EXPLORING OPERATIONAL PATHWAYS FOR ARTICLE 2.1(C) OF THE PARIS AGREEMENT IN AFRICA

The Case of Financing Climate Resilient Infrastructure

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Aligning Financial Flows

SOUTH SOUTH NORTH
TOWARDS CLIMATE RESILIENCE

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AUTHOR INFORMATION

This Pathway Paper, authored by Simbisai Zhanje, Consultant, in partnership with Samson Mbewe, Technical Programme Manager & Lead Researcher; and Aimee Tredoux, Research Assistant, affiliated with SouthSouthNorth (SSN), serves as a dynamic working document contributing to the developing evidence base for operationalising Article 2.1(c) of the Paris Agreement in infrastructure financing in Africa. The insights contained herein are open to further investigation and refinement as the research community collectively navigates the complexities of this evolving landscape Embracing an open and collaborative approach, this paper reflects a current understanding of research in the field and welcomesconstructive engagement from policymakers, researchers, and practitioners alike.

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Intended Audience

This working paper is crafted to stimulate discourse and welcomes constructive engagement from policymakers, researchers, and practitioners navigating the complexities of the evolving landscape of Article 2.1(c) of the Paris Agreement in Africa

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Content

EXECUTIVE SUMMARY

Article 2.1(c) of the Paris Agreement holds immense potential to transform the financial sector, particularly in bolstering support for developed countries to invest in climate-resilient and low-emission development pathways. Aligned with the 2030 Agenda on Sustainable Development and calls for international finance reform, realising the objectives of Article 2.1(c) stands to reshape global investment priorities towards emissions reduction, climate resilience, and development.

This transformation is relevant to Africa, where substantial investment is urgently needed across pivotal sectors including water, energy and transportation. Infrastructure stands as a lynchpin for the continent's long-term development goals, as articulated in Agenda 2063. Currently, the continent faces pressing challenges across various development indicators, including poverty reduction, access to modern energy services, and water and sanitation facilities. Barriers to meeting these targets include governance challenges, limited innovative financial instruments and limited access to finance.

Historically, the majority of infrastructure financing in Africa has been borne by national governments with limited contributions from the private sector and international capital. The African Development Bank (AfDB) estimates an annual continental investment requirement of USD 130 - 170 billion annually to invest in infrastructure alone. The current financing gap is estimated to be between USD 68 and 108 billion per year, with the most significant shortfall in the water sector. However, governments do not have sufficient resources to meet this financing gap and require additional support. Financing hurdles, such as risk perceptions of investors, inadequate creditworthiness of African utilities, and limited access to concessional finance, hamper infrastructure development, elevating capital costs and hindering essential investments.

In the face of the escalating impacts of a changing climate, decisions made today pertaining to infrastructure design, location, and operation carry serious implications for future climate resilience. However, insufficient attention has been placed on climate resilience across both large and small-scale infrastructure, amplifying negative social, environmental, and economic consequences as countries face increasing climate risks. Extreme weather events exacerbate infrastructure vulnerabilities and impact service provision. Addressing this requires a comprehensive review of infrastructure plans, projected country and regional-level climate impacts, adaptation strategies, and resource availability.

The global discourse surrounding Article 2.1(c) has predominantly centred on aligning financial flows with low-emission pathways. Yet, there has been limited exploration of how these flows can support a climate-resilient development pathway. This gap was underscored in the Conference of the Parties (COP) 27 Presidency recommendations arising from the Sharm-El Sheikh dialogues on Article 2.1(c), presented to the COP28. These recommendations urged Parties and Non-Party stakeholders to intensify their efforts in advancing methodologies for aligning financial flows with climate-resilient development pathways while also emphasising the necessity to scale up finance for developing countries, which are disproportionately vulnerable to the impacts of climate change.

These countries, particularly those in Africa, will need to prioritise financial investments in climate-resilient infrastructure, integrating resilience considerations into the planning and project preparation phases of projects. To date, limited finance has flowed towards climate-resilient infrastructure, with a substantial gap between finance directed towards standard and climate-resilient infrastructure. It is estimated that for every USD 1 spent on climate-resilient infrastructure, USD 87 was spent on non-resilient infrastructure globally. Thus, overcoming barriers preventing both financiers and countries from transitioning their investments, particularly to resilience, is paramount. Comprehensive climate risk assessments, robust feasibility studies, and inclusive stakeholder engagement are indispensable for designing socially inclusive, climate-resilient infrastructure projects.

This paper delineates a roadmap towards operationalising Article 2.1(c) of the Paris Agreement across Africa's infrastructure development landscape. It acknowledges the necessity of capacity building for financiers, policymakers, and infrastructure stakeholders to support the transition towards climate resilience. The paper outlines several recommendations, including establishing a common approach to financing climate resilience, increasing investments in downscaled climate information, mainstreaming climate resilience into infrastructure planning, and nurturing an enabling environment for climate resilience. Through the concerted actions laid out in this paper, decision-makers can optimise financial allocations and propel Africa towards achieving sustainable development Goals (SDGs

ABBREVIATIONS AND ACRONYMS

AAAP	Africa Adaptation Acceleration Programme
AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
AFRI-RES	Africa Climate-Resilient Investment Facility
AGIA	Alliance for Green Infrastructure in Africa
AU	African Union
AUDA-NEPAD	African Union Development Agency New Partnership for Africa's Development
BAU	Business-as-usual
CAPEX	Capital Expenditure
CFFP	Climate Finance Facility Programme
CPI	Climate Policy Initiative
CRI	Climate Resilience Infrastructure
CRIDF	Climate Resilience Infrastructure Development Facility
DAA	Dakar Agenda for Action
DBSA	Development Bank of South Africa
DFI	Development Finance Institutions
ECB	European Central Bank
ECOWAS	Economic Community of West African States
ESG	Environmental Social, and Governance
EV	Electric Vehicles
FDI	Foreign Direct Investment
GBSS	Green, Blue, Social and Sustainability Bonds
GCF	Green Climate Fund
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
GFDRR	Global Facility for Disaster Reduction and Recovery
GHG	Greenhouse Gas
ICA	Infrastructure Consortium on Africa
ICT	Information and Communication Technology
IFI	International Finance Institutions
IPCC	Intergovernmental Panel on Climate Change
LNG	Liquefied Natural Gas
MDB	Multilateral Development Bank
MDI	Multilateral Development Institution
NAP	National Adaptation Plan
NbS	Nature-based Solutions
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Cooperation and Development
PEEB	Programme for Energy Efficient Buildings
PIDA	Programme for Infrastructure Development in Africa
PPF	Project Preparation Facility
PPP	Public-Private Partnership
REC	Regional Economic Community
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
SMEs	Small and Medium Enterprises
TCFD	Task Force on Climate-related Financial Disclosures
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change

