

AN ACTIONABLE RESEARCH AGENDA FOR
INCLUSIVE LOW-CARBON TRANSITIONS FOR
SUSTAINABLE DEVELOPMENT IN THE GLOBAL SOUTH

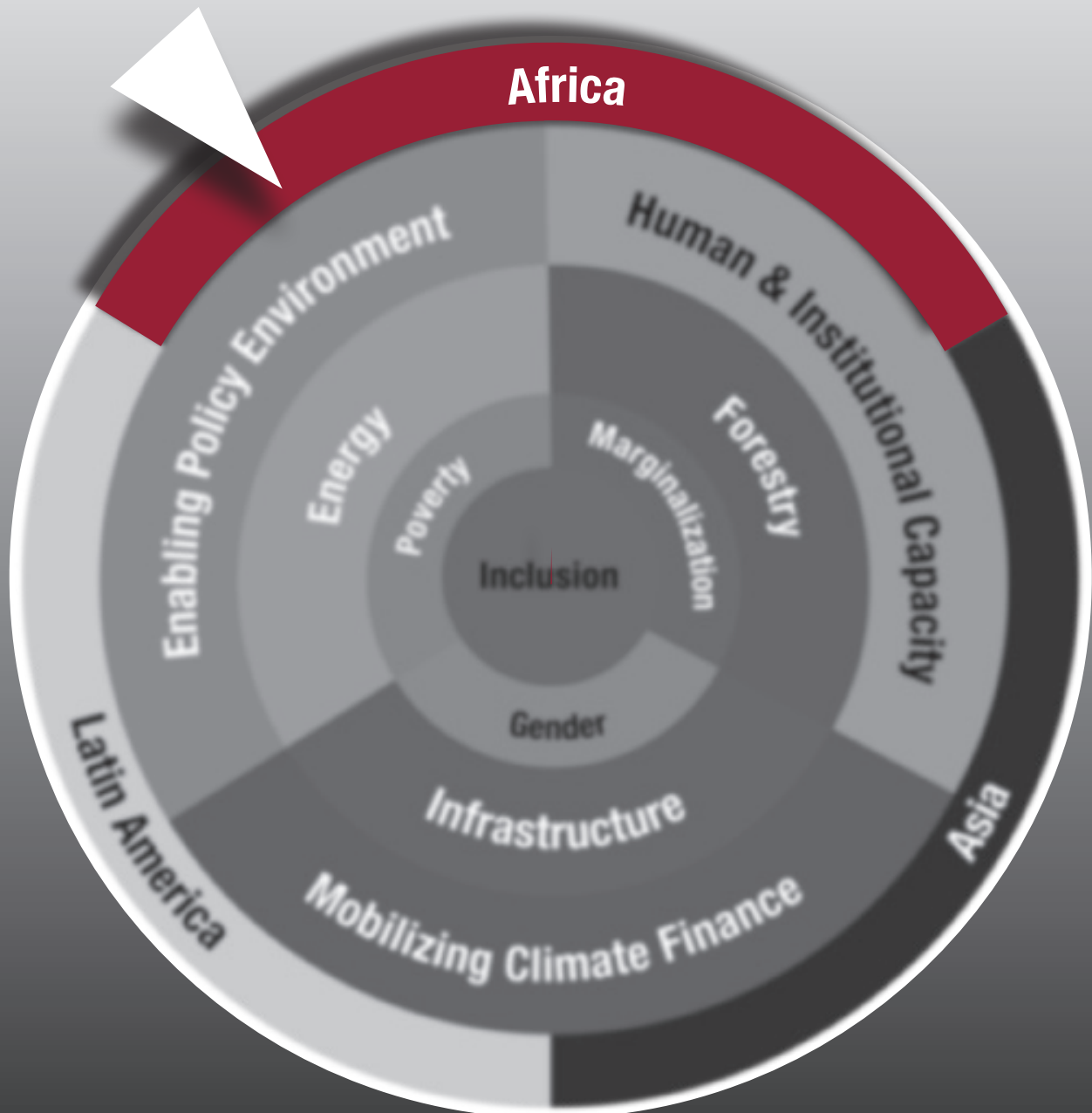


Environment for Development

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Preface

All countries now face enormous challenges posed by climate change. The consequences of continued greenhouse gas emissions are dire, particularly for countries in the Global South that are both more affected and more vulnerable to climate change at the same time as they have less capacity to adapt (AfDB, 2022). The realization that a low-carbon transition needs to be implemented also in countries in the Global South is well established and is also reflected in most countries' ratification of the Paris Agreement and in their Nationally Determined Contributions. In effect, most countries in the Global South are now confronted with the fastest and most dramatic transformation of their economies that they have ever experienced – or at least they would need to be.

The low-carbon transition in the Global South needs to be guided by research since such a transition is an inherently very knowledge-intensive process. This is why the Sustainable Inclusive Economies (SIE) Division of the International Development Research Centre (IDRC) has identified this area as particularly interesting to support. This report is commissioned by SIE as part of a bigger initiative to develop an actionable research agenda that IDRC can support to achieve a low-carbon transition with gender equity in the Global South.

This Regional Policy Review for Africa is part of the Research Agenda for Low Carbon Transition and Gender Equity in the Global South series of papers. The consortium that is working on this series of papers is global and consists of 60 researchers from a multitude of universities and institutions. This particular paper has been written by Lydia Chikumbi and Amin Karimu from University of Cape Town, Nnaemeka Chukwuone, Ebele Amaechina and Innocent Ifeluin from University of Nigeria, Nsukka, and Wisdom Akpalu, Nkechi Owoo, Anthony Amoah and Rexford Kweku Asiamah from University of Ghana. The EfD Global Hub staff supporting the authors were Daniel Slunge and Daniel Hernandez.

This Regional Policy Review for Africa is one of the three regional papers covering the experiences and political ambitions with respect to low-carbon transition in Africa, Asia and Latin America. The focus is on the opportunities and challenges that the regions will face in the years to come to achieve a low-carbon transition (LCT). Although the chapters present a regional perspective, they are supported by in-depth analyzes of a sample of countries in each region. We hope to receive constructive comments on this draft paper from IDRC, our networks and external scholars and practitioners. We will then revise the paper for validation by policy makers and senior civil servants in the Global South. Based on the reviews and validations we plan to prepare final versions of both the paper and the accompanying High-Level Research Agenda by March 2023. The ambition is that these papers will be useful both for donors and research institutions in supporting an even greater contribution by research to a much needed low-carbon transition with gender equity in the Global South in this crucial Decade of Action.

Gunnar Köhlin
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The focus is on the opportunities and challenges that the regions will face in the years to come to achieve a low-carbon transition (LCT).



Executive Summary

Africa is experiencing rapid rates of population growth, especially the youth population. Also, it is experiencing high economic growth, especially before the COVID-19 pandemic, which is projected to continue to grow in the years to come. The increasing economic growth coupled with the rising population, especially a growing young workforce, suggests a future rise in carbon emissions if the growth process is not transitioned towards a low-carbon path. Though currently Africa's contribution to global greenhouse gas (GHG) emissions per capita is low relative to other regions, it is critical for the continent to join the worldwide effort of charting a downward carbon growth path for the world economy, as it is the region that suffers the most from climate change effects. Natural disasters connected to climate change are more common in Africa during the last four decades and occur at a higher rate than in other regions. For instance, the region experienced more than a third of the world's droughts from 2010 to 2019. The World Bank 2021 report suggests that a 3°C global warming will cause Africa to lose as much as 19% of its GDP annually due to the region's vulnerability and high dependence on climate-sensitive sectors.

Within the Nationally Determined Contributions (NDCs) that African countries provided, there are ambitious mitigation and adaptation targets for GHG reduction. Key sectors of focus in the NDCs to reduce GHG are energy, agriculture, forestry, land use, Industrial process and waste management, and the transport sector. Despite the ambitious targets and well-developed NDCs with great strategies and action plans, achieving the targets presents major challenges due to several factors, including lack of political will, inadequate infrastructure and systems for enforcement of climate action, lack of capacity, lack of appropriate technology to help reduce emissions from economic activities, lack of climate funds, and lack of gender mainstreaming in climate policies. All these factors are significant implementation barriers for the NDCs in the region.

The African Group of Negotiators (AGN) agenda items at the COP26 included the need for developed countries to take the lead in achieving zero net emissions by 2050, the need for developed countries to raise enough money to finance adaptation in developing countries adversely affected by climate change, the transfer of environmental technologies to African countries by developed countries for effective climate adaptation, mitigation, and transition, and developed countries' responsibility for reducing global

warming. None of these was agreed upon in COP26, creating further difficulties for African countries to implement their updated NDCs. The items in the AGN agenda were among the critical implementation barriers for the NDCs in the region. For Africa to implement its adaptation plans by 2030, it requires US\$3 trillion (AFDB, 2019), doubling the US\$100 billion per year. Despite the lack of adequate support from the developed countries in climate finance, among others, all the case study countries in this report have made it a goal to integrate climate change policies and activities into their planning and management procedures at the national and sectoral levels. With the integration of cross-sector policy, they have connected the response to climate change to fundamental planning procedures. However, the region's most significant roadblocks to achieving low-carbon transition are governance; mitigation; adaptation; measuring, reporting and verification (MRV); and finance. In addition, all the study countries have barriers concerning technology transfer, capacity building and policy development and need support in these areas.

In economic and climate-related policies, African countries use various policy tools that directly or indirectly influence economic growth, including the transition to low-carbon growth paths. Some instruments are implemented mainly for revenue generation purposes but may have a bearing on the efficient utilisation of the underlying resources that would generate emission reduction gains and put the economy on a low-carbon growth path. Some essential policy tools include a carbon tax, fuel tax and subsidies, regulatory standards, REDD+, and Payment for Ecosystems Service (PES) schemes.

Despite the attractiveness of taxing carbon based on economic principles, it is less utilised in Africa due to the information requirement, vested interest and political buy-in (Price, 2020). Currently, only South Africa has implemented a carbon tax policy in Africa. Other countries such as Senegal and Côte d'Ivoire have preliminary studies on how to price carbon, and Nigeria made statements to consider it in the future. Beyond the carbon tax, many African nations have implemented sector-specific carbon pricing in the form of tariffs on fossil fuels or taxes on inefficient energy technology, frequently done for financial reasons, particularly the fuel taxes (KAS, 2020). Other key policies include subsidies on renewable energy at national, city and community levels as implemented by several countries such as Rwanda, Kenya, Ghana, and Nigeria, among others, and PES schemes in managing forest and land use sustainably with successful implementation from countries such as Kenya, Ethiopia, Zambia, Uganda, and Zimbabwe.

LCT policies must be inclusive in design, strategy, and implementation to yield the expected outcomes. Therefore, all groups along the lines of gender, age, religion, etc., must be included. The review of the NDCs of the selected countries for this report shows that gender aspects were considered in different climate actions and priorities. Gender inclusion is considered more often in adaptation than mitigation. Furthermore, there is a solid consideration for mainstream gender equity in policy and decision-making and identifying women as change agents. For instance, Ethiopia, Uganda, Kenya, Nigeria and Ghana mentioned plans to develop women's capacity in their NDCs. There are policy initiatives for gender inclusion in the energy sector, such as the ECOWAS Policy for Gender Mainstreaming in Energy Access, adopted in June 2017. The policy is to remove current gender hurdles to increase energy access in West Africa. Similar policy proposals are being made by Southern Africa and East African blocs. There is currently strong awareness by policymakers to also include youth in climate change policies and action plans in the region. Despite these positive developments, there is a

need to increase gender and youth mainstreaming in all LCT policy designs, strategies, and implementation in the region.

Climate change financing costs are a key bottleneck for implementing the NDCs in developing countries. In the case of Africa, the anticipated cost for 2020-2030 is US\$1.3–US\$1.6 trillion, with mitigation accounting for the largest portion, followed by adaptation and the rest. This corresponds to about US \$127.8 billion per year on average. The adaptation cost component of the anticipated cost of climate change varies from US\$6–US\$19 billion in Central Africa to US\$91–US\$143 billion in East Africa from 2020-2030. At the current international-to-domestic commitment ratio in 2020 (64% to 36%), the adaptation financing gap in Africa from international sources for the period 2020-2030 ranges from US\$166 billion to US\$260 billion, which is a significant gap that African countries in addition to their domestic responsibilities cannot bridge. Key sources of climate finance for the region are generally from three sources: multilateral climate funds, bilateral development assistance institutions, and regional or national funds.

Environmental and social challenges ahead

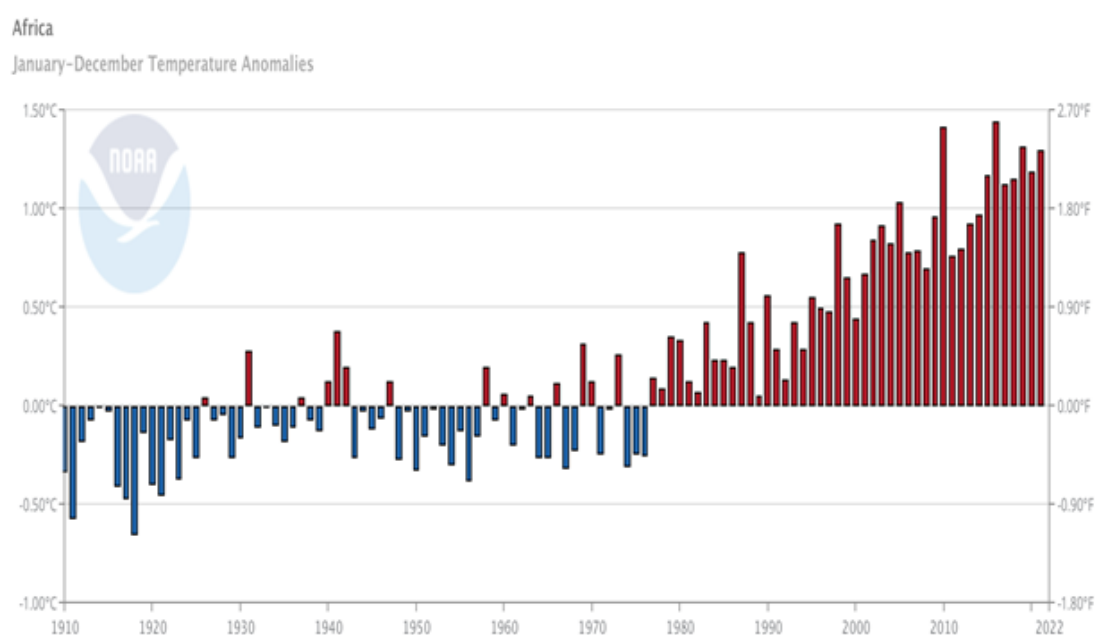
1.1 Climate change and Low-Carbon Transition

1.1.1 Climate change impact

The African continent's temperature has risen more quickly than the global mean surface temperature. Since 1910, 2020

has been the fourth-warmest on the African continent (see figure 1). The 10 warmest years in the region have all occurred since 2005, with the five warmest years occurring since 2010. With 1.44°C above average, 2010 and 2016 were Africa's warmest on record (World Bank, 2021a). Since 1910, Africa's annual temperature has risen at an average of 0.13°C (0.23°F) every decade; however, since 1981, it has more than doubled to 0.30°C (0.54°F). Under medium scenarios, long-term estimates predict that significant areas of the region will warm by more than 2°C by the last two decades of the 21st century (IPCC, 2022).

Figure 1. Africa's Temperature Anomalies, 1910-2022



Source: NOAA, 2022

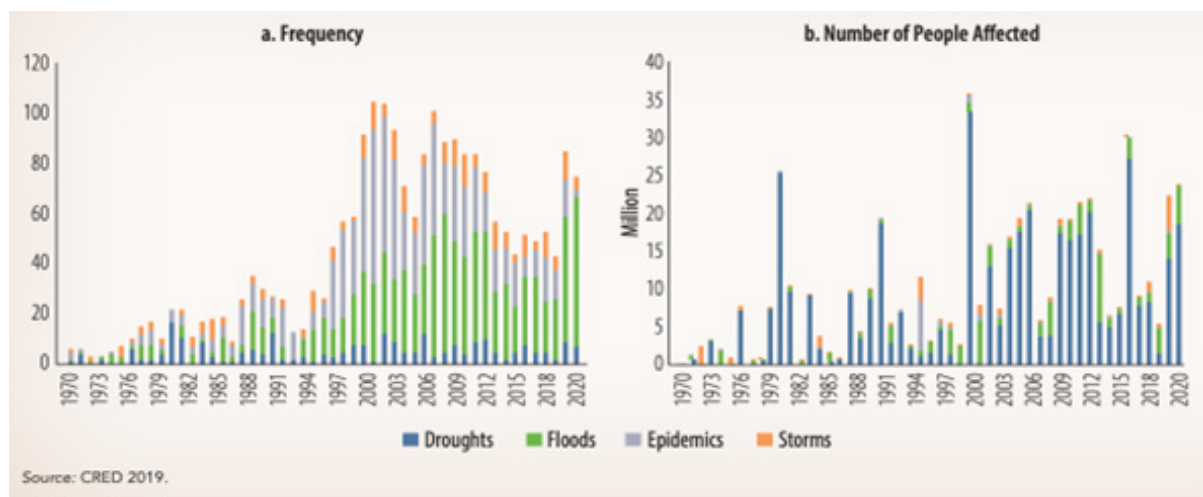
Extreme weather events such as heatwaves, droughts, floods, and storms are becoming more frequent and intense in many nations in Sub-Saharan Africa due to rising temperatures and changes in precipitation. Since the second half of the twentieth century, the duration and intensity of heatwaves have grown in portions of the continent, most notably in Southern Africa and East Africa (World Bank, 2021). Southern Africa, for example, has experienced temperature increases of up to 2°C over the last century, with the highest increases occurring during the 1980s. In addition, during the second half of the twentieth century, western areas of Southern Africa, from Namibia to Angola and the Congo, had less summer rain. Other southern countries, such as Botswana, Zimbabwe, and western parts of South Africa, had modest decreases in rainfall. Rising temperatures across the continent and more frequent and severe weather events might result in deaths, displacement, climate-related conflict, erratic rainfall, water shortages, and reduced agricultural production (World Bank, 2021b).

Temperature and precipitation anomalies, as well as natural disasters, characterise climate change in Sub-Saharan

Africa. Natural disasters have been more common in the region during the last four decades and at a higher rate than elsewhere. For example, droughts have nearly tripled in Sub-Saharan Africa from 1970 to 1979, storms have quadrupled, and floods have surged more than tenfold (figure 2). During the same period, the global frequency of storms increased fivefold, and storms increased thrice. These numbers suggest that natural disasters are more common in Sub-Saharan Africa than elsewhere.

For example, the region experienced more than a third of the world's droughts from 2010 to 2019. Sub-Saharan Africa accounts for around 20% and 60% of worldwide floods and epidemics, respectively (World Bank, 2021b). Natural disasters occur more frequently and with greater intensity, affecting a more significant number of people. Drought-affected persons in Sub-Saharan Africa climbed from 19.3 million in 1970–79 to approximately 115 million in 2010–19, while flood-affected people increased from 3.5 million to 28.1 million (figure 2). Even though droughts happen less often than other natural disasters, they affect the highest number of people.

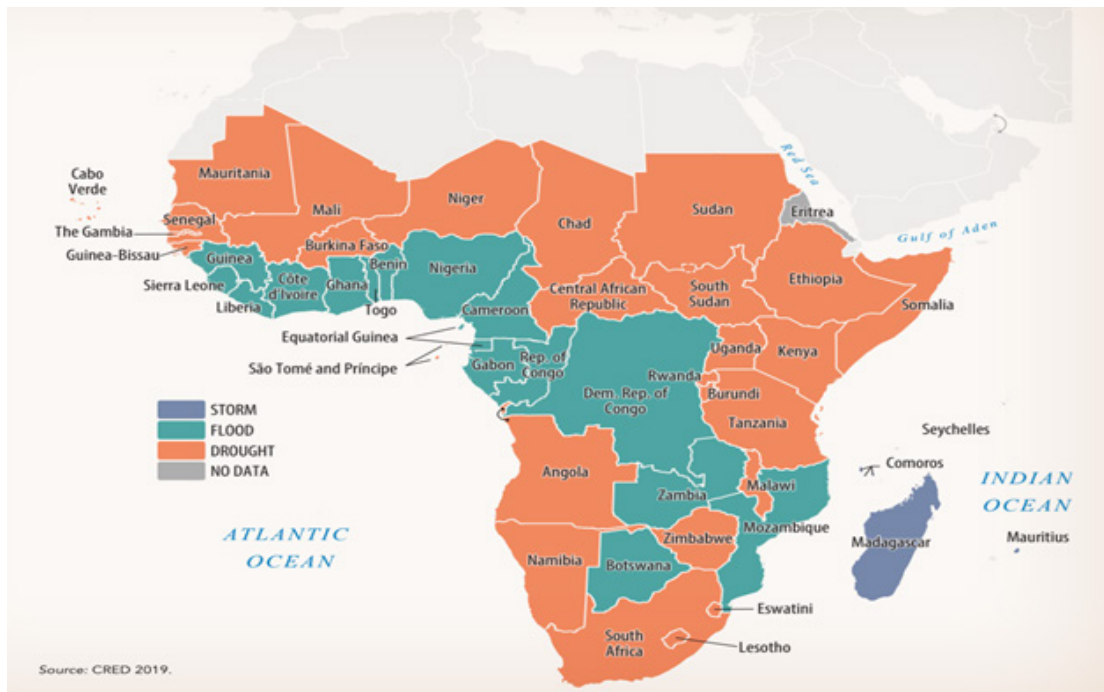
Figure 2. Natural disasters in Sub-Saharan Africa, 1970–2020



Beyond the aggregates, the risk of natural disasters varies dramatically between geographic places and months within a year. Figure 3 depicts the type of natural hazard affecting the most significant number of people in each Sub-Saharan African country over the last two decades: (i) droughts have primarily affected countries in the southern part of the continent, the Horn of Africa, and the Sahel; (ii) floods have primarily affected most countries in West and Central Africa; and (iii) countries in southeastern Africa, i.e., Madagascar, Comoros, and Mauritius, all have an annual cyclone season and are consequently mainly influenced by storms (CRED 2019).

Floods accounted for over two-thirds of the 1,053 weather-related disasters in the region between 2000 and 2019, followed by storms (15%) and droughts (12%). Natural catastrophes strike all countries in the region, but their frequency and severity vary greatly depending on location. For example, the three countries with the most disasters between 2000 and 2019 were Kenya (60), South Africa (56), and Mozambique (55), with floods and storms accounting for more than three-quarters of all disasters during the last two decades. Since 2000, Somalia has had the highest number of disaster-related deaths (20,739) due to the 2010 drought. Mozambique is next (2,291), with Cyclone Idai responsible for more than a quarter of the deaths (CRED, 2019).

