few countries, with South Africa, Egypt, Mozambique and Nigeria being the top recipients in 2021. **Chart 1.6** depicts the major recipients of FDI inflows into Africa during 2021.

Chart 1.6: Major Recipients to FDI Inflows in Africa in 2021



Source: UNCTADstat and India Exim Bank Research

FDI flows to North Africa fell by 5% to US$ 9.3 billion in 2021. FDI inflows to Egypt dropped by 12% as large investments in exploration and production agreements in extractive industries were not repeated. Despite the decline, the country was the second largest host of FDI in the continent, with total FDI inflows of US$ 5.1 billion in 2021. Flows to Morocco rose by 52% to US$ 2.2 billion in 2021 as a large international project finance deal worth US$ 20 billion was announced for the construction of a 3,800 km transmission line to the UK with 3.6 GW of capacity, sponsored by Xlinks (UK).

FDI in West Africa increased by 48% to US$ 14 billion in 2021. Nigeria's FDI inflows doubled to US$ 4.8 billion in 2021, mainly because of the resurgence in oil investment and expansion in gas. FDI flows to Ghana rose by 39% to US$ 2.6 billion, again mainly owing to projects in extractive industries; for example, the construction of an US$ 850 million gold mining facility by Newmont Corp (USA) and the construction of a cement factory by Ciment d'Afrique (CIMAF) (Morocco) for US$ 436 million.

FDI to East Africa grew by 35% to US$ 8.2 billion in 2021. FDI inflows to Ethiopia reached US$ 4.3 billion with 80% of the projects in renewables. Chinese investments tripled in 2021 as Ethiopia remains a central hub for China's Belt and Road Initiative. Uganda saw its FDI rise by 31% to US$ 1.1 billion. FDI to Tanzania rose by 35% to US$ 922 million, and new greenfield project announcements tripled in value in the country.

FDI inflows to Central Africa remained stable at US$ 9.4 billion in 2021. FDI to DR Congo rose by 14% US$ 1.9 billion, with investment remaining buoyant because of flows in offshore oil fields and mining.

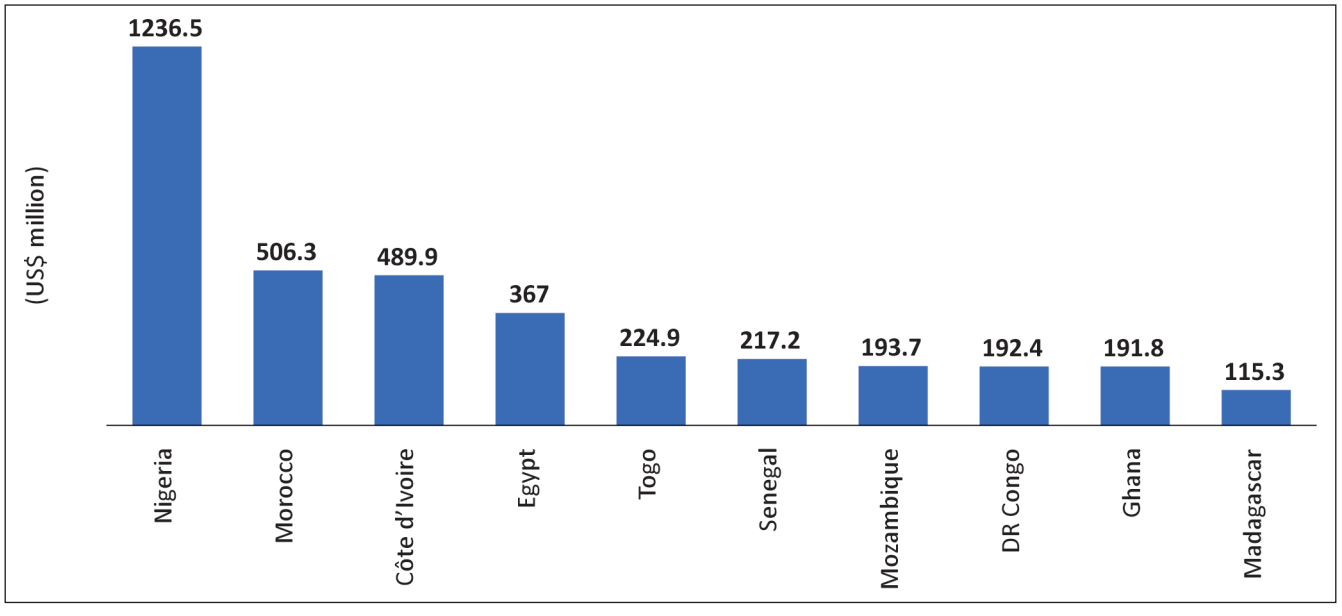
FDI inflows to Southern Africa jumped to US$ 42 billion in 2021 due to a large corporate reconfiguration in South Africa – a share exchange between Naspers and Prosus in the third quarter of 2021. Despite the overall

positive FDI trend on the continent, total greenfield announcements remained limited at US$ 39 billion, showing only a modest recovery from the low of US$ 32 billion in 2020 (down from US$ 77 billion in 2019).

In contrast, international project finance deals targeting Africa showed a rise of 26% in number (to 116) and a resurgence in value to US$ 121 billion (compared to US$ 36 billion in 2020). The rise was supported by strong investments by multilateral finance and capital market investors targeting power (US$ 56 billion) and renewables (US$ 26 billion). European investors remain by far the largest holders of foreign assets in Africa, led by the UK (US$ 65 billion) and France (US$ 60 billion).

FDI outflows from Africa increased to US$ 2.7 billion in 2021, from (-) US$ 622.5 million in 2020. However, it remained below the pre-pandemic level of US$ 4.9 billion in 2019. The highest outflows were from Nigeria and Morocco and directed to other African countries **(Chart 1.7)**.

Chart 1.7: Major Source of FDI Outflows from Africa in 2021



Source: UNCTADstat and India Exim Bank Research

The negotiations on investment of the AfCFTA commenced in March 2021, and subsequent rounds of discussions started in March 2022. The AfCFTA Protocol on Investment will aim at promoting, facilitating, and protecting intra-African investment that fosters sustainable development while safeguarding the State Parties' right to regulate. Once concluded, the investment protocol would offer a great opportunity for convergence and coherence in investment regulation in Africa.

Preliminary estimates by the UNCTAD in April 2023 reveal that global FDI inflows declined by 24% in 2022 in response to a tighter financial environment, continued geopolitical challenges and concerns about a looming recession. While Africa's trade and output may get an impetus with the implementation of the AfCFTA, the region's overall outlook remains subject to downside risks. These include the Russia-Ukraine conflict and its negative impacts on Africa's trading partners like the EU and the US. Sharp increase in interest rates resulting from inflation and heightening geopolitical tensions have also led to lower external demand as well as higher debt burden among the African economies. In the long run, however, Europe's quest for alternative energy sources may benefit Africa.

Increasing public debt, reaching over 60% of GDP and the heavy burden of debt servicing have been a cause of concern for many African countries. Debt trajectories remained different for countries, mostly depending on the economic structure of concerned countries. Bilateral creditors have offered pandemic-related debt relief and relatively low interest rates to support these economies, however, debt remains unsustainable in several African countries.

Though African economies are expected to face difficulties in 2023 with a range of internal and external shocks threatening the region's growth prospects, most of the countries are expected to continue to grow as export prices are expected to remain reasonably high and competition for Africa's resources remains intense. Dedicated support from donors, including the IMF's allocation of additional Special Drawing Rights are also expected to foster growth in the region in 2023. Africa's growth can be further insulated by the effective implementation of the AfCFTA agreement, with a market of more than 1.3 billion people, through sustainable export diversification by leveraging intra-regional trade.

Chapter

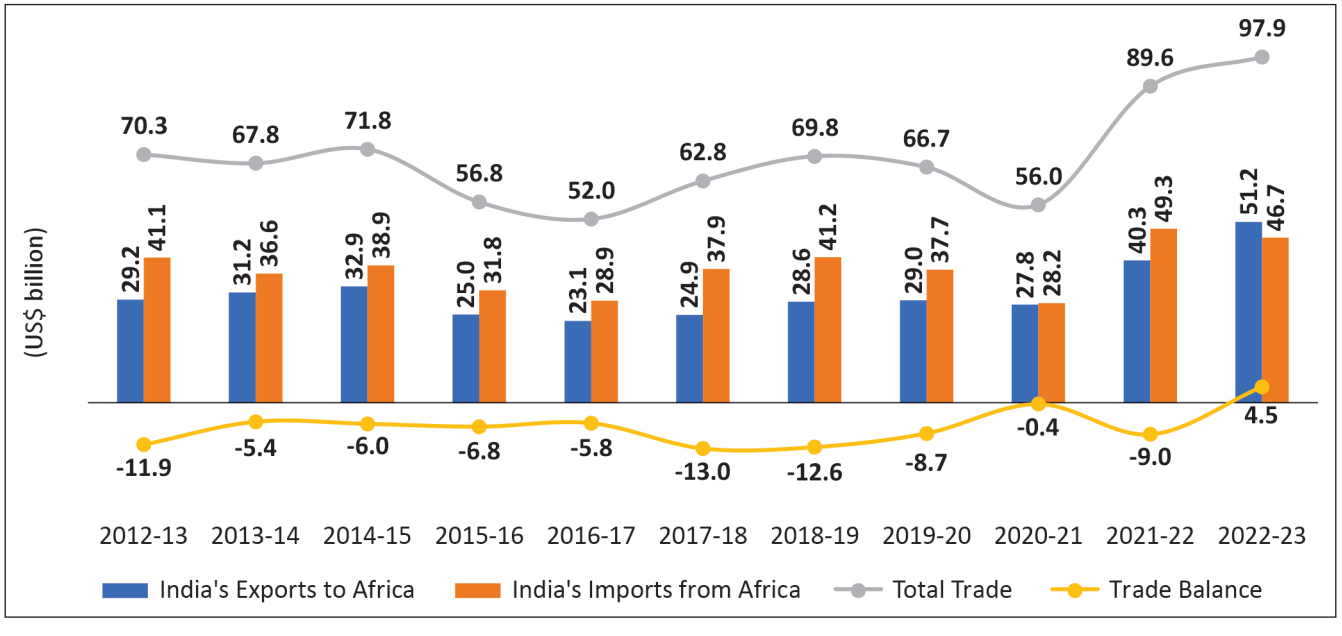
Trends in India-Africa Bilateral Trade and Investments

Africa is a dynamic continent, with unlimited commercial and development opportunities. The recent years have witnessed tremendous increase and deepening of economic and cultural exchanges and cooperation between India and Africa. The pandemic has further strengthened the existing developmental partnership guided by the Kampala Principles. With a view to facilitate and further enhance bilateral trade and commercial relations with countries in Africa, India has put in place important policy measures as also institutional frameworks to create an enabling trade and business environment. Major policy initiatives and institutional frameworks, among others, include, Focus Africa Programme, India's Duty Free Tariff Preference Scheme for Least Developed Countries (DFTP-LDC), Pan-African E-Network: India and Pan-African Countries Initiative (renamed as e-VidyaBharti and e-AarogyaBharti (e-VBAB) Network Project), IBSA Initiative, Interbank Cooperation Mechanism among BRICS members, and India-Africa Forum Summit.

Trends in India-Africa Merchandise Trade

India's total trade with Africa grew from US$ 70.3 billion in 2012-13 to US$ 97.9 billion in 2022-23, reaching the highest ever level witnessed by both regions **(Chart 2.1)**. In line with the global trends, India's trade with

Chart 2.1: India's Merchandise Trade with Africa



Source: Ministry of Commerce and Industry (MOCI), Government of India and India Exim Bank Analysis

Africa moderated in 2020-21, however, trade rebounded in 2021-22, growing by 60.1% and further by 9.3% in 2022-23. India's exports to Africa in 2022-23 were US$ 51.2 billion as compared to US$ 40.3 billion in 2021-22 (y-o-y growth of 27.3%) and US$ 29.2 billion in 2012-13. India's imports were to the tune of US$ 46.7 billion in 2022-23, as compared to US$ 49.3 billion in 2021-22 (y-o-y decline of 5.4%) and US$ 41.1 billion in 2012-13. The fall in imports was mainly due to India increasingly importing crude oil from alternate markets during the year.

While India's exports to Africa accounted for 11.4% share in India's total exports in 2022-23 (increasing from 9.5% in 2021-22), India's imports from Africa accounted for 6.5% share in India's total imports (decreasing from 8% in 2021-22). India was having a persistent negative trade balance with Africa, however, due to fall in imports, India's trade deficit with Africa turned into a trade surplus in 2022-23. India's trade surplus with the region stood at US$ 4.6 billion in 2022-23, as compared to a deficit of US$ 9 billion in 2021-22, and US$ 11.9 billion in 2012-13.

Major Export Partners

During 2022-23, South Africa remained the leading destination for India's exports to Africa, accounting for 16.5% of India's exports to the region. Other major export destinations include Togo, Nigeria, Egypt, Tanzania, and Kenya. Trends in India's exports to major markets in Africa are shown in **Table 2.1**. There has been a sharp increase in India's exports to Togo in recent years, majorly driven by exports of refined petroleum products.

Table 2.1: India's Major Export Destinations in Africa

Region/ Countries	2012-13 (US$ mn)	2021-22 (US$ mn)	2022-23 (US$ mn)	Share in India's Exports to Africa in 2022-23 (%)	Share in India's Global Exports in 2022-23* (%)
India's Exports to Africa	**29,161.5**	**40,262.5**	**51,249.6**	**100.0**	**11.4**
South Africa	5,106.9	6,085.3	8,474.4	16.5	1.9
Togo	299.9	3,012.1	6,048.1	11.8	1.3
Nigeria	2,740.0	4,663.2	5,159.4	10.1	1.1
Egypt	2,897.3	3,743.9	4,109.4	8.0	0.9
Tanzania	2,152.3	2,300.9	3,935.5	7.7	0.9
Kenya	3,770.3	2,631.9	3,273.7	6.4	0.7
Mozambique	1,001.2	1,975.8	2,506.5	4.9	0.6
Sudan	755.1	1,077.3	1,815.8	3.5	0.4
Djibouti	411.9	713.3	1,191.4	2.3	0.3
Senegal	490.2	953.6	1,134.2	2.2	0.3
Morocco	426.6	962.3	1,047.2	2.0	0.2
Ghana	744.1	1,109.5	964.2	1.9	0.2
Somalia	182.3	744.6	946.4	1.8	0.2
Benin	479.1	716.4	892.8	1.7	0.2
Côte d'Ivoire	396	728.6	887.8	1.7	0.2

Note: Including Eritrea and South Sudan; * India's global exports in 2022-23 stood at US$ 450,958.4 million

Source: Ministry of Commerce and Industry (MOCI), Government of India and India Exim Bank Research

Major Import Partners

As regards India's imports from Africa, South Africa dominated with a significant share of 22.3% of India's imports from the continent during 2022-23, followed by Nigeria, Guinea, Angola, Morocco, Tanzania, and Mozambique **(Table 2.2)**. As can be seen from the Table, India's imports from South Africa, Nigeria, Guinea, Egypt and Equatorial Guinea witnessed a decline compared to 2021-22. While imports of unworked non-industrial diamonds and manganese ores and concentrates witnessed major decline in case of India's imports from South Africa; India's imports of crude petroleum, liquefied natural gas and urea from Nigeria and Egypt witnessed a marked decline in 2022-23.

Table 2.2: India's Major Import Sources from Africa

Region/ Countries	2012-13 (US$ mn)	2021-22 (US$ mn)	2022-23 (US$ mn)	Share in India's Imports from Africa in 2022-23 (%)	Share in India's Global Imports in 2022-23* (%)
India's Imports from Africa	**41,121.6**	**49,321.1**	**46,651.6**	**100.0**	**6.5**
South Africa	8,887.9	10,965.8	10,397.8	22.3	1.5
Nigeria	12,086.1	10,291.6	6,692.7	14.3	0.9
Angola	7,157.5	2,725.1	3,599.3	7.7	0.5
Morocco	1,309.0	2,244.2	2,549.4	5.5	0.4
Tanzania	752.9	2,279.2	2,541.3	5.4	0.4
Mozambique	291.5	1,879.5	2,522.0	5.4	0.4
Guinea	527.8	3,616.6	2,082.8	4.5	0.3
Republic of Congo	454.7	1,309.7	2,026.2	4.3	0.3
Egypt	2,553.5	3,520.8	1,951.5	4.2	0.3
Ghana	277.6	1,497.8	1,909.6	4.1	0.3
Algeria	683.6	1,004.2	1,504.0	3.2	0.2
Senegal	0.4	696.2	1,377.4	3.0	0.2
Libya	1,834.8	358.2	729.9	1.6	0.1
Equatorial Guinea	524.8	885.6	712.0	1.5	0.1
Côte d'Ivoire	384.2	468.8	665.2	1.4	0.1

Note: Including Eritrea and South Sudan; *India's global imports in 2022-23 stood at US$ 714,042.4 million

Source: Ministry of Commerce and Industry (MOCI), Government of India and India Exim Bank Research

Major Traded Commodities

India's Exports to Africa

Petroleum products are the largest items in India's export basket to Africa, contributing 37.6% to India's total exports to Africa during 2022-23. Other important items of exports to Africa in 2022-23 include vehicles other than railway or tramway, cereals, pharmaceuticals products, machinery, sugar and confectionery, electrical machinery and equipment, plastics and articles, and cotton **(Table 2.3)**. The importance of Africa as India's export destination can be assessed from the fact that Africa accounted for 11.4% of India's global exports in 2022-23. Of which, India's export of mineral fuels, mineral oils and its products (mainly petroleum oils)

to Africa, itself accounts for 4.3%. At a disaggregated level, India's major exports to Africa include refined petroleum products; rice, semi-milled or wholly milled; medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, packaged for retail sale; light oils and preparations and refined sugar.