1 INTRODUCTION

The urgency of global climate action has reached unprecedented levels in the face of accelerating climate change impacts[1]. The Paris Agreement, hailed as a landmark of international cooperation, delineates a pathway towards a sustainable future. Article 2.1(c) seeks to 'make financial flows consistent with a pathway towards low greenhouse gas (GHG) emissions and climate-resilient development.'[2] This mandate holds profound significance for regions that cannot access consistent and adequate climate finance and are highly susceptible to climate change, none more so than Africa.

With high exposure levels, limited adaptive capacity, and inadequate resources, Africa faces disproportionately heightened risks from the impacts of climate change, notably within its infrastructure development sector.3 Infrastructure stands as the linchpin of sustainable development; however, years of chronic underinvestment; compounded by deficiencies in quality and accessibility, exacerbate the continent's vulnerability.4 Climate change-induced events, such as floods and droughts, pose significant threats to existing infrastructure, disrupting economic activities, impeding social progress, and exacerbating vulnerabilities. Moreover, the lack of climate-resilient infrastructure (CRI) not only undermines the continent's ability to withstand climate shocks but also restricts its capacity for long-term sustainable development.

Yet, within these challenges lies a distinct opportunity. By embedding climate resilience principles into the fabric of infrastructure development from inception, Africa can not only effectively adapt to climate impacts but also avoid costly retrofitting endeavours in the future. Investing in CRI presents a dual benefit: it enhances the capacity to withstand climate-related hazards while fostering sustainable development pathways[5]. CRI incorporates innovative design, robust engineering, and nature-based solutions to mitigate climate change risks, thus ensuring infrastructure investments' longevity and effectiveness.

Moreover, addressing the financing gap for CRI requires innovative approaches and collaborative efforts across public, private, and international sectors. It necessitates the establishment of conducive policy frameworks, financial instruments, and risk management mechanisms to incentivise investments in climate resilience. Despite the widespread acknowledgement of the imperative to align financial mechanisms with climate-resilient development, there remain challenges in achieving a comprehensive understanding of how to effectively operationalise Article 2.1(c) both within and outside the multilateral climate change negotiation processes[6]. The global discourse surrounding Article 2.1(c) has predominantly centred on aligning financial flows with low-emission pathways. Yet, there has been limited exploration of how these flows can support a climate-resilient development pathway. This gap was underscored in the Conference of the Parties (COP) 27 Presidency recommendations arising from the Sharm-El Sheikh dialogues on Article 2.1(c), presented to the CMA at COP28[7]. Based on these recommendations, the CMA decided and urged Parties and Non-Party stakeholders to intensify their efforts in advancing methodologies for aligning financial flows with climate-resilient development pathways while also emphasising the necessity to scale up finance for developing countries, which are disproportionately vulnerable to the impacts of climate change[8].

1.1 Purpose of this Pathway Paper

This pathway paper is the fourth in a series that outlines an Africa-wide perspective on operationalising Article 2.1(c) of the Paris Agreement. This paper aims to explore operational pathways for aligning the planning and financing of infrastructure projects with climate-resilient development in Africa. It proposes strategies to support the alignment of investments with the goals outlined in the Paris Agreement and contribute to sustainable development and poverty eradication in Africa. To achieve its overarching aim, this paper has the following objectives:

[1] IPCC. 2023. Synthesis Report of the IPCC Sixth Assessment Report.
[2] UNFCCC. 2015. Paris Agreement.
[3] IPCC. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*.
[4] Samuel Pleeck & Mikaela Gavas. 2023. Bottlenecks in Africa's Infrastructure Financing and How to Overcome Them
[5] LSE. 2021. Saving lives and livelihoods: The benefits of investments in climate change adaptation and resilience
[6] Standing Committee on Finance. 2023. Synthesis of views regarding ways to achieve Article 2, paragraph 1(c), of the Paris Agreement.
[7] COP27 Presidency. 2023. Sharm El-Sheik Dialogues.
[8] COP28 presidency. 2024. Report of the Conference of the Parties on its twenty-eigth session.

OBJECTIVES
1. Provide an overview of the current state of infrastructure and its financing in Africa, focusing on the energy, water, and transport sectors. 2. Examine CRI and its current financing. 3. Analyse the dual objectives outlined in Article 2.1(c) of the Paris Agreement, focusing on advancing CRI development in Africa. 4. Develop a pragmatic pathway for implementing Article 2.1(c) of the Paris Agreement, which includes short—to medium-term actions for decision-makers in infrastructure financing.

This paper reviews existing literature to explore the research objectives outlined above. It outlines the challenges, opportunities, and financing options for CRI in Africa. It uses this as a basis to develop an actionable pathway, delineating practical short-to-medium-term strategies for decision-makers, financiers, and infrastructure developers.

2 INFRASTRUCTURE LANDSCAPE IN AFRICA

This section examines Africa's current infrastructure financing landscape, spotlighting the energy, transport, and water sectors. It further delves into the sources of infrastructure finance, the financial commitments made, and the disparities across the subsectors. This is done to underscore the pivotal role of Article 2.1(c) of the Paris Agreement in supporting the continent's achievement of its SDGs.