Figure 3. Natural hazards affecting people across Sub-Saharan Africa, 2000-2019



The economic impact of climate change

Countries with low capacity, poor governance, weak natural resource management, and a high reliance on climate-sensitive activities will be particularly vulnerable to the effects of climate change (World Bank, 2020). For instance, rising temperatures and heat waves can stifle growth in different sectors, resulting in low output, physical ailments, and the destruction of land and water resources, among other things.

Climate-related shocks are disproportionately hurting Sub-Saharan Africa, which only produced 2% of global GDP in 2020, is home to almost 15% of the world's current population and will account for more than half of the predicted worldwide population by 2100. This is due to the region's geographical vulnerability, low income, increased reliance on climate-sensitive sectors, and limited ability to respond to weather shocks. For 3°C global warming by 2100, the estimated potential GDP loss is US\$2,889.66 billion, with GDP losses across African countries as high as 19% per year (World Bank, 2021).

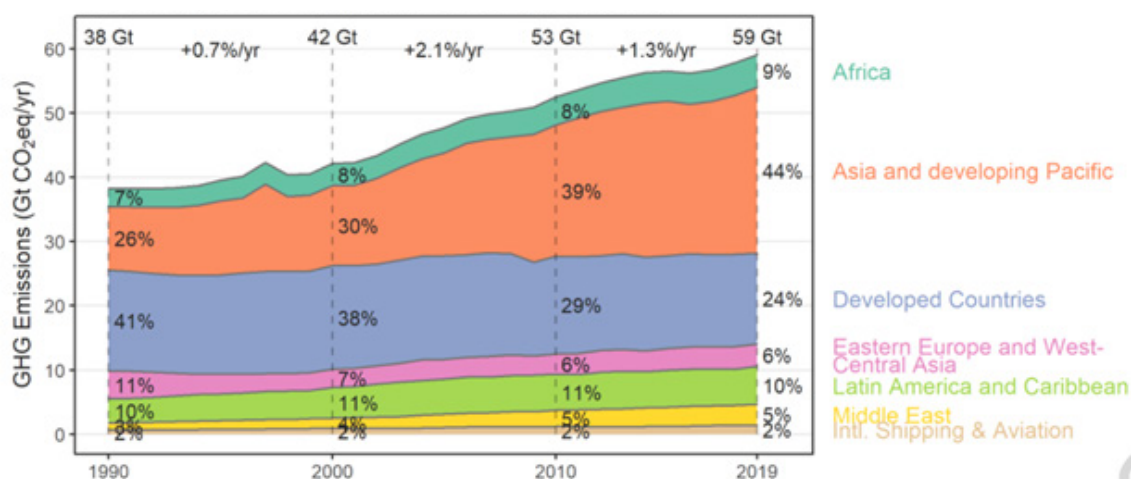
Carbon emission and LCT

Since the global climate negotiations in the 1990s, regional contributions to GHG emissions have changed (IPCC, 2022). For example, figure 4 demonstrates how developed countries

as a whole have not been able to significantly reduce GHG emissions, with levels remaining relatively stable at around 15 GtCO₂eq yr⁻¹ between 1990 and 2010, while Asia and the Developing Pacific have seen a sharp increase in their share of global GHG emissions, especially since the 2000s (Jackson et al., 2019; Peters et al., 2020; UNEP, 2017; Crippa et al., 2019; IEA, 2021).

Asia and the Developing Pacific accounted for 77% of the net 21 GtCO₂eq rises in GHG emissions since 1990 and 83% of the net 6.5 GtCO₂eq increase of the global GHG emission growth since 2010. Since 1990, Africa has contributed 11% (2.3 GtCO₂eq) of the global increase in greenhouse gas emissions, and 10% (0.7 GtCO₂eq) since 2010. Since 1990, the Middle East has increased GHG emissions by 10% (2.1 GtCO₂eq), and by 10% (0.7 GtCO₂eq) since 2010. Since 1990, the GHG emissions from Latin America and the Caribbean have increased by 11% (2.2 GtCO₂eq) and 5% (0.3 GtCO₂eq), respectively. Developed Countries and Eastern Europe and West-Central Asia have reduced emissions since 1990 by -1.6 GtCO₂eq and -0.8 GtCO₂eq, respectively. However, emissions in the latter region started to grow again in 2010, contributing to 5% of the global GHG emissions change (0.3 GtCO₂eq).

Figure 4. Regional GHG emission trends (in GtCO₂eq yr⁻¹) 1990-2019



Source, IPCC, 2022

Sub-Saharan Africa has contributed the least to GHG emissions but suffers the most from the impacts of climate change. GHG emissions in the region are estimated at 3.7 GtCO₂eq per year (7.6% of worldwide emissions). This does not include South Africa, which accounts for 3% of global emissions. Agriculture, forestry, and other land use accounted for 62% of total emissions in the region (of which 2% was from agriculture). In 2018, the energy sector in Sub-Saharan Africa accounted for 31% of the region's emissions (IRENA, 2020). This means that to meet the Paris Agreement's goals of limiting average world temperature increases, African nations' NDCs should significantly emphasise emissions from agriculture, forestry, and other land use (World Bank, 2021). See appendix 1 on the brief summary of key sectors.

Looking at the selected countries in the region, the following are the top emitters (CO₂ metric tons per capita) in 2018: South Africa (7.5), Nigeria (0.7), Ghana (0.5) and Kenya (0.4), whilst the least CO₂ emitters are Tanzania (0.2), Rwanda (0.1), Ethiopia (0.1), and Uganda (0.1), respectively (World Bank, 2021). The four top economies in the region, i.e., South Africa, Nigeria, Ghana and Kenya, seem positively correlated with emission levels. Agriculture, forestry, water, human health, infrastructure and energy are the most concerning sectors for the region. Climate change is transmitted in lower crop yields, reduced agricultural and labour productivity, and damage to human health.

The world is far from attaining the Paris Agreement on Climate Change's GHG emissions objective of keeping global temperature rise below 1.5 - 2 degrees Celsius. For this to happen, emission reduction efforts would have to be much more significant, needing anywhere from 25% to 55% lower emissions in 2030 from that pledged in the current NDCs – commitments made by each country under the Paris Agreement (AFDB, 2021). Recent studies imply that a 3°C global warming would result in projected potential GDP losses of US\$2.9 trillion in Sub-Saharan Africa if no action is taken to cut emissions (if the BAU scenario is maintained without major changes in the world's social, economic, and technological trends). Implementing policies to reach the Paris Agreement objectives (2°C global warming) would reduce economic activity losses by US\$962 billion a year in terms of the 2100 GDP (World Bank, 2021).

According to recent projections, climate change adaptation will cost US\$30 billion to \$50 billion per year (2%-3% of regional GDP) during the next decade. This can be accomplished by improving the ability of “adaptive social protection” (ASP) systems by (i) strengthening institutional coordination for shock response among agencies in charge

of social protection, disaster risk management, agriculture, and public finance; (ii) reinforcing ASP programs, such as women's empowerment, to increase their role as household drivers of resilience; and (iii) improved ASP systems through better climate early warning system data and readily available information to update shock response programs; and (iv) reprioritisation of social protection in national budgets, even in times of severe budget constraints, and development of diversified ASP financing strategies (World Bank, 2021).

Climate change mitigation and adaptation should focus on these key sectors in the region: agriculture, forestry, water, human health, infrastructure, and energy. The adverse effects of climate change, i.e., poor food yields, lower agricultural and labour productivity, and harm to human health, require bold actions and massive investments across key economic sectors. There is an urgent need to create conditions for a transition away from coal and toward scaling up renewables in the energy mix; investing in shared, low-carbon transportation in cities; boosting sustainable food and land-use systems; investing in resilient water infrastructure (including improved management) and reducing emissions from critical industrial value chains. The main impediment to the region's low-carbon transformation appears to be a lack of actionable policies and economic instruments that would drive the changes in meeting the Paris Agreement goals.

1.1.2 Gender Equality & Inclusiveness

1.1.2.1 Gender equity & other inequalities

While all people are affected by climate change, the effects differ disproportionately depending on identity intersections such as race, class, sexual orientation, and gender identity. Gender remains critical in defining social structures and identities, and climate change exacerbates gender inequalities and discrimination. Women worldwide bear the brunt of the impacts of the climate catastrophe due to their economic marginalisation, political disenfranchisement, and unequal work opportunities. They lack adequate representation and influence in creating climate policies to meet their needs. Women are more exposed and susceptible to climate change than men, owing to their lower socioeconomic status, lack of education, and lack of participation in political and household decision-making processes that affect their lives (UNDP, 2011). This is especially true because most women work in subsistence rain-fed agriculture, which is particularly sensitive to climate change (AU, 2021). The GGI measures scores on a 0 to 100 scale, which can be interpreted as the distance to parity (i.e., the percent of the gender gap that has been closed). Sub-Saharan Africa has narrowed the gender gap by 67.2% (Statista, 2021). In addition, it tracks progress toward

closing these gaps over time (GGGR, 2021). This indicates that, on average, women had 32% fewer opportunities than men did. Yet, performances differed substantially when seen from a national standpoint. The best results were shown by Namibia and Rwanda, both of which had indices of 0.81, indicating an average gender difference of about 19%. Both nations were listed among the top 10 performers in the world as a result of the accomplishment. The Democratic Republic of the Congo, on the other side, performed poorly, earning a score of 0.58. (Statista, 2021).

With a close look at the four key dimensions, it is clear that gender disparity is significant in Sub-Saharan Africa (World Economic Forum statistics, 2021). Although there has been a considerable achievement in narrowing the gender gap in Educational Attainment and Health and Survival, there are still many barriers for women in some countries to fully participate in Political Empowerment and a vast gender gap

in Economic Participation (Table 1). In Health and Survival, all selected countries have attained an average score of 96%. South Africa, in particular, has almost closed the gender gap in Health and Survival and Educational Attainment with index scores of 98 and 99, respectively. Conversely, the participation of women in Politics is abysmal, with an index score of 49 and an Economics Empowerment index score of 66. On the other hand, Botswana has attained a score of 100 in Educational Attainment, closing the gender gap (Table 1). While progress is higher for Economic Participation, there are important future implications of disruptions due to the pandemic and continued variations in quality across income, geography and ethnicity. In addition, Botswana has the largest gender gap in Political Empowerment, with only 8% closed. The widening gender gaps in Political Participation have been driven by negative trends in the political arena for women (OECD, 2022).

Table 1. Gender gaps in the selected countries

	South Africa	Zambia	Botswana	Namibia	Togo	Mozambique	Angola	Malawi	Rwanda	Uganda	Tanzania	Nigeria	Ethiopia	Senegal
Gender gap in political empowerment (score 0-100)	49	18	8	46	19	49	25	92	95	89	92	81	85	89
Health & Survival	98	80	98	98	98	98	98	98	97	98	97	97	97	97
Gender gap in educational opportunities (score 0-100)	99	93	100	100	78	90	76	99	93	100	100	78	90	76
Economic participation	66	80	79	79	79	66	66	62	72	69	70	68	56	55

Source: World Economic Forum, Gender statistics, 2021

Africa has the world's largest youth population, with a median age of 19.7. A huge young population typically indicates a large and active workforce, which would benefit any region's development prospects. However, the continent's poor employment continues to suffocate young people's potential. Africa needs to reinvigorate structural transformation guided by dedicated policy action to realise this potential. According to the African Development Bank, one-third of Africa's 420 million young people aged 15 to 35 were unemployed in 2015, another third were vulnerable, and only one out of every six was in wage employment. Among the selected countries in Table 2, South Africa, Botswana, Zambia, Nigeria and Kenya have the highest youth unemployment rates.

Table 2. Share of youth not in education, employment or training (% youth population 15-24)

	Youth (15-24)		
	Both	male	female
South Africa	32.4	31.0	33.8
Nigeria	28.1	25.3	31.0
Ghana	30.5	27.7	33.3
Ethiopia	10.5	5.7	15.1
Uganda	30	21.8	37.7
Kenya	19.7	15.0	24.3
Tanzania	14.9	10.6	19.0
Rwanda	31.0	26.6	35.3
Botswana	39.3	38.5	40
Burkina Faso	41	30.5	49.1
Zambia	43.7	36.5	50

Source: ILO, 2020

Gender equality and LCT

There is also a growing body of knowledge about gender equality, low-carbon development, and green growth. This expands on fundamental concerns like energy access and land use change (often deforestation), which are critical for LDCs in meeting low-carbon objectives and developing a green growth path (Bowen and Fankhauser, 2009). Deforestation and energy access are influenced by a variety of variables, many of which involve or have an impact on women.

Potential low-carbon policies can impact women and gender relationships, but they can also benefit from low-carbon or green-growth measures that promote gender equality.

In developing countries, women bear the brunt of the consequences of fuel poverty. A gender-sensitive low-carbon policy would prioritise improving women's access to clean energy services and delivering clean electricity for lighting (Terry, 2009). Terry (2009) cites clean energy projects catering to women's gendered demands and interests. These include schemes that allow women to make money by using or providing renewable energy services. Improved cookstoves are another low-carbon intervention featured in national plans and strategies (Ethiopia has this as a flagship program), and they can help reduce carbon emissions while reducing indoor air pollution and improving women's and children's health (IIED, 2020).

Whilst gender equality is the ultimate policy goal, mainstreaming has been internationally recognised as the tool to achieve this (UN, 2002). The strategy attempts to incorporate both women's and men's concerns and experiences into the design, implementation, monitoring, and assessment of policies and programs in all political, economic, and social arenas, ensuring that women and men benefit equally, and inequity is avoided. Gender issues need to be mainstreamed in various sectors, including health, education, and energy, and this has also been recognised in the context of climate change.

Addressing inequalities is essential for building resilience and addressing climate and environmental challenges. By involving both women and men and drawing on their gender-based experiences in the formal and informal workforce, climate responses can be more effective and sustainable in communities and households. For instance, women's full participation and contribution to decision-making and leadership in climate resilience and low-carbon development planning, as well as the preparation and implementation of gender-focused initiatives and programs, would address the inequities. It is advised that while conducting research, gender-disaggregated data be collected and that gender be included in theories of change and plan results frameworks (World Bank, 2021). There's a need for decision-makers and development partners to integrate gender perspectives into the planning, financing and implementation of climate responses at all levels and across related sectors.

1.1.3 Recovery from the COVID-19 pandemic

1.1.3.1 The economic impact of the pandemic

Covid-19 impact and gender

COVID-19 has had a particularly negative impact on women, with decades of progress being reversed as women's rights are eroded, their access to public services and the labour market is limited, their unpaid care load is increased, and their views are ignored. According to recent UN research, COVID-19 widens the poverty gap between men and women. By 2030, the gender poverty gap for ages 25 to 34 will worsen from 118 women for every 100 men in 2021 to 121 women (UN-WIDER, 2020). By 2022, around 435 million women and girls will live on less than \$1.90 daily, including 47 million pushed into poverty due to the pandemic (UN-WIDER, 2020). This is especially true given the crucial role that women will play in ensuring a successful COVID-19 recovery (UN-WIDER, 2020). For the COVID-19 recovery to be sustainable, it must be an inclusive green recovery. An 'inclusive' recovery is one in which no one is left behind, and marginalised groups (such as women and youth) are actively involved and part of the process. This is especially important given Africa's demographic shift and associated challenges around youth unemployment. Women and young people will play a vital role in all areas of COVID-19 recovery, and they must be considered, championed, and integrated.

Economic growth

GDP output in Sub-Saharan Africa (SSA) fell by 2.4% in 2020 due to the COVID-19 pandemic. This was the region's first economic contraction in a generation and the deepest recession since the 1960s (IMF, 2021). However, the recession was weaker than feared since the virus spread more slowly than anticipated and agricultural activity was intense in some countries (Benin, Ethiopia, Kenya, and Nigeria) (World Bank, 2021). As a result, growth in the region gradually resumed in 2021, at 2.8%, reflecting positive spillovers from strengthening global economic activity. Moreover, the real GDP growth was projected to be 3.3% in 2022 (IMF, 2021a).

The pandemic has contributed to widening budget deficits and a sharp increase in government debt. The debt-to-GDP ratio in the region increased on average by 8 percentage points to 70% of GDP in 2020, raising the risk of debt distress in some countries (IMF, 2021b). The adverse effects of the pandemic, fiscal pressures, and the languid pace of vaccinations have dampened the resumption of growth, particularly in the hospitality and tourism sectors.

Employment levels

The pandemic's negative effect has been significant for informal workers, who constitute the majority of the working

poor in the SSA region. As a result, governments in Sub-Saharan Africa have implemented a wide range of policies, from cash transfers for the destitute to small business loans (UN-WIDER, 2020). However, the region's precarious state of public finances has constrained governments' ability to enact expansionary fiscal stimulus programs. As a result, it's yet unclear what the pandemic's total impact will be on employment and livelihoods in the region and whether the policy solutions so far are sufficient to prevent the pandemic's adverse effects on the working poor (UN-WIDER, 2020).

Income inequality and poverty

Persistently high poverty rates heavily skew Sub-Saharan Africa. About 70% of the world's poorest people are in this region. It is estimated that 422 million people are exposed to chronic episodes of risks and shocks such as climate and conflict. In addition, food insecurity affects an estimated 27% of the population (FAO, 2021). The pandemic's devastating direct and indirect effects on an already stressed rural population in terms of poverty and food security have placed African countries in a precarious situation that requires immediate attention. The COVID-19 impacts are exacerbating existing inequalities rather than creating them.

COVID-19 effects could reverse hard-won gains in poverty reduction that occurred over the past two decades. According to revised estimates, up to 38.7 million more Africans could fall into extreme poverty in 2021–2022, bringing the total to 465.3 million people in 2021, or 34.4% of the African population (IMF, 2021). The estimated cost of raising their income to at least the poverty line is about US\$7.8 billion in 2020 and \$4.5 billion in 2021 (IMF, 2021). In addition, inequality is likely to rise, and school closures may have long-term implications for human capital accumulation and productivity growth.

1.1.3.2 Impact on carbon emissions and policy implementations.

COVID-19 is expected to significantly impact climate spending in developing nations, especially in Africa, in the short term. Unfortunately, empirical evidence on the effects of COVID-19 is scanty in Africa, another form of inequality in the global system. However, the NDC Partnership's initial global assessment of COVID-19's impact on NDC revisions and climate ambition in 54 countries (including 29 in Africa) revealed two significant challenges, among others: i) the focus on economic recovery and health threatens to divert political attention away from climate change; and 2) due to competing priorities and mobility constraints, financial resources are being diverted away from climate action and towards COVID-19 response (AU, 2021).

Despite these challenges, COVID-19 should not change

the urgency of addressing Africa's environmental issues. Africa can still accelerate decision points that could have substantial impacts through its national or sectoral master plans, climate change adaptation plans, and the NDCs. As countries transition from virus containment to economic recovery, decisions must be taken that will shape trajectories on emissions, resilience, and biodiversity for years to come. A sustainable and resilient recovery in Africa will create jobs in future industries while addressing interconnected public health concerns, prosperity, and climate change (Africa Union, 2021).

1.1.4 Knowledge Gaps

Literature on which sectors to focus on and the numbers impacted by climate change in these areas is missing.

A gender-sensitive low-carbon policy would prioritise improving women's access to clean energy services and delivering clean electricity for lighting. The enacting of these tools will cater to the gendered demands and interests of women. The acts would allow women to make money using or providing renewable energy services. They can help reduce carbon emissions while reducing indoor air pollution and improving women's and children's health.

Gender issues need to be mainstreamed in various sectors, including health, education, and energy, and this has also been recognised in the context of the low-carbon transition.

Understanding how inequality affects emissions is in a nascent stage. Less is known about the causal mechanisms by which different dimensions of inequality affect emissions; such dimensions include income, ethnicity, and socioeconomic, spatial, and socio-cultural-gender factors. In particular, limited knowledge exists on the linkages between dimensions of inequality other than income or wealth and emissions arising from different service demands. Research gaps are apparent on how inequalities in living standards relate to emissions and how changes in disparities between genders, social groups, and other marginalised communities impact emissions trends.

As a result, it's yet unclear what the pandemic's total impact will be on employment and livelihoods in the region and whether the policy solutions so far are sufficient to prevent the pandemic's adverse effects on the working poor. Data availability will help the planning process and the low-carbon transition agenda.

1.2 Visions for an Inclusive Low-Carbon Transition (LCT & GE)

1.2.1 Regional trends for Low Carbon Transition

Sub-Saharan African (SSA) countries are experiencing

rapid population growth, particularly in urban areas, and a young and growing workforce (IMF, 2021). Additionally, many SSA countries are experiencing high levels of economic growth. However, simultaneously, the increasing risk of devastating global climate change threatens to destabilise food production systems; increase the intensity and frequency of droughts, floods, and fires; and erode development and poverty reduction gains.

Despite having the world's lowest per capita greenhouse gas (GHG) emissions, SSA will need to join global efforts to combat climate change, especially by taking steps to avoid significant rises in emissions. GHG emissions in the region are likely to increase substantially due to projected population and economic growth, fossil fuel consumption, and agricultural expansions (UNEP, 2021). Consequently, agriculture, forestry, electricity, transportation, extractives, construction, and manufacturing are all at risk of becoming locked into high-carbon development pathways if no actions are taken. There are, however, opportunities for SSA governments to help create technologies and practices that will help them avoid becoming locked into high-carbon-intensive economies and manage the complex tradeoffs required to achieve sustainable economic development in a carbon-constrained world. It is important to note that as countries adopt better technologies and shift to a green economy, some economic sectors will shrink and others will expand, depending on the availability of requisite skills; the expanding sectors could absorb most of their shrinking counterparts. It is vital to mitigate the impact on women as they are more likely to be laid off when jobs are lost, or unskilled jobs are replaced with skilled jobs (ILO, 2018).

Occupational gender stereotypes are likely to endure when jobs are lost in some sectors and created in others, such as energy and the circular economy. Women will likely acquire only a minority of the jobs unless measures are taken to train women in relevant skills (ILO, 2019). While estimates imply that investing US\$630 billion in green industries by 2030 would result in at least 20 million new jobs globally (NCE, 2018), green sector skills shortages are already a serious impediment to a just transition to low-carbon, long-term growth.

Recommendations are given to provide win-win solutions to help the LCT transition, such as i) lowering GHG emissions. These may include generating on-grid electricity from renewable sources (avoiding coal power lock-in); ii) preventing lock-in to high-carbon development trajectories by adopting higher density multi-use urban plans, such as mass transportation systems; iii) promoting equitable economic

growth by integrating rural land-use planning (ODI, 2015) as well as through the creation of green entrepreneurship for women and youth through sectors that promote environmental opportunities, i.e., agriculture, food production, construction, tourism, transport, renewable energy and recycling. This might be aided through entrepreneurship training, which would include the development of company plans as well as access to technology and information or building on and greening existing businesses and projects.