Table 2.3: India's Major Exports to Africa

HS Code	Commodity	2012-13 (US$ mn)	2021-22 (US$ mn)	2022-23 (US$ mn)	Share in India's Exports to Africa in 2022-23 (%)	Share in India's Global Exports in 2022-23* (%)
	India's Exports to Africa	**29,161.5**	**40,262.5**	**51,249.6**	**100.0**	**11.4**
27	Mineral fuels, mineral oils and products	7,743.0	8,667.8	19,285.5	37.6	4.3
87	Vehicles other than railway or tramway	3,176.5	4,178.9	4,248.6	8.3	0.9
10	Cereals	2,288.6	3,414.2	4,225.3	8.2	0.9
30	Pharmaceutical products	2,327.9	3,783.3	3,591.1	7.0	0.8
84	Machinery and mechanical appliances	1,502.5	2,373.8	2,558.1	5.0	0.6
17	Sugars and sugar confectionery	617.4	1,410.5	2,442.0	4.8	0.5
85	Electrical machinery and equipment	1,543.3	1,329.8	1,422.4	2.8	0.3
39	Plastic and its articles	737.6	1,509.5	1,164.1	2.3	0.3
52	Cotton	642.7	1,078.9	972.4	1.9	0.2
29	Organic chemicals	489.9	920.9	914.0	1.8	0.2
73	Articles of iron or steel	681.7	639.5	748.5	1.5	0.2
72	Iron and steel	955.5	1,422.3	678.5	1.3	0.2
38	Miscellaneous chemical products	232.3	604.7	632.7	1.2	0.1
02	Meat and edible meat offal	549.5	849.2	549.3	1.1	0.1
48	Paper, paperboard, articles of paper pulp	252.8	551.8	538.5	1.1	0.1

Note: Including Eritrea and South Sudan; * India's global exports in 2022-23 stood at US$ 450,958.4 million

Source: Ministry of Commerce and Industry (MOCI), Government of India and India Exim Bank Research

Imports

As is evident from **Table 2.4**, mineral fuels, mineral oils and its products (mainly crude) accounted for almost half of India's total imports from Africa during 2022-23. Other major imports from Africa include natural or cultured pearls, precious or semiprecious stones, inorganic chemicals, copper and articles, fertilisers, edible fruit and nuts and salt; sulphur; earths and stone. At a disaggregated level, India's major imports from Africa include crude petroleum, gold in unwrought form, coal, phosphoric acid, and unrefined copper. While India's major imports such as crude oil, unwrought gold, liquified natural gas, non-industrial unworked diamonds, manganese ore and urea undergone a sharp decline, products such as coal, phosphoric acid, cashew nuts, diammonium phosphate and natural calcium phosphate witnessed an increase in 2022-23.

Table 2.4: India's Major Imports from Africa

HS Code	Commodity	2012-13 (US$ mn)	2021-22 (US$ mn)	2022-23 (US$ mn)	Share in India's Imports from Africa in 2022-23 (%)	Share in India's Global Imports in 2022-23* (%)
	India's Imports from Africa	**41,121.6**	**49,321.1**	**46,651.6**	**100.0**	**6.5**
27	Mineral fuels, mineral oils and its products	28,724.4	24,271.8	21,633.4	46.4	3.0
71	Pearls, precious or semiprecious stones	5,554.8	10,757.4	9,547.4	20.5	1.3
28	Inorganic chemicals	987.4	1,826.9	2,485.2	5.3	0.3
74	Copper and its articles	392.4	2,087.8	2,376.2	5.1	0.3
31	Fertilisers	357.7	2,083.3	1,979.2	4.2	0.3
08	Edible fruit and nuts	924.5	1,269.1	1,845.8	4.0	0.3
25	Salt; sulphur; earths and stone	602.6	842.0	1,122.8	2.4	0.2
26	Ores, slag and ash	540.0	1,294.8	940.9	2.0	0.1
12	Oilseeds and oleaginous fruits	101.6	622.9	585.4	1.3	0.1
72	Iron and steel	989.7	320.6	563.5	1.2	0.1
07	Edible vegetables, certain roots and tubers	234.8	765.4	533.3	1.1	0.1
47	Pulp of wood or of other fibrous material	71.8	412.9	485.8	1.0	0.1
89	Ships, boats and floating structures	2.0	567.8	333.1	0.7	0.1
44	Wood and its articles	259.4	273.5	308.5	0.7	0.04
52	Cotton	249.6	181.8	264.3	0.6	0.04

Note: Including Eritrea and South Sudan; * India's global imports in 2022-23 stood at US$ 714,042.4 million

Source: Ministry of Commerce and Industry (MOCI), Government of India and India Exim Bank Research

Trade Balance

While India has constantly run a trade deficit with Africa over the last decade, trade balance turned into a surplus in 2022-23. As can be seen from **Table 2.5**, India has the largest trade surplus with Togo, Kenya and Egypt and the largest trade deficits with Angola, South Africa and Republic of Congo.

Table 2.5: India's Trade Balance with Major African Countries

(US$ million)

Country	2012-13	2021-22	2022-23
Togo	122.5	2635.2	5507.3
Kenya	3664.4	2486.5	3157.0
Egypt	343.9	223.1	2157.9
Sudan	628.0	948.1	1597.7
Tanzania	1399.4	21.7	1394.2
Djibouti	406.7	671.7	1135.5
Somalia	169.8	726.5	928.5
Ethiopia	710.3	618.8	528.5
Benin	233.4	314.3	440.2
DR Congo	147.3	537.0	417.0
Libya	-1619.5	-118.6	-392.0
Equatorial Guinea	-503.5	-873.1	-688.9
Algeria	405.2	-301.0	-890.1
Ghana	466.5	-388.3	-945.4
Guinea	-321.8	-3055.0	-1450.9
Morocco	-882.5	-1281.9	-1502.3
Nigeria	-9346.1	-5628.4	-1533.2
Republic of Congo	-255.6	-1148.7	-1847.7
South Africa	-3781.0	-4880.5	-1923.4
Angola	-6668.8	-2272.6	-2977.5

Source: Ministry of Commerce and Industry (MOCI), Government of India and India Exim Bank Research

India-Africa Green Trade

India's exports have witnessed tremendous growth over the last two years. Following the trend, India's exports of environmental goods also increased to US$ 17.3 billion in 2021 from US$ 12.7 billion in 2020 and US$ 13.6 billion in 2019. However, the share of environmental goods in Indian exports remain marginal at 4.4% in 2021, decreasing from 4.6% in 2020.

India's exports of environmental goods to Africa stood at US$ 1.7 billion in 2021, increasing from US$ 1.4 billion in 2020, and US$ 1.5 billion in 2019. Environmental goods accounted for 4.6% of India's exports to Africa, moderating from 5.2% in 2020 and 5% in 2019. In 2021, Africa accounted for 10% of India's overall exports in environmental goods.

Among African countries, Algeria had the highest share of environmental goods exports from India. Environmental goods accounted for 24% of India's exports to Algeria in 2021, witnessing a sharp jump from 9.7% share in 2020 **(Table 2.6)**. Algeria was followed by Burundi, Seychelles, and Ghana. African countries such as Lesotho, Botswana, Togo, Comoros and Chad had the lowest share in environmental goods exports from India in 2021.

Table 2.6: India's Environmental Goods Exports as Share of Total Exports (%) - Top African Countries

Partner Country	2016	2017	2018	2019	2020	2021
Algeria	14.7	5.9	6.8	6.1	9.7	24.0
Burundi	5.4	7.0	4.5	8.4	13.6	12.6
Seychelles	3.1	3.6	2.5	4.7	5.5	11.5
Ghana	8.3	9.1	8.8	8.3	9.0	11.1
Gabon	2.8	7.9	9.6	9.1	7.7	11.1
Mali	9.6	9.3	8.7	6.6	5.7	10.3
Equatorial Guinea	10.8	9.1	6.1	12.1	9.3	10.0
Rwanda	8.1	7.7	23.9	14.2	13.6	8.3
Angola	3.8	5.6	6.8	7.4	10.5	7.9
Zambia	7.5	7.9	6.4	8.3	9.3	7.8
Uganda	9.8	9.6	9.4	8.2	8.1	7.5
Nigeria	8.2	9.5	12.6	12.3	12.2	7.0
Malawi	5.4	4.7	6.4	6.5	6.0	6.8
São Tomé and Príncipe	8.0	25.2	12.9	22.1	10.7	6.2
DR Congo	6.9	6.5	9.3	10.1	7.5	6.1

Source: IMF and India Exim Bank Research

India's global imports of environmental goods stood at US$ 33.7 billion in 2021, increasing from US$ 23.1 billion in 2020 and US$ 28.2 billion in 2019. However, the share of environmental goods in Indian imports declined to 5.9% in 2021 from 6.3% in 2020. Africa accounted for a meagre 0.9% of India's global imports of environmental goods in 2021.

India's imports of environmental goods from Africa stood at US$ 296 million in 2021, increasing from US$ 158.6 million in 2020, and US$ 193.8 million in 2019. Environmental goods accounted for a marginal 0.7% of India's total imports from Africa, increasing from 0.6% in 2020 and 0.5% in 2019. Environmental goods accounted for 7.2% of India's imports from Algeria in 2021, witnessing a sharp jump from 3.3% share in 2020 **(Table 2.7)**. Algeria was followed by Libya, Seychelles, and Egypt.

Table 2.7: India's Environmental Goods Imports as Share of Total Imports (%) - Top African Countries

Partner Country	2016	2017	2018	2019	2020	2021
Algeria	3.5	0.5	0.4	0.9	3.3	7.2
Libya	-	0.4	0.3	0.3	0.9	4.5
Seychelles	1.8	4.1	0.1	1.2	2.9	4.4
Egypt	1.1	1.0	4.9	5.6	3.3	4.0
Mauritius	9.7	8.8	6.6	6.8	7.1	3.7
Niger	6.3	0.2	7.6	0.4	1.2	3.5
Tunisia	1.5	2.5	1.6	2.0	7.6	1.7
South Africa	0.8	0.5	0.9	0.7	0.7	0.9
Sierra Leone	0.1	0.04	0.02	0.3	-	0.7
Madagascar	0.3	0.5	0.4	0.2	0.3	0.6

Partner Country	2016	2017	2018	2019	2020	2021
Zimbabwe	0.02	0.003	0.01	0.0004	0.02	0.5
Kenya	1.5	1.3	0.5	1.6	0.9	0.4
Eswatini	4.1	10.0	12.1	42.3	19.5	0.4
Morocco	0.4	0.9	0.3	0.3	0.3	0.3
Rwanda	-	0.1	0.7	0.03	0.1	0.2

Source: IMF and India Exim Bank Research

Indian Investments in Africa

According to data from the Ministry of Finance, Government of India, and the Reserve Bank of India (RBI), approved[10] cumulative India's investments in Africa during April 1996 to March 2023 amounted to US$ 75.2 billion. Mauritius, Mozambique, Sudan, Egypt, and South Africa were the top destinations of India's investments in the African region **(Table 2.8)**. India's approved investments in Africa have largely been concentrated in Mauritius, with a share of 85% in India's total overseas direct investments to Africa, due to its status as a low-tax jurisdiction and the Double Taxation Avoidance Convention[11]. During 2022-23, the largest FDI recipients were Mauritius, Mozambique, Gabon, and South Africa, among the 32 African countries that received Indian investments.

Table 2.8: India's Overseas Investments in Africa

(US$ million)

Country	Apr 1996 - Mar 2014	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	1996-2023
Mauritius	38,630.2	4,580.8	3,670.4	5,392.7	1,387.1	3,086.8	2,940.0	2,496.8	872.2	828.6	63,885.7
Mozambique	2,665.9	7.7	1.7	8.0	37.3	40.2	150.4	323.1	2,261.4	133.5	5,629.2
Sudan	1,238.8	0.01	-	-	-		-	12.2	22.5	32.4	1,305.9
Egypt	963.4	17.6	8.3	1.0	13.8	22.0	0.2	0.2	0.6	2.0	1,029.2
South Africa	408.1	29.5	60.6	32.5	64.9	54.8	12.8	15.1	7.2	64.3	749.8
Kenya	163.3	6.1	3.8	7.8	28.1	20.7	22.0	16.4	7.5	11.0	286.8
Libya	247.2	7.4	0.1	0.5	0.6	5.2	1.0	0.1	0.1	14.8	276.9
Gabon	88.0	12.1	0.01	2.7	5.3	3.9	6.7	2.9	2.1	89.1	212.7
Nigeria	105.9	12.7	0.6	5.0	4.3	9.7	12.3	34.8	2.7	11.6	199.6
Tunisia	113.4	-	82.2	0.1	2.5	-	-	-	-	-	198.2
Liberia	192.1	0.2	-	-	0.02	-	-	-	-	0.6	192.9
Zambia	23.2	41.7	79.7	10.8	10.2	2.6	3.6	4.1	4.9	6.2	187.0
Morocco	84.6	14.9	21.7	11.5	18.5	13.4	8.2	4.9	8.8	0.02	186.4
Ethiopia	28.5	42.2	17.0	20.9	21.5	28.6	12.5	2.0	0.7	1.8	175.7
Tanzania	61.6	1.6	11.4	0.2	21.8	17.2	2.5	0.7	5.8	2.7	125.5
Africa Total	**45,282.7**	**4,790.2**	**3,970.5**	**5,520.9**	**1,651.6**	**3,335.5**	**3,208.7**	**2,935.1**	**3,228.4**	**1,257.9**	**75,181.5**
India Total	2,28,044.6	30,919.5	22,016.5	24,901.5	18,654.9	21,322.6	20,995.4	18,619.2	24,955.2	22,880.7	4,33,231.2
Share of Africa	***19.9%***	***15.5%***	***18.0%***	***22.2%***	***8.9%***	***15.6%***	***15.3%***	***15.8%***	***12.9%***	***5.5%***	***17.4%***

Note: - Negligible/ nil; * India's total Overseas Investment figure include investments in Gift City

Source: Ministry of Finance, Reserve Bank of India (RBI) and India Exim Bank Research

[10] Approved Overseas Direct Investment implies RBI approvals (financial commitments) for Overseas Direct Investment in Equity, Loan and Guarantees

[11] In 2016, the Indian government amended its tax treaty with Mauritius; after which, the preferential tax benefits were removed partially starting in the fiscal year of 2017 and removed completely starting fiscal year 2019.

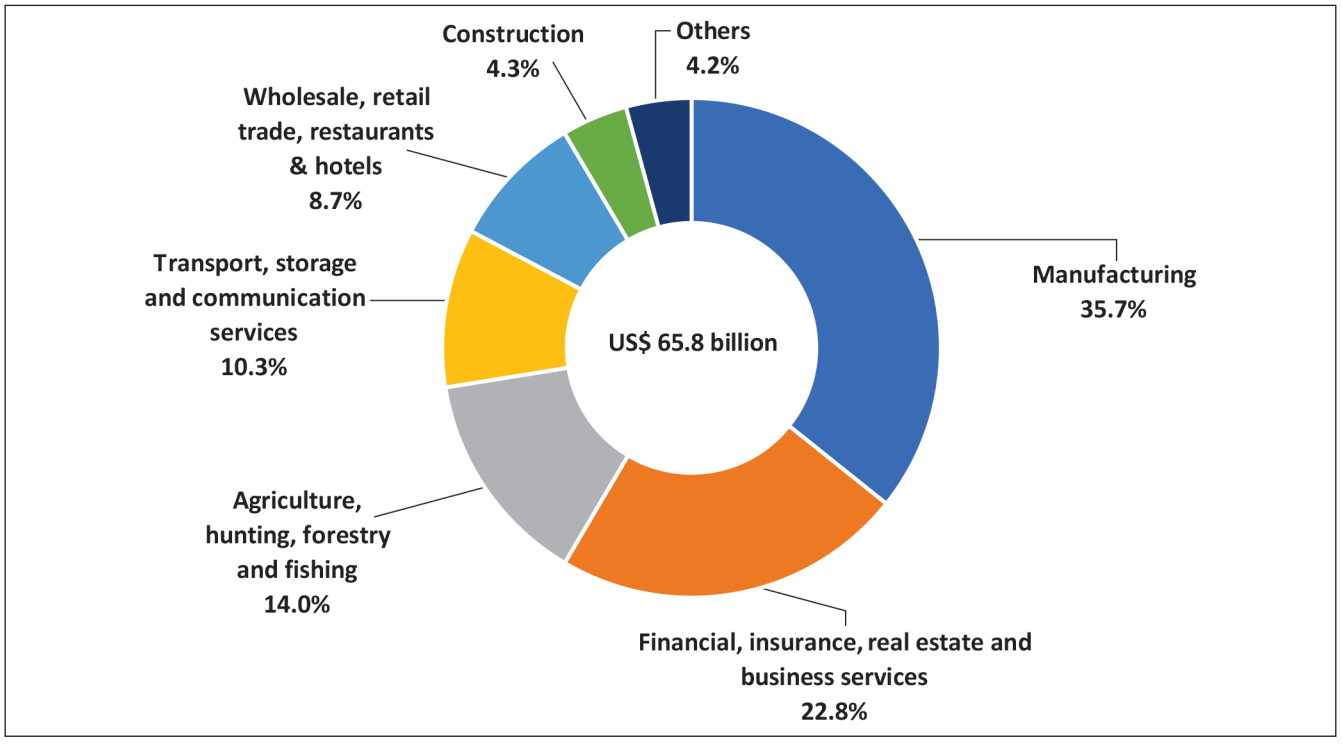
Setting up a Wholly Owned Subsidiary (WOS) is the most preferred route of investment for Indian investors in Africa, with nearly 81.6% of the total approved investments during April 2010 - March 2023. Joint Ventures (JV) accounted for 18.6% of the total approved investments during the same period. However, in 2022-23, share of JVs stood at 30%, reflecting growing collaboration between Indian and African companies.

Africa's manufacturing sector attracted the highest Indian investments during April 2010 - March 2023 **(Chart 2.2)**. Other major sectors attracting Indian investments include financial, insurance, real estate and business services, agriculture and allied sectors, transport, storage and communication services.

Mauritius accounted for 72.9% of India's investments in Africa during April 2010 - March 2023, in sectors like manufacturing, financial, insurance and business services and transport, storage and communication services, among others. Though most Indian investments in Mauritius were 'round-tripped' back to India, the country also serves as a gateway to Indian investments in Africa. However, with the given data, it is not possible to disaggregate the FDI data to know the volume of Indian FDI outflows that are routed through Mauritius to other countries. Sector-wise classification of major countries in Africa attracting investments from India are given in **Table 2.9**.

Mozambique is the second largest investment destination for India in Africa. Indian investments in Mozambique have been mainly concentrated towards mining, reflecting investments by ONGC Videsh Limited (OVL).

Chart 2.2: Sector-wise Indian Investments in Africa



Note: Legend is arranged based on the size of its share in total investments; others include electricity, gas and water and miscellaneous; and cumulative approved investments during April 2010- March 2023 stood at US$ 65.8 billion.