2.1 Infrastructure Overview

2.1.1 Africa's Infrastructure Deficit

Africa's pursuit of a development pathway that meets the needs of its people, as expressed in its long-term development blueprint - Agenda 2063,[9] has prompted significant investments in infrastructure. One notable initiative is the Programme for Infrastructure Development in Africa (PIDA)[10], the continent's largest transboundary infrastructure programme, summarised in Box 1. Despite such endeavours, Africa grapples with an infrastructure deficit, which is also marked by poor quality and inadequate infrastructure services. The reasons for this deficit as health and education, which are historically underserved in infrastructure development. Further, the infrastructure gap has gendered impacts that are often overlooked in the planning, design, and operationalisation of infrastructure projects. For example, across the three subsectors, women and girls suffer more from time poverty, having a disproportionate burden in collecting biomass for fuel, safe water and finding safe sanitation spaces and transport options[11].

Therefore, aligning the funding strategies for these sectors with Article 2.1(c) of the Paris Agreement is crucial as it puts the continent on a climate-resilient development pathway. Financing approaches need to strike a balance between environmental sustainability and socio-economic benefits. A thorough assessment can pinpoint financing mechanisms that bolster low-carbon, climate-resilient projects while addressing Africa's unique developmental challenges.

2.1.2 Energy Sector

The energy sector in Africa is crucial for socio-economic development, yet it faces significant challenges. Approximately 600 million people lack access to electricity, and about 970 million lack access to clean cooking facilities, with these numbers projected to rise[12]. Energy generation requires expansion and repairs of infrastructure to meet growing demand. However, attracting foreign private capital is difficult amidst increasing debt levels and uncertainties, exacerbated by the COVID-19 pandemic[13]. Public utilities, pivotal in financing key power sector infrastructure, now grapple with prolonged indebtedness due to the economic fallout of the COVID-19 pandemic, where revenue was significantly reduced[14].

Grid inefficiencies hinder the potential of renewable energy sources and restrict electricity supply, export capabilities, and regional interconnectivity[15]. Further, these inefficiencies lead to a reliance on backup diesel generators, contributing to emissions

[9] Agenda 2063 is the continent's socioeconomic blueprint over 50 years.
[10] Led by the African Union Commission (AUC), NEPAD Secretariat and the African Development Bank (AfDB), PIDA promotes socio-economic development and poverty reduction in Africa through improved access to integrated regional and continental infrastructure networks and services.
[11] UNOPS. 2021. Infrastructure for gender equality and the empowerment or women.
[12] International Energy Agency. 2022. Africa Energy Outlook.
[13] International Energy Agency. 2022. *Africa Energy Outlook 2022.* IEA, Paris.
[14] Ibid.
[15] IRENA et al. (2023). The Renewable Energy. Transition in Africa: Powering Access, Resilience and Prosperity.

and health hazards. In Nigeria, for example, these generators have surpassed renewables-based capacity[16][17].

Financing energy infrastructure will shape countries' development pathways, requiring policy and regulatory frameworks that prioritise a just transition, climate resilience, and development

BOX 1: PROGRAMME FOR INFRASTRUCTURE DEVELOPMENT IN AFRICA (PIDA)

PIDA in Africa is the blueprint for continental-level infrastructure development. Endorsed by the African Heads of State in 2012, its main objective is accelerating regional integration and facilitating the creation of the African Economic Community as planned by the Abuja Treaty[12]. PIDA focuses on four sectors: energy, water, transport and Information and Communication Technology (ICT) and is implemented by the African Union Commission in collaboration with the African Union Development Agency (AUDA-NEPAD), the African Development Bank (AfDB) and the United Nations Economic Commission for Africa (UNECA). PIDA was designed to be implemented in three phases, 2012 – 2020, 2021 – 2030 and 2031 – 2040, at an estimated cost of USD 360 billion by 2040. The first PIDA Priority Action Plan (PIDA PAP 1) comprised 409 projects to be implemented between 2012 and 2020. Of these, only 76 were operational as of 2020, with 104 still in the pre-feasibility and feasibility stages[13]. The second priority action plan identified 69 projects estimated to cost USD 160 billion, with the bulk of the Capital Expenditure (CAPEX) costs being from the transport sector (approximately 67% USD 107.6 billion)[14]. This is followed by energy (24%, USD 38.4 billion), water (6%, USD 9.8 billion) and ICT (3%, USD 5 billion). The AfDB is the leading international finance institution (IFI) in financing PIDA projects, having invested almost USD 7 billion in the first phase.

Some of the challenges faced in financing PIDA projects are[15]:

- A large portfolio of projects (the Priority Action Plan had 409 eligible projects) was not adequately prioritised based on the financier's needs.
- A weak enabling environment to support project advancement to implementation, including regulatory issues and the misalignment between continental priorities and country priorities.
- Inadequate resources for project preparation.
- A lack of a diverse pool of financiers resulted in less financial capacity across different stages of the project preparation phase.
- Limited grant availability to assess each project's climate risks and to design suitable adaptation options. In some cases, these challenges are due to the type of infrastructure

2.1.3 Water Sector

Climate change exacerbates water scarcity and drought conditions, placing Africa at high risk due to its heightened vulnerability and limited capacity to adapt to ageing and inefficient infrastructure amid resource constraints[18]. Water is the foundation for food security, with agriculture accounting for 70% of total water consumption[19]. At the same time, the remainder supports energy security, industrialisation, regional integration through transboundary waters, and various aspects of quality of life, including health and livelihoods.

This critical sector incurs substantial losses, with African countries losing up to USD 200 billion annually due to inadequate investment, infrastructure inefficiencies, and climate change impacts[20]. Furthermore, by 2050, climate-related costs driven by water-related hazards could amount to USD 50 billion 2050[21].