For example, evidence from the energy sector shows the value of promoting women's entrepreneurship through business education and skills development, training on personal agency and initiative, access to finance and capital, and access to coaches, mentors, and networks. These transformations will necessitate sector-level action by specific governments. These will require support through cross-sector collaboration and international aid in finance, technology transfer, and frameworks to promote low-carbon trade and productivity.

African countries signed the Paris Agreement and submitted their Nationally Determined Contributions (NDCs) to cut GHG emissions. Many regions have established clear mitigation targets and adaptation priorities in their NDCs. The updated and latest NDCs demonstrate high-level ambitions to reduce GHG further. The disclosed conditional and unconditional contributions lay the groundwork for the region's transition to a low-carbon, climate-resilient future. Developing the necessary policies, strategies and programs to transform SSA's infrastructure and natural and human resources will play a prominent role in shaping SSA nations' growth.

Although policy tools such as strategies, programs, and action plans are carefully developed, implementation has always been a struggle in the region (ODI, 2015). This is because most governments lack i) political will to champion climate actions; ii) appropriate policy instruments; iii) infrastructure and systems for climate action enforcement; iv) capacity building; v) technology transfer; vi) climate funds; and vii) gender equity, to name a few.

To establish and implement effective low-carbon policies in SSA, various government agencies, ministries, and departments must work together because transitions cut across numerous sectors. Additionally, a high level of political leadership will demonstrate the importance of LCT to national objectives.

Incentivising low-carbon development must be supported by effective implementation across government agencies, which can build institutional capacity and human resource

development. Improving knowledge and engagement of private actors in low-carbon transitions will require communication and information campaigns to highlight that low-carbon objectives align with poverty reduction goals and improve quality of life. Women and other marginalised groups must be involved for LCT to be effective, as women are disproportionately affected by climate change impacts. Sub-Saharan Africa and the Global South demonstrate the potential for women and youth in green sectors provided that women are supported in overcoming social and cultural barriers, i.e., lower literacy; lower access to finance, education, and land; lower mobility; and the burden of care — ensuring that skills training matches opportunities in growing and emerging green sectors, and recognizing the importance of transitioning informal workers to the formal economy to ensure they have access to decent work and employment protections (WOW, 2021). Another strategy to promote LCT is to improve public awareness of the opportunities and direct and practical benefits of low-carbon production. This will boost the likelihood of success. In addition to the actions of individual governments, foreign funding and other forms of assistance are critical.

1.2.2 Regional LCT & GE visions, strategies, and programs

1.2.2.1 International commitments for decarbonisation

Analysis of NDCs, conditional and unconditional commitments and long-term strategies.

At the 21st Conference of the Parties (COP21) in Paris on 12 December 2015, parties to the UNFCCC secured a breakthrough agreement to fight climate change effects and accelerate and intensify the actions and investments needed for a sustainable low-carbon future. The agreement entered into force in November 2016 after all parties unanimously adopted it. The Nationally Determined Contributions (NDCs) also detail the adaptation and mitigation measures that each nation plans to take in order to combat climate change. However, since the ratification of these NDCs, there have been doubts regarding African countries' ability to follow through on their obligations and, more significantly, whether their commitments under the NDCs are reasonable given their national circumstances. Many causes have been blamed for this, including a lack of competence within African countries and a lack of accurate data collection and monitoring systems. In addition, some critics claim that the NDCs were rushed by consultants to meet the COP21 submission deadlines, with little participation from key stakeholders.

Nevertheless, parties are obligated to contribute to the accomplishment of these goals and communicate them to

the UNFCCC (Article 3) in the form of NDCs. NDCs are the centerpieces of the Paris Agreement agreed through an international partnership that forms the foundation for the pathway towards a low-carbon and climate-resilient development.

Parties were requested to submit the updated and revised NDCs to the UNFCCC Secretariat in 2020, pushed forward to 2021 due to the pandemic. Compared to the first NDC, the ambition to reduce emissions is relatively high. Many countries have set conditional targets, while others have developed conditional and unconditional targets (see Table 3).

Although gender is barely discussed in NDCs, many countries have attempted to address the issue; what is clear, though, are the political pledges to have net-zero tracker status. There is little indication of participation in the international market in the region. However, many countries have well-defined adaptation priorities and anticipated implementation barriers. We have selected eight countries (South Africa, Rwanda, Tanzania, Ethiopia, Uganda, Kenya, Nigeria, and Ghana) for this review (see Table 3). This sample provides some insight into the strategies for LCT.

Table 3. Countries' Mitigation and Adaptation contributions.

Country	NDC submit	GHG Target level emissions	GHG Target Type	Target period	Adap-tion in-cluded	Sector cov-ered	Con-dition-ality	Share of global GHG emis-sions	Polit-ical de-cision	Build on existing policies	Gender men-tioned	Risk hazards	Climate vul-nerability score	Read-iness score
South Africa	21.09.2021	SA commits to reducing GHG emissions to 389-510MtCO ₂ e by 2025 and 350-429 MtCO ₂ e by 2030.	Fixed level target	2025 and 2030	Yes	Energy, Agric, For-estry, Land use, Indus-trial process-es, Waste	condi-tional NDC only	1.06%	head of state, cabinet and En-viron-mental Minister	NDP, NS-SD, LEDS, NCCAS, NCCRP	no	droughts, storms, epidem-ics, wild-fires, earth-quake, floods	0.41	0.36
Rwanda	19.05.2020	Rwanda com-its to reduce emissions by 16% (uncon-ditional) and 38% (condi-tional) in 2030 compared to BAU	Base-line scen-ario target	2015-2030	yes	energy; in-dustrial pro-cesses and product use (IPPU); Waste; and agriculture, forestry and other land use (AFOLU) but exclud-ing sources from forest-ry and other land use	both condi-tional & uncon-ditional	?	Minister Environ-ment	NDC, GG-CRS, DDP, NST	no	droughts, storms, epi-demics, landslides, floods, earthquakes	0.54	0.4
Tanza-nia	30.07.2021	not specified	Base-line scen-ario target	2030	yes	Energy, IPPU, Agric, Waste, LULUCG	condi-tional NDC only	?	head of state, cabinet and En-viron-mental Minister		no	droughts, epidem-ics, floods, earthquakes	0.53	0.29
Ethiopia	22.07.2021	The combined mitigation tar-get (uncon-ditional and conditional) is a reduction of 68.8% com-pared to the BAU projection by 2030. total reductions 14% & condi-tional 54.8% com-pared to the BAU projection by 2030	base-line scen-ario target	2010-2030	yes	Land use, forest-ry, industry, energy, live-stock, Waste, soil manage-ment	both condi-tional & uncon-ditional	0.42%	not speci-fied	CRGE, NDP	yes	droughts, epidem-ics, floods, earthquakes	0.55	0.29

Uganda	12.10.2021	22% reduction of national GHG emissions in 2030 compared to business-as-usual estimated at 143 MtCO ₂ e.		2021-2030	yes	Energy, transport, Agric, Forestry, land, Waste, IPPU	both conditional & unconditional		Minister water & Environment, climate change dept.	NCCP, NDP, NA-PA, NAP	yes	droughts, epidemics, landslides, floods, earthquakes	0.58	0.28
Kenya	27.12.2020	32% reduction in GHG emissions by 2030 compared to the BAU scenario (143 MtCO ₂ eq)	baseline scenario target	2021-2030	yes	Energy, transportation, industrial, agric, land use, forestry, Waste	both conditional & unconditional	0.15%	Ministry Environment & forestry, NCC and CCD		yes	droughts, epidemics, -floods	0.53	0.28
Nigeria	02.07.2021	50% reduction from current levels by 2050 and net-zero emissions between 2050 and 2070	baseline scenario target	2021-2030	yes	energy, industry, agric, land, forestry	both	0.73%	Ministry of Environment		yes	epidemics, floods	0.49	0.21
Ghana	15.10.2021	Absolute 8.5 MtCO ₂ e GHG reductions by 2025 and a further 24.6 MtCO ₂ e by 2030 compared to BAU, and conditional actions to reduce emissions by 16.7 MtCO ₂ e by 2025 and 39.4 MtCO ₂ e by 2030.	dynamic baseline scenario	2021-2030	yes	energy, industrial, Waste	both conditional & unconditional	0.04%				droughts, epidemics, floods	0.46	0.35

1.2.2.2 Implications of the outcomes from COP26

The UN's 26th annual climate summit on 12 November 2021 concluded with new commitments and pledges to address the global climate crisis. Despite this, Africa, the most affected by climate change, failed to secure several critical demands outlined by the African Group of Negotiators (AGN). According to the AGN, the leading African agenda items can be summarised as follows:

- **Climate responsibility:** Developed nations must take responsibility and lead the way to reach zero net emissions by 2050.
- **Climate finance and adaptation:** Developed nations have to mobilise enough funds to finance adaptation in developing countries adversely affected by climate change. Finance architecture and transparency mechanisms should be put in place.
- **Transfer of technologies and capacity building:** Developed nations must transfer sound environmental technologies to African countries for effective climate adaptation, mitigation and transition.
- **Long-term climate financing:** Developed nations must meet their pre-2020 commitment of US\$100 billion annually and agree on long-term climate financing.

Questions around international climate finance for adaptation and how climate finance is distributed among developing and least developed nations remained unanswered. In addition, issues regarding climate justice for historical emissions and who ultimately bears responsibility for the climate crisis remain largely unresolved.

For instance, between 2016 and 2019, high-income countries committed to mobilising US\$100 billion per year in international climate finance to assist developing nations in dealing with climate change. However, the highest annual contribution was \$80 billion in 2019 (GGA, 2021). Of this amount, Africa received only 26% despite suffering the highest burden from climate impacts and having the highest need for transitioning to green energy (GGA, 2021). For Africa to implement its adaptation plans by 2030, it requires \$3 trillion (AFDB, 2023). Numerous reports have shown that even with the potential to double international climate funding to \$200 billion per annum, this is still nowhere near enough to meet the continent's actual needs. At the summit, the chair of the AGN, Tanguy Gahouma-Bekale, called for developed nations to commit to a \$700 billion-a-year finance deal to accelerate decarbonisation and adaptation efforts.

Additionally, COP26 did not progress towards a more balanced needs assessment for international climate finance. Instead, an individual country's needs and priorities were

addressed—for example, providing more funding for adaptation projects in countries vulnerable to climate impacts and providing more mitigation funding for high-emitting countries. The 50/50 commitment further marginalises poorer countries with low carbon emissions, where adaptation is a priority.

Notably, the summit failed to address inequalities in how international climate finance is dispersed between developing and least developed nations and the form this financing should take. Most of the mobilised finances were distributed to countries with more robust financial capabilities, such as South Africa, and not the poorest countries. South Africa is one of the countries in Africa whose communities depend on coal mining. It will most likely suffer from a transition to a low-carbon economy without economic regeneration. The least developed countries appear to have higher levels of investment risk, hence the lack of investment opportunities. Developed countries invest in countries where their capital has higher return prospects. Climate inequalities in Africa are further deepened by private financing going to even fewer developing countries. The summit failed to address one complex issue: the form (grants or loans) in which the money is to be received. Between 2016 and 2019, most public climate finances came from loans. Of the \$60 billion in public finance, \$44 billion consisted of loans (OECD, 2019). This further indebts poorer nations, who often get penalised if they default on loan repayments.

Despite acknowledging loss, costs, and damages caused by climate change at COP26, high-income countries still refuse to officially acknowledge historical responsibility for loss and damage costs. For countries witnessing the devastating impacts of climate change that cannot afford adaptation strategies, the failure to secure a dedicated damage fund is equivalent to no action. Besides Scotland and philanthropic organisations offering some financial support towards the loss and damage costs, most high-income countries have refused to compensate and are reluctant to act further. However, the African Group of Negotiators (AGN) did not receive the commitments they sought at COP27.

1.2.2.3 Commitments and pledges

Important deals and new commitments were made during the summit. Relating to the African region, for example, the Just Transition Partnership Deal was signed between South Africa and Germany, France, the United Kingdom (UK), the United States (US), and the European Union (EU). The deal will provide South Africa with \$8.5 billion to assist in the country's transition to renewable energy sources.

Over 100 nations signed the Global Forests Pledge, which

outlines the intention to end deforestation by 2030. The pledge includes a \$1.5 billion fund backed by the European Union (EU) and the UK to protect and restore the Congo Basin.

The Global Energy Alliance (GEA), a group of philanthropic foundations and international development banks, announced a \$10.5 billion fund to help emerging economies with growing energy needs switch from fossil fuels to renewable sources. However, crucial incentives are needed to speed up investment and funding for a low-carbon future.

Glasgow Commitment Pact

While the above commitments reflect actual progress made, the African Group of Negotiators failed to secure key demands. However, COP26 concluded with parties adopting the following main points of the pact (GCP, 2021):

- The pact urges developed countries to scale up their collective provision of climate change finance for adaptation to developing countries and deliver on the 2009 \$100 billion pledge urgently and through 2025.
- The pact reaffirms the Paris Agreement's goal of limiting the global average temperature to well below 2°C above pre-industrial levels, preferably to 1.5°C, given the solid scientific indications that anything above 2 will result in climate catastrophe.
- The pact urged countries to provide more ambitious Nationally Determined Contributions (NDCs) in 2022 instead of following the traditional five-year interval for NDC submissions. This opens the door to ratcheting up climate commitments on an annual basis.

1.2.3 National laws and policies for LCT & GE

This section maps the national laws and policies for Low Carbon Transition and Gender Equity. The eight countries considered as case studies all have specific national and cross-sectoral visions, strategies and programs that address LCT and GE. For example, in Tanzania, IGE visions, strategies and programs that are national and cross-sectoral include Tanzania Development Vision (TDV), 2025 National Strategies for Growth and Poverty Reduction (NSGPR I and II), Five Year Development Plans, which have been revised thrice (FYDP- I, II and III), and many strategies and programs established by the vice presidential office responsible for environmental issues.

Rwanda

Through its national laws and policies, e.g., Vision 2050, National Strategy for Transformation (NST-1), Green Growth and Climate Resilience Strategy (GGCRS), Nationally Determined Contributions (NDCs), and

Sustainable Development Goals, the government of Rwanda has subscribed to the national, regional and global LCT and GE development commitments. Specifically, the revised Green Growth and Climate Resilience Strategy of 2021 has defined a pathway to achieve Vision 2050 through climate resilience and green economic innovation. The vision is for the country to achieve upper-middle-income status by 2035 and high-income status by 2050 through a developed, climate-resilient, and low-carbon economy.

Uganda

The model of green growth has received considerable attention in Uganda's development agenda. This is evidenced by the implementation of the Uganda Green Growth Development Strategy (see UGGDS, 2017/18 – 2030/31), aimed at ensuring that the goals of Vision 2040 and the National Development Plans are realised sustainably. In Uganda's context, green growth is observed as an inclusive economic growth process that can lead to low emissions while ensuring effective and efficient use of the country's natural, human, and physical capital that benefits present and future generations. Specifically, the overall objective of UGGDS is to guide priorities, strategies and governance structures that can help implement the green growth principles within existing development frameworks that target sustainable development of the country.

Kenya

Kenya's Green Economy Strategy (Green Economy Strategy Implementation Plan 2016-2030) is geared toward enabling Kenya to attain a higher economic growth rate consistent with Vision 2030, which firmly embeds the principles of sustainable development in the overall national growth strategy. The implementation and realisation of the vision of the Green Economy Strategy are therefore firmly anchored on Vision 2030 and its medium-term plans. The Green Economy Strategy Implementation Plan (GESIP) vision is to adopt development pathways with higher green growth, a cleaner environment and higher productivity relative to the Business-as-Usual (BAU) growth scenario.

Kenya is one of the most forward-thinking African countries in designing and implementing climate change policies. The country enacted the Climate Change Act No. 11 of 2016 (Kenyan Act), in response to its Paris Agreement commitments, establishing a legal framework for expanded climatic change responses, processes, and policies to promote low-carbon climate development. The Kenyan Act recognises the importance of incorporating climate change responses into day-to-day activities for public and private businesses. It also aims to improve adaptive capacity and resilience. Perhaps

most critically, the Kenyan Act allows for legal action against anyone who has acted in a way that has harmed or is likely to harm mitigation and adaptation efforts.

Ethiopia

There has been considerable policy attention to incorporating climate and environmental considerations in Ethiopia's economic plan, with the formulation of the high-profile Climate Resilient Green Economy strategy (CRGE). The government developed its CRGE as an anticipatory strategy to avoid the adverse effects of growth. The CRGE's vision outlines a roadmap that will enable Ethiopia to achieve middle-income status by 2025 whilst building a climate-resilient green economy for Ethiopia to become a "green economy front-runner" that fosters sustainable development (FDRE, 2012). The CRGE primarily addresses promoting economic development and growth and reducing and avoiding future greenhouse gas (GHG) emissions. The strategy identified six sectors considered to have high carbon-abatement potential: agriculture; forests (e.g., through the Reducing Emissions from Deforestation and Forest Degradation, or REDD+, initiative); transport; energy supply; green cities; and industry. The CRGE strategy accordingly identified and prioritised more than 60 initiatives across the different sectors, enabling the country to achieve its development goals while limiting GHG emissions in 2030 to 125 MtCO_{2e}. These initiatives intend to save 277.7 MtCO_{2e}, with around 83% of low-carbon development opportunities from the Agriculture and Land Use Change and Forestry sectors (Ethiopia NDC, 2021).

South Africa

The South African government's adoption of the National Climate Change Adaptation Strategy (NCCAS) in 2020 is instrumental in addressing climate change challenges. It will inform climate change adaptation planning (DEFF 2020). The NCCAS serves as South Africa's National Adaptation Plan and fulfils South Africa's commitment to its obligations in Article 7.9 of the Paris Agreement under the UNFCCC. It further provides a policy instrument in which national climate change adaptation objectives for the country can be articulated to provide overarching guidance to all sectors of the economy in implementing adaptation.

The NCCAS is aligned with the country's policy and legislation, building on principles contained therein, including international agreements with South Africa. Relevant domestic legislation and policy include the National Climate Change Response Policy (NCCRP), National Development Plan (NDP), National Strategy for Sustainable Development (NSSD), South Africa's Low-Emission Development Strategy

(LEDS), sector adaptation strategies/plans, and provincial and municipal adaptation strategies/plans (NDC, 2021).

South Africa is the most developed economy in the Sub-Saharan Africa region. However, in its first NDC draft, its failure to commit to net-zero carbon emissions has been addressed in the updated NDC to commit to net-zero carbon emissions by 2050. This time around, South Africa intends to limit "absolute emissions levels", with the upper limit being 28% lower than its initial NDC and the lower limit remaining unaltered.

In 2020 the South African Cabinet approved the establishment of the Presidential Climate Change Coordinating Commission (P4C). This multi-stakeholder group includes representatives from government, state entities, business, labour, academia and research institutions, civil society, and traditional leadership. The agenda of the P4C is to advise on South Africa's climate change response in order to realise its vision for an effective climate policy. Accordingly, it adopted several models to present the most effective and equitable route toward a net-zero carbon emission future.

Further, many sectors have also developed Climate Change Sectoral Adaptation Plans, and the government has created a Climate Change Policy Framework for state-owned companies and rural human settlements. In addition, all nine of South Africa's provinces have developed climate change response plans. All 44 district and metropolitan municipalities have received support from the national government to mainstream climate change into municipal Integrated Development Plans.

Ghana

Ghana commits to implement 19 policy actions, translating to 13 adaptation and 34 mitigation action programmes. The 19 policy actions have the potential to maximise the synergies between adaptation and economic diversification, resulting in mitigation co-benefits leading to optimal outcomes, including i) generating absolute greenhouse gas (GHG) emission reductions of 64 MtCO_{2e}, ii) avoiding at least 2,900 premature deaths per year from improved air quality, iii) creating over one million decent and green jobs, and iv) benefiting cumulatively nearly 38 million people, with the majority being youth and women.

Ghana's NDC is built on the existing Economic and Social Development Policy (see PESD, 2022-2025) Medium-Term Development Policy Framework and focused on 10 priority areas (Energy, Industrial Processes and Product Use, LULUCF and Waste) for the next decade, as well as the renewable energy master plan (2019-2030) being developed by the national energy transition committee. Ghana and Switzerland recently signed a Cooperation Agreement under

which Switzerland will provide the necessary funds to enable Ghana to invest in and adopt low-carbon technological solutions. Switzerland will benefit through carbon credits and the associated offset mechanisms. This investment will help Ghana achieve its national clean energy access plan (NCEP), which aims to reduce GHG emissions by two million tonnes while also providing clean electricity to millions of people. These agreements, envisioned in Article 5 of the Paris Agreement, encourage countries to maximise private sector participation and present an innovative climate funding alternative (PACJA, 2020).

Nigeria

Much progress has been made in implementing climate action since the first NDC, i.e., adopting sectoral action plans that guide NDC in five key areas: agriculture, industry, power, oil and gas, and transport. Examples of steps taken: i) updated National Climate Change Policy for 2021-2030; ii) approval of Nigeria's NAP to reduce short-lived climate pollutants (SLCPs); iii) the development of the new REDD+ Strategy (2021) and a National Forest Policy of 2020 plus National Forest Investment Plan (2019-2023); iv) the introduction of the first Building Energy Efficiency Code, which sets minimum standards for energy efficiency for new buildings in Nigeria, to name a few.

The new policy commitments have been made to implement unconditional contributions. These include, among others, elimination of kerosene lighting by 2030, a greater uptake of bus rapid transit, a 50% reduction in the fraction of crop residues burned by 2030, implementation of forest programmes and initiatives to deliver 20% GHG emission reductions and enhanced removals equivalent to approximately 74.2 MtCO₂e by 2030, and ratification of the Kigali Amendment to the Montreal Protocol to phase out HFCs. Further, the updated NDC aims to mainstream gender across all sectors. This was made possible with the approved National Action Plan on Gender and Climate by the Federal Executive Council in 2020.

1.2.4 Assessment of gender inclusiveness in LCT visions

How gender equity is included in the LCT vision varies among the selected countries. Table 4 shows whether the gender aspect is considered in different climate actions and priorities of the NDCs.¹ First, this issue is considered in the adaptation component more often than in mitigation, which suggests a potential research gap. Second, women tend to

be recognised as the more vulnerable group and sometimes suffer from the uneven fulfilment of substantive human rights. Third, the most popular consideration is mainstreaming gender equity into policy and decision-making and identifying women as agents of change or promoting empowerment. Ethiopia, Uganda, Kenya and Nigeria mentioned plans to develop women's capacity in their NDCs (see Table 4).