Source: RBI and India Exim Bank Research

Table 2.9: Country-wise Major Sectors Attracting Indian Investments in Africa, April 2010 - March 2023

Sector/ Major Countries	Share in the Respective Sector
Manufacturing	
Mauritius	93.0%
Tunisia	0.8%
South Africa	0.7%
Morocco	0.7%
Ethiopia	0.6%
Financial, insurance, real estate, and business services	
Mauritius	97.0%
South Africa	1.8%
Egypt	0.4%
Zambia	0.3%
Botswana	0.2%
Agriculture, forestry, fishing, and mining	
Mozambique	91.5%
Mauritius	6.8%
South Africa	0.3%
Zambia	0.3%
Uganda	0.2%
Transport, storage, and communication services	
Mauritius	99.8%
Kenya	0.1%
Mozambique	0.1%
Wholesale, retail trade, restaurants, and hotels	
Mauritius	97.7%
South Africa	1.0%
Uganda	0.5%
Ghana	0.3%
Kenya	0.2%
Construction	
Mauritius	97.6%
Nigeria	1.2%
Zambia	0.4%
South Africa	0.3%
Mozambique	0.2%
Uganda	0.1%
Kenya	0.1%

Sector/ Major Countries	Share in the Respective Sector
Community, social and personal services	
Mauritius	97.5%
South Africa	1.5%
Uganda	0.2%
Nigeria	0.2%
Guinea Republic	0.2%
Electricity, gas, and water	
Mauritius	44.4%
Zambia	34.7%
Egypt	13.9%
Ghana	4.4%
Seychelles	2.3%
Miscellaneous	
Mauritius	89.0%
Nigeria	11.0%

Note: - Negligible/ nil; cumulative approved investments during April 2010- March 2023 stood at US$ 65.8 billion

Source: RBI and India Exim Bank Research

The critical drivers of FDI inflows into Africa are mostly the availability of natural resources, market size, GDP, infrastructure development, trade openness covering imports and exports of goods and services – both intra-regional and extra-regional, and the strength of local currency.

FDI Inflows from Africa

FDI inflows to India from Africa have been dominated by investments from Mauritius that accounts for 25.8% of India's overall FDI inflows **(Table 2.10)**. Other African countries investing in India include South Africa, Seychelles, Morocco, and Kenya, among others.

Table 2.10: FDI Inflows to India from Africa, April 2000 – March 2023

Country	FDI Inflows (US$ mn)	Share in India's Total FDI Inflows (%)
Mauritius	1,63,876.1	25.8
South Africa	595.7	0.1
Seychelles	217.5	0.03
Morocco	140.9	0.02
Kenya	30.3	0.005
Nigeria	15.9	0.003
Mozambique	15.7	0.003
Liberia	14.7	0.002

Country	FDI Inflows (US$ mn)	Share in India's Total FDI Inflows (%)
Egypt	10.4	0.002
Uganda	10.2	0.002
Ghana	7.9	0.001
Total FDI from Africa	**1,64,960.0**	**26.0**
India Total	**6,34,561.8**	**100.0**

Source: Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Government of India and India Exim Bank Research

Chapter

2 Present Trends in Development Related Climate Financing in Africa

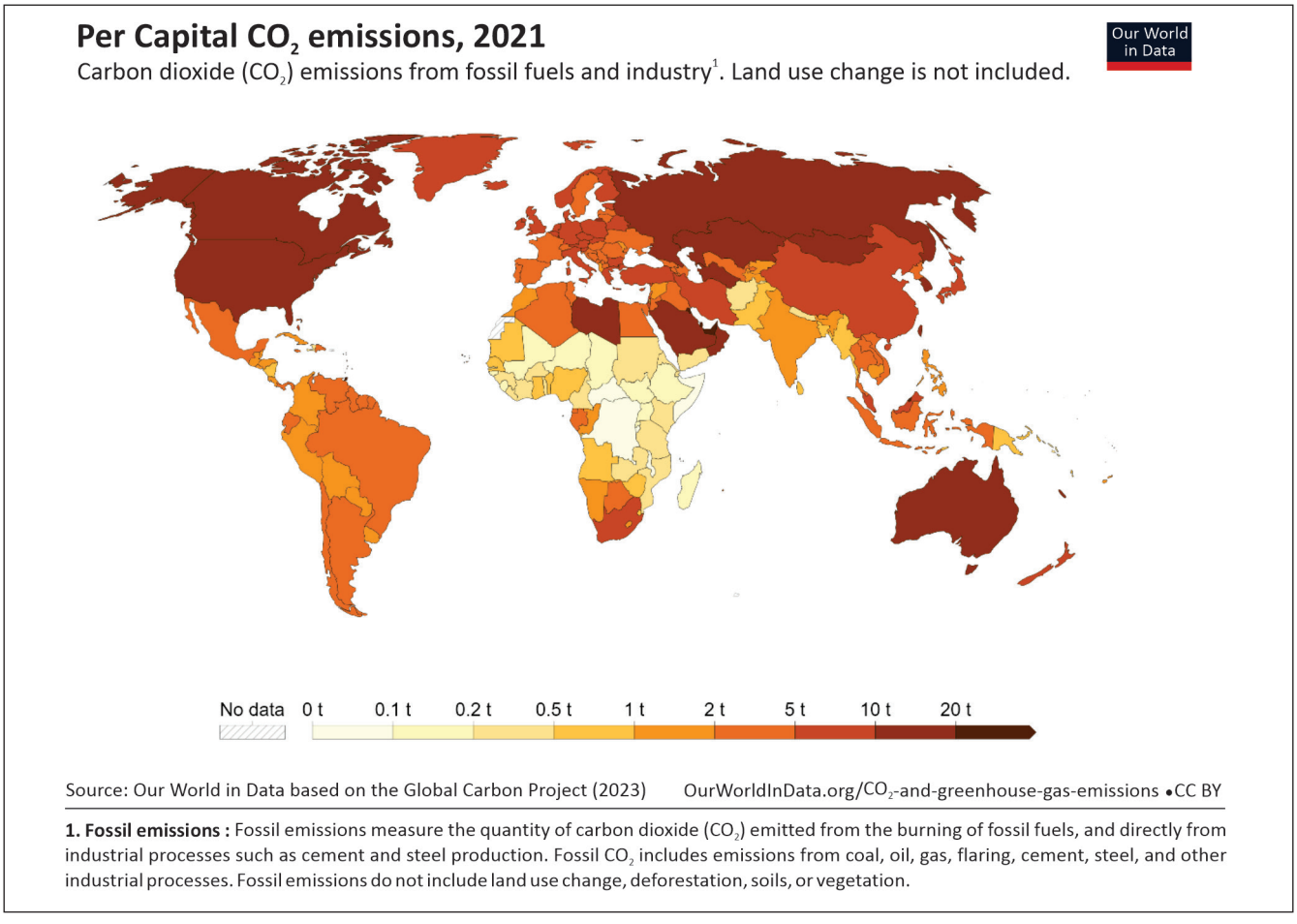
As per the report of the UN's Intergovernmental Panel on Climate Change dated August 9, 2021, the emissions of greenhouse gases (GHGs) from human activities are responsible for ~1.1°C of global warming since pre-industrial times. Africa accounts for the lowest share in terms of CO_2 emissions which has increased marginally from 3.5% in 2000 to 3.8% in 2020, whereas it accounts for 16% of the world's population. According to the UN, Africa remains the most vulnerable to impacts of climate change. Africa faces challenges ranging from lack of energy access to water scarcity, to acute food insecurity, and others, which have been aggravated by the COVID-19 pandemic, Russia – Ukraine conflict, rising debt, and climate change-induced severe weather conditions. Accordingly, commitments to green growth methods are necessary for sustainable growth and development in Africa.

Most of the developing countries have been developing first in a high carbon-intensive way and try for decarbonization at a later stage of development. This is no longer possible and has become an immediate challenge for these countries. Developing economies need immediate investments to slow a changing climate and enable billions to live safer, more prosperous, inclusive and sustainable lives.

Prosperity is a primary driver of CO_2 emissions, but clearly policy and technological choices make a difference. Many countries in the world still have very low per capita CO_2 emissions. In many of the developing countries in Sub-Saharan Africa, such as Chad, Niger and Central African Republic, the average footprint is around 0.1 ton per year, which is more than 160 times lower than the US, Australia and Canada. In just 2.3 days, the average American or Australian emits as much as the average Malian or Nigerien in a year. In fact, when compared against the global average of 4.69 ton per capita, only Libya and South Africa breach the world average, with Libya emitting 11.06 ton per capita and South Africa emitting 7.34 ton per capita in 2021. India emitted 1.93 ton per capita in 2021 as compared to 8.05 ton emitted by China and 14.86 ton per capita emitted by the US. DR Congo was the lowest emitter per capita at 0.03 ton in 2021 among the African economies[12].

[12] Hannah Ritchie, Max Roser and Pablo Rosado (2020) - "CO_2 and Greenhouse Gas Emissions", Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/co2-and-greenhouse-gas-emissions'

Exhibit 3.1: Global Per Capita Carbon Dioxide Emissions



Source: Our World in Data based on the Global Carbon Project

Climate Change Vulnerability and Readiness

The Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index[13] summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. Based on 2020 data, 182 countries are rated, with the aim of helping governments, businesses and communities better prioritize investments for a more efficient response to the immediate global challenges ahead. The ND-GAIN scores reflect a country's ability to adapt to climate change based on its vulnerability and readiness. Among 182 economies, Mauritius was ranked at 46 with an overall score of 56.96 out of 100, followed by Morocco and Tunisia, among others.

The Readiness Indicator of ND-GAIN measures a country's ability to leverage investments and convert them to adaptation actions. It measures overall readiness of a country by considering three components – economic readiness, governance readiness and social readiness. In terms of readiness, Mauritius accounted for the highest score among all the African countries at 0.57 as compared to the highest global rank holder Singapore with a score of 0.804. Other African countries which emerged as climate ready are Seychelles, Cape Verde, Tunisia, Botswana, Morocco, and Rwanda. All these countries' readiness scores were equal to or more than

[13] gain.nd.edu

the average of the 182 country scores that are ranked. However, the countries which were least ready as per the index were Central African Republic, Chad, DR Congo, Eritrea, and Zimbabwe, among others.

The Vulnerability Parameter measures a country's exposure, sensitivity and capacity to adapt to the negative effects of climate change. It measures overall vulnerability by considering six life-supporting sectors – food, water, health, ecosystem service, human habitat, and infrastructure. The most vulnerable countries were Niger, Guinea Bissau, Chad, Sudan, Liberia and Mali, whereas the least vulnerable were Morocco, Algeria, Tunisia, Cape Verde, South Africa and Gabon, among others.

Out of all the 182 countries that are ranked by the ND-GAIN index, the top 10 most vulnerable countries in the world belong to Africa **(Table 3.1)**. The high vulnerability and low readiness scores of most of the African countries imply greater need for investment and innovation to improve readiness and urgency for climate adaptation.

Table 3.1: Country Rankings in terms of Vulnerability and Readiness Towards Climate Change

ND- GAIN Rank	Country	ND – GAIN Score	Vulnerability Score	Readiness Score
46	Mauritius	56.96	0.43	0.57
66	Morocco	52.61	0.38	0.43
67	Tunisia	52.48	0.39	0.44
72	Cape Verde	51.54	0.41	0.44
82	Seychelles	49.46	0.47	0.46
89	Botswana	48.34	0.47	0.43
96	South Africa	47.44	0.42	0.36
99	Algeria	47.05	0.39	0.33
108	Namibia	45.12	0.47	0.38
109	Egypt	45.11	0.44	0.34
111	Ghana	43.99	0.47	0.35
112	India	43.98	0.51	0.39
115	Gabon	43.70	0.42	0.30
122	Djibouti	42.43	0.48	0.33
124	Rwanda	42.00	0.59	0.43
125	Libya	41.85	0.43	0.27
127	Sao Tome and Principe	41.67	0.53	0.36
129	Lesotho	41.39	0.48	0.31
130	Togo	41.38	0.52	0.35
134	Senegal	40.90	0.53	0.35
139	Zambia	40.01	0.52	0.32
140	Equatorial Guinea	39.66	0.44	0.24
141	Swaziland	39.63	0.52	0.31
142	Cote d'Ivoire	39.61	0.51	0.31
143	Mauritania	39.33	0.57	0.36

ND- GAIN Rank	Country	ND – GAIN Score	Vulnerability Score	Readiness Score
144	Gambia	39.17	0.55	0.33
145	Tanzania	39.08	0.52	0.30
147	Guinea	39.03	0.53	0.31
148	Cameroon	38.96	0.48	0.26
150	Kenya	38.70	0.53	0.30
152	Benin	38.22	0.57	0.34
154	Angola	37.86	0.51	0.26
155	Sierra Leone	37.65	0.56	0.32
157	Mozambique	37.56	0.52	0.27
158	Nigeria	37.54	0.50	0.25
159	Comoros	37.50	0.53	0.28
161	Burkina Faso	37.18	0.55	0.29
162	Ethiopia	37.15	0.56	0.31
163	Malawi	36.99	0.55	0.29
165	Burundi	35.52	0.56	0.27
166	Uganda	35.39	0.58	0.29
167	Madagascar	35.27	0.56	0.27
169	Congo	34.84	0.52	0.22
170	Mali	34.73	0.60	0.29
173	Liberia	33.78	0.60	0.28
174	Zimbabwe	33.08	0.55	0.22
176	Niger	32.91	0.67	0.33
177	Sudan	32.28	0.62	0.26
178	Eritrea	31.08	0.59	0.21

Note: Higher the score, more the vulnerability and readiness; ND-GAIN Score = (Readiness Score – Vulnerability Score+1) * 50

Source: Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index and India Exim Bank Research

Climate Related Official Development Assistance

External development finance plays an important role to support developing countries in their transition to a low-carbon, climate-resilient and environmentally sustainable development pathway. This could be done through technical assistance to strengthen enabling environments and build capacity in developing countries, and through direct support to climate change and environmental activities.

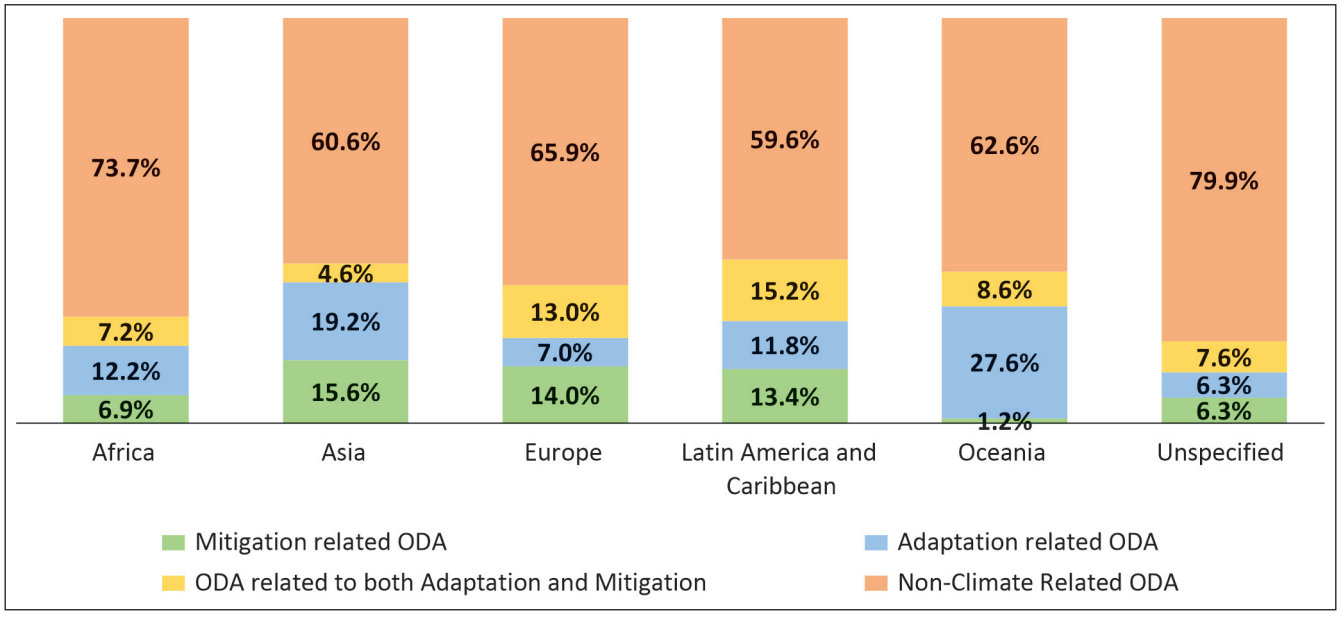
Climate change, environment and development are intrinsically linked. The design of the Sustainable Development Goals (SDGs) is grounded in the recognition of the fundamental interdependence of these issues. Environmental considerations are broadly reflected in the holistic nature of the proposed SDGs; achieving these goals will thereby require an integrated approach.

The year 2020 was initially the target year for meeting the US$ 100 billion goal of United Nations Framework Convention on Climate Change (UNFCCC) for total climate finance to be provided by developed countries to

developing countries. However, according to the OECD, it stood at US$ 83.3 billion, thereby falling short of US$ 16.7 billion of the goal.

The OECD reports that during the period of 2020-2021, the proportion of climate-related commitments allocated to African countries was notably lower compared to other regions. In Africa, climate-related official development assistance (ODA) accounted for 26% of the total commitments. In contrast, other regions consistently received higher proportions of climate-related ODA, with figures surpassing one-third of the total commitments. Specifically, Latin America and the Caribbean received 40% of their commitments for climate-related purposes, Asia received 39%, and Oceania received 37% **(Chart 3.1)**. These statistics highlight the relative disparity in climate-related funding between Africa and other regions during the mentioned period.

Chart 3.1: Regional Allocation of Bilateral Climate-Related ODA



Source: OECD Climate Related Official Development Assistance and India Exim Bank Research

Many economies in Africa have high debt and constrained fiscal budgets because of the pandemic and face higher government borrowing costs amid rising interest rates around the world, making it especially difficult for public finance to meet pressing climate financing needs. According to the IMF, concessional funding can narrow the gap between the private costs faced by the region and the social benefits enjoyed by the rest of the world, especially on mitigation. Concessional finance still dominates the flow of climate finance to the region, making it the most promising funding source in the immediate term.

Climate Finance in Africa

According to the Climate Policy Initiative (CPI) Africa 2022, the total cost of implementing nationally determined contributions (NDCs) in Africa is estimated at US$ 2.8 trillion over 2020-2030. Of this, African governments have committed to providing US$ 264 billion (about 10%), with the remaining US$ 2.5 trillion identified as climate finance needs.

Africa is currently confronted with a pressing and critical deficiency in financial resources to address climate adaptation, while the expenses associated with delaying necessary actions continue to escalate. An annual

average of US$ 29.5 billion in climate finance was committed to Africa in the years 2019 and 2020. This represented only around 11% of the estimated US$ 277 billion of climate financing needs annually to implement Africa's NDCs and climate goals by 2030. To tap a wide range of potential actors, it is necessary to build the enabling environment for adaptation investment and aggressively deploy innovative finance instruments at scale towards adaptation activities.