By 2025, water scarcity will affect 230 million Africans, with an additional 460 million residing in areas where demand periodically outstrips supply[22]. Over 300 million lack access to clean drinking water, and more than 700 million lack adequate

[16] 13 GW is in Nigeria where 40% of the total electricity is generated by industrial and commercial firms and households using oil products (including diesel).
[17] IRENA. 2023. Renewable Energy Roadmap Nigeria.
[18] African Development Bank. 2023. World Water Day 2023: Accelerating Change in solving Africa's Water and Sanitation Crises.
[19] Ibid
[20] African Union. 2023. International High Level Panel on Water Investments for Africa: Africa's Rising Investment Tide
[21] African Union. 2023. Africa's rising investment tide: How to mobilise USD 30 billion annually to achieve water security and sustainable sanitation in Africa.
[22] Ibid

sanitation, disproportionately impacting rural communities where over 80% of those without access reside[23]. Amidst rapid urbanisation, African cities, poised to accommodate 1.5 billion inhabitants by 2050, grapple with escalating water challenges exacerbated by inequitable access, loss of natural water systems, and increased climate-related hazards[24]. Despite these pressing needs, only 5% of Africa's water resources are developed, with limited investments, inadequate budget allocations, and challenges in resource mobilisation, particularly from the private sector, hindering sectoral growth[2526]. Additionally, ageing infrastructure, insufficient storage and distribution networks, mismanagement, pollution and environmental degradation exacerbate the sector's challenges, necessitating CRI planning and design to ensure long-term viability and sustainability.

2.1.4 Transport Sector

The transport sector contributes approximately 23% of all energy-related carbon emissions globally and requires urgent decarbonisation[27]. Emissions in Africa are increasing at a rate of 7% annually due to factors like colonial legacy, poor fuel quality, an ageing vehicle fleet, and limited access to sustainable public transport[2829]. Roads are a key asset for Africa, carrying 90% of its passengers and 80% of its goods[30]. Given the sector's pivotal role in supporting industrialisation and socioeconomic growth, decoupling transport development from fossil fuel emissions is imperative to enhance mobility and foster socio-economic development.

Africa's transport infrastructure deficit stems from economic, geographical, and historical factors, including the colonial focus on externally oriented infrastructure like railways, neglecting comprehensive passenger internal networks. Post-independence fragmentation further compounded the issue, resulting in underdeveloped road networks characterised by low density and poor quality, exacerbated by insufficient maintenance and vehicle overloading[31]. Policymakers are directing significant investments towards improving transport infrastructure to facilitate greater trade and enhance competitiveness as envisioned by the African Continental Free Trade Area.

The transport sector faces dual challenges: expanding infrastructure and ensuring low-emission and climate-resilient transport systems. This necessitates significant changes, including establishing charging stations for electric vehicles (EVs) and investing in public transportation like rail. Decarbonising the energy sector is crucial for transitioning to low-emission EVs, leveraging Africa's abundant renewable energy resources. Prioritising low-emission and resilient infrastructure safeguard investments and reduces costs associated with future damage and maintenance repairs.

2.2 Financing Overview

Infrastructure investment yields significant returns, with every dollar invested resulting in a long-term increase of 20 cents in a country's GDP. This boost in productivity is evident through reduced travel time, improved access to essential services and expansion of the digital economy[32]. Despite these potential gains, Africa's investment in infrastructure has stagnated at approximately 3.5% of GDP since 2000[33]. This is significantly lower than other regions, such as India and China, which spend about 5.2% and 7.7%[34] of their GDP on infrastructure investment, respectively. Consequently, Africa needs to increase its infrastructure spending.

In 2018, the AfDB analysed the infrastructure investment needs across four key African sectors. This analysis aimed to determine the financing required to meet specific targets by 2025, as shown in Table 1[35]. However, it is essential to note that these targets primarily focus on fulfilling basic infrastructure needs. They do not adequately address the financing gaps in low-emissions and CRI, representing a major limitation in current assessment methodologies.

Based on these targets, the AfDB estimates that the continent requires between USD 130 - 170 billion annually, with the financing gap ranging from USD 68 - 108 billion[36] annually. This gap has

[23] African Union. 2023. Africa's rising investment tide: How to mobilise USD 30 billion annually to achieve water security and sustainable sanitation in Africa
[24] van den Berg, R & Fikresilassie, A. 2021. As cities grow across Africa, they must plan for water security.
[25] Infrastructure Consortium of Africa. 2022. Infrastructure Financing Trends in Africa: 2019-2020.
[26] McCallum & Viviers,. 2020. Private sector impact investment in water purification infrastructure in South Africa: a qualitative analysis of opportunities and barriers.
[27] IPCC. 2022. Transport.
[28] Ayetor. 2021. Investigating the state of road vehicle emissions in Africa: A case study of Ghana and Rwanda.
[29] Gwilliam, K. 2011. Africa's Transport Infrastructure. World Bank Group
[30] AfDB. 2023. Cross-border Corridors- Expanding Market Access in Africa and Nurturing Continental Integration
[31] Cervigini, R., Losos, A., Chinowsky, P & Neumann, J.E. 2017. Enhancing the climate Resilience of Africa's Infrastructure: The Roads and Bridges Sector.
[32] McKinsey Global Institute. 2016 Bridging Global Infrastructure Gaps.
[33] Lakmeeharan, K., Manji, Q., Nyairo, R & Pöltner, H. 2020. Solving Africa's Infrastructure paradox.
[34] Ibid
[35] AfDB. 2018. "Africa's Infrastructure: Great potential but little impact on inclusive growth".
[36] AfDB. 2018. "Africa's Infrastructure: Great potential but little impact on inclusive growth".

widened over time, exacerbated by the COVID-19 pandemic, which resulted in significantly fewer financing commitments. The pandemic also highlighted the limited flexibility of some financiers in infrastructure financing. For instance, the World Bank sustained its infrastructure financing due to its larger operating budget, access to other donor trust funds and unique project financing structure for infrastructure (feasibility studies are financed differently). In contrast, the AfDB operations faced delays, as feasibility studies are financed with loan proceeds.

Furthermore, the pandemic precipitated credit rating downgrades, exacerbating difficulties in accessing finance[37][38]. Whilst most African countries (32) are rated by at least one of the major three agencies, 56% experienced downgrades during the pandemic, surpassing the global average of 31.8%[39]. Comparatively, African countries had the highest downgrade rate (28% in Asia, 9% in Europe),[40] impeding financial flows and increasing debt servicing costs. Analysts suggest these downgrades contributed partly to the economic shocks experienced by countries[41].