Table 4. Reference to Gender inequality in NDCs (Source: Countries' NDCs, 2021)

Country	South Africa	Rwanda	Tanzania	Ethiopia	Uganda	Kenya	Nigeria	Ghana
Adaptation	yes	yes	yes	yes	yes	Yes	yes	yes
Gender Main-streaming				yes	yes	yes	yes	
Mitigation	yes	yes	yes	yes	yes	yes	yes	yes
Vulnerability	yes	yes	yes	yes	yes	yes	yes	yes
Capacity development		yes		yes				
Resilience	yes	yes	yes	yes	yes	yes	yes	yes
Human rights	yes	yes	yes	yes	yes	yes	yes	yes
Decision making	yes	yes	yes	yes	yes	yes	yes	yes
Agent of change	yes	yes	yes	yes	yes	yes	yes	yes
Finance								

Gender is of concern for the majority of the study countries. Although some nations have recognized the need for gender equality, more work needs to be done to adopt a gender mainstreaming strategy that will involve evaluating the effects on both women and men of any proposed climate change action, including laws, policies, or programs, in any sector and at all levels of government. Besides gender inequality, some countries also mentioned youth in their visions for LCT. Youth representation is essential and can be very important for socioeconomic growth. Thus, youth must be given explicit roles and opportunities to engage in decision-making in climate change governance, so that they can pursue the possibilities that arise via climate change measures in the overarching climate change legislation and

¹ This approach can be found in the analysis of Huyer et al. (2016, pp. 10–12).

amendments to sectoral laws (PACJA, 2022).

1.2.5 Challenges and opportunities of the LCT & GE vision

Even though the study countries contribute little to global GHG emissions, many priority development initiatives captured in their action plans impact GHG emissions levels. Therefore, to attain low-carbon growth, the governments of the study countries have made a concerted effort to establish regulatory mechanisms that mainstream joint carbon growth initiatives into their planning processes and functions.

Including climate change policy responses and actions in national and sectoral planning and management processes has become a goal for most of the study's participating nations. By integrating cross-sector policy, they have connected climate change activities to fundamental planning procedures. Climate change mainstreaming has been achieved by developing frameworks and tools to include climate change solutions in national and sectoral planning processes, such as economic planning, development plans, and budgeting.

However, the region's most significant roadblocks to achieving LCT and GE are under five components: Governance; Mitigation; Adaptation; Measuring, Reporting, and Verification (MRV); and finance. In addition, all the study countries have barriers concerning technology transfer, capacity building, and policy development and may need support in these areas. Policy-action gaps can be bridged by effectively implementing the five macro-level indicators/components, i.e., good governance, MRVs/transparency, mitigation, adaptation, and finance, across sectors highly relevant to the development and linked to the SDGs.

1.2.6 Knowledge Gaps

The literature on national mitigation strategies remains skewed towards large emitters. Many low-income nations have scant or no studies (Lepault and Lecocq, 2021). A better knowledge of mitigation at the national level would result from creating new research and including related scenarios in the updated national mitigation pathway database.

There is little research on how development decisions affect emissions and mitigation capacity. Here, additional input from the scientific community focused on development issues would be especially helpful.

Literature detailing changes in developmental pathways and the circumstances that lead to such changes (based on historical data or models) is negligible. It takes innovative thinking, multidisciplinary research, and the use of different frameworks and methodologies to study changes in development paths. These techniques are best suited for studying change agents, determinants of change, and adaptive management, among other challenges (Winkler 2018). Not only is it anticipated that research would advance knowledge and innovation, but it will also aid in identifying transformational routes and inform public discourse and political decision-making on relevant issues.

There is a lack of knowledge regarding: i) linking equity frameworks for mitigation, adaptation, and, most importantly, loss and damage; ii) adding ethical considerations to many of the existing quantitative frameworks to evaluate the fairness and ambition of NDCs; and iii) extending equity frameworks to quantify equitable international support as the difference between equity-based national emissions scenarios and national domestic emissions scenarios.

1.3 Policy Instruments for LCT & GE

1.3.1 Africa trends on policy instruments (summary)

Many policy tools are available to promote economic transitions, including those to low-carbon growth paths. Currently, SSA governments have a wide range of policy tools that promote Low Carbon Transitions, e.g., carbon tax, ETS, RBCF, fuel tax and subsidies, and regulatory standards. Many policy instruments are, in principle, capable of covering the entire economy. However, in practice, the instruments are often targeted at particular sectors or industries (see table 5).

To address negative externalities associated with emissions,

Table 5. Examples of Sector Policy instruments.

Policy instruments	Energy	Transport	Buildings	Industry	AFOLU	Infrastructure
Market-based	Carbon tax	Fuel tax Vehicle taxes	Carbon or energy taxes	Carbon/energy tax Waste disposal tax/charges	Fertilizer/nitrogen taxes	Property tax
Tradable allowance	Emission trading	Fuel & vehicle standards	Tradable certificate for energy efficiency	Emission trading Tradable green certificate	Tradable certificate under CDM Voluntary carbon markets	Urban-scale cap & trade
Subsidies	Fossil fuel subsidy removal Feed-in tariff for renewable energy	Biofuel subsidies Vehicle purchase subsidies feebates	Tax exemption for investing in efficient buildings and products Subsidised loans	Subsidies for energy audits Fiscal incentives, e.g. fuel switching	Credit lines for low carbon agric, sustainable energy	Special improvement or redevelopment districts
Regulatory Approaches	Efficiency or environmental performance standards Renewable Portfolio standards for renewable energy	Fuel economy performance standards Fuel quality standards GHG emission performance standards	Building codes & standards Equipment & appliance standards	Energy efficiency standards for equipment Energy management systems	National policies to support REDD+ including MRV Forest law to reduce deforestation Land use planning	Mixed-use zoning Development restrictions Affordable housing mandates Design, building codes & standards
Information Programmes		Fuel labelling Vehicle efficiency labelling	Energy audits Labelling programmes Energy advice programmes	Energy audit benchmarking	Certification schemes for sustainable forest practices Information policies to support REDD+ and MRV	

market-based strategies such as carbon tax, ETS and other hybrid mechanisms are used to influence the reduction of GHG emissions. These tools can penalise production processes that contribute to emissions while compensating for climate-friendly production processes.

Carbon pricing needs to be more represented in the development agenda of African countries despite its potential to generate climate finance. So far, only South Africa has successfully enacted a carbon tax (Carbon Tax Act No. 15 of 2019). In addition, there need to be more regulatory frameworks to drive carbon pricing in Africa. Currently, most climate change frameworks countries use are executive

instruments, and only a few countries have laws. A content analysis of the NDCs reveals that most of the countries in the region did not express an intention to adopt traditional carbon pricing mechanisms in their initial nationally determined contributions (INDCs). They did, nonetheless, express interest in taking part in the global carbon market and, in many cases, directing carbon-related efforts toward REDD+ activities (reducing emissions from deforestation and forest degradation), conservation of current forest carbon stocks, sustainable forest management, and augmentation of forest carbon stocks (see NDCs, 2021). According to the World Bank, carbon taxes or carbon pricing initiatives are

under consideration or in progress in Burkina Faso, Côte d'Ivoire, Rwanda, Senegal, and Nigeria. These initiatives are diverse and extensive. They include traditional carbon pricing mechanisms and other more innovative and context-appropriate approaches, e.g., results-based climate finance (RBCF) and forestry-derived carbon value.

Together with carbon price, there are other, less conventional methods, such as project-based offsetting strategies and result-based climate finance (RBCF).² These indirect carbon pricing strategies include policies or instruments that impose a compliance cost on activities that result in GHG emissions. Examples include the removal of fossil fuel subsidies, adopting taxes, and implementing regulatory standards, i.e., performance standards for buildings and roads, support for renewable energy, and energy efficiency certificate trading.³

1.3.2 Tax on Carbon Emissions

1.3.2.1 Carbon pricing

The literature on carbon pricing is extensive and constantly changing. It has attracted much international interest since it is widely acknowledged that placing a price on carbon to internalise the societal costs of emissions is the most effective and cost-effective strategy to combat climate change. However, given its complexity, massive vested interests against carbon taxes, and the political buy-in required for these to succeed, implementing carbon pricing successfully remains tough, particularly in Africa.

Despite increased interest in recent years, efforts to enact a carbon tax or emission transmission systems (ETS) appear to be in their infancy in African nations. A content analysis of the Nationally Determined Contributions (NDCs)⁴ reveals that only two countries (Côte d'Ivoire and Egypt) referred to emission trading, and only Côte d'Ivoire and South Africa made reference to the carbon tax. Additionally, only seven countries referred to 'fossil fuel subsidy reform' while 34 countries refer to international market mechanisms.

1.3.2.2 South Africa's carbon tax

South Africa enacted a carbon tax⁵ on 1 June 2019. It concentrates on emissions from certain industrial, electricity, building, and transportation operations. The South African carbon tax targets CO₂e emissions above a specific threshold from fuel burning, energy production, industrial activities, and predicted (irregular or unplanned) emissions.

As a result, 80% of South Africa's greenhouse gas emissions are covered by the carbon tax. This tax puts a price on carbon emissions and will enhance awareness and increase reporting on climate emissions while the revenue will be used for the poor communities (Winkler & Marquard, 2019). Although the tax is introduced at a low price of about \$0.42/ ton,⁶ there are indications that this will be increased over time. For example, in 2021, the finance minister announced an increase in the carbon tax rate to R144 (about US\$9), beginning in 2022. The tariff would increase yearly by at least \$1 until it reaches \$20 to uphold South Africa's COP26 obligations.

The government wants to increase the carbon price more quickly each year beginning in 2026 to reach at least US\$30 by 2030 and US\$120 beyond 2050.⁷ The country aims to apply the fundamental principle of environmental law: 'the polluter pays principle.' However, tax exemptions ranging from 60% to 95% apply to several sectors to protect the national industry from foreign trade risk or to allow the offset of emissions resulting from mitigation efforts (KAS, 2021).

South Africa's carbon tax is one of the key instruments in meeting its NDC commitment. Although it is still being determined whether the South African experience is efficient, successful, or fair due to its newness, it has prompted other African governments to consider the practicality of implementing carbon prices (ActionAid, 2020). Besides South Africa, there are carbon pricing considerations in western African countries such as Côte d'Ivoire and Senegal (World Bank, 2021).

Côte d'Ivoire

Côte d'Ivoire has stated its desire to study a domestic carbon pricing mechanism to decrease national GHG emissions

² According to the World Bank, RBCF can include a carbon pricing component for mitigation projects, in which the amount of funding received per unit of GHG reduction target achieved incentivizes further action.

³ Greiner, S., Howard, A., Diagne, EMM and Gaspar-Martins, G. (2016), "Will Carbon Pricing Emerge in Africa As Well?", Climate Focus. [https://www.climate-focus.com/sites/default/files/IETA%20GHG%20Report%202016%20\(Sandra\).pdf](https://www.climate-focus.com/sites/default/files/IETA%20GHG%20Report%202016%20(Sandra).pdf)

⁴ Carbon Tax Act, Act No. 15 of 2019.

⁵ Winkler, H. and Marquard, A. (2019), "South Africa's new carbon tax could help poor people pay less for energy", World Economic Forum. <https://www.weforum.org/agenda/2019/06/carbon-tax-revenues-could-be-harnessed-to-help-south-Africa-s-poor/>

⁶ <https://theconversation.com/south-africas-carbon-tax-rate-goes-up-but-emitters-get-more-time-to-clean-up-177834>

⁷ The Republic of Uganda, Traffic and Road Safety Act 1998 (Amendment Bill) 2018

by 28% by 2030 as part of its Nationally Determined Contribution to the Paris Agreement. Exploratory work, stakeholder meetings, and a preliminary feasibility assessment on a potential carbon tax scheme have already been completed. In addition, the country named a new technical partner at the PMR Partnership Assembly in October 2017. The US\$500k project funding request to support the policy design of a carbon price for the country was granted at the subsequent Partnership Assembly in April 2018.

Senegal

Senegal is also studying carbon pricing as a policy option to achieve its NDCs. The country

investigates potential design options for a carbon pricing plan specific to its economy to achieve this. Discussions were held with partners from the public and private sectors in 2018.

1.3.3 Energy/Fuel-based Carbon Tax

Carbon taxes are widely regarded as effective for lowering emissions and promoting a green transition. However, most of what we know about how they function comes from energy markets in high-income countries, which could be a better proxy for Sub-Saharan African country contexts. Improperly implemented carbon taxes in these contexts may cause more problems than they solve: more problems for state-run utilities and more deforestation as people confront higher electricity and gas costs. On the other hand, carbon taxes provide a chance for green transitions in Sub-Saharan Africa if carefully designed.

Several African countries have implemented sector-specific carbon pricing by imposing taxes on inefficient energy technologies or fossil fuels. For example, because of environmental concerns, Uganda revised its Traffic and Road Safety Act of 1998⁸ to make the import of obsolete cars illegal. Vehicles older than eight years were subjected to a 50% environmental tax, while vehicles between five and eight years were taxed at a rate of 35%.

Kenya's Finance Act of 2019⁹ raised taxes on vehicles that run on gasoline with the engine capacity of more than 1.5 litres. Beginning in November 2019, they increased the excise tax from 20% to 25%. Furthermore, diesel-powered automobiles now face a 35% excise duty, up from the previous 30% for models with engines larger than 2.5 litres and 20% for smaller cars. On the other hand, to stimulate the

adoption of green transportation technology, excise duty on fully electric automobiles was reduced to 10%.

Malawi implemented a tax on vehicles, the amount of which depends on the engine size. As a result, the per capita CO₂ emissions are equivalent to 0.11 tons per person per year. Based on a population of about 19 million, the CO₂ emissions of this country can thus be estimated at 2 million tons of carbon per year. Malawi is the second country on the continent, after South Africa, to have adopted the carbon tax.

Zambia also enacted a vehicle levy that acts as an indirect type of carbon pricing, imposing a one-time flat fee on vehicles older than five years. It comes in the form of a Motor Vehicle Surcharge, which is added to import duty, and a yearly fee on emissions known as the Carbon Emissions Surcharge, which is imposed on all vehicles based on engine size. In addition, Zambian excise duty on electric vehicles has been abolished, while customs duty has been cut. However, there have been worries that similar tax changes in Zambia have not helped encourage people to switch to cleaner vehicles; for example, no electric vehicles have been registered in the country despite the incentives.

On the other hand, Kenya has seen the introduction of electric vehicles into the market. In addition, the Neopia Ride started operations in 2019, demonstrating an enabling fiscal climate incentive for cleaner technology. Zimbabwe only levies particular fuels (petrol and diesel), even though this was not intended to be a carbon tax.¹⁰ The carbon fuel tax was estimated at US\$ 1cent per liter of petrol or diesel in 2017, or US\$13 for gas and US\$11 for diesel per ton of CO₂e. Although the Ministry of Finance had the right to exempt any licensed power production that began after 1 January 2018, carbon tax is imposed on every litre of fuel imported into Zimbabwe.

1.3.3.1 Fuel subsidies reforms

Energy subsidy reform in Sub-Saharan Africa (SSA) is essential to ensuring future energy supply and achieving Africa's growth potential. Although subsidies continue to consume a large portion of public resources, SSA's electricity generation and access levels remain significantly lower than in other low-income countries. These facts are linked because energy subsidies generate at least two problems. For starters, they need to be more adequately targeted. The subsidies

⁸ Section 26(a)(ii), Laws of Kenya, Finance Act, Act No. 23 of 2019.

⁹ Goldstein, A. Not So Niche: Co-benefits at the Intersection of Forest Carbon and Sustainable Development, (Ecosystem Marketplace, 2016).

¹⁰ Committee of Experts on International Cooperation in Tax Matters, 2019: 22

benefit all segments of society, but the wealthy gain the most. Second, subsidies frequently create a disincentive for energy sector upkeep and investment, perpetuating energy shortages and low levels of access. As a result, reforms are required to improve the use of budgetary resources for pro-poor and development spending and to facilitate the growth of electricity production. However, reforms are difficult because the public must be persuaded that reallocating government spending to other purposes will benefit them more than the loss of subsidies. Reform efforts must therefore concentrate on assembling credible packages of measures that can then be used to create support for reform.

Very little data is available on a country-by-country basis for the amounts of fossil fuel subsidies, broken down by fuel type, in Sub-Saharan Africa. However, in absolute terms, SSA is a relatively small emission contributor (Coady et al., 2015). When SSA is compared to other continents, China is the highest subsidizer, providing US\$1.4 trillion, followed by the USA at US\$649 billion, Russia at \$551 billion, the EU at \$289 billion, and India at \$209 billion (KAS, 2020).

In 2015, it was predicted that SSA would receive US\$26 billion in total subsidies, down from US\$32 billion in 2013, which can be ascribed to a decline in the price of fossil fuels, which was partially offset by rising energy consumption.

More than US\$1 billion in fossil fuel subsidies were given by Angola, Côte d'Ivoire, Mozambique, Nigeria, South Africa, Tanzania, Zambia, and Zimbabwe, among other countries. It was determined that South Africa's subsidies were on the rise, going from US\$2.9 billion in 2014 to US\$3.5 billion in 2016 (Whitley & van der Burg, 2015). If externalities such as local pollution, effects on climate change, road accidents, and congestion are considered, the cost for all countries, concentrating on petroleum, coal, and energy subsidies, rose to US\$75 billion in 2015. Because of data limitations, an assessment of the socioeconomic impacts of subsidies in the region is missing. Future quantitative analysis is recommended to inform policy prioritizing mitigation efforts in Africa. Emerging Asia makes up nearly 40% of all energy subsidies worldwide, followed by Advanced Asia (27%), the Commonwealth of Independent States (15%), the Middle East, North Africa, Afghanistan, and Pakistan (9%), Latin America/the Caribbean (5%), Emerging/Developing Europe (3%), and Sub-Saharan Africa (2%), in that order (Coady

et al., 2015). Although it is unclear how much gasoline is subsidized in the SSA, removing subsidies may offer some potential benefits, even though removing them might also introduce competitiveness and food price concerns.

1.3.4 Carbon Sequestration

Historically, land use, land use change, and forests have contributed to Africa's emissions rather than fossil fuels. This means that most carbon emissions have been caused by people clearing land for agricultural expansion, as well as deforestation, fires, and forest degradation, all of which decrease the amount of carbon ecosystems can absorb from the atmosphere.

In acknowledgment of their capacity to act as efficient sinks that absorb excess CO₂ from the atmosphere, many Sub-Saharan African nations are engaged in carbon sequestration projects in the forestry industry. Funding now goes to initiatives in these nations that reduce carbon emissions from forests based on proven emission reductions (known as "offsets" when purchased by buyers). Such projects also provide co-benefits, including job development, land tenure reform, women's empowerment, biodiversity protection, and these financial flows.¹¹ Hence, carbon sequestration offers advantages that are pertinent to Africa's sustainable development on an economic, social, and environmental level.

The analysis of national planning documents reveals that many countries under consideration have carbon sequestration as an aim or policy target. It is explicitly and indirectly mentioned in many NDCs and other national development plans and strategies. For instance, in their NDCs, countries like Angola, the DRC, Madagascar, Malawi, and Zambia mention "reducing emissions from deforestation and forest degradation" (REDD+) and explain how specific national programs are relevant to the achievement of their mitigation objectives. Some national plans and strategy papers include clauses that encourage reforestation, afforestation, and programs to reduce deforestation and address forest protection, sustainable management, and use.

Further recognized as the project category generating the greatest offsets in Africa, forestry and land use projects include REDD+, agroforestry, enhanced forest management, and afforestation/reforestation initiatives.¹² Offsets traded on the voluntary carbon markets, which often adhere to the guidelines issued by voluntary standards organizations,

¹¹ Belachew Gizachew et al., REDD+ in Africa: Contexts and Challenges, (Natural Resources Forum, 2017).

¹² Hamrick, K., see n 128.

such as the Verra VCS and the Climate Community and Biodiversity Standards, are among the instruments used for these activities.

African nations are particularly interested in REDD+ because it offers social and environmental protections and financial prospects through markets, performance-based payments, or grants. Countries are pursuing REDD+ projects with assistance from numerous initiatives such as the UN-REDD Programme and the Forest Carbon Partnership Facility (FCPF). For example, the Central African Forest Initiative (CAFI) seeks to support REDD+ in Central Africa. Significant sums of money are required to finance all phases of REDD+, including readiness, capacity building, and piloting.

The World Bank and other donors are funding a new US\$68 million project in Ethiopia that uses carbon offsets to help the nation reach its goal of becoming net carbon neutral by 2025. Additionally, the Oromia Forested Landscape Program will receive up to US\$50 million over the next ten years for verified carbon offsets and an additional US\$18 million over five years for REDD+ capacity building.

Other active nations include the DRC and Mozambique, which have reached two EPAs with the World Bank for RBCF mitigation in the forestry sector under the FCPF's Carbon Fund. The two nations are the first of the FCPF Carbon Fund's 19 members to sign such payment agreements; the ERPA for the DRC is worth a total of US\$55 million, while the ERPA for Mozambique is worth US\$50 million and aims to reduce emissions by 10 MtCO₂e by 2024 (World Bank, 2019).

However, forestry-based carbon sequestration in Africa faces various challenges that hamper the uptake of this mitigation mechanism.

1.3.5 Emission Pricing and Market Experiences

1.3.5.2 Challenges in pricing carbon

Although undisputable and a suitable instrument for LCT, carbon pricing faces many challenges in planning and implementation in Africa. Because the majority of countries in Africa depend heavily on fossil fuels for economic activities and government revenues, carbon pricing has been a challenge to implement owing to its ability to exacerbate poverty levels (directly or indirectly) by increasing prices for essential goods and services such as food, electricity, and travel (Vogt-Schilb et al., 2019). Because substitutes are rarely available, indirect taxes on home fuels such as electricity and cooking are the biggest source of concern in developing countries regarding the effects on equity. As a result, poor households have no option but to pay the tax. Interest in this tradeoff can be an enormous obstacle to carbon pricing in developing countries.

Another barrier associated with carbon pricing in Africa is

the political economy of these policies. Increasing the price of fuel and energy is a politically dangerous endeavor because the poor people in these economies oppose it. Natalini et al. (2020) provide a comprehensive list of such opposed political forces in African countries, including Zambia, Mozambique, Uganda, Nigeria, Chad, Sudan, Guinea, and Burkina Faso, in the period 2005-2016. Furthermore, it is difficult to judge the performance of carbon pricing, mainly because there needs to be more research to analyze its success in developing and emerging economies, especially since it has only been in place for less than a decade (ActionAid, 2020).