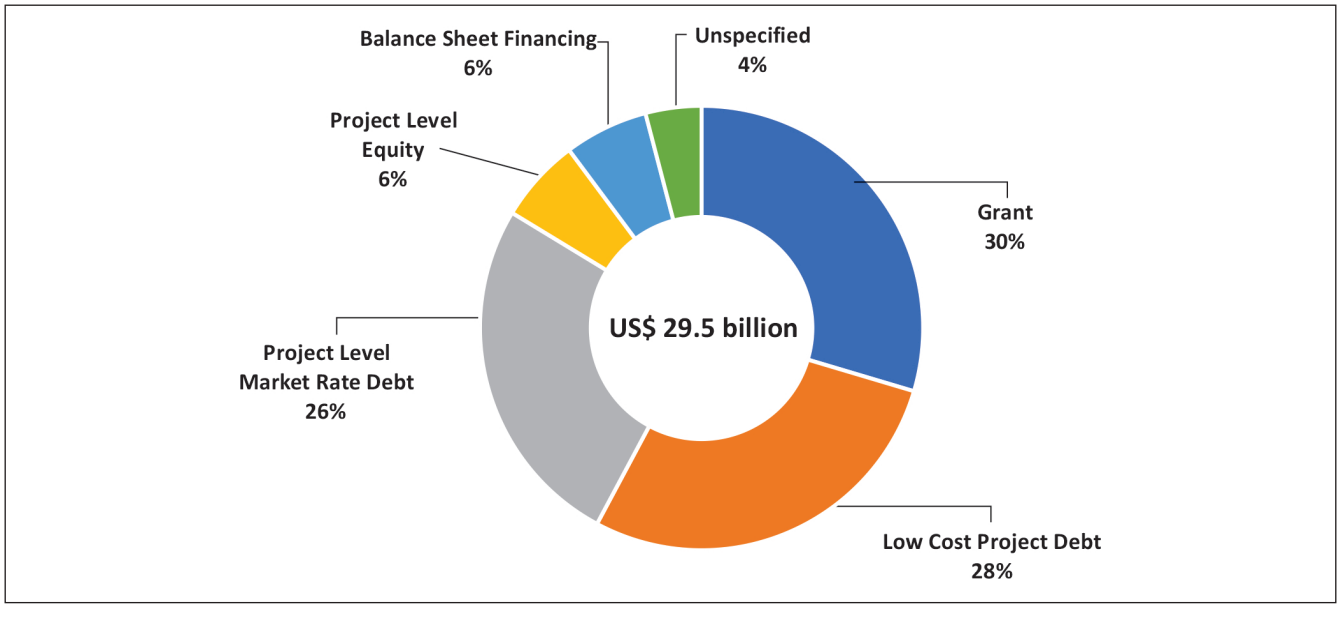
According to the CPI, notwithstanding the pandemic, public climate finance flows to Africa grew from US$ 22.3 billion in 2019 to US$ 24.3 billion in 2020. In Africa, climate finance flows have been allocated with 49% (US$ 14.6 billion) towards mitigation efforts, 39% (US$ 11.4 billion) for adaptation measures, and 12% (US$ 3.5 billion) for initiatives that cater to both measures. This distribution differs from other regions worldwide, where adaptation typically accounts for only 7% to 16% of the total climate finance. This trend is encouraging, considering Africa's heightened vulnerability to the impacts of climate change. However, there is a pressing need to significantly increase funding for both adaptation and mitigation.

Climate Financing in Africa - Instruments and Sectors

There are several instruments by which governments, banking and financial institutions and private investors can fund green projects. These include project specific grants, risk-mitigation instruments (credit enhancement guarantees and insurance products), equity, and debt instruments (green loans and bonds). It is important to start by establishing an attractive investment climate and policies to incentivize private participation. Climate policies and finance are complementary because better policies attract private investment, in turn helping to meet policy objectives. Carbon pricing is the most effective tool to make high emitters pay for the climate costs they impose and thereby channel private investment towards projects that emit less.

Loans comprising project level market debt and low-cost project debt were the most preferred instruments for climate financing in Africa, accounting for over 54% of total climate finance in the region, followed by grants accounting for a share of 30% **(Chart 3.2)**.

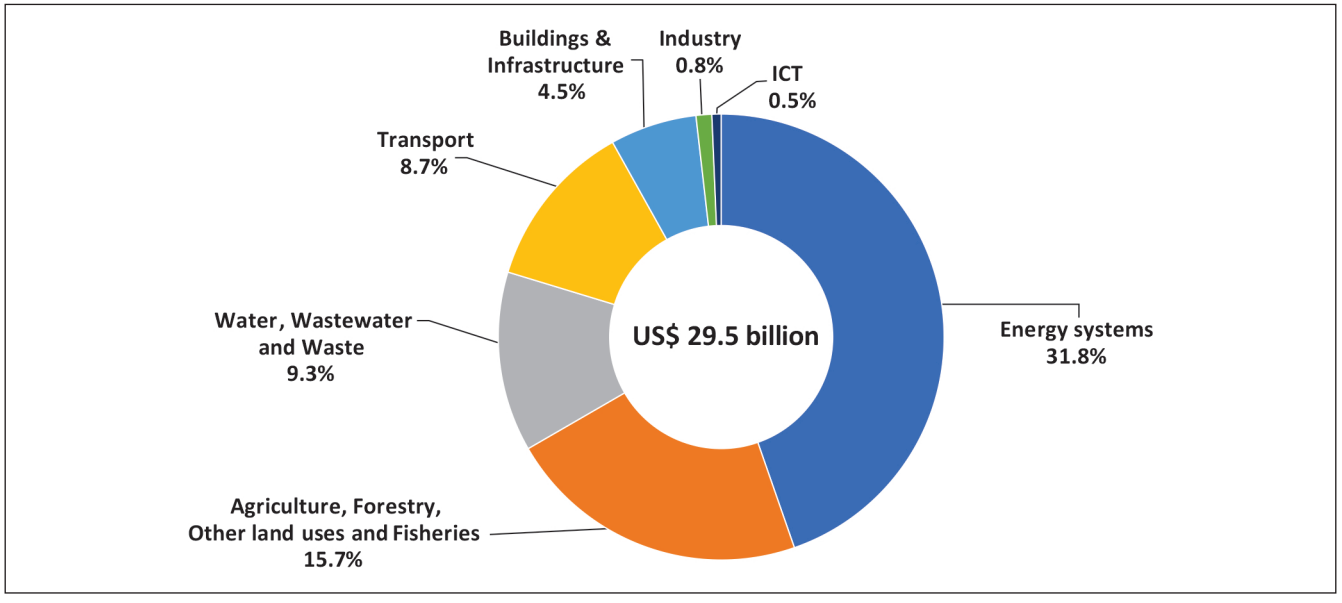
Chart 3.2: Instrument wise Climate Finance Flows in Africa (Annual Average 2019-2020)



Source: CPI Africa and India Exim Bank Research

As shown in **Chart 3.3**, energy systems accounted for the highest climate financing received in Africa, followed by agriculture, forestry, and other land use (AFOLU), and water, wastewater and waste sectors. These sectors are crucial for building resilience and adapting to the impacts of climate change in Africa.

Chart 3.3: Major Sectors Receiving Climate Financing in Africa (Annual Average 2019-2020)



Source: CPI Africa and India Exim Bank Research

Sources of Climate Financing in Africa

The majority of climate investment in Africa comes from public international actors (80%), followed by private sector finance (14%). However, contributions from African governments (4%) are often underreported due to inadequate tracking of domestic climate budget expenditures.

Multilateral Development Financial Institutions

Multilateral Development Financial Institutions (DFIs) were the largest source of public climate finance in the continent (around 40% of total international public climate finance flows) during 2019-2020, followed by bilateral development partners including bilateral DFIs (22%), international governments (16%) and climate funds (4%). 52% of the financing from multilateral DFIs went towards adaptation activities; 46% towards mitigation; and the remaining 2% towards projects with both measures.

Almost 40% of funding by multilateral DFIs were concentrated in five countries, Egypt, Morocco, Nigeria, Ethiopia, and Kenya. Cross-sectoral projects (31%), energy (24%), AFOLU (16%), transport (10%) and water (9%) were the key sectors financed by multilateral DFIs. Cross-sectoral projects include policy, budget, and capacity building (30%), R&D (10%), COVID-19 response and social protection (21%) and disaster-risk management (19%). Multilateral DFIs used a limited set of financial instruments to channel their investments. 77% of the funding was channelled through loans (47% at market rate and 30% at concessional rate), followed by 20% grants, and 3% equity financing. The energy sector was the largest recipient of loans whereas grants were used primarily for cross-sectoral adaptation projects and those in the AFOLU sector.

Bilateral Climate Financing in Africa

Germany and France emerged as the primary contributors of bilateral funding in Africa, with other European countries, Japan and UK also playing significant roles in providing finance. However, it is important to note that the majority of bilateral climate finance to Africa is often in the form of debt. On the other hand, climate-related development assistance from China remains largely under-reported due to limited or no official reporting on its specific contributions in this regard.

In December 2021, China, and the African Union Commission decided to establish the China-Africa partnership of strategic cooperation of the new era for the fight against climate change[14]. It aims to enhance coordination and cooperation in the multilateral process on climate, and jointly safeguard the legitimate rights and interests of China, Africa, and other developing countries. China has launched over 100 clean energy and green development projects under the framework of the Forum on China-Africa Cooperation to support African countries for utilizing solar, hydropower, wind, biogas and other renewable sources of energy. China has committed to further increase investment in Africa on low-emission projects including photovoltaic, wind and other renewable energies, energy-saving technologies, high-tech industries, and green and low-carbon industries, and decided to not build new coal-fired power projects abroad.

According to the China's Global Energy Finance (CGEF) Database by the Boston University, from 2000-2021, the China Development Bank (CDB) and Export-Import Bank of China (CHEXIM) committed US$ 49 billion in loans to African governments for 128 energy projects, representing over a third of CDB and CHEXIM's overseas energy projects. In terms of the type of energy projects these loans supported, the majority loans went to oil (US$ 18 billion), followed by hydropower (US$ 13 billion), coal (US$ 6 billion), gas/LNG (US$ 3 billion), wind (US$ 611 million), geothermal (US$ 480 million) and solar (US$ 367 million)[15].

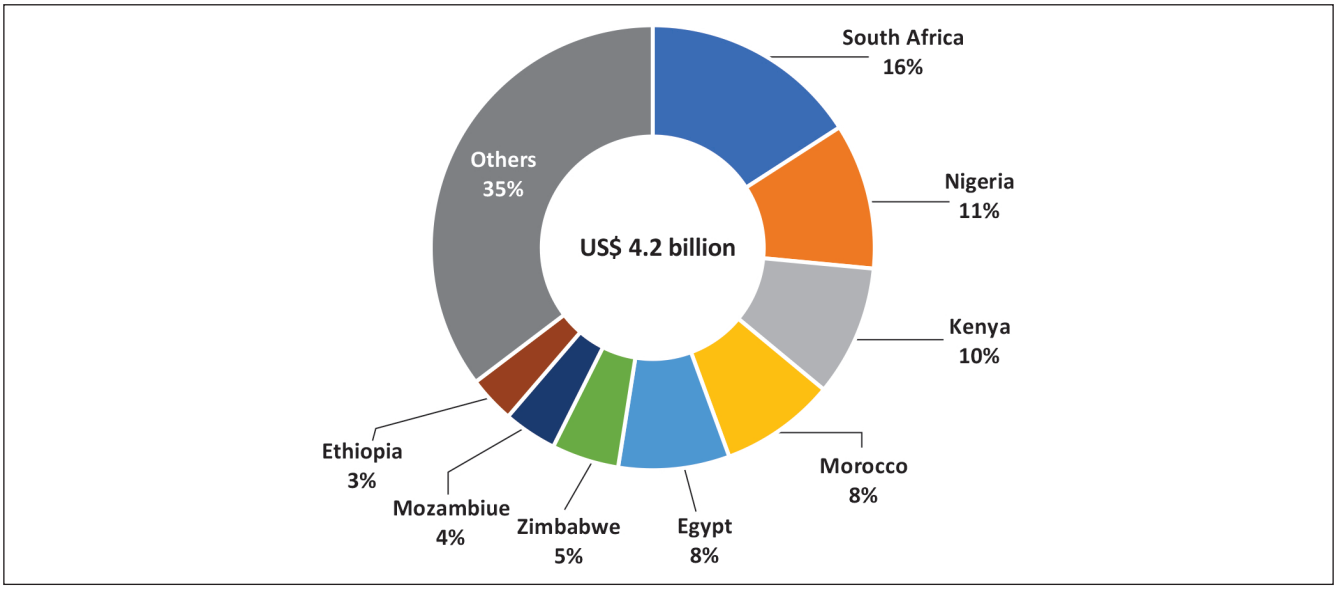
Private Finance in Climate Financing

Private finance in Africa remains concentrated in a few countries with more developed financial markets. Climate-related projects in Africa received US$ 4.2 billion in private investments during 2019-2020, representing only 14% of the total climate finance flows. In comparison, private climate finance as a percentage of total climate finance is much higher in other regions like Latin America & Caribbean (48%), East Asia & Pacific (38%), and South Asia (36%). Domestic sources accounted for 50% of private finance in Africa, followed by international sources (39%), and unknown sources (11%).

Larger African economies with political stability, favourable regulatory environments, and stronger local project developers attracted more private investment. Countries like South Africa, Nigeria, Kenya, Morocco, and Egypt accounted for over 50% of private finance **(Chart 3.4)**, while LDCs received 24% of total private financing, with Mozambique, Ethiopia, and Burkina Faso being the largest recipients. However, many essential elements for private sector participation, such as liquid bond markets, currency stability, and investment grade ratings, are not fully developed in African economies. This resulted in private finance remaining concentrated in a handful of countries in Africa that have more developed financial markets.

[14] Declaration on China-Africa Cooperation on Combating Climate Change, Ministry of Foreign Affairs of China, December 2022.
[15] Towards a Solutions-Oriented Approach: China, Africa and Energy Transition Narrative Building, Global Development Policy Centre, Boston University, November 2022.

Chart 3.4: Country wise Private Climate Financing in Africa (Annual Average 2019-2020)



Source: CPI Africa and India Exim Bank Research

Approximately 81% of Africa's private climate finance flows were directed towards mitigation projects, including renewable energy, energy efficiency, and sustainable transport. These investments primarily originated from corporates and commercial financial institutions. Limited private finance was allocated to adaptation initiatives due to perceived risks and low, unstable returns. Africa's largest share of private climate finance, amounting to US$ 3.1 billion (74%) was invested in energy systems, primarily renewables. Buildings and transport infrastructure received US$ 0.3 billion (7%) of private climate finance. These sectors are crucial for green growth, however, they face obstacles in attracting more private funding due to factors such as high capital requirements, governance barriers, lengthy construction processes, and a lack of incentives.

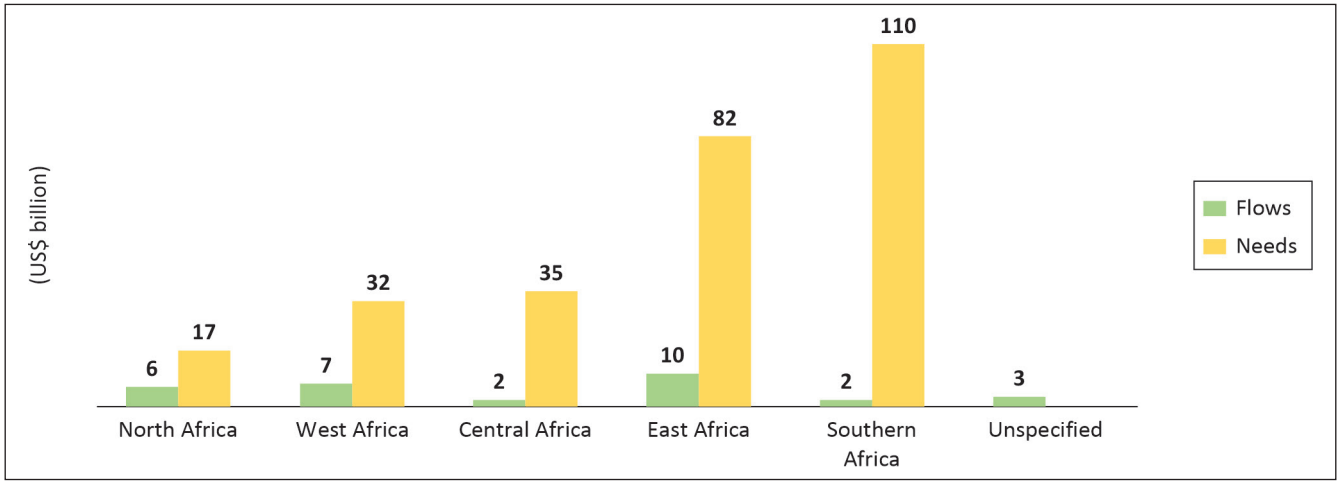
Agriculture, forestry, and other land use (AFOLU) as well as water are highly vulnerable sectors to climate change. However, they received only US$ 0.3 billion and US$ 0.4 billion, respectively, in private investments in 2019-20, with over 90% of the funding coming from international public financing sources. Private investment in these sectors is generally low due to their small-scale, cross-sectoral nature, difficulties in valuation, and challenges in attracting financiers. Cross-cutting areas such as capacity building, education, health, and food primarily rely on grants and donor funding and received only US$ 0.4 billion. Investments in industry and ICT buildings remain minimal.

Region wise and Sector wise Climate Finance Requirements in Africa

There is a significant disparity between the finance received and the actual needs across all regions in Africa, with varying investment gaps among countries. Comparisons between climate finance flows and needs at both the regional and country levels can be challenging due to factors such as geographic differences, economic contexts, methodologies used to estimate needs, and varying levels of vulnerability to climate change. West and North Africa received highest amount of climate financing flows. Among the African countries, Egypt received the highest climate financing amounting to US$ 2.6 billion, followed by Morocco (US$ 2 billion), Nigeria (US$ 1.9 billion), Kenya (US$ 1.9 billion) and South Africa (US$ 1.7 billion), among

others[16]. However, the Southern African region experiences the largest financing gap, primarily due to South Africa's high climate finance needs combined with one of the lowest levels of regional climate investment **(Chart 3.5)**.

Chart 3.5: Region wise Climate Finance Flows and Needs in Africa (Annual Average 2019-2020)



Source: CPI Africa and India Exim Bank Research

Mitigation actions offer the most significant opportunities for financing, representing 66% of the total financial need, equivalent to US$ 1.6 trillion. Within the mitigation category, four key sectors require the majority of funding: transport (58%), energy (24%), industry (7%), and AFOLU (7%). Following mitigation, adaptation measures require 24% of the funding, amounting to US$ 579 billion, while actions impacting multiple sectors account for 10%, totalling US$ 242.8 billion. In terms of adaptation finance, the main areas requiring funding are agriculture (25%), water (17%), infrastructure and buildings (12%), disaster prevention and preparedness (10%), and health (8%). These sectors are crucial for building resilience and adapting to the impacts of climate change in Africa.