Closing the financing gap necessitates doubling the annual investment to USD 150 billion by 2025. However, rising debt levels may curtail infrastructure spending without international support to manage the continent's debt crisis. Additionally, evolving socioeconomic factors and technological disruptions, such as expanding decentralised renewable energy systems and advances in manufacturing, will likely reshape Africa's infrastructure needs. Policymakers must anticipate these changes as the world transitions towards a lower emission and climate-resilient pathway.

Table 1: Africa's Infrastructure Investment Needs

Infrastructure Sector	Target by 2025	Annual Cost (USD billions)
Power	100% urban electrification 95% rural electrification	35 - 50
Water supply and sanitation	100% access in urban areas 100% access in rural areas	56 - 66
Road and other transport	80% preservation (maintenance and rehabilitation) 20% development (upgrading and new construction)	35 - 47
ICT	Mobile universal coverage 50% of the population within 25km of a fibre backbone Fibre to home/premises internet penetration rate (10%)	4 - 7

Source: Authors own tabulation from the African Development Bank.

2.2.1 Current Sources of Finance

National governments are the largest financiers for infrastructure, accounting for 42% of all investment commitments in 201842. Alongside governments, significant contributors include China, Multilateral Development Institutions (MDI), Development Finance Institutions (DFI), and the private sector. Table 2 summarises funding sources between 2018 and 2020, showing a decline in total infrastructure investments over the three years.[43]

MDIs have directed their funding towards various sectors, with energy projects receiving approximately 50% of financing commitments in 2018, followed by water and sanitation (25%), transport (19%), ICT (2%), and multi-sector projects (2%). In 2018 alone, MDIs committed USD 19 billion to infrastructure projects,

[37] Infrastructure Consortium of Africa. 2022. . Infrastructure Financing Trends in Africa: 2019-2020
[38] Chirikure, Abimbola, & Chelwa,. 2022. How are the 'Big Three' rating agencies impacting African countries?
[39] UNECA. 2021. Africa Sovereign Credit Rating Review: 2021 Mid-year outlook
[40] Ibid
[41] Ibid
[42] Infrastructure Consortium of Africa. 2022. Infrastructure Financing Trends in Africa: 2019-2020
[43] Ibid

utilising concessional loans, equity, guarantees, and bond enhancement mechanisms[44]. Additionally, bilateral development finance institutions (DFIs) established by donor governments contributed USD 6 billion to infrastructure financing in 2018.[45]

Foreign investment in African infrastructure has been rising, particularly from China, which focuses on energy and transport[46][47][48]. However, recent years have seen a decline in the credit lines from China due to various factors, including the economic impact of COVID-19, a reduced appetite for foreign investments, commodity price crashes affecting African debt servicing, and reluctance by borrowers to enter deals backed by natural resources[49]. Notably, Zambia became the first pandemic-era sovereign defaulter in 2020, with over USD 12 billion in international debt, more than half of which was owed to China-based public and private lenders[50]

2.2.2 Private Sector Investment

Private sector involvement in the infrastructure sector across the African continent has been relatively limited, except in South Africa, where it garnered nearly two-thirds of the total private sector financing commitments to the region in 2018[51]. Several factors contribute to this limited engagement, including a weak enabling environment, poor governance of public institutions, and regulatory uncertainties regarding tariffs and procurement.

Moreover, the lack of appropriate financing vehicles and instruments, along with limited bankable projects and the creditworthiness of African utilities in the energy and water sectors, have significantly reduced the private sector's appetite[52] for investment[53]. These factors also contribute to an increase in the cost of capital. However, given the scale of finance required, private sector investment is crucial to help meet the goals of the Paris Agreement. Strategies to mobilise, scale up and increase investments from the private sector, which take into account country context and debt sustainability, are imperative. Available data indicate that the private sector has largely focused on energy and ICT, attracting Africa-based and global institutional investors, as shown in Table 3[54]. However, private sector finance remains variable, as its project cycle differs from that of the public sector (project identification, preparation, and financial close), potentially resulting in discrepancies between commitment and financial close date

[44] The main DFI's are the French, German and South African development agencies
[45] African Union Development Agency (AUDA-NEPAD). 2022. PIDA-PAP 2 Financing Strategy
[46] The Infrastructure Consortium for Africa. 2017. Infrastructure Financing Trends in Africa.
[47] Infrastructure Consortium for Africa. 2022. Key Achievements in the financing of African infrastructure in 2019 - 2020.
[48] Infrastructure Consortium for Africa. 2018. Infrastructure Financing Trends in Africa – 2018.
[49] Miriri, D. 2021. Insight: African nations mend and make do as China tightens Belt and Road.
[50] Corbet, S. 2023. Debt-plagued Zambia reaches deal with China, other nations to rework $6.3B in loans, French say.
[51] Infrastructure Consortium Africa. 2018. Infrastructure Financing Trends - 2018
[52] Ibid.
[53] Infrastructure Consortium of Africa. 2022. Infrastructure Financing Trends in Africa: 2019-2020.
[54] Ibid

Table 2: Sources of Finance for Infrastructure Development in Africa (ICA, 2022)

Source	2018 Commitments (USD billions)	2019 Commitments (USD billions)	2020 Commitments (USD billions)
African national government	37,5	34,9	33,4
China	25,7	6,7	6,5
MDBs and DFIs (members of ICA[55])	20,2	26,9	18,1
Private sector	11,8	10,8	19,0
Other bilateral/multilateral (non-ICA members)[56]	5,5	5,8	3,9
Total commitments	100,7	85,1	80,9

Source: Authors own tabulation from the Infrastructure Consortium for Africa (2018 and 2022)[57].