Focus is being placed by many Sub-Saharan African nations on how they may profit from carbon pricing outside of the conventional carbon pricing systems, such as any replacement for the Clean Development Mechanism (CDM) and other project-based mitigation measures. Following the filing of the NDCs, the stance has changed to some extent in recent years, but it is still in its early phases. In Africa, notably in West Africa, there is now a limited but growing interest in imposing carbon taxes or ETS. The East African Alliance on Carbon Markets and Climate Finance (EAA) and the West African Alliance on Carbon Markets and Climate Finance (WAA) are two new organizations that have both expressed interest in regional carbon pricing initiatives, which may include the conventional carbon pricing mechanisms (KAS, 2020). Moreover, there is a gender dimension where some environmental taxes, such as taxes on energy products for home use, may significantly impact women because women spend a higher percentage of their disposable income on domestic goods and services. However, some steps can be taken to make an environmental tax more progressive, such as varied rates for specific sectors/people or redistribution mechanisms to make up for higher costs for lower-income groups. The only challenge is that these instruments necessitate strong tax administration capacity due to the system's increased complexity (ActionAid, 2020: 3).

1.3.6 Other instruments

1.3.6.1 Renewable energy subsidies

Renewable energy promotion is an important instrument that is becoming popular in Sub-Saharan Africa. Renewable energy offers vital benefits, such as reducing air pollution and mitigating climate change. Energy consumption in the region remains among the lowest in the world, at around 17 GJ per capita per year in 2018 (except for Nigeria and South Africa), it is nearly five times below the world average (84 GJ per capita per year) (IEA, 2020). In addition, Sub-Saharan Africa uses approximately 66% (traditional biomass - non-transport sector) of total final energy consumption, making it the only

region in the world with such heavy reliance on biomass. Meanwhile, the region has made progress in integrating renewable energy into national planning. By 2020, almost all countries party to the Paris Agreement on climate change have pledged to reduce greenhouse gas emissions through their NDC (NDCs, 2021). For example, Nairobi enforced a national regulation that requires large buildings to use solar PV for water heating to reduce pressure on the electricity grid; Rwanda is developing Africa's first "green" city – within the capital Kigali – to be powered entirely by renewable energy, and Accra initiated an incentive program that reduces building permit fees by 10% if applicants include a 20 kW solar PV system in the design.

In Nigeria, Eko Atlantic City in Lagos State secured its first-ever EDGE (Excellence in Design for Greater Efficiencies) green building certification from the International Finance Corporation in January 2020, ensuring homeowners that their homes are designed and built to be resource-efficient (ESI, 2020). Further, the Economic Community of West African States (ECOWAS) has set a target for 48% renewable electricity by 2030, and the East African Community (EAC) aims for 21% renewables in the power generation mix by 2038 (IRENA, 2019). Despite the abundance of local renewable energy resources in Africa, renewables account for only 7% of the total primary energy supply, 8% of total final energy consumption, and 26% of power generation in the region as of 2018 (IRENA, 2020). The expansion of renewable energy can be achieved if barriers such as access to financial markets, infrastructure, and capacity are improved for the region.

1.3.6.2 Payment for ecosystems services, forestry and land use

In most countries in Sub-Saharan Africa, the survival of the majority of people depends on forest environmental services that enable subsistence agriculture and ensure safe drinking water and forest products for housing, energy, and food security. Moreover, about 80% of people in the sub-region depend on wood for energy. In addition to benefiting local people, forests in Sub-Saharan Africa provide environmental services at the regional and global levels.

Payment for Ecosystems Services (PES) schemes constitute an opportunity to manage ecosystems sustainably and can provide avenues through which the beneficiaries of the environmental services provided by forests in Sub-Saharan Africa can contribute to providing those services, easing the financial burden on governments and local communities. Payments for environmental services are growing their importance in the arena of policy tools, encouraging the transition to green growth. Countries such as Kenya, Ethiopia, Zambia, Uganda, and Zimbabwe have proactively applied that tool for forestation and carbon reduction from deforestation (FAO, 2019). Some programs successfully promoted the inclusion of vulnerable groups and reduced poverty. Africa has many successful PES scheme projects (see examples in Table 6). These schemes have provided a funding source for land management, restoration, conservation, and sustainable use.

Table 6. Examples of Payment scheme services in Sub-Saharan Africa (FOA, 2019).

Example	Description	Environmental services provided
Communal conservancies (Namibia)	The government created legislation giving communities the power to create their conservancies. As a result, the communities benefit from tourism income.	Biodiversity conservation: these are communal conservation areas, the majority of which lie adjacent to the government's protected-area networks, increasing the continuity between protected areas and providing migration routes for elephants and other large-range animals.
Canopy walk at Kakum National Park (Ghana)	The revenue-sharing arrangement between the park and local communities	Biodiversity conservation: seeks to incentivise community management in natural forests by sharing revenue from ecotourism.
Bigodi Wetland Sanctuary (Uganda)	A private deal between the Kibale Association for Rural and Environmental Development, a local non-governmental organisation and local communities, with support from the United Nations Environment Programme. Tourists pay members' tour-guiding fees.	Biodiversity conservation: mobilises involvement in the co-management of the wetland and reducing pressure on the Bigodi Wetland Sanctuary. Communities are involved in the provision of tour guiding services.
CAMPFIRE – Communal Areas Management Programme for Indigenous Resources (Zimbabwe)	Community-based natural resource management programme, in which power is transferred from central government to local communities. The local administration and local communities share the income from selling wildlife safaris.	Biodiversity conservation: rural district councils, on behalf of communities on communal land, are granted the authority to sell access to wildlife in their districts to safari operators.
Mgahinga Bwindi Forest Conservation Trust (Uganda)	A public fund in which communities obtain grants for development projects (e.g., schools, hospitals, livelihood improvements and roads).	Biodiversity conservation: targeting the improved management of forests that constitute habitat for more than half the global population of mountain gorillas. This is a partnership with communities living in and around the Mgahinga National Park, the Bwindi National Park, and the Uganda Wildlife Authority.
Cederberg Conservancy (South Africa)	A stewardship programme that consolidates 22 properties in central Cederberg as one of the core corridors of the Greater Cederberg Biodiversity Corridor.	Biodiversity conservation: a voluntary agreement between landowners to manage the environment sustainably. Conservation goals are achieved through cooperation and dedication toward the conservation of nature on private land. The stewardship programme ensures that landowners who commit their property to a stewardship option will benefit from their conservation actions.
Kasigau Corridor REDD+ project (Kenya)	Registered under the Voluntary Carbon Standard and the Carbon, Community and Biodiversity standard. This partnership between Wildlife Works and various landowners is in the corridor between two national parks – Tsavo East and Tsavo West. Communities benefit from employment, and landowners are paid for the sale of carbon credits.	Biodiversity conservation and climate services: applying REDD+ as a tool for protecting threatened forests, wildlife and communities.
Lesotho Highlands Water Project (border between Lesotho and South Africa)	The two countries signed a treaty in 1986 to transfer 780 000 million litres of water and generate 72 megawatts of hydropower at the Muela Power Station. South Africa pays royalties to Lesotho for this water, using revenues generated by water sales.	Lesotho provides water from the Senqu River system to South Africa's economic hub, the water-stressed Gauteng region. The water en route to South Africa is put to good use, powering an underground hydroelectric power station that generates electricity to meet Lesotho's needs. The agreement stipulates environmental protection and the sustainability of the river system.
Community Markets for Conservation (COMACO) (Zambia)	The private deal between COMACO and private farmers to adopt organic farming practices and pledge not to poach or make charcoal illegally while farming with COMACO. Communities benefit from access to markets. In addition, farmers earn conservation points and, at the end of the year, are paid according to the number of points earned.	Wildlife conservation: COMACO rewards farmers with increased commodity prices for adopting improved land management and farming practices that can sustain higher food crop yields while reducing conflicts with natural resources. COMACO produces "IT'S WILD!", a brand of organic, value-added processed products produced by farmers who live with wildlife.

Several countries in Sub-Saharan Africa have established forest conservation-related policies or are signatories to international or multilateral agreements that need better implementation and can benefit from PES approaches. For example, many ongoing national policy efforts could leverage PES methods, such as the REDD+ preparedness processes and strategies. Unlike in Sub-Saharan Africa, where most existing PES initiatives are in the form of projects, PES has been applied in Latin America as a policy instrument, enabling the development of successful national-level PES schemes (FAO, 2019). Costa Rica, for example, identified the need to improve the protection and management of national forest resources and established policies that introduced a PES scheme and created a market for environmental services. PES schemes have been distinguished from integrated conservation and development projects because PES schemes are direct, cost-effective, and less complex institutionally and, therefore,

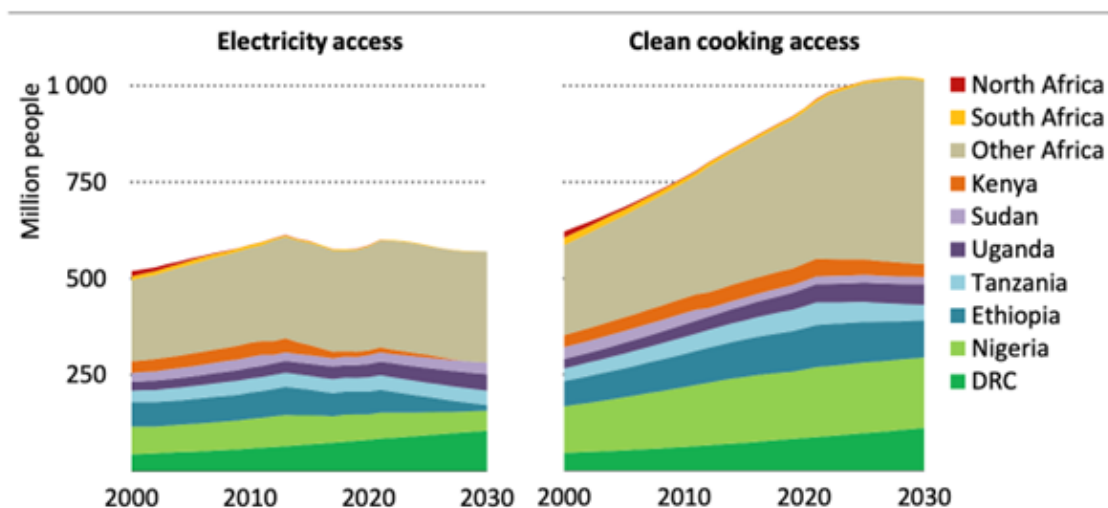
more likely to produce the desired results. The ability of PES schemes to produce desired results lies in their conditionality – they rely on incentives to induce behavioral change (Kelsey, Kousky, and Sims, 2008).

1.3.7 Gender inclusiveness of these policies

1.3.7.1 Energy Access and Inclusiveness

By the beginning of 2020, Africa was already behind schedule for achieving the Sustainable Development Goal (SDG) of having universal access to modern electricity by 2030 (SDG7), and the COVID-19 outbreak has further slowed down progress (IEA, 2022). Current government policies need to be revised to achieve the aim. In 2030, 565 million people will still lack access to electricity, and almost one billion people will not have clean cooking if no more steps are taken during and after the pandemic (IEA, 2022). Figure 5 illustrates Africa's population needing access to modern energy relative to other regions.

Figure 5. Population without access to modern energy services by region & country in Africa



Source, IEA, 2022

Sub-Saharan Africa still needs access to clean cooking, with only a modest improvement in access from 15% in 2015 to 17% in 2020. Moreover, it is the only region where those without access continue to expand significantly, with population growth increasing the number of those without access by 10% to around 940 million in 2020 (IEA, 2022). Given the gender gap, women and men are affected by this poor accessibility differently. For instance, due to institutionalized gender inequity, gender roles, and social conventions, women incur higher expenditures in the lack of modern energy (United Nations, 2018).

In Africa, many women and girls spend a significant portion of their time harvesting wood fuel, which exposes them to various risks (Rewald, 2017). For example, according to research, women and girls are at risk of sexual assault when they go outdoors after dark to collect water and fuel or shop (Rewald, 2017), especially in the absence of community lighting. In addition, because SSA relies heavily on solid biomass and coal for cooking, household air pollution is responsible for 2.8 million premature deaths annually (IEA, 2017), linked to biomass fuel fumes. According to the Africa Progress Panel (2015), home air pollution causes 600,000 annual deaths in SSA, with women making up roughly 60% of these casualties (ESMAP, 2011; IRENA, 2013).

Women's chances for education and employment are further hampered by inadequate access to energy and time spent on cooking and other domestic duties (UNDP, 2019). Women and children bear the most significant burden of energy poverty. Easy access to energy improves women's capacity to engage in income-generating activities. Greater gender equality, economic productivity, educational possibilities, and other benefits result from improved access to and usage of renewable energy. Even though it is possible to upgrade to clean cookstoves to reduce the time and health consequences of cooking with biomass, it has been challenging to persuade households to utilize modern cooking technologies, and policy commitments to clean cooking have significantly slackened (Rewald, 2017; IEA, 2018). A lack of sustainable transportation, water pumps, electric appliances, and other tools and equipment that require energy access means that women in poor households must utilize much more energy (UNSDG7, 2018). Greater access to energy services can enhance women's health and well-being, freeing up their time and enabling their economic empowerment, thereby supporting the achievement of SDG 7.

Impact of Policy instruments on inclusiveness

Data on gendered energy access for SSA is limited. However, many analyses look at a general trend for access to

clean cooking fuels and electricity (IES, 2020, 2021, 2022; WHO, 2021). Studies show that SSA's access to clean cooking fuels and technology has declined during the pandemic. Over 970 million people (two-thirds) lacked access to clean cooking facilities as of 2021 (African Economic Outlook, 2022). This number increased by an average of 17 million, 2% per year between 2010-2019, and by 20 million, 2.5% annually between 2020-2021 (IEA, 2022). The pandemic-induced reduction in household income and the world's rising population are the leading causes of this degradation in access to modern energy. Few people could afford to gain access for the first time or maintain access they had just acquired because of the decline in household income. By the end of 2022, more than 25 million additional people in Sub-Saharan Africa—roughly 465 million people—will be living in extreme poverty due to Russia's invasion of Ukraine and the inflation that followed (World Bank, 2022). According to projections by the Africa Energy Outlook (2022), 10 million Sub-Saharan Africans who had just received access to essential power services could no longer afford to pay for the service, while 5 million Sub-Saharan Africans were no longer able to afford modern cooking fuels, i.e., LPG.

However, undoubtedly noticeable discrepancies between nations are hidden by the general trends. For instance, some countries have seen continued progress in improving access to electricity and clean cooking fuels, though slowed by the pandemic. Others, however, have observed an increase in the population's numbers and the proportion of people without access (IEA, 2022). The Democratic Republic of the Congo (DRC), Ethiopia, Nigeria, Tanzania, and Uganda house over half of all Africans without access to electricity today. Only Ethiopia and Nigeria showed an increase in the number of people without access between 2015 and 2019. (They both had a slight rebound but proved to have more resilient electrification plans through the pandemic.) Between 2015 and 2021, the number of individuals without access to energy grew in the DRC, Tanzania, and Uganda. According to preliminary data, even while the epidemic slowed new cases, other nations such as Côte d'Ivoire, Ghana, Kenya, Rwanda, and Senegal have continued to reduce or stabilize the number of persons without access.

The epidemic's economic slowdowns primarily impacted installing new stand-alone off-grid systems. Between the first half of 2019 and the first half of 2021, sales of stand-alone solar home systems with photovoltaic (PV) panels and batteries with a capacity of at least 20 watts decreased by around one-fifth in Sub-Saharan Africa (GOGLA, 2021). As a result, energy access targets are more challenging to

attain and disproportionately negatively impact household living standards due to the region's high energy costs. For instance, efforts to increase clean cooking fuels are hindered by increased LPG prices. Since December 2019, international LPG prices have increased by more than 60%, driving up LPG costs by 40% to 60%. This has caused many households in the region to revert to polluting cooking fuels such as charcoal, with severe consequences for human health and deforestation.

1.3.7.2 Inclusiveness in the design and implementation of LCT-related policy instruments

Including women in designing and implementing LCT-related policies is critical to reaping the full benefit of renewable energy developments. In SSA, the integration of gender into policy instruments is gaining momentum. The importance of gender considerations in interventions and development in the energy sector has been acknowledged in many good initiatives at the regional and national levels (UN Women, 2018). In one such case, the ECOWAS Policy for Gender Mainstreaming in Energy Access, adopted in June 2017, 15 countries agreed to remove current gender hurdles to increase energy access in West Africa. This gender-responsive energy policy aims to increase general awareness of gender and energy within government and academia; mainstream gender perspectives into all public-sector energy activities; achieve gender balance in public-sector energy-linked jobs and decision-making roles; and ensure women have equal opportunity to participate in private energy sector (SEforALL, 2017).

The ECOWAS is now debating legislation requiring gender-impact studies for energy projects. Similar initiatives are being made in Southern Africa (Southern Africa Centre for Renewable Energy and Energy Efficiency) and East Africa (East Africa Centre for Renewable Energy and Energy Efficiency) (SEforALL, 2017). Gender dimensions in energy policies are on the rise. According to a recent analysis of gender integration in 15 East and South African countries, more than half of the plans mention the need to increase women's access to energy services and technologies as empowerment. More than 60% stress the importance of increasing women's participation in sector policy- and decision-making (UN Women, 2017). A few of the policies also specify steps to take in order to address the problems. About 40% of the policies draw attention to the connection between increased environmental sustainability in the industry and women's empowerment.

Although there has been progress, many energy planning and policy decisions do not take gender into account (Clancy, 2017). Regarding electrification projects, even though

the impacts and risks of energy development should be addressed in environmental and social impact assessments, mitigation plans are not continuously funded, monitored, or disaggregated by gender. Consultations, policy planning, and decision-making in the energy sector do not always consider gender and social inclusion issues and stakeholders. Since women and other vulnerable groups are left out of energy plans and surveys, baselines for measuring development benefits usually do not exist.

1.3.8 Opportunities & constraints - policy instruments

In Africa, there are no regulatory mechanisms to support carbon pricing. Few countries have laws addressing climate change, and most nations' frameworks are executive ones. As a result, the coverage of climate financing issues and the execution level must be improved where legislative tools have legal standing. Despite being a challenging endeavor, African regional organizations must harmonize the legal frameworks that support carbon pricing regimes throughout the continent.

It is important to remember that building capacity is still a top priority for Africa's effective carbon pricing system. There is a need to upskill individuals to investigate existing carbon pricing methods, formulate ideas, and implement them at the local and national levels. In addition, to attain the necessary low-carbon emissions, various policy organizations, such as local think tanks and other consulting firms, must improve their competence to offer context-specific recommendations.

Financial structures and resources must be improved to support climate change mitigation efforts. Fiscal policy can address explicit/direct carbon taxes if decision-makers and responsibility-bearers have the political will to do so. However, the ability of the money market and the stock market to support the instruments, particularly concerning ETS and hybrid mechanisms, will determine if such tactics are successful. For example, the ETS "cap and trade" systems that have been shown to lower CO₂ emissions involve the sale of permits to discharge particular pollutants, with polluters paying an amount corresponding to their emissions. Trading in financial derivatives related to climate change could be restricted due to Africa's underdeveloped capital market.

The political manifestos in Africa tend not to capture climate change issues, and pre-election debates need to consider more discussion on environmental externalities or climate change issues. It is time for political leaders and society to act to mitigate climate change. In this way, financial tools like the carbon pricing mechanisms can be inculcated in key policies and eventually implemented.

Recommendations

Governments should prioritize supporting low-emission industries like services and light manufacturing over high-emitting ones like heavy and extractive industries to encourage low-carbon growth in SSA. Africa's leaders and development partners may support improved climate action and carbon pricing in the following areas:

- The UNFCCC–Collaborative Instruments for Ambitious Climate Action (UNFCCC-CIACA) initiative and the regional dialogues on carbon pricing (REDICAP) process are examples of platforms or initiatives that can be used to strengthen regional collaboration. In addition, a regional readiness program on universal access obstacles for all nations should also be created. This will help early adopters like South Africa feed into the strategies of later adopters.
- There should be concrete actions taken to make it easier to establish a forum for national stakeholders' consultation that includes the government, the private sector, regional communities, academic institutions, young people, and gender specialists. In addition, a lot has to be done to get the private sector to accept the problems of climate change and the need to adopt market-based solutions to solve them.
- There should be political will from each country, and this can be driven by advocacy works of civil society and the populace. This should be accompanied by various institutional changes to ease the implementation of existing and future climate change laws, regulations, and policies.
- The support of development organizations and developed countries, i.e., China, the US, and the EU/UK, who are involved in Africa's development agenda, should draw more attention to climate change issues. Measures should be taken to raise sustainability awareness and target its inculcation during trade negotiations and international diplomacy. In addition, climate change pricing should support the African continental trade agreement and its implementation.

1.3.9 Knowledge and research gaps in policy instruments

While the advantages of conventional carbon pricing systems are undeniable—among them, the capacity to raise funds for worthwhile development goals—implementing such policies in developing and least-developed nations requires careful consideration and examination of a number of issues. For instance, the design and implementation of LCT-related policy tools have not effectively taken gender into account, even in areas such as energy, where women are more

impacted. In order to foster gender equality across sectors, there is a need for an integrated approach that considers gender equality in all relevant contexts.

Literature evaluating the impacts of the implemented reforms on fossil fuel subsidies or taxes is minimal. One of the reasons is that these policies are only used to stabilize fuel consumption and consumption prices whenever there is a fuel shock. Governments might raise fuel taxes or cut subsidies when fuel prices fall, and vice versa. For the development of policies and guidelines, more empirical evidence is required.

The influence of the substitution effect between fossil fuel and non-fossil fuel needs to be better understood. Even while there is information on the use of revenue from a tax placed on fuel or savings from changes made to fossil fuel subsidies to invest in renewable energy, there must be more evidence about such expenditures. In addition, more information and empirical data are needed on the magnitude and potential regressive effects of such subsidies and their changes. The lack of knowledge about the scope and coverage of such subsidies, particularly in Sub-Saharan Africa, and the political sensitivity surrounding their removal may make this problem challenging to resolve.

In Sub-Saharan Africa, there is room for carbon pricing tools to be adapted to suitable industries or goods. Furthermore, to derive an adequate carbon value in the contexts of developing countries, so-called “direct traditional” pricing mechanisms, i.e., ETS and carbon tax, are insufficiently nuanced. This further supports the idea that an expanded notion of carbon pricing, applicable across a continuum of mechanisms, is warranted.