It is imperative for multilateral development banks and private investors to increase financial flows to Africa. MDBs in particular will likely play an essential part in helping boost climate funding to Africa, as they already serve as a key source of long-term and concessional funding. On climate and other global public goods, the role of these institutions is evolving rapidly. Climate finance committed by MDBs in Sub-Saharan Africa has more than tripled since the 2010s, and they have valuable experience in financial structures that include guarantees, insurance, risk mitigating features, or other capital-market instruments to help address barriers to investment.

To mobilise the amount of investment, multilateral DFIs will need to increase concessional finance to Africa and use it more strategically to better leverage private capital. This includes domestic financial markets, which need to more than double in size by the second half of this decade. New capital sources, such as climate finance and carbon credits, can bring more international financial flows to bear. However, cross-cutting investment risks such as high debt burdens remain a challenge. Further, MDBs also have a key role in leveraging their existing climate expertise by improving data and information on climate projects for the private sector, through local capacity development and enhanced project identification and monitoring.

[16] Landscape of Climate Finance in Africa, Climate Policy Initiative, September 2022.

It may be noted that concessional finance by itself is unlikely to meet Africa's transition and adaptation needs, as the amounts required to fund adaptation and mitigation are immense. These factors mean mobilizing private capital on a large scale will be key to achieving their climate objectives. Still, concessional funding can play a critical role in expanding access to private sector capital by accelerating high-priority projects that can help unlock follow-on private investment or by allowing for risk-sharing arrangements that address the most pressing concerns of risk-averse investors. In this context, Africa urgently needs new ways of connecting public, private, and concessional finance to lift investment and close the gap between resources and needs.

Financial markets alone will not be sufficient, but combining public and private capital offers unique advantages by reducing investment risk and attracting greater funding. Multilateral development banks and international financial institutions can provide support through creating blended financing structures to alter the risk-return profile for the climate transition in emerging economies.

Sustainable Financing and India

In August 2022, India has formally updated its NDCs to fight climate change, confirming that it will reduce the emissions intensity of its GDP by 45% from 2005 levels by the year 2030, and to have installed capacity for non-fossil fuel-based power sources equivalent to the country's 50% requirement by 2030. In India's pursuit towards a sustainable growth, India requires an approximate US$ 2.5 trillion from 2015-2030, i.e., around US$ 170 billion per year[17].

With this aim, India has been developing suitable financing mechanisms in various sectors including tapping in green and sustainable bonds by various public and private players. Accordingly, India has made significant progress in facilitating and promoting sustainable finance projects in the country over the recent years. In India, the green bonds are one of the most popular and recognized means of raising sustainable finance. According to Fitch Solutions, the outstanding amount of green, social, sustainable, and sustainability linked (GSS+) bonds issued by Indian entities stood at US$ 19.2 billion by December 2022, accounting for 3.8% of the overall outstanding corporate bonds in India. In terms of issuance, green bonds accounted for the majority of labelled bonds issued in India, accounting for a total of US$ 20 billion by January 2023. Although the value of green bonds issued in India constituted a small portion of the total bond issuance, India maintained a favourable position compared to several advanced and emerging economies.

The Government of India issued a framework for Sovereign Green Bonds in November 2022, which will help in tapping the requisite finance from potential investors for deployment in public sector projects aimed at reducing the carbon intensity of the economy. The Government of India joined 43 other sovereign governments that have raised GSS+ bonds in January 2023. According to Climate Bonds, India is the sixth largest issuer of GSS+ bonds in the Asia Pacific Region. The use of proceeds has been earmarked for expenditures in grid scale solar and wind, decentralised solar such as solar water pumps for agriculture, green hydrogen, metro lines and afforestation. Indian state governments are also planning to tap the green bond market in the coming days. This is in addition to domestic issuances by a number of Indian public sector entities, municipal corporations and some large private sector issuers such as CLP Wind Farms, Hero Future Energies, Greenko, ReNew Power and JSW Energy, tapping green bonds; Shriram Transport Finance raising funds through social bonds; UltraTech Cement Ltd issuing sustainability-linked bonds (SLBs), etc, among others.

[17] Climate Policy Initiative

These are further supported by other Government of India initiatives such as the US$ 2.4 billion National Green Hydrogen Mission for making India a leading producer and supplier of Green Hydrogen in the world; US$ 4.3 billion energy transition project, in addition to programmes for green fuel, green energy, green farming, green mobility, green buildings, and green equipment, and policies for efficient use of energy. The government will also subsidise private-sector projects for battery energy storage, through which electricity from intermittent power sources like renewables could be stored and used in other areas.

Box 3.1: India Exim Bank's Sustainability Bond

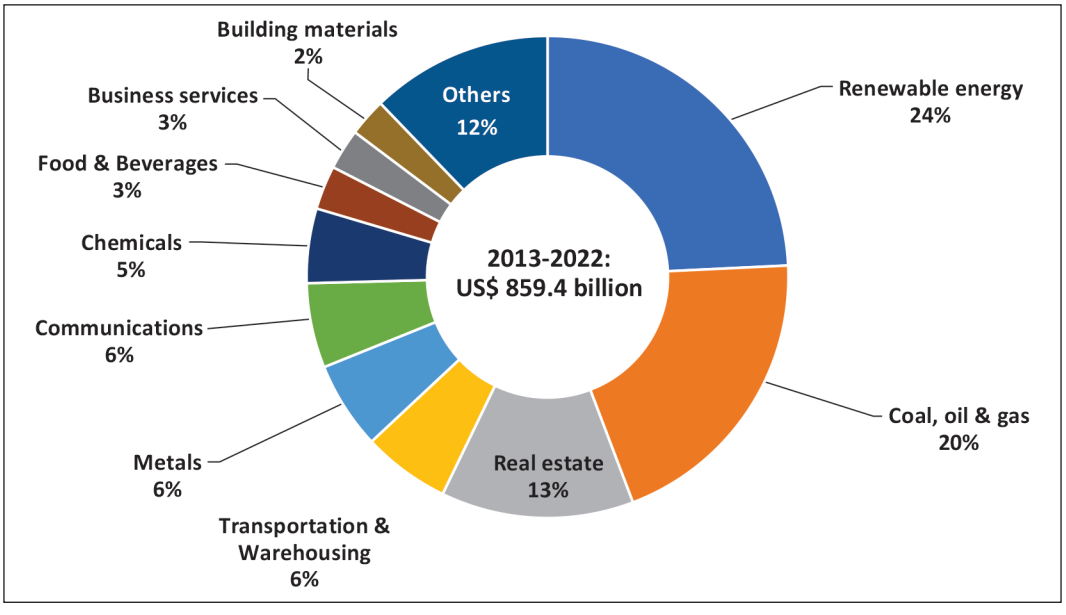
India has made significant progress in facilitating and promoting sustainable finance projects in the country over the recent years. Aligning itself with India's climate goals, India Exim Bank has consistently been enhancing its Environmental, Social and Governance (ESG) initiatives, while promoting sustainable banking both in India as well as internationally. India Exim Bank's ESG framework to issue green, social or sustainable bonds and loans outlines the Bank's intent to enter into sustainable financing transactions to finance projects that have a positive environmental and/or social impact while supporting its business strategy. The framework defines eligibility criteria in six green and four social areas, viz. renewable energy, sustainable water and wastewater management, pollution prevention and control, clean transportation, green buildings, energy efficiency, access to essential services and basic infrastructure, food security and sustainable food systems, MSME financing, and affordable housing. India Exim Bank issued its maiden benchmark-sized 10-year Sustainability Bond of US$ 1 billion under its ESG Framework on January 10, 2023. The issuance has made India Exim Bank the first Indian issuer to access the markets for sustainability bond issuances in 2023, apart from making it the largest ever single tranche Investment Grade (IG) Environmental Social Governance (ESG) issuer out of India. Previously, the Bank had issued a 5-year Reg S Green Bond of US$ 500 million in 2015 and a US$ 50 million Socially Responsible Bond in 2019.

Chapter 4

Opportunities in Green Business for India-Africa Trade and Investment

Africa has been receiving considerable investments during the past decade due to its abundant resources and growing markets besides enormous development needs. **Chart 4.1** shows the major sectors where foreign capital expenditure has been announced in Africa during 2013 to 2022. Renewable energy accounted for 24% share in sectors attracting envisaged capital investment in Africa between 2013 to 2022. However, it may be noted that between 2013 to 2021, coal, oil and gas was the sector attracting major investments, accounting for a share of 23.4% of investments received by Africa, followed by renewable energy (13.6%), and real estate (6.6%) sectors, among others.

Chart 4.1: Global Envisaged Capital Expenditure in Africa



Source: fDi Markets, Financial Times[18] and India Exim Bank Research

However, these investments remain insufficient for Africa's green transition. Some of the risks that reduce investor appetite to invest in the continent are currency instability, regulatory and governance problems, lack

[18] fDi Markets tracks cross-border investment in a new physical project or expansion of an existing investment which creates new jobs and capital investment. This data differs from official data on FDI flows as company can raise capital locally, phase their investment over a period of time, and can channel their investment through different countries for tax efficiency.

of bankable project pipelines, counterparty risks, lack of technical capacity, transparency and accountability mechanisms and asymmetric information. Credible data on climate financing remains another major challenge. Also, climate change financing needs to be new and additional and not reallocated from other developmental needs.

According to the UNCTAD, exports by African countries continue to remain the least diversified globally as commodities account for more than 60% of total merchandise exports in 45 of the 54 countries in Africa, leaving them highly vulnerable to global commodity price shocks and undermining the continent's inclusive growth and development prospects. The mining industry remains highly energy intensive due to exploration activities and also consumes a lot of water. This challenge could be turned to an opportunity if the circular mining could be introduced.

Another challenge that Africa may face is the impact of the European Union's Carbon Border Adjustment Mechanism (CBAM). The CBAM is being introduced by the EU to prevent "carbon leakage" or less stringent carbon emission norms prevalent in trading partners, or the EU companies invest in companies abroad to evade the emission norms applicable in the EU. The CBAM will initially apply to imports of certain goods and selected precursors whose production is carbon intensive and at most significant risk of carbon leakage: cement, iron and steel, aluminium, fertilisers, electricity, and hydrogen. Under the political agreement, the CBAM will enter into force in its transitional phase as of October 1, 2023.[19] The impact on African countries would be larger as a share of their GDP, than on all other regions as the EU is a particularly important export market for African countries, accounting for 26% of Africa's exports of fertiliser, 16% of iron and steel, 12% of aluminium and 12% of cement. Africa's exports of several important commodities to the EU are relatively more carbon intensive than Africa's competitors. The CBAM could cause a fall in exports from Africa to the EU of aluminium by up to 13.9%, iron and steel by 8.2%, fertiliser by 3.9% and cement by 3.1%[20].

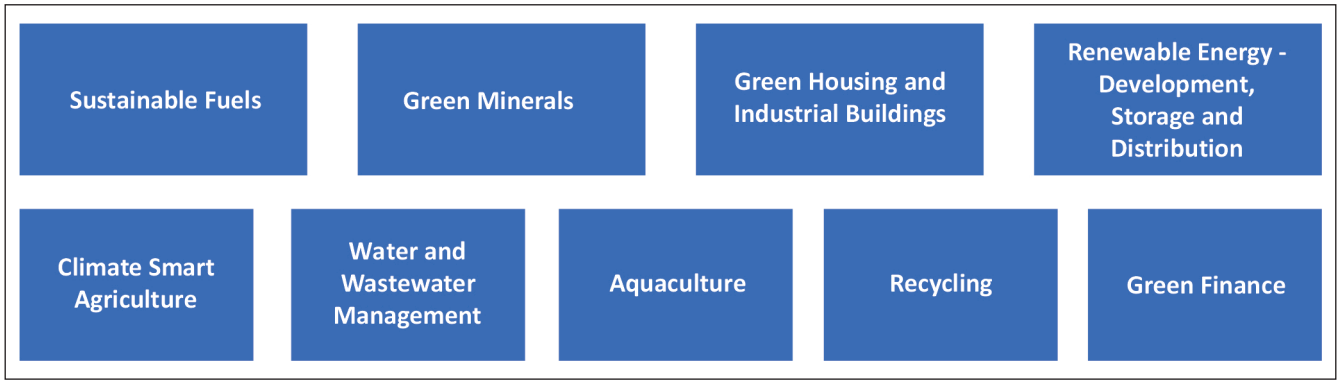
Potential Opportunities for Sustainable Trade and Investment in Africa

Post-Covid Africa's special needs in supporting climate resilience amidst its quest for a just energy transition has become more significant. As global investments in Africa are extending beyond extractives and other traditional sectors, opportunities are flourishing in new value chains, from sustainable agribusiness to renewable energy. Having some of the fastest growing global economies, large human capital base, abundant natural resources, diverse biodiversity, and huge renewable energy potential coexisting with low levels of development, low legacy high-emissions infrastructure and low project finance default rates (AfDB estimates of 5.5%) offer greatest potential for green investment, technology, and green growth in Africa. Despite these potentials, the continent has been underperforming in green trade, green innovation, and green investment. It is an opportune time for African countries to invest in infrastructure that lays the foundation for low carbon and climate resilient economies.

India, being a trusted development partner for Africa, is exploring newer avenues to strengthen and advance its engagement with the African region, with a focus on green transition to combat and mitigate climate change impacts. African countries and India can forge mutually useful collaborations in the following areas.

[19] https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en
[20] Implications for African Countries of a Carbon Border Adjustment Mechanism in the EU, London School of Economics.

Chart 4.2: Potential Sectors for India-Africa Collaboration in Green Trade and Investment



Investment in Clean Energy

Africa accounts for only 3.8% of global greenhouse gas emissions, in contrast to 23% in China, 19% in the US, and 13% in the EU.[21] However, the region remains highly vulnerable to climate change and continues to suffer its consequences in the form of regular droughts and floods, leading to food insecurity and threat to life and livelihoods. The surface temperature of the continent has already risen faster than the world average. Similarly, over 600 million Africans, the most of whom live in rural regions, lack access to electricity, and 900 million do not have access to clean cooking facilities. Apart from deforestation, four out of every five Africans cook with solid biomass, resulting in an estimated 600,000 fatalities per year due to indoor air pollution.

Africa has enormous energy potential to harness in addition to natural gas. It has significant quantities of other resources, including forests and minerals, arable land, water, and wind, and thus, the continent is capable of producing enough clean energy to meet the needs of its people and to industrialize, while supporting sustainable development. According to IRENA's Report on Scaling Up Renewable Energy Deployment in Africa, the continent has the potential to install 310 gigawatts (GW) of clean renewable power—or half the continent's total electricity generation capacity, to meet nearly a quarter of its energy needs by 2030.[22] This corresponds to a seven-fold increase from the capacity available in 2017, which amounted to 42 GW. A transformation of this scale would result in carbon dioxide emissions reductions of up to 310 mega tonnes per annum in Africa.

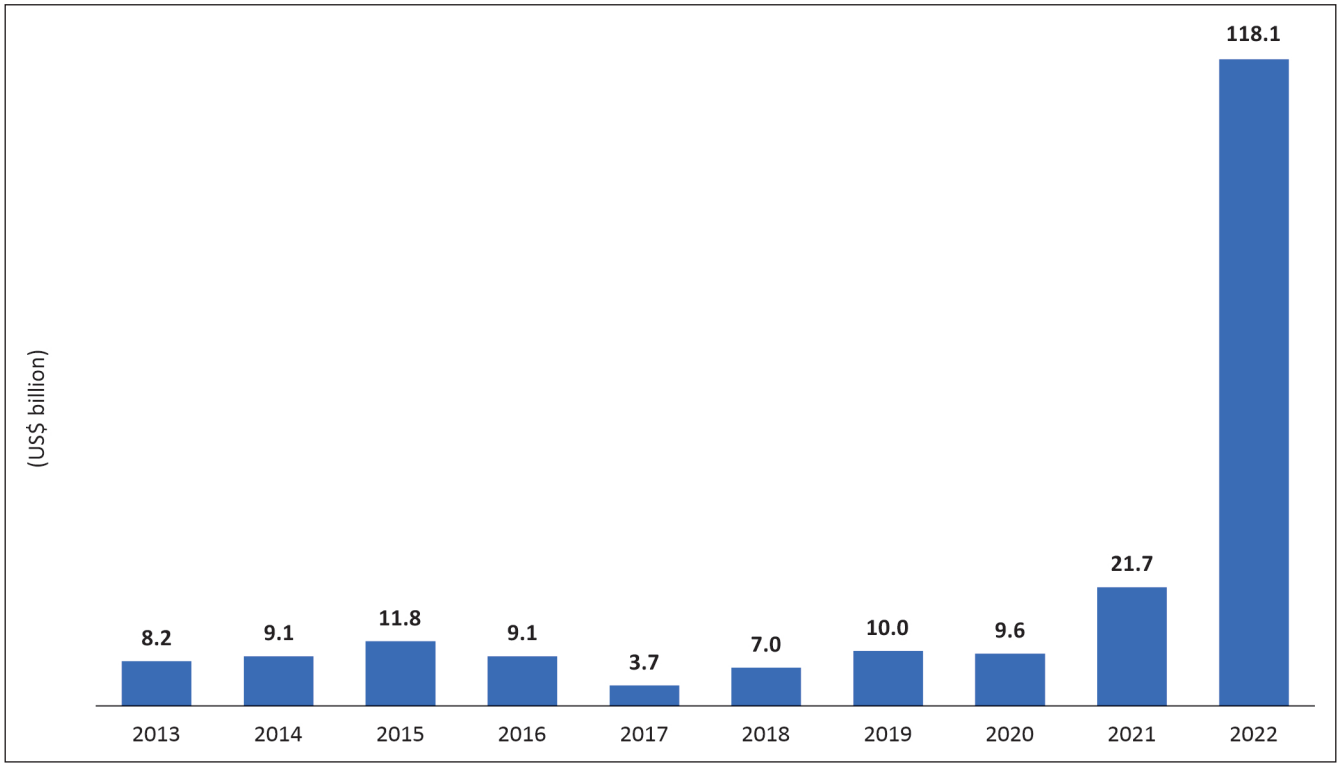
The African Development Bank estimates that ensuring continental-wide access to electricity by 2030 will require US$ 32-US$ 40 billion annually, while around US$ 45 billion are needed per year to achieve Africa's renewable energy goals. According to the Africa Energy Outlook 2022, International Energy Agency (IEA), Africa accounts for less than 5% of global energy investments despite accounting for almost one-fifth of the global population. Ten countries accounted for 90% of private investment in energy and electricity infrastructure on the continent over the last ten years, with South Africa alone accounting for nearly 40% of investment in the sector. Total energy investment in Africa was already declining prior to the pandemic and fell even more quickly in 2020, by over 20%. The US$ 73 billion invested in 2020 was equal to just 3% of Africa's GDP. In 2021, spending is estimated to have recovered to just below its 2019 level. Historically, fossil fuel supply has accounted for the majority of energy investment in Africa, driven by oil production. However, since 2016, capital spending on fuel supply has fallen by more than a fifth with a shift to less risky projects elsewhere.