Geographically, most private investments have been concentrated in North and West Africa (except for South Africa), primarily in the energy and ICT sectors. This sectoral focus reflects the ability of private sector players to generate revenue, thus explaining the limited investments in water and sanitation[58]. Additionally, the ICT sector requires less government support than energy and transport, where public-private partnerships, government guarantees, or loans from foreign governments may be necessary Several efforts have considered attracting private finance through public finance leverage mechanisms such as public-private partnerships (PPP), credit guarantees, and other credit enhancement mechanisms[59]. However, PPP projects remain complex and time-consuming, with high transaction costs. Critics highlight national officials' lack of familiarity capacity and transparency and accountability in infrastructure contracts.[60]To address some of these barriers for the private sector, the African Union is implementing several initiatives, such as the AUC-NEPAD 5% Agenda, which seeks to increase the allocation of African asset owners (pension funds, sovereign wealth funds, and insurance companies) to African infrastructure from its low base of approximately 1.5% of their assets under management to 5%[61]. Policy and regulatory reform and developing products to de-risk credit are essential to these initiatives[62].

[55] ICA members include governments and development agencies of G8 countries, South Africa, the World Bank Group, the African Development Bank Group, the European Commission, European Investment Bank, Development Bank of Southern Africa, the African Union Commission, the NEPAD Planning and Coordinating Agency with Regional Economic communities participating as observers in ICA meetings.

[56] This includes the Arab Coordination Group, EBID, EBRD, India, AIIB

[57] Infrastructure Consortium of Africa. 2022. Infrastructure Financing Trends in Africa: 2019-2020

[58] Ibid.

[59] Ibid.

[60] McKinsey Global Institute. 2016. Building Global Infrastructure Gaps.

[61] AUDA-NEPAD. 2017. Official launch of NEPAD Agency's 5% Agenda Initiative.

[62] Pension funds may be subject to the 'prudent person' investment regulation which prevents them from building a large exposure to long-term infrastructure projects.

Table 3: Private Sector Financing Between 2016 and 2020

Sector	2016 (USD billions)	2017 (USD billions)	2018 (USD billions)	2019 (USD billions)	2020 (USD billions)
Energy	1,3	1,9	6,3	1,3	6,3
ICT	-	-	4,8	6,9	
Transport	1,3	1,9	0,4	2,5	6,0
Water	-	0,4	0,3	0,1	0,2
Total	2,6	4,2	11,8	10,8	19

Source: Authors own tabulation from the ICA

2.2.3 Financial Commitments across Key Sectors and Regions

There are notable financing disparities across the key sectors, highlighting the importance of understanding the country's context and the challenges of accessing finance. These can include governance, limit political will, and limit innovative financial instruments and approaches for the context. Table 4 provides a sectoral breakdown of the total financial commitments to the energy, water and transport sectors for infrastructure between 2018 and 2020[63]. Transport received the largest share of commitments over the period, highlighting its importance to national governments The water sector faces the largest financing gap, with investment commitments declining.

Based on 2020 data, ICA estimates that commitments in the water sector would only address between 14% and 17% of the required annual investments to meet basic needs. In dollar terms, this sector requires approximately USD 64 billion annually to achieve the Africa Water Vision for 2025. This presents a significant challenge as the water sector is highly

vulnerable to climate change. With increased water stress, sectors such as energy and agriculture, which form the backbone of many economies, will experience disruptions. South Africa's National Water and Sanitation Master Plan, for example, indicates that water demand will surpass supply by 2030 if no measures are taken, with some experts suggesting it may occur even earlier[64]

Table 4: Sectoral Commitments Between 2018 and 2020

Sector	Total Commitments in 2018 (USD)	Total Commitments in 2019 (USD)	Total Commitments in2020 (USD)
Transport	32.5 billion (32%), of which 19.6 billion (60%) was committed by African governments	33.8 billion (40%), of which 18.7 billion (55%) was committed by African governments	34.4 billion (42%), of which 18.6 billion (54%) was committed by African governments
Water	11 billion	10.1 billion (12%)	8.1 billion (10%)
Energy	43.8 billion (43%)	25.9 billion (31%), of which 13.1 billion (50%) was committed by ICA members	23.5 billion (29%), of which 7 billion (30%) was committed by ICA members
ICT	7.1 billion (7%)	11.4 billion (13%), of which 6	10.4 billion (13%)

Source: Authors own tabulation from the ICA (2018 and 2022).

[63] Infrastructure Consortium of Africa. 2022. Infrastructure Financing Trends in Africa: 2019-2020 and Infrastructure Consortium Africa. 2018. Infrastructure Financing Trends - 2018

[64] NCA. 2023. South Africa may run out of drinking water by 2030 or sooner.

The developmental impact of water insecurity will be felt in areas such as food security, education and health. Overcoming these financing challenges will require innovative approaches, addressing governance issues, fostering international cooperation, and demonstrating unwavering political commitment to securing the necessary investments.

Table 6 below illustrates the regional distribution of infrastructure financial commitments. Unfortunately, finance is not flowing to countries in greatest need but to those with greater capacity. For example, although Southern Africa received the highest average infrastructure finance commitments between 2018 and 2020, most of these investments were directed to a single country—South Africa.

In a changing climate marked by increased frequency and intensity of extreme weather events, the most vulnerable countries are not receiving adequate financial resources to invest in infrastructure. Understanding the barriers to financing infrastructure at a country level is crucial. Furthermore, assessing how regional economic communities (RECs) can help countries overcome barriers could support transboundary infrastructure projects

Table 5: Sectoral Financing Gap

Sector	2019 Financing Gap (USD bn)	2020 Financing Gap (USD bn)
Transport	3 - 15	4 - 16
Water	46 - 56	49 - 59
Energy	4 - 19	- 21

Source: Adapted from ICA (2022)

2.2.4 Challenges in Financing Infrastructure

The discussion thus far reveals that there are significant structural barriers for countries to access finance for infrastructure. A McKinsey study estimated that 80% of all projects fail at the feasibility and business plan stage, leaving only 20% to financial closure[65]. Poor financial sustainability is limiting the expansion of access to services in the energy and water sectors. Average tariffs in these sectors are too low, with insufficient billing and collection and inadequate operational efficiency of the water and electricity utilities to attract significant private sector investment66. Consequently, grants from governments and donors are the major sources of finance in these sectors.