More research is required on climate institutions and governance, politics, policies, and acceleration of action. Areas for research include approaches to mainstreaming climate governance across sectors and at different scales; developing the governmental and non-governmental capacity to bring about long-term low-carbon transformations and associated capacity needs; the drivers of subnational climate action; the scope for regulatory framework; and ex-post analysis of impacts.

Due to the limited experience with climate-related policy experiments, empirical data on emission consequences from climate policies, including carbon pricing, must be more comprehensive for a clear attribution assessment. In addition, more consideration must be given to the technique for thoroughly evaluating climate policies and measures, such as effective carbon rates. Finally, ex-post evaluations of climate and non-climate policies and initiatives for their impact on emissions, particularly at the global scale, considering

national circumstances and priorities, also have significant information gaps.

1.4 Climate finance initiatives at the regional level

1.4.1 Introduction to climate finance instruments and mechanisms available in the African region

Africa has multiple sources of funds for the LCT. The main three channels are multilateral climate funds, bilateral development assistance institutions, and regional or national funds. Multilateral climate finance initiatives can fall inside or outside the UN Framework Convention on Climate Change (UNFCCC) mechanisms.

The Global Environment Facility (GEF) is part of the UNFCCC, and its resources are allocated based on the impact of dollars spent on environmental outcomes. The Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) are administered by the GEF and support the development and implementation of National Adaptation Plans, primarily through smaller initiatives (Watson & Schalatek, 2022). The Green Climate Fund (GCF) was established in 2015 as a financing vehicle for the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. The GCF supplied

around half of the total funding from multilateral climate funds in 2019–2020 (CPI, 2021). The Adaptation Fund, which has been in operation since 2009, is funded by a 2% levy on the sale of Clean Development Mechanism emission credits (CDM). Thus, if carbon prices are low, the Adaptation Fund depends heavily on developed-country grant contributions (CPI, 2021).

Non-UNFCCC channels include multilateral development banks (MDBs), such as Climate Investment Funds (CIFs), administered by the World Bank, and regional development banks, such as the African Development Bank. The funds' major goal is to deepen understanding of optimally utilizing public financing at scale for economic change; they have funded program initiatives in developing countries (Watson & Schalatek, 2022). The CIFs include the Clean Technology Fund and the Strategic Climate Fund, composed of the Pilot Program for Climate Resilience, the Forest Investment Program, and the Scaling Up Renewable Energy Program in Low-Income Countries. In 2020, MDBs committed \$66.05 billion to climate finance, with 76% going to mitigation and the balance to adaptation (Bennett, 2021). Below is a list of African climate finance initiatives highlighting the multilateral climate funds (see figure 6).

Figure 6. Multilateral climate funds targeting Africa

Fund	Fund focus	Approved (\$ millions)	Percent of global approvals	Disbursed (\$ millions)	Percent of global disbursement	Pledges (\$ millions)
Adaptation for Smallholder Agriculture Programme (ASAP)	Adaptation	169.2	57.6	107.1	54.4	382.0
Adaptation Fund	Adaptation	260.7	29.9	162.6	31.1	1,160.0
BioCarbon Fund Initiative for Sustainable Forest Landscapes (BioCarbon Fund ISFL)	Mitigation—REDD	30	30.5			367.4
Central African Forest Initiative (CAFI)	Mitigation—REDD	192.7	84.3	192.2	92.3	784.0
Clean Technology Fund (CTF)	Mitigation—General	1,020.7	18.0	284.2	15.7	5,783.2
Congo Basin Forest Fund (CBFF)	Mitigation—REDD	13.1	15.8	5.5	9.3	186.0
Forest Carbon Partnership Facility—Readiness Fund (FCPF-RF)	Mitigation—REDD	121.4	38.6	105.7	38.0	468.8
Forest Investment Program (FIP)	Mitigation—REDD	264.6	42.8	133.2	48.2	748.6
Global Environment Facility (GEF7)	Multiple Foci	153.4	9.8			728.4
Global Climate Change Alliance (GCCA)	Multiple Foci	337.8	37.9	2.87	0.5	1,652.8
Global Energy Efficiency and Renewable Energy Fund (GEEREF) ^a	Mitigation—General	57.1	25.54	0	0	281.5
Green Climate Fund Independent Redress Mechanism (GCF IRM)	Multiple Foci	1,777.3	18.7	429.7	18.4	10,322.1
Green Climate Fund (GCF-1)	Multiple Foci	20	2.4			9,999.2
Least Developed Countries Fund (LDCF)	Adaptation	903.4	67.6	364	68.2	1,878.0
Millennium Development Goals (MDG) Achievement Fund	Adaptation	24	26.8	24	26.8	89.5
Partnership for Market Readiness	Mitigation—General	12.7	15.4	8.3	12.9	131.5
Pilot Program for Climate Resilience (PPCR)	Adaptation	293.3	28.7	253.9	34.6	1,151.8
Scaling Up Renewable Energy Program (SREP)	Mitigation—General	314.1	46.6	67.5	51.4	778.6
Special Climate Change Fund (SCCF)	Adaptation	61.7	21.7	47.4	26.2	379.8
UN-REDD Programme	Mitigation—REDD	29.2	8.5	28.6	8.5	344.9

Source: Calculations based on Climate Funds Update 2022 dashboard, <https://climatefundsupdate.org/data-dashboard/>.

Bilateral initiatives

These cover many public climate finances and follow a development aid approach. Even though financial flows are self-reported by countries without a standardized format, bilateral aid is recorded by the Organization for Economic Co-operation and Development (OECD), Development Assistance Committee, and climate change aid (OECD n.d.b).

Regional and national channel funds

These funds are diverse in form and function and have been established by several developing countries through international finance and domestic and private sector budgets. For instance, at the regional and national levels, we have the Benin National Fund for the Environment and Climate, the Mali Climate Fund, Rwanda's Green Fund, South Africa's Green Fund, etc. In addition, regional and continental initiatives include the Africa Adaptation Acceleration Program, which aims to mobilize \$25 billion by 2025 to scale up innovative and transformative actions on climate change adaptation; Africa Financial Alliance on Climate Change, which seeks to leverage the region's key financial institutions to promote knowledge sharing, climate risk-mitigating financial instruments, climate risk disclosure, and climate finance flows; and Africa Adaptation Benefit Mechanism, which mobilizes public and private finance for climate change adaptation and intends to de-risk and incentivize investments by facilitating payments for delivery and certification of adaptation benefits.

The climate funds received from global sources, i.e., UNFCC, GEF, GCF, CIF, etc., by the respective ministries of finance in Africa usually require the integration of gender equality in funding proposals as a criterion for approval (GEF, 2017; Adaptation Fund, 2019; CIF, 2018). Even though the climate finance instruments and mechanisms for the region are well structured (i.e., OECD, DAC, Rio Markers and MDBs¹³), they are not designed to track how finance reaches local actors, nor do they consider how effective implementation is supported in their biennial climate finance assessment report, making it difficult to track the actual effects of climate finance in the region (UNFCC, 2019).

1.4.2 Ease of doing business and Foreign Direct Investment for the LCT

Attracting FDI for LCT is a challenge for the region due to currency risk, poor regulatory environment, lack of green

investment project pipelines, and weak understanding of climate risks. Further, local greenhouse gas monitoring and accounting capacity must often be included. Additionally, applying internationally recognized frameworks, such as the climate-related financial disclosure task force, is limited (FDS Kenya and the South Pole, 2021).

Generally, financial systems in many African countries are small and underdeveloped, often dominated by commercial banks, which constrains the intermediation of long-term capital for several reasons, including high interest rates on the demand side. Furthermore, most domestic financial institutions do not lend to key low-carbon sectors, even with third-party partial guarantees, since they need more expertise and the competence to analyze low-carbon project returns. Instead, they prioritize high-return investments with clear risk profile information, such as real estate. Africa's capital markets are equally underdeveloped and illiquid. The highest stock market capitalization as a share of GDP in 2020—excluding South Africa (235%)—was in Mauritius (56.4%) (World Bank, n.d). Africa's investment rate of 24% is lower than that of emerging economies and regions such as China (40%), East Asia and Pacific (32%), and South Asia (28%) (Soumare et al., 2021). Green bonds, which are becoming more popular in underdeveloped financial markets, are also struggling to attract the rising pool of climate finance. Except for South Africa, which accounted for 73.8% of all cumulative bond issuance from 2010–2021, the number of green finance issuers in Africa is small and dominated by corporations (CPI, 2021). Proceeds from these issues are allocated mainly to energy development, although recent allocations have also gone to construction, transport, water, and waste management (CPI, 2021). Africa is behind other emerging markets in issuing these bonds.

1.4.3 Financial needs and available funding for the LCT

Financing climate change commitments has been the biggest challenge for Africa. At the 15th UN Climate Change Conference of the Parties (COP15) in Copenhagen, Denmark, in 2009, developed countries committed to channeling \$100 billion a year to developing countries for climate adaptation and mitigation and confirmed this in the Paris Agreement at COP21 in 2015 and COP26 in Glasgow. However, despite the evident impact of climate change in Africa, they have

¹³ OECD DAC Rio Markers for Climate: Handbook. See <https://tinyurl.com/9utjzby8>

never met this target (UNFCCC, n.d).

Africa's climate change financial needs are anticipated to be \$1.3–\$1.6 trillion in 2020–30, with mitigation accounting for the largest portion, followed by adaptation and the rest (see Table 7) (NDC Hub, 2021). This corresponds to about \$127.8 billion per year, with lower and upper amounts of \$118.2 billion and \$145.5 billion, respectively. The cost of adaptation alone is estimated at \$259–\$407 billion. Suppose the international-to-domestic commitment ratio as of 2020 remains constant (with 64% of costs coming from international sources and 36% from domestic sources); in that case, the adaptation financing gap in Africa from international sources ranges from \$166 billion to \$260 billion in 2020–30. Over the same period, the cumulative adaptation finance needed from global resources in the top five priority sectors is estimated at \$9–\$14 billion for agriculture, \$6.7–\$10.6 billion for water and sanitation, and \$4.48–\$7 billion each for health, energy, and biodiversity and ecosystems (Integral Consult, 2021).

When divided regionally, East Africa has the highest estimated adaptation cost, \$91–\$143 billion, due mainly to its higher vulnerability to climate change and lower resilience and readiness. It also requires the largest contribution from international resources (\$58.2–\$91.5 billion) to meet its adaptation needs. Central Africa has the lowest estimate, \$6–\$19 billion. The cost is estimated at \$73.5–\$115.5 billion for West Africa, \$33.7–\$53 billion for North Africa, and \$25–\$42 billion for Southern Africa (Integral Consult, 2021).

Estimating climate financial needs for Africa is challenging due to uncertainty around different climate impact scenarios – and more due to a scarcity of statistical data. Nevertheless, NDCs include conditional pledges by countries and unconditional external support to implement the NDCs, and these are taken as primary sources to estimate climate finance needs and commitments. The main issue is that not all African countries provide comprehensive details on the cost of climate adaptation in their NDCs, leaving Africa's NDC hub to provide estimates for all countries based on available costs reported by individual countries and extrapolating to determine adaptation costs for the remaining countries (analysis based on 44 African countries). However, climate finance needs go beyond adaptation to include mitigation, technical and technological needs; loss and damage needs; monitoring, reporting, verification, capacity-building needs, and more (see Table 7).

Table 7. Estimated Africa climate financing needs 2020-2030

Type of finance needs	Amount or description
Adaptation	\$259-\$407 billion
Mitigation	\$715 billion
Technical & technological needs	\$1.38 billion
Loss & damage needs	\$289.2-\$440.5 billion
Monitoring, reporting, & verification	\$258 million for report preparation \$46.5 million to \$93 million for monitoring, reporting & verification, and capacity building
Other needs (not estimated)	
Climate finance environment needs	It is necessary to provide an attractive financing environment and diverse financing sources, mobilise the private sector, introduce risk-sharing mechanisms, & launch new financial instruments.
Capacity-building needs	The NDCs projects require capacity-building from design to implementation. However, these costs are not often estimated.

Source: Calculations based on data from Africa NDC Hub (2021)

1.4.4 Inclusive finance and budgeting

Gender dimension and climate finance in Africa

Given the disproportionate impact of climate change on women, incorporating gender dimensions in financing and policy discussions could also increase climate financing needs for adaptation and mitigation. This is due to the persistence of multifaceted gender disparities. Without gender-responsive climate actions, climate financing instruments delivering adaptation and mitigation funding for Africa will underestimate financing requirements, exacerbating inequalities against women and the marginalized, i.e., youth, children, disabled, and displaced people.

Gender views are increasingly being recognized as necessary in climate finance in developing countries, leading to the emergence of gender-responsive climate finance, which targets gender inequalities in Africa. As a result, finance from various sources increased from an average of \$80 million in 2010 to \$1.6 billion in 2019, with a peak of \$5 billion in 2018 (OECD, n.d.a). In the decade leading up to the pandemic (2010–2019), about 50% of gender-responsive climate finance (about \$720 million) was channeled annually to mitigation in Africa, with around 37% (roughly \$545 million) to adaptation. The remaining 13% (around \$194 million) went to mitigation and adaptation. Scaling up climate finance targets gender inequalities and prioritizing women's access to climate financing instruments will strengthen the “build back better” plan post-COVID-19. Despite Africa's comparatively good performance among global regions, more than three-quarters of climate development finance failed to consider

women's specific needs and contributions during the 2010s (OECD, n.d.a.). Empowering women and girls to reduce the ongoing socioeconomic inequalities they experience would require more and better finance focusing on gender-specific needs.

According to contributors reporting to the UNFCCC (2020), 20% of climate finance is invested in developing country adaptation, although more is needed to know about the quality of this finance. Contributors (donors) neither track nor report on how much local actors receive, the terms they provide it on, or who decides on its use. As a knowledge gap, there is a need to explore the practicality of tracking climate finance at the local level if transformative adaptation is to be attained, especially for women and other vulnerable groups, i.e., youth, children, disabled, and displaced people (CABRI, 2021). According to CABRI, IBP, IIED, and UNDP (2021), gender-responsive climate budgeting (GRB) reforms must incorporate methods and practices across the budget cycle to ensure that gender and climate change are taken into account, also referred to as 'double-mainstreaming.' In other words, the reforms should integrate gender concerns into existing climate-responsive budgeting (CRB) practices. They can also include the joint and coordinated gender and climate change integration into the mainstream budget.

Several countries in the region now have policies that advocate gender mainstreaming within their national climate efforts, albeit in different ways and with varying degrees of success. Examples of countries leading in related reforms include Nigeria, Eswatini, and Rwanda, which have introduced joint gender and climate-change strategies and plans aligned with international frameworks, including the UNFCCC Gender Action Plan. Nigeria developed a National Action Plan on Gender and Climate Change led by the Ministry of Environment. The action plan focuses on practical strategies for integrating gender into the implementation of national climate change initiatives, including the NDCs and Nigeria's Economic Recovery and Growth Plan. The priority sectors covered by the action plan include agriculture, forestry, land use; food security and health; energy and transport; waste management; and water and sanitation. The implementation strategy was developed to ensure that the actions identified in the blueprint action plan are integrated into implementing entities' day-to-day operations and decision-making processes (Nigeria Federal Ministry of Environment, 2020).

In its new 2020–2030 gender policy, Eswatini embraces the SDGs, the African Union Agenda 2063, and other gender equality advancement conventions and protocols such as CEDAW, the Beijing Declaration and Platform for

Action, and the UNFCCC Gender Action Plan. The draft policy considers gender-related issues regarding access, control, benefits, and management of natural resources. It also commits to providing education, training, and capacity-building on the intersections between gender and climate change. Similarly, Rwanda revised its national gender policy in 2021, demanding that gender is mainstreamed across all sectors, including the environment and climate change. Its 2019 environment and climate change policy includes gender mainstreaming. In addition to integrating gender and climate change into their national planning processes, Rwanda's Ministry of Finance and Economic Planning has developed tools to ensure that gender and climate change are included in budget formulation (see Rwanda Ministry of Finance and Economic Planning for 2021). Since 2014, Uganda's Ministry of Finance, Planning, and Economic Development has issued guidelines for including programs that promote gender equality in different sectors. Recently, the government of Uganda has mandated the inclusion of the environment and gender in all programs.

Additionally, with relative success, Mozambique has already developed gender-responsive programs to empower women's adaptation to climate change impacts. For example, through its Coastal Resilience to Climate Change program, the country provides gender-responsive donor funding for women and men in coastal communities by investing in women's resilience to climate change and agricultural conservation initiatives. Between 2019 and 2020, the program distributed materials to build mangrove nurseries and provided fishing conservation equipment to invest in conservation agriculture (UNFCCC, 2016).

Thus, maintaining effective gender mainstreaming in climate finance requires improved governance and operational procedures alongside technical expert advisory services. While global funds have developed instruments and requirements to strengthen governance and operational modalities for the inclusion of gender equality and stakeholder participation, there are still gaps in terms of practice. For example:

- The GEF evaluation found that among the 157 completed projects, only 38% (59 projects) mentioned gender but did not incorporate gender into their activities (GEF, 2017).
- The CIF assessment of funded programs found that only a limited number of in-country women- and gender-related groups engaged in adaptation programs. Strong national leadership and frameworks to monitor accountability for making progress toward gender equality were lacking. In addition, stakeholders

across the board lacked knowledge of the methods for engagement and gender mainstreaming approaches, and there was inadequate financial allocation and specific budgeting for engagement, including non-state actors.

- There is a need to track climate finance at the local level in LMICs and explore questions that need to be asked to understand progress and address problems (Soanes et al., 2021).

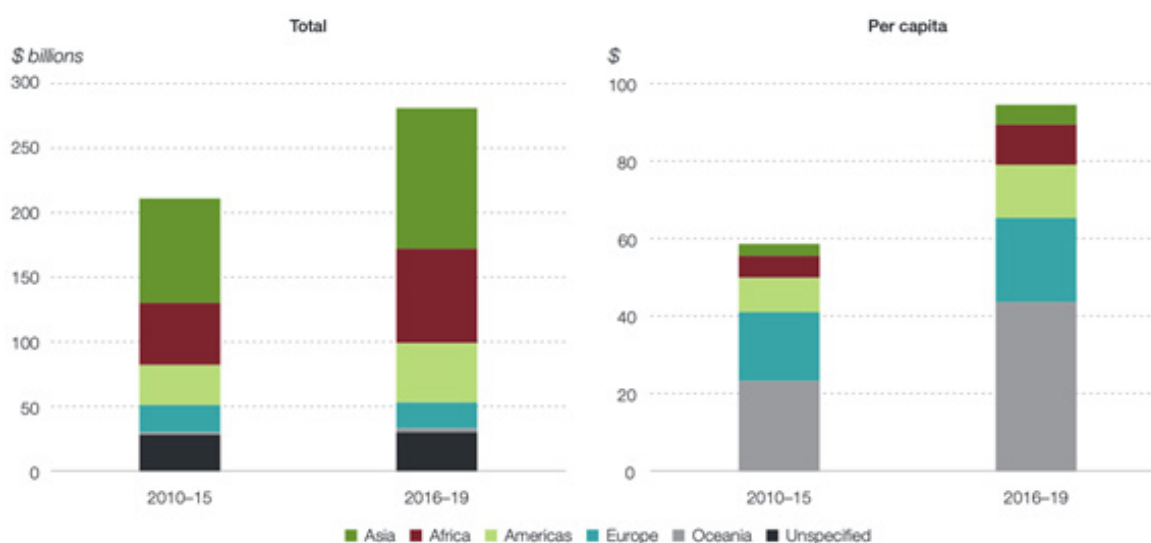
1.4.5 Climate Finance Mobilization & LCT

Climate finance mobilized globally falls short of African countries' needs, creating a climate financing gap of \$99.9–\$127.2 billion a year from 2020–2030. Despite a steady increase in global climate finance, only \$79.6 billion of the \$100 billion committed by developed countries was mobilized in 2019, two-thirds of which was mitigation (OECD, 2021). Furthermore, the \$100 billion reflects neither the estimated

financing needs in Africa to reach the net-zero transition by 2050 nor the actual opportunity cost of historical emissions by advanced economies, far above the pledged \$100 billion (OECD, 2021).

Recognizing the current climate finance shortfall, developed countries pledged to double the funding allocated to developing countries for adaptation by 2025 through the Glasgow Climate Pact, bringing the annual figure to around \$40 billion (Masood & Tollefson, 2021). Though commendable, this pledge should not just add to existing commitments on climate finance but be put into execution. Africa's contribution to global climate finance flows increased by only 3% points on average in 2010–2019, from 23% (\$48 billion) in 2010–15 to 26% (\$73 billion) in 2016–19 (figure 7).

Figure 7. Africa's share in global climate finance from 2010-2019



Source: Calculations based on OECD, n.d.a and Africa NDC Hub 2021

This means that in 2016-2019, the continent received only \$18.3 billion a year, significantly behind Asia (\$ 27.3 billion). Furthermore, the impact of COVID-19 and the Russia–Ukraine crisis on climate finance may further stifle the flow of climate resources to Africa, with governments in advanced economies reallocating resources to tackle the effects of these two shocks. If Africa receives the same amount of climate-related development finance annually through 2030, the resulting financing gap would be \$99.9–\$127.2 billion a year, averaging \$108 billion, severely limiting governments’ ability to build climate resilience. From 2016-2019, Africa’s average annual climate finance was among the lowest in the world, at \$10.40 per capita. Insufficient climate finance means most African countries will not meet their conditional Nationally Determined Contribution targets, amounting to approximately 85% of total financing needs (see, NDC 2021).

1.5.6 Domestic sources of funding: Institutional setup

Green finance and national climate funds are the best avenues for mobilizing climate finance domestically. Africa can leverage other sources of finance (i.e., green finance, carbon markets, debt-for-climate swaps, climate-linked debt, reallocation of SDRs in Africa’s favor, Natural Capital Accounting, areas of new domestic finance, and increased private sector participation) to support climate resilience and a just energy transition in Africa.

Green banks are country-driven, nationally based, catalytic finance facilities that mobilize private investment. They direct funding toward specific sectoral climate change needs to support, for example, climate-smart agriculture or the use of clean energy from non-renewable or renewable sources. Green banking is gaining popularity in Africa. According to a survey by the European Investment Bank, more than 70% of African banks regarded green finance as an attractive lending opportunity. In comparison, 55% and 60% saw it as an opening for investing and a source of additional funding, respectively (EIB, 2021). For example, Benin, Ethiopia, Mali, Morocco, Rwanda, and South Africa have successfully developed domestic climate funds. However, lessons from across Africa point to the following challenges in mobilizing domestic and international climate finance: 1) securing capital from funding sources, particularly in debt-distressed countries; 2) obtaining the necessary technical assistance funding for designing and structuring the work of green banks and national climate funds, and 3) overcoming the uncoordinated approach to forming green banks (AfDB, 2021).