[21] CDP Africa Report: Benchmarking Progress Towards Climate Safe Cities, States, and Regions, March 2020
[22] The Investment Case for Energy Transition in Africa, IRENA, March 2020

Achieving Africa's energy and climate goals means more than doubling energy investment this decade. This would take it over US$ 190 billion each year from 2026 to 2030, with 70% of the investments directed towards clean energy, thereby increasing share of energy investment in Africa's GDP to 6.1% in the 2026-30.[23] It is therefore crucial for Africa to step up its efforts to generate significant investments and business opportunities to boost the growth of renewable energy in the continent.

As observed from **Chart 4.3**, investments in renewable energy in Africa spiked in the year 2022 by 444%. Investments announced in 68 renewable projects, with over 80% investments in Egypt in 2022, followed by Morocco, Djibouti, and Zimbabwe. UAE, India and UK were the major investors in renewable energy sector in Africa in 2022.

Chart 4.3: Global Envisaged Capital Expenditure in Africa in Renewable Energy

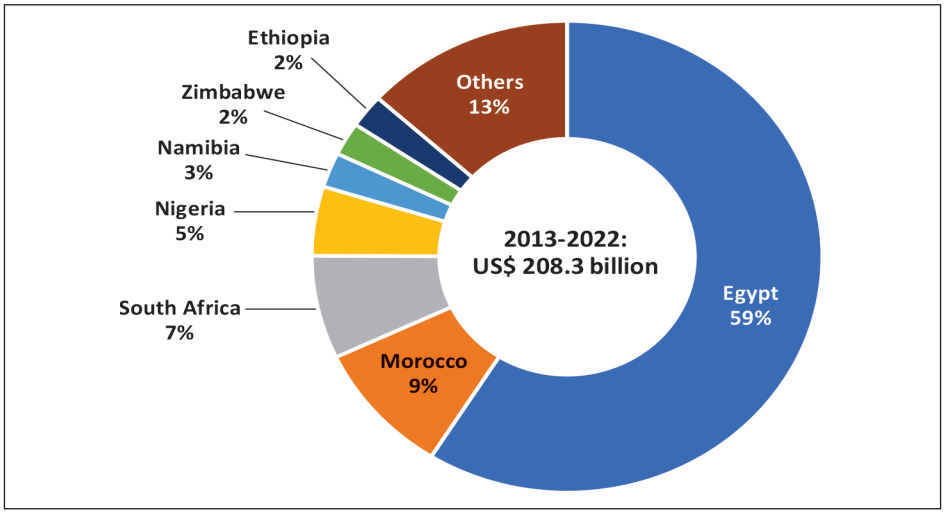


Source: fDi Markets, Financial Times and India Exim Bank Research

Egypt was the largest recipient of investments in renewable energy sector, accounting for US$ 122.7 billion during 2013 to 2022, followed by Morocco (US$ 18.9 billion), South Africa (14.7 billion) and Nigeria (US$ 9.9 billion), among others **(Chart 4.4)**. These four economies accounted for almost 80% of renewable energy investments in Africa during 2013 to 2022.

[23] IEA (2022), Africa Energy Outlook 2022

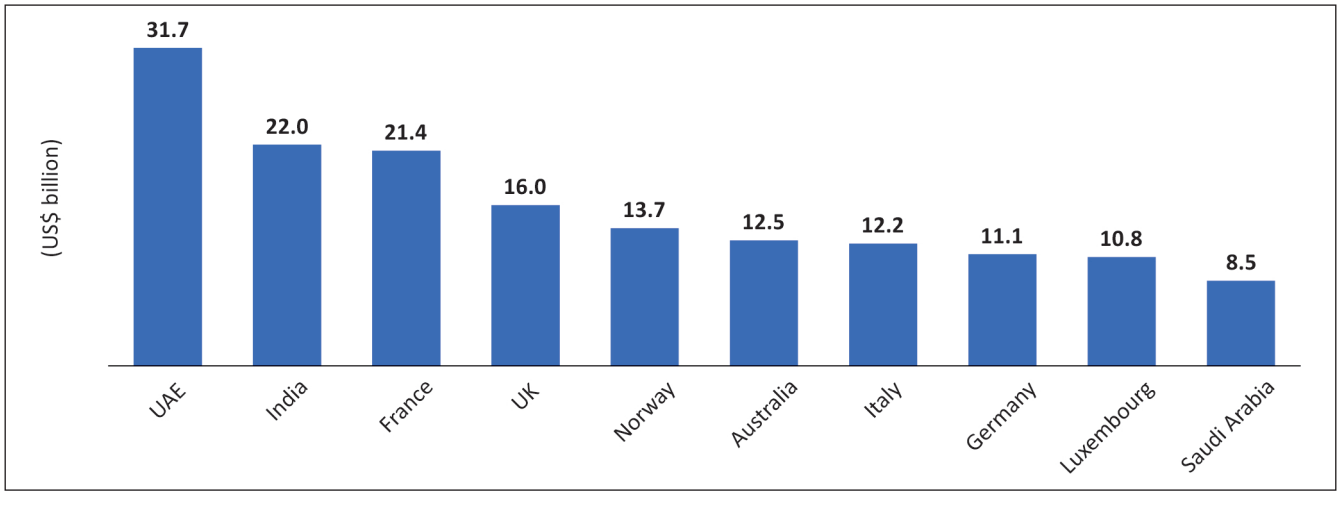
Chart 4.4: Top African Countries Receiving Investment in Renewable Energy



Source: fDi Markets, Financial Times and India Exim Bank Research

The major source countries investing in the renewable energy sector of Africa during 2013 to 2022 were UAE, India, France, UK and Norway, among others **(Chart 4.5)**. UAE, India, and France accounted for more than one third of renewable energy investments in Africa during the period.

Chart 4.5: Major Sources of Investment in Renewable Energy Sector of Africa



Source: fDi Markets, Financial Times and India Exim Bank Research

India was the second largest investor in the renewable energy sector in Africa during 2013 to 2022, accounting for a share of 10.6% in total investment. India's investments were mainly in Egypt (93.9% of India's total investments in the renewable energy sector of Africa), followed by South Africa (3.3%), Zambia (1.7%), Nigeria (0.8%) and Ethiopia (0.4%).

The Sustainable Development Goal on energy (SDG 7) is incorporated in the social, economic and sustainability goals of Africa's Agenda 2063. Sustainable energy is at the forefront of the development plans of African nations, recognising its central role in achieving all SDG targets and mitigating and adapting to climate change. Out of the 53 African NDCs, 45 contains quantified renewable energy targets. This clearly acknowledges the

abundant opportunities offered by Africa's vast renewable energy to put the continent on a clean development path.

India has updated its NDCs to aim for 50% of its cumulative electric power installed capacity to come from non-fossil fuel-based energy resources by 2030. Currently, India ranks 4th globally in renewable energy installed capacity, wind power capacity, and solar power capacity. As of December 2022, India has installed 167.75 GW of renewable energy capacity, with an additional 78.75 GW under implementation and 32.60 GW in the bidding stage. From March 2014 to December 2022, the installed renewable energy capacity has more than doubled, and solar power capacity has increased by over 24 times, reaching 63.30 GW[24].

India possesses a significant advantage as a pioneer in harnessing Africa's solar resources through its involvement in the International Solar Alliance (ISA). Currently, the ISA comprises the majority of African nations, with 33 countries from the continent being members. The total solar potential of all countries in Sub-Saharan Africa is about 10,000 GW. Solar potential is fairly distributed across all the countries, with an average of 6 kilowatt hours (kWh) of solar energy per sq m available per day. A significant portion of Africa currently uses solar energy to meet relatively basic needs like lighting, charging mobile phones, and powering low-capacity appliances. The biggest options for solar power generation in Africa are photovoltaic (PV) and concentrated solar power (CSP), as well as small-scale PV systems suitable for off-grid power generation. Both PV and CSP technologies are crucial for rural communities in Africa, given their diverse potential uses ranging from energy generation to agriculture, food processing, waste treatment, and water supply.[25] However, installed capacity in African countries remain much lower compared to the potential. According to a World Bank study, the African continent has an average daily potential of 4.49 kWh/kWp with an installed capacity of just 4,878.1 MW.

The dynamics of solar sector exchanges between India and Africa are shaped by the fact that African countries possess abundant solar resources but lack the necessary technology. India, therefore, can play a vital role in establishing a collaborative platform by providing technology transfer, capacity building, and even employment opportunities. India has implemented various initiatives to leverage its expertise in solar power within the framework of the ISA programs. For instance, India, through the ISA, is already supporting the implementation of off-grid solar energy projects in Africa. ISA has partnered with the AfDB to develop 10,000 MW of solar power systems across the Sahel region, aimed at providing electricity to approximately half of the 600 million Africans who remain off-grid.[26]

There is opportunity for Indian businesses to leverage their strong solar expertise to lead involvement in utility solar projects in African countries. The Government of India has earmarked concessional Lines of Credit (LOC) worth US$ 2 billion for solar projects in Africa out of its US$ 10 billion concessional LOCs committed for Africa during India-Africa Forum Summit (IAFS)-III. India and Africa could collaborate in setting up / scaling up wind farms and utility solar projects, provide residential, commercial & Industrial solar solutions, to capitalise on the growing importance of solar and wind in Africa's total power mix and help to drive universal electrification. Setting up fully integrated supply chains in the region remain crucial to reduce import dependence and increasing cost competitiveness, in addition to ensure enhanced access to financing. Indian investments in renewable sector in Africa would boost Africa's domestic manufacturing of quality and cost-effective modules.

[24] Annual Report 2022-23, Ministry of New and Renewable Energy, Government of India.
[25] India and the Global Commons: A Case Study of the International Solar Alliance, Oluwasem Oguntuase, ORF, March 2022
[26] India's international solar leadership: Walking the talk?, ORF, December 2021

Climate Smart Agriculture

The agriculture, fisheries and other land uses sector is a major source of employment for Africa and accounts for 57% of the continent's emissions[27]. The cost of action on climate adaptation of agriculture and food systems in Sub-Saharan Africa is estimated to be annually US$ 15 billion. Further, this sector has high implications for food security, gender, biodiversity, and water security, among others. Nearly two-thirds of African countries are net importers of basic food products, whereas the number of hungry people in the region has estimated to have risen to 278 million, around one-fifth of the population in Africa. Building the capacity to be self sufficient in food production would help African countries to lower their vulnerability towards natural calamities and foreign exchange shocks. Agriculture is a sector with immense potential for adaptation, especially in Africa. There exists immense potential in using resource-smart technology such as hydroponics to control the environment for growing agriculture products. Resource-smart technologies require less water, complete production cycle in less time and at lower cost.

Climate Smart Agriculture (CSA) is an integrated approach for managing landscapes such as cropland, livestock, forests, and fisheries that addresses the interlinked challenges of food security and accelerating climate change. In order to promote climate-smart agriculture three pillars need to be followed – (i) sustainably increasing agricultural productivity to support equitable increases in incomes, food security and development; (ii) adapting and building resilience to climate change from the farm to national levels; and (iii) developing opportunities to reduce GHG emissions from agriculture compared with past trends. The “Feed Africa” Agenda of the AfDB had targeted to achieve self-sufficiency in key commodities (rice, wheat, fish, palm oil, horticulture, cassava); and move up the value chain in key export orientated commodities (cocoa, coffee, cotton, cashew).

Precision agriculture utilizes digital technologies such as sensors, drones, and satellite imaging to monitor crop health, optimize resource use, and enhance productivity. By incorporating weather data, farmers can make data-driven decisions tailored to local climatic conditions. Africa’s diverse crops and regions require crop-specific models based on climate variability data to predict yields, mitigate risks, and optimize resource allocation. Training programs and extension services can build farmer capacity in using digital tools and interpreting weather data, ensuring accessibility and affordability for all farmers. Leveraging digital technologies and building capacity promote sustainable and climate-resilient agricultural practices. Financing plays a crucial role in accessing and adopting these best practices.

Smart farming offers an opportunity to integrate digital and physical infrastructures, benefiting small farmers. Indian agro-based start-ups can play a crucial role by providing viable and cost-effective solutions to African small and marginal farmers. By bridging the gap between technology and small farmers, these start-ups can enable access to digital tools and help improve the efficiency and profitability of their farming operations.

In order to reduce the climate risks to food systems in Africa, adaptive capacity of African countries need to be developed through knowledge sharing, expertise and enhanced research capabilities in agriculture. The information on best practices adopted by countries such as India towards minimising climate change impact on agriculture could be exchanged and disseminated amongst the stakeholders. Co-developing climate change resistant crop varieties as well as promoting resource saving agricultural practices may also be considered.

India has been increasingly using CSA Approach, which integrates the three dimensions of sustainable development (economic, social, and environmental) by jointly addressing food security and climate challenges.

[27] Landscape for Climate Financing in Africa, Climate Policy Initiative, September 2022.

The Maharashtra Project on Climate Resilient Agriculture, with outlay of US$ 600 million is one of the largest CSA projects and is estimated to yield significant climate change improvements. As of May 2023, 6,59,205 project beneficiaries have adopted climate-smart agriculture practices, and several hectares of land have benefitted from improved irrigation and drainage technologies. Increased usage of stress-tolerant varieties of rice such as Salt tolerant rice and Direct-seeded rice, setting up Climate Smart Villages across various districts in India, implementing climate-smart practices such as laser-land levelling and alternate wetting and drying of rice, are some of the innovations adapted by Indian farmers in this area.

Indian farmers have also been receiving agro advisories on their mobile phones, with inputs from met departments, scientists, input dealers and farmers, which allow them to make timely decisions. The GOI's "Krishi Rath" mobile app to facilitate the farmers to hire trucks and transport agri produce to the markets showcases that both public and private sector cooperation will be valuable in ensuring sustainable agriculture. India also launched a project, Sensor-based Smart Agriculture (SENSAGRI), where drones would be used for smooth scouting over land fields, for collecting precious information and transferring the data to farmers on a real-time basis. Farmers in several Indian states are also using clean energy sources like solar power for irrigation, which benefits farmers in two ways, a) farmers are provided incentives by transferring excess electricity to the local grid, and b) smart farming enables crop diversification which helps farmers reduce their dependency on monsoon and ground water.

India and Africa could collaborate for increasing investment, promote research and development, facilitate technical cooperation and apply innovative, appropriate and reliable technologies in the agricultural sector for enhancing productivity to ensure food security. Increased Indian investment in the sector in Africa would lead to sharing of Indian technology, experiences and learnings in this area with Africa with a view to implement and adopt digital practices and CSA in agriculture in African countries.

Water and Wastewater Management

According to the World Resource Institute, many African countries are at extremely high risk considering multiple factors like vulnerability to droughts and floods, seasonal variability and competition for available water. Already, one in every three people across Africa face water scarcity. According to the UNICEF, nearly 418 million people in Africa are denied even basic drinking water supply. Since 2015, the number of people without safely managed drinking water facility in Sub-Saharan Africa has increased from 703 to 766 million in 2020. In Sub-Saharan Africa, 1 out of 3 people have no handwashing facility at all and 839 million people in Africa lack basic hygiene services. Achieving the SDG targets in Africa will require a 12-fold increase in current rates of progress on safely managed drinking water, a 20-fold increase for safely managed sanitation and a 42-fold increase for basic hygiene services. While climate is an important factor driving water stress in Africa and around the world, poor management of water resources and services remains the biggest challenge. As climate change makes rainfall more erratic and increases the risks of floods and droughts, investing in better water management and infrastructure is becoming even more important. These investments can strengthen economies by alleviating poverty, supporting jobs and growth, and reducing vulnerability to climate change. Securing safe drinking water, sanitation, and hygiene for all in Sub-Saharan Africa would require US$ 35 billion per year.

Reusing and utilization of water resources can play an important role in maintaining sustainable use of water resources. Given the scarcity of fresh water, wastewater treatment can provide an alternative source of water supply. Depending on the amount of treatment, treated wastewater can be supplied for direct consumption

or partially treated for industrial and irrigation purposes. Additionally, nitrate and phosphorus recovered from sewage effluent could be used to make high-quality manure, which can support the agricultural sector by reducing the amount of manure and fertilizer needed for optimal crop development and maintaining food security. Partially treated water is nutrient-rich while also maintaining a lower risk of chemical contamination. Wastewater as a source of energy is also underestimated, as organic compounds from sewage can be an abundant source of biogas which can be exploited to generate electricity.

However, delivery of water investments across Africa is below target levels to meet the continent's growing needs. The World Bank estimates that at least US$ 35 billion/year needs to be invested to meet the SDG Goal 6 target on water and sanitation. Currently, only US$ 10 - US$ 19 billion is invested each year in the sector in Africa. There is a need for increased investments at domestic level, international level, and by private sector investors to close the financing gap by 2030.[28] Wastewater treatment plants are capital-intensive and require the use of innovative technology, such as sensors, Internet of Things devices and Artificial Intelligence-based trackers. It also requires high upfront capital requirements in machinery and equipment. Blended finance remains the most favourable option for the up-front investment of medium- to large-scale wastewater treatment plants.

The Government of India, through National River Conservation Plan (NRCP), National Mission for Clean Ganga (NMCG), Smart Cities Mission of Ministry of Housing & Urban Affairs and Atal Mission for Rejuvenation and Urban Transformation (AMRUT), has sanctioned sewage treatment infrastructure in the country. There are several wastewater treatment plants in India, operating successfully under public private partnership model, such as Hindustan Zinc Sewage Treatment Plant, in Udaipur, Rajasthan, and Thane Belapur Common effluent treatment plants (CETP) in Maharashtra.

India and Africa could collaborate in areas like water recycling, water sanitation and treatment to enhance Africa's resilience in access to clean water and optimising water usage through execution of water management techniques. Indian models can be customised and adopted for the reuse of treated wastewater, particularly for agriculture using micro irrigation and fertigation. Similarly, export and investment opportunities exist in setting up wastewater treatment plants; supplying membrane modules for water treatment, recycling and reusing; water pumps; desalination equipment; water treatment OEMs, and zero-liquid discharge (ZLD) technology products.

Investments in Green Minerals for Clean Energy and Sustainable Transport

African economies have a significant economic opportunity in their natural resources, including oil, gas, and minerals. While the global shift towards low carbon sources may eventually lead to reduced demand for Africa's oil, gas, and coal resources, the timing and scale of this decline are uncertain and could take several years or even decades. However, there is a growing demand for minerals essential for the clean energy transition, such as lithium, cobalt, copper, platinum, and manganese, many of which are abundant across Africa and crucial for technologies like batteries and electric vehicles (EV). Africa is rich in the commodities needed to support renewable energy development for domestic energy access and to accelerate the low carbon transition.