Table 6: Geographic Distribution of Infrastructure Financial Commitments

Geographic Region	USD(billions) committed (2018)	USD (billions) committed (2019)	USD (billions) committed (2020)
Southern Africa	31.7 billion (of which South Africa[67] received 18 billion)	23.5 billion (of which South Africa received 12.7 billion)	19.6 billion (of which South Africa received 9.5 billion)
West Africa	25.7	22.5	22.3
North Africa	19.9	15.1	16.8
East Africa[68]	14.2	16.3	14.8

[65] Lakmeeharan, Manji, Nyairo, & Pöltner. 2020. Solving Africa's Infrastructure paradox.
[66] Infrastructure Consortium of Africa. 2022. Infrastructure Financing Trends in Africa: 2019-2020
[67] Private sector commitments in South Africa declined from US7,7 bn in 2018 to USD 2 bn in 2019 to 1,7 bn in 2020.
[68] Governments were the largest contributor (53% in 2019, 57% in 2020 and 43% in 2018).

Central Africa	7	5	5.3
Cross-regional	2.4	2.6	2.3
Total commitments	100.8	85.0	81.0

Source: Authors own tabulation from the ICA (2018 and 2022).

Other identified challenges include[69]

- Limited deal pipeline or selection of low-impact projects, often due to the lack of a long-term master plan that can bridge political cycles. A shorter-term focus may result in the unwillingness to develop larger, more impactful projects and inadequate infrastructure-policy frameworks, leading to poor prioritisation of infrastructure projects
- Weak feasibility study and business plan: Developers and governments often lack crucial capabilities and resources, including the capacity to assess key technical and financial risks associated with large-scale infrastructure projects.
- Delays in obtaining licences, approvals, and permits: These issues may include government agencies'' lack of capacity to get projects off the ground, coordination between responsible agencies, and community resistance to some projects.
- Inability to agree on risk allocations: This results from skill gaps in quantifying and correctly allocating risks to their natural owners—a challenge that persists in even the most sophisticated public agencies worldwide. Another common problem is an excessive focus on risk avoidance instead of risk management and mitigation
- Inability to secure off-take agreements and guarantees: A primary cause of the failure to provide sovereign guarantees due to weak balance sheets
- .Poor programme delivery results from insufficient capabilities in planning (including technical design), managing, and executing large projects.

The risks to financing infrastructure are highest during the early stages of projects, specifically the project preparation and construction phases. which are also susceptible to delays, including administrative (permits and licensing) and political (regulation changes, government priorities)[70]. The persistent negative perception of investing in Africa and the limited viable funding models within the African context reduce the pool of financiers that can finance certain assets. In sectors like energy and water, some investors may demand higher returns than what could be feasibly delivered. Hence, the project preparation phase is the most important determinant of the success of infrastructure projects. Project preparation facilities are increasingly playing a critical role in supporting the development of bankable projects on the continent. The demand for these outpaces current supply; on average, it takes eight years for a project to move towards a financial close. Annexe 1 summarises the type of PPFs available on the continent. Table 7 below summarises some sectoral challenges and opportunities for financing infrastructure

[69] Lakmeeharan, Manji, Nyairo, & Pöltner. 2020. Solving Africa's Infrastructure paradox.
[70] Ibid.

Table 7: Barriers and Opportunities for Sectoral Infrastructure Investment

Sector	Barriers	Opportunities
Energy (renewable energy)[71]	▪ High upfront capital costs and higher risks are associated with the project preparation phase, including the construction phase. ▪ Limited access to affordable early financing during the development and construction phases. ▪ High currency risk for hard-currency investors due to the long project life can limit the projects' ability to raise money from international financiers. ▪ Governance-related issues include the legal and administrative structures, the absence of any regulation changes, for example, feed-in tariffs, the availability of fossil fuel subsidies, the quality and enforceability of power purchase agreements, and how long it takes to obtain permits and licensing (procurement, etc.). ▪ Perceived and/or real risk of default by power off-takers, including public utilities and corporations. For off-grid projects, the counterparty risk is high due to the low creditworthiness of the end users, typically low-income households. ▪ Project size can limit the role of large-scale investors. RE projects are smaller, raising the due diligence and transaction costs.	Low operating costs and stable cash flow once construction is complete and the project has started operations.
Transport (road and rail)	▪ Limited access to affordable, long-term capital. ▪ Long lead times for planning, project preparation and construction make up most of the overall project costs. ▪ High currency risk for hard-currency investors due to the long project life can limit the projects" ability to raise money from international financiers. ▪ Relies on long-term public planning and political will to support the maintenance and upgrades of existing infrastructure and the development of new infrastructure. ▪ Administrative risks related to licensing and permitting can be inefficient and involve many layers of entities. ▪ Changes in regulatory systems, such as vehicle standards and incentives ▪ The potential for default by national or sub-national government entities. ▪ An Inadequate existing infrastructure to transport raw materials and components. ▪ The limited availability of locally skilled personnel across the project cycle.	A stable revenue structure and reliance on well-established technologies mean the risks can be lower at a project level.
Water	▪ Limited access to affordable, long-term capital. ▪ Social and Equity Concerns: Ensuring equitable access to clean and safe water for marginalised communities can be challenging, thus balancing affordability for low-income populations and generating revenue for infrastructure maintenance.	Blended finance can be used to make projects bankable Portfolio pooling arrangements can be used to attract large-scale commercial investment72

Source: Authors' tabulation from the CPI and the OECD

[71]CPI. 2022. Climate finance for innovation in Africa

[72] OECD. 2023. Background note: Diversifying sources of finance for water in Africa. 10th meeting of the roundtable on financing water.

3 CLIMATE RESILIENT INFRASTRUCTURE

Climate-resilient infrastructure (CRI) has become necessary for African countries as they experience more climate impacts. Financial flows need to be aligned with this nascent but growing approach. This section provides an overview of the status of climate-resilient infrastructure and its interaction with development agendas, highlighting opportunities for aligning climate-resilient infrastructure investment with Article 2.1(c) of the Paris Agreement.