The issuance of green bonds is heavily concentrated in developed countries and has yet to gain traction in Africa

(IEA, 2022). Africa received only 0.26% of global green bond issuance, the lowest share of all global regions, except for green loans, which accounted for about 1.9% of global issuance by value in 2021. Africa accounted for less than 1% of the global issuance of sustainability bonds, sustainability-linked bonds, and loans (BloombergNEF, 2021). Again, most green finances were issued in advanced economies, except for South Africa, which accounted for 73.8% of all cumulative bond issuance in Africa in 2010–2021 (CPI, 2021). The number of green finance issuers in Africa is small and dominated by corporates (CPI, 2021). Proceeds from these issues are allocated mainly to energy development, although recent allocations have also gone to construction, transport, water, and waste management (CPI, 2021). Even though Africa’s green finance market has expanded over the past five years (BloombergNEF, 2021), it still has room for much more, mainly if barriers such as currency risk, poor regulatory environment, lack of green investment project pipelines, and weak understanding of climate risks are dealt with.

Due to its disincentivizing nature, private sector involvement in climate finance is minimal. Nevertheless, between 2019-2020, the private sector invested approximately 13% in Sub-Saharan Africa, compared to an average of 42% in other developing regions (CPI, 2021). However, increased private sector participation faces three main barriers in Africa: 1) Essential knowledge gaps on climate change and the climate finance landscape—including limited understanding of climate risk and vulnerability data—reduce private actors’ incentive or ability to invest in adaptation and mitigation projects. In addition, 2) due to the good public nature of some adaptation or mitigation projects, private actors might not fully capture the economic benefits of their investments. Finally, 3) the inherently long-term horizons of many climate change projects, particularly adaptation projects, dissuade private actors, as they would find it hard to make a business case for potentially high up-front costs against long payback times in an uncertain future.

1.4.7 Bilateral agreements

Bilateral agreements cover a significant amount of public climate finance and are based on developmental aid approach. Even though financial flows are self-reported by countries without a standardized format, bilateral aid is recorded by the Organization for Economic Co-operation and Development’s Development Assistance Committee, and climate change aid is tagged with Rio markers (OECD, n.d.b). Figure 8 shows examples of bilateral climate finance initiatives from January 2022.

Figure 8. Bilateral climate finance initiatives from January 2022

Fund	Benefactor countries/bodies	African beneficiary countries
Global Climate Partnership Fund (GCPF) ^a	Germany, the United Kingdom, and Denmark	Ghana, Kenya, Namibia, Tanzania, Uganda
International Climate Initiative (IKI) ^b	Germany	Ethiopia, Ghana, Malawi, Morocco, Namibia, Nigeria, Rwanda, Sierra Leone, South Africa, Tunisia, Zimbabwe
MDG Achievement Fund (MDG-F) ^c	Spain	Ethiopia, Mauritania, Mozambique, Senegal
Nationally Appropriate Mitigation Action Facility (NAMA Facility) ^d	The United Kingdom, Germany, Denmark, and the European Commission	Cabo Verde, Gambia, Kenya, Madagascar, Morocco, Mozambique, South Africa, Tunisia
Norway's International Climate Forest Initiative (NICFI) ^e	Norway	Angola, Democratic Republic of Congo, Ethiopia, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Somalia, South Africa, South Sudan, Sudan, Tanzania, Uganda, Zambia, Zimbabwe
REDD+ Early Movers (REM) ^f	Germany and the United Kingdom	Benin, Burkina Faso, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Nigeria, Sudan, Tanzania, Togo, Uganda, Zambia

a. Countries where the fund invested in 2020. b. Countries where the initiative has bilateral projects running as of January 2022. c. The fund focuses on other areas, but in environment and climate change, experimental pilot initiatives took place in the beneficiary countries. d. Countries where the facility has projects active as of February 2022. e. The initiative's partner countries for development cooperation. f. Countries where REM has activities.

Source: Calculation inputs from various sources.

1.4.8 Constraints and opportunities

The current \$100 billion annual targets in climate finance for LDC need to reflect an accurate cost to meet net zero by 2050. Climate finance obligations should be amended to reflect the total opportunity cost of climate change in Africa and other developing regions, thereby contributing to climate justice. This applies to the countries' climate finance responsibilities, reflecting their past and future footprints in the carbon budget. If developed countries demonstrated strong political will in climate finance commitments, as they did with COVID-19, this would fast-track climate finance and support African countries in moving to climate resilience.

Developed nations must keep their financial commitments. The inability to meet the \$100 billion annual target in climate finance for LDC raises questions about this commitment. Meeting the pledge in 2022 would help restore faith in climate negotiations.

African governments must invest in building human resources and institutional public financial management capacity, given their direct access to global climate funds. Improving financial management on the public side should increase investor confidence in in-country systems.

Governments must enact robust laws encouraging local services and labor in climate-related activities. In addition, Africa faces unique problems, such as moving forward on a clean and sustainable path rather than decarbonizing, which necessitates the development of locally generated technology and business structures. These steps, backed up by demonstration and pilot projects, can potentially boost

investment in Africa-led innovation.

African countries should create well-tailored domestic resource mobilization instruments to fund climate resilience and the energy transition, reducing their reliance on external climate finance. In addition, countries should push through ambitious tax reforms spanning green taxes, subsidies, real estate taxes, and import duty revisions, with help from development partners and banks, to provide them with the financial freedom to fund climate resilience activities.

LDC should consider blended finance to provide fiscal incentives for issuers of green finance instruments. Blended finance could help de-risk investments in the transition by the private sector and thus leveraged instruments such as green bonds, green loans, and sustainability bonds. South Africa's \$8.5 billion package announced at COP26 demonstrates the potential for African countries to use bilateral and multilateral agreements and a mix of grant and concessional finance packages to fund energy transitions.

Strengthening public finance management (PFM) systems and integrating gender and climate change at the country level would address issues of equity and inclusion and support the development of bankable proposals for African countries to access global climate funds. There must be more than domestic financing to meet developing countries' climate adaptation and mitigation needs.

Therefore, accessing international finance for climate change is vital to African countries facing limited fiscal space and mounting unsustainable debt levels as they recover from the global recession induced by the COVID-19 pandemic

(World Bank, 2022). However, finance needs to be channeled through the national budget instead of a project approach. Inclusive budgeting at the national level can ensure that international and domestic finance address climate change adaptation/mitigation and gender inequality and strengthen coherence between gender and climate.

1.5 Key inputs to the development of the LCT & GE research agenda

1.5.1 Knowledge gaps and research needs to enable an LCT & GE transition

Mainstreaming gender and marginalized groups in climate policies. Though there are some gender dimensions incorporated in the NDCs in some countries, most of the gender aspects are built into adaptation issues with less mitigation. Furthermore, gender aspects are more focused on male-female issues with limited studies and knowledge on other socially excluded groups such as youth, children, and displaced people in society, especially in rural areas. Depending on the specific livelihood activities of each group, different elements of a LCT may have positive or negative effects on each group. Also, the youth excluded from the job market and knowledge of such an excluded group may influence various LCT transition outcomes that need improvement in SSA. Additionally, there needs to be more information on the implications of LCT for the future of work, especially those jobs that once were predominantly fed by carbon-intensive activities, and whether the transition is fair or just for women, youth, and other marginalized groups.

Lack of gender-disaggregated data for analysis. There is little data on gender inclusiveness in most policies in the region. The availability of gender-responsive monitoring, evaluation, and learning systems that provide sex-disaggregated data is crucial to tracking, monitoring, and evaluating gender and climate expenditure, as well as the effectiveness of adaptation responses for the most vulnerable groups to the impacts of climate change.

Connecting green economy and informal economy. The large informal sector needs more skilled personnel and knowledge of low-carbon technologies. Formal policy transmission is minimal and practically challenging to monitor and evaluate to ensure compliance for a smooth transition process to a low-carbon economy. Moreover, this large group — the informal sector — must learn about low-carbon and green economy issues to appreciate and align their activities to promote such (Smit et al., 2015).

Policy on carbon pricing and ETS. The review suggests

a need for more policy on carbon tax and emission trading systems in Sub-Saharan Africa (SSA) regarding policy instruments to promote LCT and GE transition. There is, however, a growing interest in the region in such policies and, therefore, a need for country-specific studies to establish the manpower and institutional arrangement required to design, implement, and monitor such policy instruments within each country's context. It needs to be clarified how to develop such carbon taxes for countries currently implementing different taxes and levies on petroleum products with revenue mobilization as the primary goal, which is the case for several SSA countries. Research is needed on how to design an effective carbon tax within a context of a large informal sector, and further, how to create it to be socially inclusive.

The substitution effect between fossil fuel and non-fossil fuel must be better understood. Even while there is information on the use of revenue from a tax placed on fuel or savings from changes made to fossil fuel subsidies to invest in renewable energy, there is no proof of such expenditures on the magnitude and potential regressive effects of such subsidies, and their changes, more information and empirical data are needed. Moreover, the political sensitivity surrounding their removal and the need for more understanding regarding the scope and breadth of such subsidies, particularly in Sub-Saharan Africa, may make this problem challenging to resolve.

Mobilization of domestic and international climate finance. Lessons from across Africa point to the following challenges in mobilizing domestic and international climate finance: (1) securing capital from funding sources, particularly in debt-distressed countries; (2) obtaining the necessary technical assistance funding for designing and structuring the work of green banks and national climate funds, and (3) overcoming the uncoordinated approach to forming green banks (AfDB, 2021). Research on better ways to tackle these challenges is needed.

Tracking of climate finance and measuring its impact on the ground. Climate finance instruments and mechanisms for the region are structured at the international level (i.e., OECD, DAC, Rio Markers, and MDBs⁶). They need to be designed to track how finance reaches local actors and consider how effective implementation is supported in the UNFCC biennial climate finance assessment report, making it difficult to track the actual effects of climate finance in the region (UNFCC, 2019). As a knowledge gap, there is a need to explore the practicality of tracking climate finance at the local level if transformative adaptation is to be attained, especially for women and other vulnerable groups, i.e., youth,

children, disabled and displaced people (IIED, 2020, CABRI, 2021).

Private sector involvement and low carbon transition. Furthermore, among the financing initiatives, very little is focused on domestic options that explore the potential partnership between the private sector and the public in funding projects that help promote an LCT and GE transition, such as low-carbon transport infrastructure, low-carbon energy systems such as a solar system for industries and households, climate-smart irrigation system in drought-prone countries in the region, among others. Key constraints and opportunities for an LCT & GE transition

In Africa, particularly SSA, a key constraint for LCT & GE transition is the growing population and increasing demand for personal vehicles by the growing middle class. In addition, the growing private vehicle fleet is predominantly dependent on fossil fuels, which, due to government subsidies on such fuels in some countries, makes it attractive to the consumer. Furthermore, electric vehicle penetration is slow due to the lack of reliable electricity supply in many SSA countries. This places a significant constraint on LCT & GE transition in SSA. Also, the existing economic and social structures in most of the countries in SSA are designed around a carbon-intensive system, which has the potential to lock into a carbon-intensive economic system. The infrastructure investments in these systems last between 10 to 15 years. They must be replaced after some time due to the size of the investments and the vast amount of resources required to replace them with a low-carbon system.

Another constraint to LCT and GE transition in SSA is a combination of low-skilled personnel on low carbon technologies and the large size of the informal sector, where formal policy transmission at best is minimal and practically challenging to monitor and evaluate to ensure compliance for a smooth transition process to a low-carbon economy. Furthermore, some of the operators in the informal sector need more knowledge of low-carbon and green economy issues to appreciate them and align their activities to promote such.

A key constraint to SSA's transition to a low-carbon economy is adequate funds to finance projects enabling the transition process. Most of the countries in SSA need more fiscal space to fund an LCT & GE transition in addition to supporting the existing government budget. In addition, there is minimal capacity for additional internally generated funds for most of these countries and a poor institutional framework that discourages public-private partnerships as a funding option for such low-carbon transition processes in

SSA.

Despite the critical constraints provided above, there are several opportunities for SSA countries to adopt and promote an LCT and GE transition. Some possibilities include the potential to generate all the continent's electricity from green sources, such as leveraging the geothermal potential from the rift valley and the enormous solar potential in the region. These could create additional jobs and accommodate the displaced jobs from the fossil fuel sector. Furthermore, this can boost the continent's industrialization drive under strong sustainability principles led by access to affordable and clean electricity, achieving sustainable development goal 7 (SDG 7).

Moreover, a transition to a low-carbon economy, among other things, requires investment in energy efficiency, a low-carbon transportation system, and efficient waste management practices, which, if well planned and executed, will generate additional green jobs in SSA economies. In addition, if such jobs are well targeted, it could reduce the already high youth unemployment problem in most of SSA.

Beyond the employment opportunities of a low carbon transition for SSA, there are also the health benefits driven by improved air quality from less polluted cities and towns, less polluting energy sources for cooking and lighting, and the health benefits of increasing cycling infrastructure in urban areas. Again, these benefits from air quality are the highest for marginalized groups.

Another opportunity associated with LCT and GE transition is the potential to promote social justice through improving accessibility to low-carbon transportation, which will benefit the urban poor the most since it is the group that typically spends more time commuting. Additionally, a key aspect of inclusion should focus on procedural, distributive, and recognition forms of justice, to ensure that those likely to be left behind by LCT planning have their voices heard and have access to opportunities. LCT must target their needs and recognize them as a critical group that can contribute and also be supported by the LCT development pathways.

1.6 Conclusion & Recommendation

1.6.1 Summary

The results from this report are based on desk reviews of available information and complemented by selected interviews with government staff and other stakeholders, focusing more on the eight selected countries in the Sub-Saharan region, namely, South Africa, Nigeria, Ghana, Kenya, Tanzania, Ethiopia, Uganda, and Rwanda. The review aims to identify knowledge gaps and research needs by conducting regional studies of priorities, challenges, and

opportunities related to Low-Carbon Transition and Gender Equity (LCT & GE) reforms.

Africa's contribution to global greenhouse gas (GHG) emissions per capita is currently low compared to other regions. However, the continent must join the global effort of charting a downward carbon growth path for the world economy since it is the region most affected by climate change. Natural disasters linked to climate change have occurred more frequently and at a higher rate in Africa over the last four decades than in other regions. For example, from 2010 to 2019, the region experienced more than a third of the world's droughts. Reports suggest that a 3°C global warming will cost Africa up to 19% of its GDP per year due to the region's vulnerability and reliance on climate-sensitive sectors.

Despite ambitious targets and well-developed Nationally Determined Contributions (NDCs) with excellent strategies and action plans, achieving the targets is hampered by several factors, including a lack of political will, insufficient infrastructure and systems for enforcing climate action, a lack of capacity to enforce laws and appropriate instruments, a lack of appropriate technology to help reduce emissions from economic activities, a lack of climate funds, and a lack of gender mainstreaming in climate policies. These factors pose significant implementation barriers for the NDCs in the region. Further, the main impediment to the region's low-carbon transformation is a lack of actionable policies and economic instruments to drive the changes in meeting the Paris Agreement goals.

Africa needs US\$3 trillion to implement its adaptation plans by 2030; even doubling the US\$100 billion per year will be insufficient. The case study countries in this report have prioritized integrating climate change policy responses and actions into their national and sectoral planning and management processes, even though developed countries still need to provide significant help in climate finance. By integrating cross-sector policy, they have connected climate change activities to fundamental planning procedures. However, the region's most significant barriers to achieving a low-carbon transition are poor governance, mitigation, adaptation, measuring, reporting, and verification (MRV) and finance. Furthermore, all the study countries face barriers to technology transfer, capacity building, and policy development and need support.

In economic and climate-related policies, African countries use various policy tools that directly or indirectly influence economic growth, including the transition to low-carbon growth paths. Although some instruments are implemented

mainly for revenue generation, they have a bearing on efficiently utilizing the underlying resources that would generate emission reduction gains and put the economy on a low-carbon growth path. Some essential policy tools include a carbon tax, fuel tax and subsidies, regulatory standards, REDD+, and Payment for Ecosystems Service (PES) schemes.

Despite the economic appeal of carbon taxation, it is less used in Africa due to inadequate information, vested interests, and lack of political buy-in. So far, only South Africa has implemented a carbon tax policy. Other countries, such as Senegal and Côte d'Ivoire, have done preliminary studies on how to price carbon, and Nigeria has shown interest in considering it in the future. Aside from the carbon tax, many other African nations have introduced sector-specific carbon pricing through tariffs on fossil fuels or taxes on inefficient energy technology, mainly to raise revenue.

Gender issues were taken into account in various climate actions and priorities. Gender inclusion issues, in particular, are considered more frequently in adaptation than in mitigation. Furthermore, there is a significant consideration for mainstreaming gender equity into policy and decision-making and identifying women as change agents. Policymakers know the importance of including youth in the region's climate change policies and action plans. More gender and youth mainstreaming are required in all LCT policy designs, strategies, and regional implementation.

The cost of climate change financing is a significant impediment to effective NDC implementation. Critical sources of climate finance for the region are generally from three key sources: multilateral climate funds, bilateral development assistance institutions, and regional or national funds. It is estimated that between US\$1.3 and US\$1.6 trillion will be needed for 2020-2030, with mitigation accounting for most of the cost, followed by adaptation and the rest. This equates to approximately US\$127.8 billion per year on average. For 2020-2030, the adaptation cost component of the expected cost of climate change ranges from US\$6-US\$19 billion in Central Africa to US\$91-US\$143 billion in East Africa. At the current international-to-domestic commitment ratio in 2020 (64% to 36%), the adaptation financing gap in Africa from international sources range from US\$166 billion to US\$260 billion for the period 2020-2030, a significant gap that African countries cannot bridge in addition to their domestic responsibility.

COVID-19 is expected to significantly impact climate spending in Africa in the short term. Empirical evidence on the effects of COVID-19 is scanty in Africa, another form of inequality in the global system. The focus on economic

recovery and health threatens to divert political attention from climate change. Due to competing priorities and mobility constraints, financial resources are being diverted from climate action and toward the COVID-19 response.

1.6.2 Recommendations

Climate change mitigation and adaptation should focus on the following key sectors in the region: agriculture, forestry, water, human health, infrastructure, and energy. The adverse effects of climate change, i.e., poor food yields, lower agricultural and labor productivity, and harm to human health, require bold actions and massive investments across these vital economic sectors. In addition, there is an urgent need to create conditions for a transition away from coal and toward scaling up renewables in the energy mix, investing in shared, low-carbon transportation in cities, boosting sustainable food and land-use systems, investing in resilient water infrastructure and reducing emissions from critical industrial value chains.

Africa has the world's most significant youth population, with a median age of 19.7. A large young population typically indicates a large and active workforce, which would benefit any region's development prospects. However, the continent's poor employment continues to suffocate young people's potential. Africa must reinvigorate structure transformation guided by dedicated policy action to realize this potential. Like women, youth's mainstreaming in national and sectoral planning and implementation is commended.

Gender-responsive climate budgeting (GRB) reforms must incorporate methods and practices across the budget cycle to ensure that gender and climate change are considered, also called 'double-mainstreaming.' The research priority would be to identify practical approaches to bridge the gap. International support for strengthening inclusive gender and climate-responsive PFM systems can also help bridge the gap between international and national initiatives. Further, GRB will assist countries in accessing international climate finance, which remains vital to meeting the adaptation financing needs of developing countries.

Addressing inequalities is essential for building resilience and addressing climate and environmental challenges. By involving the marginalized groups, i.e., women, youth, and displaced people, and drawing on their gender-based experiences in the formal and informal workforce, climate responses can be more effective and sustainable in communities and households. For instance, women and youth's full participation and contribution to decision-making and leadership in climate resilience and low-carbon development planning, as well as the preparation and

implementation of gender-focused initiatives and programs, would address the inequities.

Despite these challenges caused by COVID-19, the misfortune should not change the urgency of addressing Africa's environmental issues. Africa can still accelerate decision points that could have substantial impacts through its national or sectoral master plans, climate change adaptation plans, and the NDCs. As countries transition from virus containment to economic recovery, decisions that will shape trajectories on emissions, resilience, and biodiversity must be taken for years to come. A sustainable and resilient recovery in Africa will create jobs in future industries while addressing interconnected public health concerns, prosperity, and climate change.

Recommendations are given to provide win-win solutions to lowering GHG emissions. These may include i) generating on-grid electricity from renewable sources (avoiding coal power lock-in); ii) preventing lock-in to high-carbon development trajectories by adopting higher density multi-use urban plans, such as mass transportation systems; iii) promoting equitable economic growth by integrating rural land-use planning and through the creation of green entrepreneurship for women and youth through sectors that promote environmental opportunities, i.e., agriculture, food production, construction, tourism, transport, renewable energy, and recycling. This could be aided through entrepreneurship training, which includes developing company plans and access to technology and information or building on and greening existing businesses and plans.

It takes innovative thinking, multidisciplinary research, and different frameworks and methodologies to study changes in development paths. Therefore, Africa needs to invest more in studies that detail changes in developmental pathways and the circumstances that lead to such changes (based on historical data or models). The research will advance knowledge and innovation but will also aid in identifying transformational routes and inform public discourse and political decision-making on relevant issues.

Africa has abundant renewable energy resources, but renewables account for only 7% of the total primary energy supply, 8% of total final energy consumption, and 26% of power generation in the region as of 2018. To leverage this natural endowment, the expansion of renewable energy can be achieved if barriers, i.e., access to financial markets, infrastructure, and capacity-building, are improved for the region.

All the study countries signed the same Paris Agreement

and the subsequent ratification. Therefore, it is only for the governments to implement similar activities within any action areas of NDCs to ease tracking accountability and transparency. For ease of tracking, monitoring, and evaluation, it will be wise to intervene with comparable NDCs' Implementation of climate action areas, particularly in cases where they are recipients of international climate money.