India is one of the largest EV markets in Asia after China. The Government of India's goal of 30% EV penetration for passenger cars, 70% for commercial vehicles, and 80% for two- and three-wheelers by 2030 through its

[28] International High-Level Panel on Water Investments for Africa, United Nations, 2022.

flagship Faster Adoption and Manufacturing of Electric Vehicles (FAME) Phase II policy will greatly boost EV adoption. Electric two-wheelers and three-wheelers (including e-rickshaws) accounted for 92% of EVs registered in India in 2022. Decarbonization of two and three wheelers' sectors in India, which is mostly used by lower- and middle-income sections of Indian population, clearly indicates inclusiveness of India's green growth and development in transport sector. Lithium-Ion batteries are the future of automobiles owing to their unique properties — lightweight, high charge holding capacity, and steady output. The increasing use of EVs in India is expected to raise demand for Lithium-Ion batteries. To attain more than 30% EV adoption, India will require approximately 800 GWh of batteries by 2030.[29]

To meet this rising demand, India is accelerating plans to manufacture Lithium-Ion cells within the country. Lithium-Ion cell manufacturing is expected to evolve in stages, with a concentration on battery pack assembly in the initial phase, and manufacturing becoming more localized eventually.

Solar photovoltaic plants, wind farms and electric vehicles generally require more critical minerals to build than their fossil fuel-based counterparts. Similarly, electricity networks need a huge amount of copper and aluminium, with copper being a cornerstone for all electricity-related technologies. Rare earth elements are also essential for permanent magnets that are used in wind turbines and EV motors. A typical electric car requires six times the mineral inputs of a conventional car and an offshore wind plant requires thirteen times more mineral resources than a similarly sized gas-fired plant.[30] Lithium, nickel, cobalt, manganese, and graphite are crucial to battery performance. The primary raw materials required for the cathode in cell manufacturing are cobalt, nickel, lithium, and manganese.

The growing demand for electric vehicle components will create demand for various electronics and battery related items, including controllers, and capacitors. Thus, component makers are recognizing the importance of investing in EV component technology and capacity. Demand for required minerals such as lithium, cobalt, copper, and nickel will increase with changes in component requirements. India has limited reserves of raw materials except graphite, which is used in anode[31] and hence need to import these minerals. A challenge here is the reliance on limited geographical areas for the extraction of such metals. About 70% of materials used to manufacture EVs in India are imported from China and a few other countries. To tackle this, India needs to form strategic alliances with countries where these critical minerals are produced.

Africa is richly endowed in lithium, graphite, cobalt, nickel, copper, and rare earth minerals. Africa has an estimated rare earth elements reserves of 4 million tonnes. Africa also has some of the high-grade deposits in the world. These minerals are essential for building the global green economy of the future and they also comprise new market opportunities for net-zero transitions. Both cobalt and lithium are highly concentrated in a few countries. An average of 60% of global mined cobalt production comes from DR Congo. DR Congo is also the largest copper producer in Africa, accounting for 6.5% of global output. Zimbabwe possesses significant lithium reserves, while countries like Namibia have begun establishing lithium mines. South Africa is the world's largest producer of manganese, and Madagascar, Mozambique, and Tanzania are among the top ten countries with substantial graphite deposits. Furthermore, Africa holds over 75% of the world's platinum and chromium reserves and is the main exporter of cobalt, a commodity used in all forms of energy production. However, processing of these minerals requires great expertise, and most countries send

[29] Unlocking India's Electric Mobility Potential, Report by Arthur D Little, August 2022
[30] International Energy Agency
[31] A brief look at value chain of Lithium-Ion Battery, Invest India Outlook Editorial, August 2021

these critical minerals for processing to China. Accordingly, China processes more than 60% of the lithium produced globally, 65% of cobalt and 93% of manganese. As per various estimates, China makes three out of four batteries produced globally. Over 100 Chinese battery units make 60% of the cathodes and 80% of the anodes used in Lithium-Ion cells.

The AfCFTA can play a vital role in leveraging these resources by enabling countries to build regional clean energy value chains, particularly considering infrastructure and capital constraints. By harnessing these resources and developing sustainable and responsible mining practices, African countries can benefit from the increasing demand for minerals required for the low carbon transition. As Africa is estimated to have an abundance of rare earths, but lacks exploration and extraction capabilities, India could play a significant role in the African mining value chain to optimize benefits from the demand for battery and electric value chain. Indian state-run companies can form joint ventures to secure critical mineral assets such as lithium and cobalt that could fuel India's plan for mass adoption of electric vehicles by 2030. Development of low-cost, low-radioactive-waste refinement technologies for processing rare earth minerals would ensure easy availability of critical minerals, while ensuring green growth. India could collaborate with third countries such as Japan, Australia, the US and Germany, using capital and green tech know-how for securing and processing of these critical mineral assets. This kind of collaboration would also help in building up a strategic reserve of critical minerals as a buffer against global supply crises.

Strategic Collaboration in Green Fuel

Hydrogen is extensively used in various sectors as industrial feedstock and in chemical processes such as production of ammonia for fertilizers, methane, and methanol, industrial processes in iron and steel plants, refineries for hydrocracking and desulphurisation of fuels, as transportation fuel for vehicles, power sector storage and grid balancing and for co-firing in thermal power plants. Green hydrogen could be an alternate to grey hydrogen which is produced through coal or lignite gasification and/or steam methane reformation of natural gas or methane.

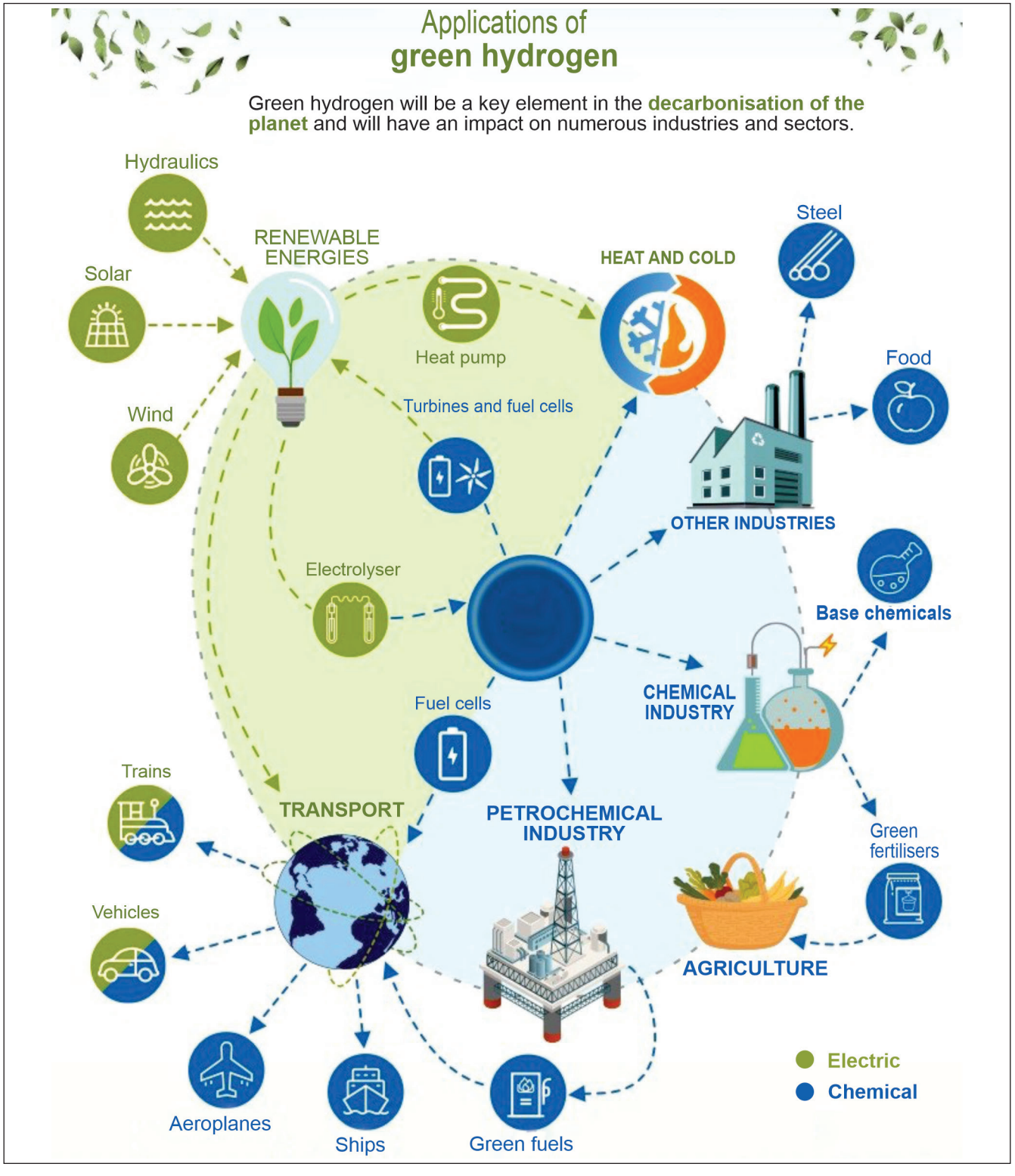
Green hydrogen, widely known as the fuel of the future, is the hydrogen produced from renewables-based electricity through water electrolysis. Green hydrogen can also be produced by reforming biogas (instead of natural gas) and through biochemical conversion of biomass if the process is conducted in line with sustainability requirements. Central to the green hydrogen production process is the electrolyser technology. An electrolyser is a device capable of splitting water molecules into their constituent oxygen and hydrogen atoms. Efficient electrolysers will be key to the penetration of hydrogen in industries and the adoption of hydrogen fuel cells. Providing a solution for global energy crisis, carbon-neutral green hydrogen can emerge as the sustainable next generation energy carrier[32]. Green hydrogen production is expected to reach approximately 25% of global energy sources by 2050, with Africa having the potential to take a significant share.

An advantage of green hydrogen is that it can be stored and transported over long distances. It also has the potential to complement other energy carriers such as electricity to help with the deep decarbonisation of the energy sector and the use of energy in end-use sectors such as transport, buildings and industry. Green hydrogen is also a potential solution to decarbonise hard-to-abate sectors such as refinery, ammonia, methanol, iron and steel and heavy-duty trucking. As per industry experts, in the coming years green hydrogen

[32] Green Hydrogen: Bridging the Energy Transition in Africa and Europe, Africa-EU Energy Partnership, 2020

could also be used to produce and store electricity, serve as an alternative to diesel generators, used as fuel for cars, heavy duty vehicles, aviation and shipping, and can be a source of heat for industry and residential utilities **(Exhibit 4.1)**.

Exhibit 4.1: Applications of Green Hydrogen



Source: Borrowed from Iberdrola

Several African countries, in particular South Africa, Egypt, Morocco and Namibia, have the potential to develop fully sustainable hydrogen economies. Realizing the immense opportunity offered by green hydrogen, these countries have already started working towards developing green hydrogen technology. The African Hydrogen Partnership, a continent-wide umbrella association dedicated to developing green hydrogen, hydrogen-based chemicals, and fuel cell technology was established in 2018. In 2022, Egypt, Kenya, Mauritania, Morocco, Namibia and South Africa have formed the Africa Green Hydrogen Alliance to intensify collaboration and supercharge development of green hydrogen projects in the African continent. It is estimated that green hydrogen could sustainability industrialize Africa and boost GDP in these 6 African countries by 6-12%. Morocco in North Africa has already established its first green hydrogen production system in 2022. With the improvement of renewable energy infrastructure, the country is working towards producing green hydrogen at low cost and meeting Europe's energy demands through exports. However, concerted efforts by diverse stakeholders are necessary for realizing Africa's green hydrogen potential.

India is aiming to become the world's largest hydrogen hub. Hydrogen demand in India is expected to grow more than fourfold by 2050, representing almost 10% of global hydrogen demand. A robust market for green hydrogen would result in increased demand for production and consumption technologies such as electrolysers and fuel cells and an opportunity for scaled manufacturing. India already has half a dozen alkaline electrolyser manufacturers; however, electrolyser technology needs to be improved further to make them more efficient and economical. India also needs to identify appropriate electrolyser recycling strategies.

Given the abundant renewable energy resources in Africa and India's distinct advantage in terms of low-cost renewable electricity, complemented by rapidly falling electrolyser prices, a major avenue for cooperation between India and Africa could be collaborating on the adoption and expansion of green hydrogen, thus, creating a mutually beneficial hydrogen ecosystem. A hydrogen value chain can be established by India and African countries, extending from production to consumption. Indian companies could set up Power-to-X (P2X) plants in the region for converting electricity into carbon-neutral energy carriers. India and Africa could cooperate on technological development to scale up the production, enable exports of green hydrogen, supporting research and development to develop more efficient and cost-effective technologies and setting up transnational partnerships. Transporting green hydrogen to Europe has huge potential, and India can work together with Africa to develop the required infrastructure.

Mainstreaming the Circular Economy

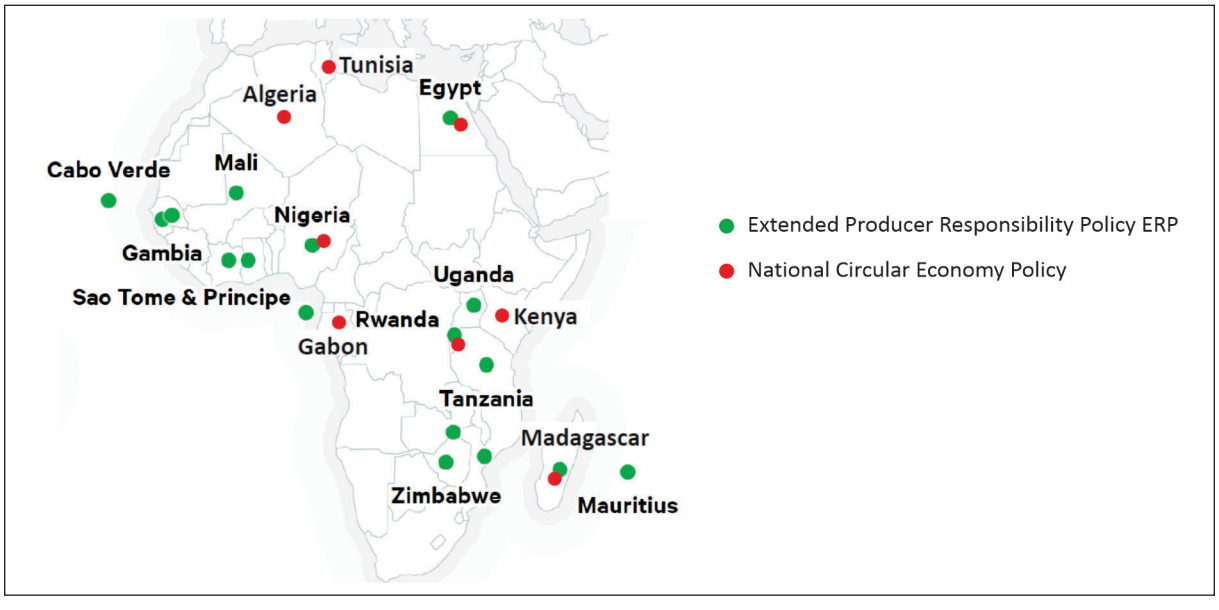
Africa is widely recognized as the upcoming frontier for global production, primarily due to its abundant and untapped natural resources, particularly in the energy and agriculture sectors. According to the AfDB, Africa's consumer spending is expected to reach US$ 1.4 trillion by 2020 and US$ 2.1 trillion by 2025. By the year 2030, the demand for food in urban areas is projected to triple, reaching an estimated value of US$ 1 trillion. Additionally, approximately 2 billion people will require access to food, clothing, and other goods. To effectively meet these demands while minimizing resource waste and environmental impact, transitioning from the linear "extract-use-dispose" model to a circular production model focussing on "use-reuse-repurpose" is crucial. The circular production model emphasizes the reuse, recycling, and repurposing of materials, allowing for optimal resource utilization and reducing the need for extracting new raw materials. By embracing this approach, Africa can contribute to sustainable development and ensure a more resilient and environmentally friendly production system. Implementing the circular economy as a development strategy not only promotes resource efficiency but also fosters innovation, job creation, and the establishment of

resilient and sustainable industries. It allows African countries to simultaneously meet the needs of their growing populations, spur economic growth, and utilise its resources sustainably.

This transition involves implementing practices such as recycling, upcycling, and incorporating renewable materials into production processes. It will require investment in infrastructure, technology, and skills development to support circular production systems. To facilitate this transition, collaboration is essential among governments, businesses, civil society, and international partners. Policy frameworks, incentives, and regulations need to be developed to promote circular practices and provide support to businesses and entrepreneurs embracing this model. Knowledge sharing, capacity building, and technology transfer can further accelerate the adoption of circular production methods.

By adopting practices such as material reuse, recycling, and repurposing, Africa can optimize resource utilization, contribute to a greener economy, and ensure a resilient and environmentally friendly production system for the future. The Government-led coalition of African nations, the African Circular Economy Alliance (ACEA) was launched in 2016 with three member countries: Rwanda, Nigeria, and South Africa. In 2020, Ghana and Côte d'Ivoire joined, followed by Benin, Burkina Faso, and Sudan in 2021. In 2022, Zambia and Morocco have expressed interest in becoming members. The five sectors of focus of ACEA are food systems, packaging, fashion and textiles, electronics, and environment friendly buildings. E-waste management has emerged as a policy priority, with several countries publishing policy frameworks to improve e-waste management, including introducing the Extended Producer Responsibility (EPR) policy **(Exhibit 4.2)**.

Exhibit 4.2: Circular Economy as a Part of National Development Policies in Africa



Source: Adapted from Africa Circular Economy Facility, AfDB

While the circular economy concept in India is still in its early stages, it has managed to attract considerable investments of around US$ 1.8 billion between 2016 and 2021[33]. Notably, a significant portion of these investments, accounting for over 60% in terms of volume and 80% in terms of deal value, has been directed towards mitigation-oriented innovations in the energy and transportation sectors. This aligns with

[33] Circular Economy for Sustainable Development in India, IBEF, January 12, 2023.

the global trend of increasing interest in energy and mobility start-ups. This positive trend is especially significant considering that these industries are major contributors to global GHG emissions, accounting for over 70% of the emissions. The growth in funding for the circular economy in India reflects the notable advancements made in technology and commercial viability, along with a supportive policy environment and the establishment of standardized frameworks over the past decade. At the same time, India still has considerable scope for expansion in areas such as smart agriculture, waste management, environmental conservation, and sustainable use of natural resources. These sectors offer substantial potential for innovation and development within the circular economy framework. By tapping into this potential, India can further enhance its efforts towards sustainability, resource efficiency, and reducing environmental impacts.

Realising the business opportunities in the sector, several Indian companies have come up with innovative business models to provide circular solutions. A number of Indian companies have been set up in textiles and apparel sector, connecting buyers and sellers of second-hand clothing with the assurance of quality and traceability. Africa has a thriving textile industry, and a circular economy holds the key to a prosperous, inclusive, and resilient fashion industry. Several Indian companies are providing end-to-end recycling solutions in the electronics sector. Companies are also offering EPR solutions, where product manufacturers are taking the responsibility for the entire lifecycle of their products, from production to disposal. Similarly, Indian mining companies have been increasingly using high technology for the automation of processes and has started integrating technologies across the value chain to reduce waste, increase resource efficiency, and drive-up productivity, while promoting the harnessing of renewable energy sources. Indian companies investing in African mines could also help using water saving technologies or renewable energy solutions thereby contributing to the economy.

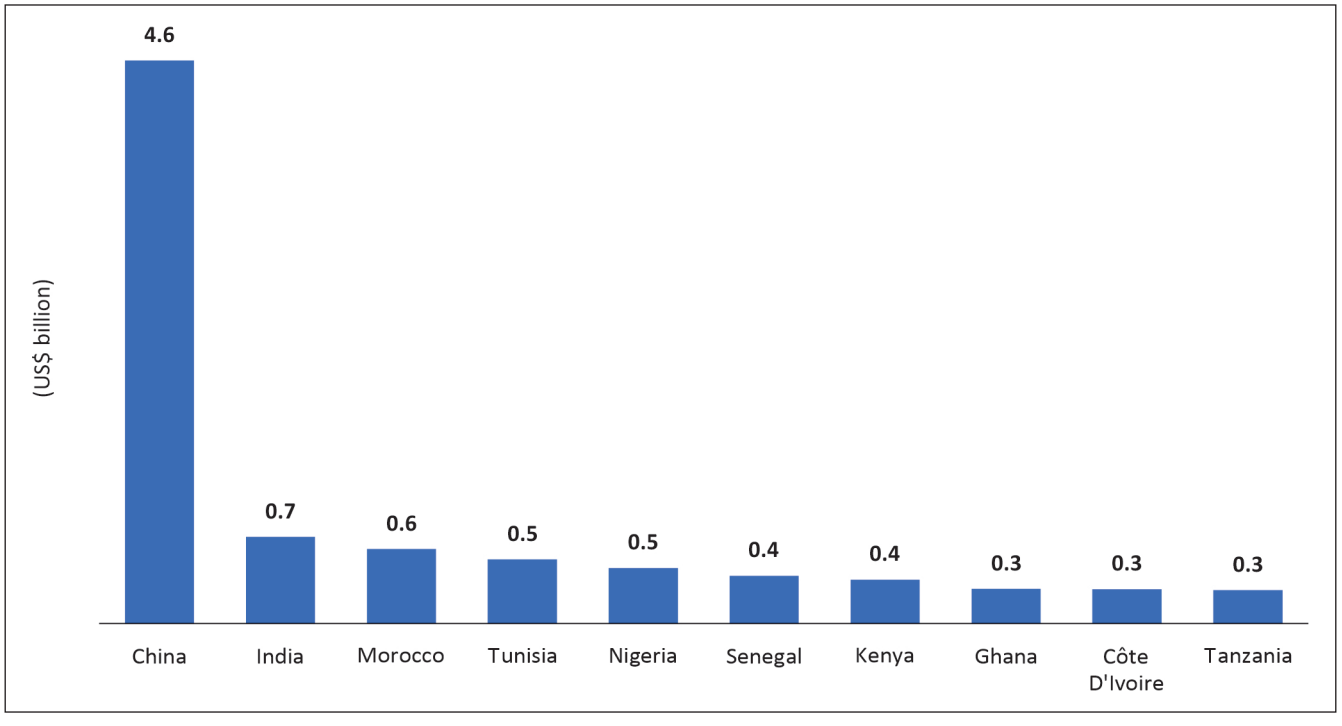
Indian companies can invest and collaborate with various African companies across sectors like consumer goods, textile and fashion, among others to develop circular economies and waste management. There are also circular opportunities in African countries in the design of buildings and infrastructure yet to be constructed. Indian collaboration and investment in the creation of automotive refurbishment and repurposing clusters would improve the recovery rate of materials from end-of-life vehicles and enable local material feed-in mechanisms to prolong the lifespan of vehicles and remanufacture spare parts.

In August 2022, Government of India notified the Battery Waste Management Rules, 2022, for more eco-friendly management of waste batteries across industries, including EVs. The new rules also made various stakeholders of the EV ecosystem responsible for recycling the batteries. The recycling of the metals and other natural resources from a spent battery through mechanical and metallurgical processes is the best option to make use of those spent batteries. By 2030, 2.5 million tons of Lithium-Ion batteries would reach the end of their life, while currently there is only the capacity for 0.7 million tons of battery waste to be recycled. Realizing the tremendous opportunities in recycling of Lithium-Ion battery waste, several Indian start-ups have set up manufacturing facilities for recycling, repurposing, and refining of these batteries. It is estimated that almost 95% of valuable materials can be recovered from these batteries. These companies extract critical metals such as lithium, cobalt, nickel, graphite, and manganese and recycles them and then exports the output to gigafactories manufacturing battery cells outside of India. Recycling spent batteries will be crucial for the continuous supply of lithium and would make EVs affordable for all sections of society. India and Africa could collaborate in recycling and repurposing of spent batteries to manufacture more batteries, which would reduce the dependency on imports of lithium.

Increasing Project Exports from India to Africa in AfDB Funded Projects

African Development Bank contracts are characterised by contracts for goods, works, consulting services and others (including operating costs, food crisis expenses, and personnel costs). In case of the AfDB funded projects, majority of the contracts in value terms were accorded to non-regional members. China accounted for 36.6% of the value of contracts during 2018 to 2022, followed by India (5.6%). Besides India and China, the regional members accounted for the major share in the value of contracts awarded like Morocco, Tunisia, Nigeria and Senegal. **Chart 4.6** shows the major bidder countries of the AfDB contracts during 2018 to 2022. The cumulative value of contracts awarded by the AfDB during this period was US$ 12.7 billion.

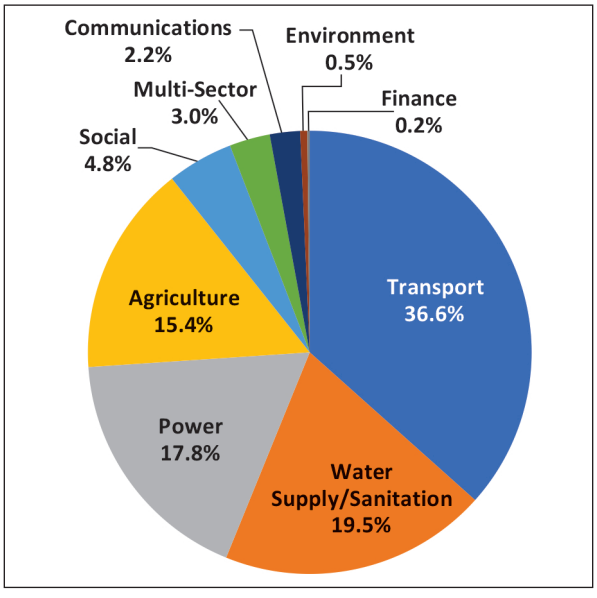
Chart 4.6: Top Countries Securing Contracts in the AfDB Funded Projects – By Value of Contracts Awarded (2018-2022)



Source: AfDB and India Exim Bank Research

In terms of value, 36.6% of the contracts awarded in the AfDB funded projects during the period 2018-2022 were in transport sector, followed by water and sanitation sector (19.5%), and power sector (17.8%), reflecting the AfDB's strategic focus on the development of infrastructure in Africa, as also larger value of contracts in these sectors **(Chart 4.7)**. Other major sectors included agriculture (15.4%) and social sector (4.8%). The environment sector accounted for 0.5% of the total value of the contracts awarded. India accounted for 0.3% of the total value of contracts awarded in the environment sector during 2018 to 2022.

Chart 4.7: Sector-wise AfDB Funded Projects – By Value of Contracts Awarded (2018-2022)

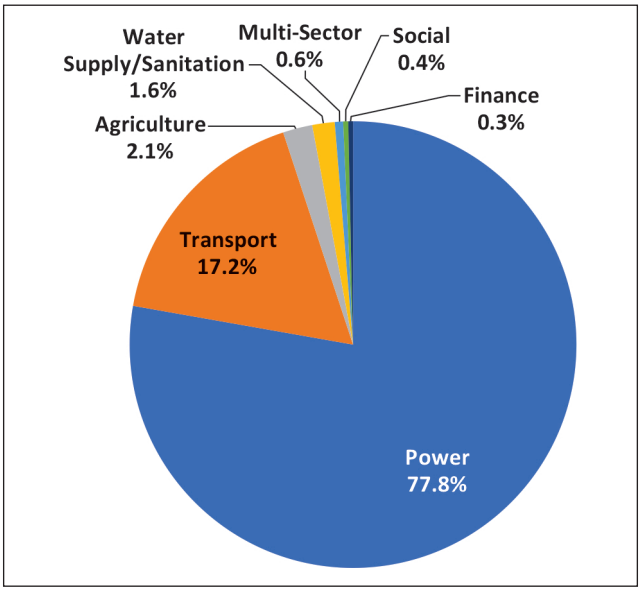


Source: AfDB and India Exim Bank Research

India in AfDB Funded Projects

During 2018-2022, India accounted for US$ 707.4 million worth of the AfDB awarded contracts. The power sector accounted for majority of the contracts in terms of value awarded to Indian companies in the AfDB funded projects, accounting for 77.8% of total value of contracts secured during 2018-2022, followed by transport (17.2%), agriculture (2.1%), and water and sanitation (1.6%) **(Chart 4.8)**.

Chart 4.8: Top Project Sectors for Contracts Secured by Indian Companies in the AfDB Funded Projects - By Value of Contracts Awarded (2018-2022)



Source: AfDB and India Exim Bank Research

Way Forward

According to the AfDB, Africa will need US$ 1.3 trillion annually to meet its sustainable development needs. The gap between climate change financing and the requirement for Africa remains significant. Concessional finance will continue to play a crucial role in achieving impactful outcomes, both in LDCs and Lower and Middle-Income Countries. However, to meet these increasing needs and given the current levels of public climate finance, private climate finance should increase by about 36% each year until 2030[34]. Though the investment requirement is huge, it is also an opportunity for African countries to invest in infrastructure that lays the foundation for low carbon and climate resilient economies.

Climate financing in Africa remains majorly concentrated in countries like Egypt, Morocco, Nigeria, Kenya, Ethiopia, South Africa, Mozambique, Côte d'Ivoire, Tunisia, and Ghana. Ineffective implementation of green growth strategies, weak regulatory structures and institutions, high perceived investment risk, and the lack of bankable project pipelines continue to impede private investment in Africa's climate and green growth projects. Climate-proofing the trade and investment regimes in Africa is critical to ensuring a just transition and achieving the broader goal of sustainable development. This would not only align Africa with the various climate-alignment initiatives, both at region level and globally, it would also strengthen the capacity of African countries to effectively engage in a rapidly changing global context. The African Continental Free Trade Area, with its vast potential, provides an unprecedented opportunity to develop the value chain within the continent, leveraging regional cooperation and addressing constraints such as skills, infrastructure, and capital requirements.

The private sector can tap into Africa's trillion-dollar market opportunities by investing in sectors that require climate-smart and low-carbon technologies. These sectors include renewable energies, electric vehicles, energy-efficient buildings, climate-resilient infrastructure, improved dryland crop production, and water resource resilience. However, the realization of these opportunities as profitable markets for private investors relies on the effective implementation of regulatory, policy, and institutional frameworks. Establishing the right frameworks is crucial for unlocking the potential of these sectors and attracting private investment. To scale up private sector mobilization, efforts should focus on creating new green business opportunities, developing project pipelines, providing early-stage finance, and mobilizing direct or indirect financing through innovative instruments and risk-sharing mechanisms. Additionally, promoting green infrastructure projects in developing economies, particularly in Africa, can be facilitated by directing additional climate financing through development banks. This can be achieved by strengthening their capital reserves and establishing partnerships with the private sector. Furthermore, utilizing public funds, including those from international financial institutions, to initiate climate-oriented funds can attract more private capital by distributing risks among different tranches.

Despite all the challenges, Africa still is an important destination for green investment, supported by its abundant natural resources and growing skilled population. Indian companies are already investing in various green sectors in the region; however, there exists further scope for collaboration. India like Africa too faces the brunt of climate-change induced disasters despite accounting for much lower per capita emissions as compared to the global average. Building an India-Africa partnership through green transition can foster sustainable development, address climate change, and enhance mutual cooperation between the two regions. India has made significant progress in renewable energy, and can share its expertise, technology, and best

[34] African Economic Outlook 2023, AfDB May 2023

practices with African countries to promote the development of renewable energy infrastructure. This can involve joint ventures, capacity building programs, and knowledge sharing to facilitate the adoption of clean energy sources across Africa. Both India and Africa face challenges related to agricultural productivity, food security, and climate change impacts on agriculture. By sharing knowledge, innovative techniques, and sustainable farming practices, India can assist African countries in improving agricultural productivity, enhancing food security, and mitigating the effects of climate change on agriculture. India has experience in developing sustainable and smart cities.

Collaborative efforts can be undertaken to design and implement green infrastructure projects in African cities, focusing on renewable energy integration, efficient waste management systems, green transportation, and sustainable urban planning. India and African countries are vulnerable to the impacts of climate change. By exchanging experiences and collaborating on climate change adaptation strategies, both regions can enhance their resilience and mitigate the effects of climate-related disasters. This can involve joint research projects, information sharing, and capacity building initiatives. India possesses expertise in various sectors, including renewable energy, information technology, and healthcare. Through technology transfer and capacity building programs, India can support African countries in developing their technological capabilities, promoting sustainable development, and achieving their climate goals. To facilitate the green transition, it is crucial to mobilize adequate investment and financing. India can collaborate with African governments and institutions to explore innovative financing mechanisms, such as green bonds, climate funds, and public-private partnerships, to fund sustainable development projects. Regular knowledge sharing platforms and policy dialogues can be established between India and Africa to exchange experiences, best practices, and lessons learned in promoting sustainable development. These exchanges can help in formulating effective policies, regulations, and frameworks for green growth.

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As part of its endeavour in enriching the knowledge of Indian exporters and thereby to enhance their competitiveness, India Exim Bank periodically conducts research studies. These research studies are broadly categorized into three segments, viz. sector studies, country studies and macro-economic related analysis. These studies are published in the form of Occasional Papers, Working Papers and Special Publications. The research papers that are brought out in the form of Working Papers are done with swift analysis and data collation from various sources. The research papers under the series provide an analytical overview on various trade and investment related issues.

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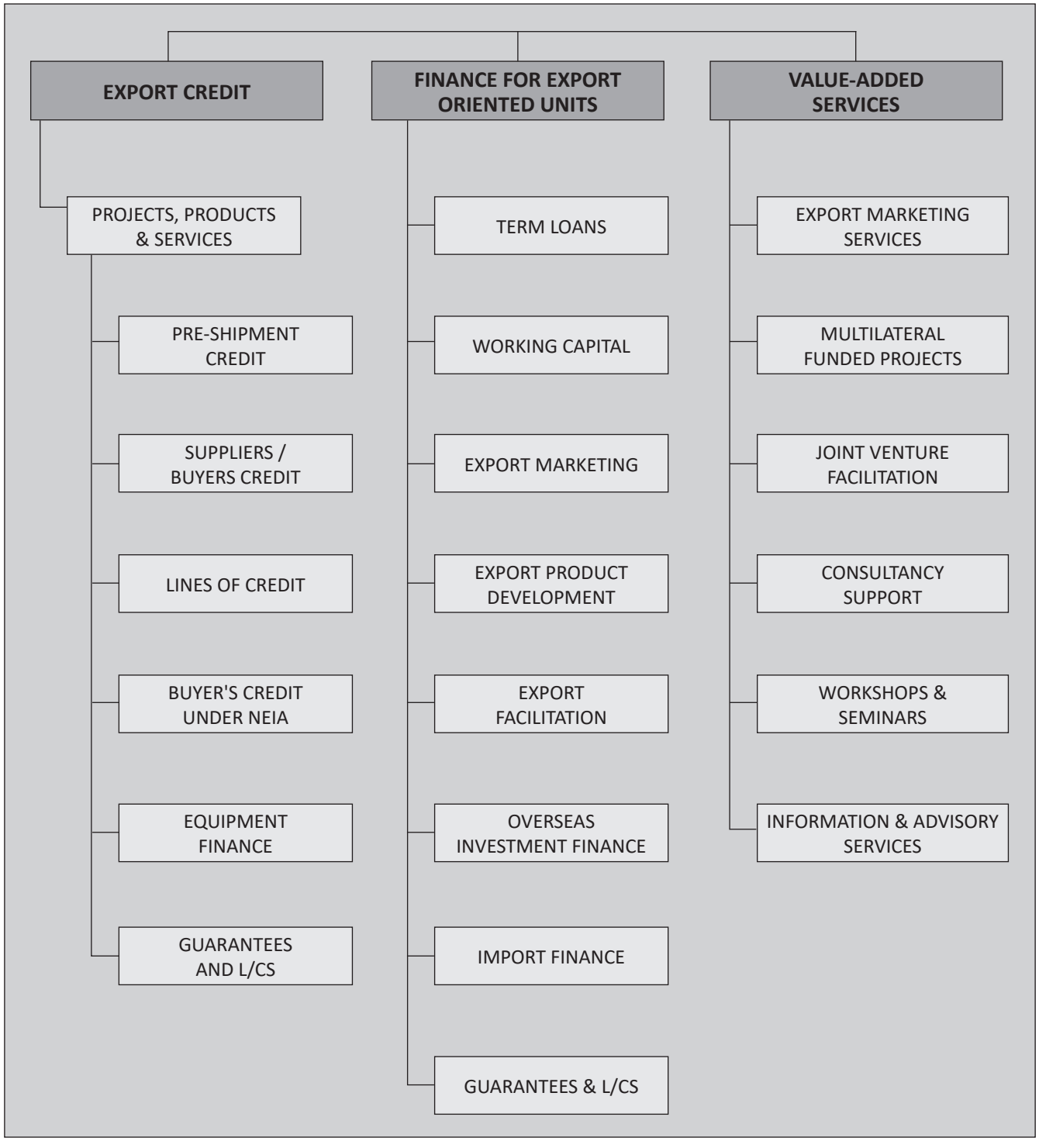

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