References

- ActionAid 2020. Progressive taxation policy brief: Carbon taxes. Johannesburg: ActionAid International Secretariat. <https://actionaid.org/sites/default/files/publications/Carbon%20taxes.pdf>
- Africa Development Bank 2023. Climate Change, Abidjan, Côte d'Ivoire: African Development Bank, <https://www.afdb.org/en/topics-and-sectors/sectors/climate-change>
- African Development Bank. 2022. African Economic Outlook 2022. Abidjan, Côte d'Ivoire: African Development Bank
- African Development Bank. 2021. Potential for Green Banks & National Climate Change Funds in Africa: Scoping Report. Abidjan, Côte d'Ivoire: African Development Bank.
- African Union 2018. African Union Strategy on Gender Equality and Women's Empowerment 2018–2028'. Addis Ababa: African Union. https://au.int/sites/default/files/documents/36817-doc-52569_au_report_eng_print.pdf
- Africa Union. 2021. Africa Union Green Recovery Action Plan 2021-2027. Addis Ababa: African Union. <https://au.int/en/pressreleases/20220303/african-countries-adopt-common-african-position-integrate-gender-equality>.
- Attah, A. 2021. Initial Assessment of the Impact of COVID-19 on Sustainable Forest Management in Africa. United Nations Forum on Forests. <https://www.un.org/esa/forests/wp-content/uploads/2021/01/Covid-19-SFM-impact-Africa.pdf>
- Bennett, V. 2021. MDBs' Climate Finance Rose to US\$ 66 Billion in 2020, Joint Report Shows. Press release, European Bank for Reconstruction and Development, <https://www.ebrd.com/news/2021/mdbs-climate-finance-rose-to-us-66-billion-in-2020-joint-report-shows.html>.
- BloombergNEF. 2021. Sustainable Debt Issuance Breezed Past \$1.6 Trillion in 2021. <https://about.bnef.com/blog/sustainable-debt-issuance-breezed-past-1-6-trillion-in-2021/>
- Bowen, A., and Fankhauser, S. 2009. Low-Carbon Development for the Least Developed Countries, LSE Working Paper Boserup, E. 1970. W
- CABRI, 2021. The integration of climate change into budgeting and finance. CABRI Policy Brief. <https://www.cabri-sbo.org/en/publications/policy-brief-2021-the-integration-of-climate-change-into-budgeting-and-finance>
- Carbon Brief. 2018. The Carbon Brief Profile: South Africa. <https://www.carbonbrief.org/the-carbon-brief-profile-south-africa>
- CDP (Center for Disaster Philanthropy) 2019. Tropical Cyclone Idai, <https://disasterphilanthropy.org/disasters/tropical-cyclone-idai/>
- Claire Lepault and Franck Lecocq. 2021. Mapping forward-looking mitigation studies at country level Environ. Res. Lett. 16 083001 DOI 10.1088/1748-9326/ac0ac8
- Clancy, J.S. 2017. Gender matters in energy access. J S Clancy, Professor of Energy and Gender/ Principal Investigator ENERGIA Gender and Energy Research Programme, CSTM, University of Twente, PO Box 217, 7500 AE Enschede, The Netherlands.
- Coady, D., Parry, I.W.H. and Shang, B. 2018. Energy Price Reform: Lessons for Policymakers, Review of Environmental Economics and Policy, 12(2), 197–219. <https://doi.org/10.1093/reep/rey004>
- CPI (Climate Policy Initiative) (2021). Global Landscape of Climate Finance 2021. <https://www.climatepolicyinitiative.org/wp-content/uploads/2021/10/Full-report-Global-Landscape-of->

[Climate-Finance-2021.pdf](#).

- CRED (Centre for Research on Epidemiology of Disasters) 2019. “Disasters in Africa 20 Year Review: 2000- 2019.” CRED, Brussels, Belgium, <https://reliefweb.int/sites/reliefweb.int/files/resources/CredCrunch56.pdf>.
- Crippa M, Oreggioni G, Guizzardi D, Muntean M, Schaaf E, Lo Vullo E, Solazzo E, Monforti-Ferrario F, Olivier J G J and Vignati E. 2019. Fossil CO2 and GHG Emissions of All World Countries—2019 Report (Luxembourg)
- Danquah, M. and Schotte, S. 2020. COVID-19 and the socio-economic impact in Africa: The case of Ghana. WIDER Background Note 2020/5. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNUWIDER/WBN/2020-5>
- Danquah, M., Schotte, S., and Sen, K. 2020. COVID-19 and employment: Insights from the Sub-Saharan African experience. Indian Journal of Labour Economics (64), 23-30.
- DEFF 2020. National Climate Change Adaptation Strategy. Tshwane. https://www.environment.gov.za/sites/default/files/docs/nationalclimatechange_adaptationstrategy_10november2019.pdf.
- EIB (European Investment Bank) 2021. Finance in Africa: For Green, Smart and Inclusive Private Sector Development. Luxembourg: European Investment Bank.
- ESI Africa 2020. The big question: The future skyline of energy generation in cities, 11 May 2020, <https://www.esi-africa.com/industry-sectors/future-energy/the-big-question-the-future-skyline-of-energy-generation-in-cities>.
- Eskom 2021. Load shedding will be suspended from 23:00 tonight as Eskom generation capacity improves, <https://www.eskom.co.za/loadshedding-will-be-suspended-from-2300-tonight-as-eskom-generation-capacity-improves/>
- ESMAP. 2011. ESMAP Annual Report. Washington: Energy Sector Management Assistance Program <https://esmap.org/node/1383>
- Food and Agriculture Organization of the United Nations (FAO). 2020. Global Forest Resources Assessment (database), <https://fra-data.fao.org/>, (accessed 01 Aug. 2022).
- FAO. 2021. Low-Income Food-Deficit Countries (LIFDCs) – List updated. June. [Online] [Accessed on 31 March 2022]. <https://www.fao.org/countryprofiles/lifdc/en>
- Federal Democratic Republic of Ethiopia. 2012. Forest Carbon Partnership Facility, Readiness Preparation Proposal. Addis Ababa.
- FSD Kenya and South Pole. 2021. Green Finance Ecosystem in Kenya. Race to Zero. UNFCC <https://racetozero.unfccc.int/africa-green-finance-coalition-seizing-the-opportunity-that-green-investment-provides/>
- Glasgow Climate pact (GCP) 2021. UN Climate change conference UK 2021 <https://ukcop26.org/wp-content/uploads/2021/11/COP26-Presidency-Outcomes-The-Climate-Pact.pdf>
- GEF (Global Environmental Facility). 2017. The enabling environment for transformation http://www.thegef.org/sites/default/files/documents/2022-04/GEF_R.08_14_GEF-8_Policy_Directions.pdf
- GGA (Good Governance Report) 2021. The governance report <https://www.gga.org>
- GGCCA (Global Gender & Climate Alliance) (2011). Gender and Climate Change Capacity development series – Africa, UNDP.
- GGGR (Global Gender Gap Report) 2021. Insight Report 2021 https://www3.weforum.org/docs/WEF_GGGR_2021.pdf.
- Global Land Analysis and Discovery 2022. GLAD Forest Alerts, <https://glad.umd.edu/dataset/glad-forest-alerts>, (accessed 01 April 2022).

- GOGLA (Global Off-Grid Lighting Association) 2021. Global Off-Grid Solar Market Report, Semi-Annual Sales and Impact Data, https://www.gogla.org/sites/default/files/resource_docs/gogla_sales-and-impact-reporth2-2021_def2.pdf. (accessed 01 July 2022).
- Hill, M. and Mitimngi, T.C. 2019. Zambia Faces an Electricity Crisis from Global Warming, <https://www.bloomberg.com/graphics/2019-new-economy-drivers-and-disrupters/zambia.html#xj4y7vzkg> (subscription only)
- Huyer, S. 2016. Gender Equality in National Climate Action: Planning for Gender- Responsive Nationally Determined Contributions. [online] UNDP. <https://www.undp.org/content/undp/en/home/librarypage/womens-empowerment/gender-equality-in-national-climate-action--planning-for-gender-.html> [Accessed 2 Oct. 2022].
- ICAP 2020. Emissions Trading Worldwide: Status Report 2020. Berlin: International Carbon Action Partnership. <https://icapcarbonaction.com/en/icap-status-report-2020>
- IDS 2021. Lessons learned from carbon pricing in developing countries 2021. Help desk report. https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/15336/799_Lessons_learned_from_carbon_pricing_in_developing_countries.pdf?sequence=1&isAllowed=y
- IEA 2020. World Energy Outlook 2020 (Paris), <https://www.iea.org/reports/world-energy-outlook-2020>, p. 288.
- IEA 2022. Africa Energy Outlook 2022: World Energy Outlook Special Report.
- IEA 2022. Access to Electricity (database), <https://www.iea.org/fuels-and-technologies/electricity>, (accessed 01 August 2022).
- IEA 2022. Access to Electricity (database), <https://www.iea.org/fuels-and-technologies/electricity>, (accessed 01 July 2022).
- IEA 2022b. Renewable Energy Market Update, <https://iea.blob.core.windows.net/assets/d6a7300d-7919-4136-b73a-3541c33f8bd7/RenewableEnergyMarketUpdate2022.pdf>
- IEA (International Energy Agency) 2021. World Energy Investment 2021, <https://www.iea.org/reports/world-energy-investment-2021>
- IEA 2020. CO2 Emissions from Fossil Fuel Combustion (Paris) (available at: <https://webstore.iea.org/co2-emissions-from-fuel-combustion-2019-highlights>)
- ILO 2018a. Labour Issues in Urban and Peri-Urban Agriculture: Information and Resource Guide. International Labour Organization, Geneva, Switzerland.
- ILO 2018b. Promoting Green Jobs for Youth through National Employment Policies and Programmes. https://www.ilo.org/global/topics/youth-employment/publications/WCMS_732596/lang--en/index.htm
- ILO 2019a. Empowering Women at Work Company Policies and Practices for Gender Equality. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_756721.pdf
- ILO 2019b. Skills for a greener future: A global view based on 32 country studies. International Labor Office Geneva. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_732214.pdf
- ILO 2020a. ILO Monitor: COVID-19 and the World of Work. http://www.ilo.org/global/topics/coronavirus/impacts-and-responses/WCMS_755910/lang--en/index.htm
- ILO 2020b. World Employment and Social Outlook: Trends 2021. https://www.ilo.org/global/research/global-reports/weso/2021/WCMS_795453/lang--en/index.htm
- IMF 2020c. Greening the Recovery. Special Series on Fiscal Policies to Respond to COVID-19. <https://www.imf.org/en/Publications/SPROLLS/covid19-special-notes>

- IMF 2021a. Global Economic Prospects. Sub-Saharan Africa. June 2021. Washington, DC: IMF.
- IMF 2021b. Fiscal Monitor: A Fair Shot. April. Washington, DC: International Monetary Fund.
- IMF (International Monetary Fund) 2020. Fiscal Monitor: Policies for the Recovery. Washington, DC: International Monetary Fund.
- Integral Consult. 2021. Needs of African Countries Related to Implementing the UN Framework Convention on Climate Change and the Paris Agreement. January 2021. https://unfccc.int/sites/default/files/resource/Needs%20Report_African%20countries_AfDB_FINAL.pdf
- IPCC (Intergovernmental Panel on Climate Change) 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK, and New York: Cambridge University Press.
- IPCC (Intergovernmental Panel on Climate Change) 2022. Mitigation of climate change https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf
- IPCC, (2021) Climate change 2021. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf
- IPCC 2019. Special Report on the Ocean and the Cryosphere in a Changing Climate,”<https://www.ipcc.ch/srocc/>
- IRENA (International Renewable Energy Agency) 2020. Global Renewables Outlook: Energy Transformation 2050 (Abu Dhabi: 2020). https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Apr/IRENA_Global_Renewables_Outlook_2020.pdf
- IRENA 2013. Renewable Energy and Job. <https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2013/rejobs.pdf>
- IRENA. 2020. Renewable Power Generation Costs in 2019. <https://www.irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019>
- Jack, B., Kousky, C., & Sims, K. 2008. Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms. Proceedings of the National Academy of Sciences, 105(28), 9465-9470.
- Jackson R, Friedlingstein P, Andrew R M, Canadell J G, Le Quéré C and Peters G P 2019. Persistent fossil fuel growth threatens the Paris Agreement and planetary health Environ. Res. Lett. 14 121001
- KAS (Konrad Adenauer Stiftung) 2020. Carbon Pricing in Sub-Saharan Africa. <https://www.kas.de/documents/282730/282779/Carbone+Pricing+in+sub-Saharan+Africa+anglais.pdf/afbff20e-0b1a-61e8-24d6-38ae056c0c81?t=1594785554783>
- Kelsey, J. B., Kousky, C. and Sims, K. R. 2008. Designing payments for ecosystem services: lessons from previous experience with incentive-based mechanisms. Proceedings of the National Academy of Sciences, 105(28): 9465–9470. doi: 10.1073/pnas.0705503104 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]
- [Kings, S. 2020. Flooding cuts power in Uganda, https://mg.co.za/africa/2020-05-06-flooding-cuts-power-in-uganda](https://mg.co.za/africa/2020-05-06-flooding-cuts-power-in-uganda)
- Masood, E. and Tollefson, J. 2021. ‘COP26 Hasn’t Solved the Problem’: Scientists React to UN Climate Deal. Nature 599: 355–356. <https://www.nature.com/articles/d41586-021-03431-4>
- [Mushota, R. 2019. Loadshedding now for 20 hours, https://www.zambiatwatchdog.com/loadshedding-now-for-20-hours/](https://www.zambiatwatchdog.com/loadshedding-now-for-20-hours/)
- [Mwenda, M. 2019. The drought in Zambia is causing starvation, a power crisis and threatening the Victoria Falls, https://www.lifegate.com/drought-in-zambia-starvation-kariba-victoria-falls](https://www.lifegate.com/drought-in-zambia-starvation-kariba-victoria-falls)
- Natalini, D., Bravo, G., and Newman, E. 2020. Fuel riots: Definition, evidence and policy

- implications for a new type of energy-related conflict. *Energy Policy*, 147, 111885.
- ODI (Overseas Development Institute) 2015. Low-Carbon development in sub-Saharan Africa, 20 cross-sector transitions. <https://odi.org/en/publications/low-carbon-development-in-sub-saharan-africa-20-cross-sector-transitions/>
- OECD (Organisation for Economic Co-operation and Development). 2021. Climate Finance Provided and Mobilised by Developed Countries Aggregate Trends Up-dated with 2019 data. Climate Finance and the USD 100 Billion Goal. Paris: OECD Publishing.
- OECD, 2019 <https://data.oecd.org/>. Paris: OECD
- OECD.Stat 2014. Aid projects targeting gender equality and women's empowerment (CRS), https://stats.oecd.org/Index.aspx?DataSetCode=DV_DCD_GENDER (accessed on 20 April 2022).
- OECD.Stat (n.d.), Aid projects targeting gender equality and women's empowerment (CRS), https://stats.oecd.org/Index.aspx?DataSetCode=DV_DCD_GENDER (accessed on 15 April 2022).
- PanAfrican Climate Justice Alliance (PACJA). MDC Implementation 2020. <https://www.pacja.org/docs/publications/NDC%20Implementation%20Report%20-final.pdf>
- Peters G P, Andrew R M, Canadell J G, Friedlingstein P, Jackson R B, Korsbakken J I, Le Quéré C and Peregón A. 2020. Carbon dioxide emissions continue to grow amidst slowly emerging climate policies *Nat. Clim. Change* 10 2–10
- Price, R.A. 2020. Lessons learned from carbon pricing in developing countries. K4D Helpdesk Report 799. Brighton, UK: Institute of Development Studies.
- Rewald, R. 2017. Energy and Women and Girls: Analyzing the Needs, Uses, and Impacts of Energy on Women and Girls in the Developing World. Oxfam Research Backgrounder series, <https://www.oxfamamerica.org/explore/research-publications/energy-women-girls/>
- SEforAll 2017. Opening Doors: Mapping the Landscape for Sustainable Energy, Gender Diversity & Social Inclusion. Vienna, Austria: Sustainable Energy for All.
- Soanes, L. M., Pike, S., Armstrong, S., Creque, K., Norris-Gumbs, R., Zaluski, S., & Medcalf, K. 2021. Reducing the vulnerability of coastal communities in the Caribbean through sustainable mangrove management. *Ocean & Coastal Management*, 210, 105702.
- Soumaré, I., Kanga, D., Tyson, J., and Raga, S. 2021. Capital Market Development in Sub-Saharan Africa: Progress, Challenges and Innovations. ODI Research Series for Financial Development in Africa Working Paper 2, London: Overseas Development Institute.
- Statista 2021. <https://www.statista.com/statistics/1220485/gender-gap-index-in-sub-saharan-africa-by-country/>
- Terry, G. 2009. 'No climate justice without gender justice: an overview of the issues.' *Gender & Development*, (17) 1, 5-18.
- UK (United Kingdom) Government 2021. Glasgow Leaders' Declaration on Forests and Land Use, UN Climate Change Conference 2021, <https://ukcop26.org/glasgow-leaders-declaration-on-forests-and-land-use/>
- UN 2020. Gender, Climate & Security: Sustaining inclusive peace on the frontlines of climate change 2020, United Nations Environment Programme, UN Women, UNDP and UNDP/PA/PSO.
- UN Women 2002.. Supporting gender mainstreaming: The work of the Office of the Special Adviser on Gender Issues and Advancement of Women. <https://www.un.org/womenwatch/osagi/pdf/report.pdf>
- UN Women 2011. Climate Change, a Further Challenge for Gender Equity: How men and women

- farmers are differently affected <http://www.fao.org/newsroom/en/news/2008/1000809/index.html>
- UN Women 2016. Leveraging Co-Benefits between Gender Equality and Climate Action for Sustainable Development: Mainstreaming Gender Considerations in Climate Change Projects.
- UN Women 2017. Brief. Gender, energy and policy. A Review of Energy Policies in East and Southern Africa. <https://africa.unwomen.org/en/digital-library/publications/2017-b/11/a--review-of-energy-policies-in-east-and-southern-africa#view>
- UN Women 2018. Accelerating SDG 7 achievement, Energy and Gender: Policy Brief 12
- UN-WIDER, 2020. <https://www.wider.unu.edu>. Helsinki: UNU-WIDER
- UNDP 2017. Gender Equality in National Climate Action: Planning for Gender-Responsive Nationally Determined Contributions, <https://www.undp.org/publications/gender-equality-national-climate-action-planning-gender-responsive-nationally-determined-contributions>
- UNDP 2021. ‘Joint Submission by the United Nations Development Programme (UNDP) and the Food and Agriculture Organization of the United Nations (FAO) to the United Nations Framework Convention on Climate Change (UNFCCC) in relation to the “Call for submissions on how to mainstream gender considerations into national adaptation planning and implementation” of the Adaptation Committee’, <https://www4.unfccc.int/sites/SubmissionsStaging/Documents/>
- UNDP (United Nations Development Programme) 2013. Green Jobs for Women and Youth: What Can Local Governments Do? New York: United Nations Development Programme, <https://www.undp.org/publications/green-jobs-women-and-youth-what-can-local-governments-do>
- UNEP 2017. The Emissions Gap Report 2017 (Nairobi: United Nations Environment Program) (available at: www.unep.org/pdf/2012gapreport.pdf) UNEP, 2021 P. 22
- UNFCCC (United Nations Framework Convention on Climate Change) 2019. Biennial climate finance report by the UNFCCC Standing Committee on Finance.
- UNFCCC 2016. Leveraging Co-Benefits between Gender Equality and Climate Action for Sustainable Development, https://unfccc.int/files/gender_and_climate_change/application/pdf/leveraging_cobenefits.pdf
- UNFCCC (United Nations Framework Convention on Climate Change). 2016. Guidelines or other tools for integrating gender considerations into climate change related activities under the Convention Technical paper. Bonn, Germany: UNFCCC Publishing. <https://unfccc.int/resource/docs/2016/tp/02.pdf>
- UNFCCC (United Nations Framework Convention on Climate Change). 2016. Guidelines or other tools for integrating gender considerations into climate change related activities under the Convention Technical paper. Bonn, Germany: UNFCCC Publishing. <https://unfccc.int/resource/docs/2016/tp/02.pdf>
- UNFCCC n.d. “Decision -/CP.26, Glasgow Climate Pact.” Advance unedited version. https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf.
- Vogt-Schilb, A., Walsh, B., Feng, K., Di Capua, L., Liu, Y., Zuluaga, D., ... and Hubacek, K. (2019). Cash transfers for pro-poor carbon taxes in Latin America and the Caribbean. *Nature Sustainability*, 2(10), 941-948. <https://www.nature.com/articles/s41893-019-0385-0>
- Watson, C. and Schalatek, L. 2022. The Global Climate Finance Architecture. Climate Finance Fundamental Climate Funds Update, Overseas Development Institute and Heinrich Böll Stiftung, London and Washington, DC. https://climatefundsupdate.org/wp-content/uploads/2022/03/CF2-Global-CF-Architecture_ENG-2021.pdf.
- Were, M. 2020. COVID-19 and the socio-economic impact in Africa: The case of Kenya. WIDER Background Note 2020/3. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNUWIDER/>

[WBN/2020-3](#)

- Winkler, H. and Marquard, A. 2019. South Africa's new carbon tax could help poor people pay less for energy. World Economic Forum. <https://www.weforum.org/agenda/2019/06/carbon-tax-revenues-could-be-harnessed-to-help-south-Africa-s-poor/>
- World Bank 2019. Using Carbon Revenues. Partnership for Market Readiness. Technical Note No. 16. Washington, DC: World Bank. <http://hdl.handle.net/10986/32247>
- World Bank 2020. Africa Pulse Report: An analysis of issues shaping Africa's economic future — October volume 2021/volume 24 World Resources Institute. 2020. "This Interactive Chart Shows Changes in the World's Top 10 Emitters. Washington, DC: World Bank <https://www.wri.org/insights/interactive-chart-shows-changes-worlds-top-10-emitters>
- World Bank 2021. Gender and Carbon Pricing. Washington, DC: World Bank <https://www.thepmr.org/system/files/documents/Gender%20and%20carbon%20pricing%20discussion%20paper.pdf>
- World Bank 2021a. Who Benefits from Public Spending? Gender Responsive Budget Policies Support Inclusive Societies. Washington, DC: World Bank <https://blogs.worldbank.org/governance/who-benefits-public-spending-gender-responsive-budget-policies-support-inclusive>
- World Bank 2021c. What you need to know about green loans. Feature story, Washington, DC: World Bank <https://www.worldbank.org/en/news/feature/2021/10/04/what-you-need-to-know-about-green-loans>
- World Bank 2022. Pandemic, prices, and poverty. Washington, DC: World Bank <https://blogs.worldbank.org/opendata/pandemic-prices-and-poverty> (accessed 01 May 2022).
- World Bank 2022b. Poverty and Inequality Platform. Washington, DC: World Bank. <https://data.worldbank.org/indicator/SI.DST.10TH.10>, (accessed 01 May 2022).
- World Bank Group 2019. State and Trends of Carbon Pricing 2019. Washington, DC: World Bank. <http://hdl.handle.net/10986/31755>
- World Economic Forum statistics, 2021. <https://www.weforum.org/reports/the-global-risks-report-2021/>
- WOW (Work and Opportunities for Women) 2021. Helpdesk Query 58: Green growth opportunities for women and youth in urban areas of Mozambique