3.1 Understanding Climate-resilient Infrastructure

Climate change poses significant financial costs for countries and regions; for example, it could cost upwards of USD 183 billion by 2100 to maintain the road networks damaged by climate-related impacts[73]. These damages affect infrastructure and increase the costs of goods, particularly in landlocked areas where transport costs represent up to 75% of the product value[74]. East, West and Central Africa have the highest expected annual damages to road and rail assets relative to their GDP[75].

The failure to integrate climate risks into infrastructure planning and design carries substantial financial implications. For instance, the IPCC estimates potential damages ranging from USD 65 billion to USD 86.5 billion across 12 African coastal cities by 2025 under medium and high emission scenarios[76]. Similarly, the energy sector faces risks, with over 60% of thermal power plants at high or very high risk of disruption due to water stress and LNG plants vulnerable to flooding from rising sea levels. These risks are exacerbated by factors such as infrastructure location and quality; for example, thermoelectric plants are often situated near water sources, exposing them to flooding and rising sea levels[77].

Resilience, defined by the IPCC as the capacity of interconnected systems (social, economic and ecological) to cope with a hazardous event or trend, is crucial in mitigating climate risks[78]. However, despite the increasing emphasis on climate resilience and adaptation, there is no universal definition of climate-resilient infrastructure. The terms "climate resilient" and "climate-proof" are used interchangeably in several countries, such as National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs), complicating measurement and tracking efforts.

Thus, when implementing CRI, a systems approach that emphasises analysis of the asset and the environment in which the asset will sit is a prerequisite.

Some considerations outlined by the OECD include[79]:

- The infrastructure asset is planned, designed, built and operated in a way that considers changing climate conditions. It can also withstand, respond to and recover rapidly from disruptions caused by these climate conditions.
- Risks have been considered and managed to achieve an acceptable level of performance of the asset given the available information and the capacities to withstand and recover from shocks are in place.
- The costs of protection have been weighed against the consequences of damage or disruption in the design of the asset.

When considering the environment, consideration will have to be given to:

- Placing infrastructure in areas that are less exposed to climate hazards ensures that the infrastructure can better cope with the impacts when they do happen.
- Assessing the impacts of risks elsewhere, for example, downstream users when a dam is built.

However, addressing climate impacts alone is insufficient and will likely not achieve equitable, efficient or effective outcomes. Equity, gender, social justice and development are important elements that must be integrated into the infrastructure planning and design process. Without this, given the long-lived nature of infrastructure, vulnerabilities may be locked into certain choices, further exacerbating the impacts of climate change and significantly increasing the costs of recovery or maintenance. In moving towards implementing climate-resilient infrastructure,

[73] IPCC. 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability
[74] Ibid
[75] Ibid.
[76] International Energy Agency. 2022. *Africa Energy Outlook 2022.*
[77] Ibid
[78] IPCC. 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability
[79] OECD. 2018. Climate-resilient infrastructure.

several capacities and capabilities at different scales are needed, such as:

- **Using climate information:** Downscaled climate information is necessary to inform decision-makers and project owners about future climate risks, given the long-lived nature of infrastructure. However, this information is not always accessible and can be costly and difficult to interpret. Thus, a coh8llaboration between climate scientists, financiers and decision-makers and enhanced capacity-building efforts about using climate information for long-term planning is required.
- **Co-designing infrastructure:** Climate information alone is insufficient when considering resilience, given the context-specific nature of risks and responses. Understanding communities' social and cultural needs about infrastructure needs, gender, indigenous knowledge, and adaptation priorities is important to enhance climate resilience. Thus, a wide range of inclusive and participatory tools will be required.
- **Gender responsiveness:** Different genders have different needs and uses of infrastructure due to traditional/cultural roles, economic status and/or preferences and their level of access to resources. Men and women do not benefit equally from public investments in infrastructure, with women and girls disproportionately impacted by the loss of infrastructure services[80]. In addition, infrastructure is predominantly planned, designed and implemented by men,[81] which often leads to gender-blind infrastructure. Gender-blind infrastructure design significantly impacts poverty eradication, safety and wellness and economic growth. Thus, designing resilient infrastructure relies on mainstreaming gender into the infrastructure planning and development process and strengthening the enabling environment for gender mainstreaming[82], for example, Box 2.
- **Adaptive Management:** The future is uncertain even with climate projections and inclusive, participatory processes. Failure to reduce emissions or rapid transitions to net zero emissions may change the intensity of climate risks. Using adaptive management can support climate resilience throughout the life of infrastructure assets. This is particularly important for large-scale water infrastructure with a lifespan of upwards of 75 years. Within this time, there is a wide variation of possible outcomes, which will be difficult and costly to design for[83]. Adaptive management builds flexibility and can allow for the adjustment of certain aspects as the climate outcomes become clearer.

Box 2: Taking an Integrated Approach that Encompasses Gender, Equity and Social Inclusion

Gender and other social inequities such as race, income and ethnicity compound vulnerability to climate change impacts. Addressing the inequities in access to resources, assets, and services and enhancing inclusive participation in decision-making and leadership is critical to achieving gender and climate justice and delivering climate-resilient development. Investments in supporting structural inequities and an enabling environment for marginalised groups increase the ability to adapt to climate change effectively. It is worth noting that adaptation actions do not automatically have positive outcomes for gender equality; thus, assessing interventions is critical.

Infrastructure projects that do not take an inclusive, integrated approach are at a higher risk of failure as different social groups' ability to benefit from the infrastructure is constrained. Engaging men, women, and non-binary persons using different types of knowledge, including indigenous knowledge, considering community dynamics at the scale in which the infrastructure asset is used and working together to ensure that infrastructure approaches are appropriate and benefit all. This approach has been used by the Climate-Resilient Infrastructure Development Facility (CRIDF) to provide small-scale water infrastructure to communities in Southern Africa . In the water sector, despite women and girls being the primary managers and users of water, they typically have less decision-making power and lack access to resources. CRIDF recognises that the detrimental impacts of gender gaps are not only felt by women, but they can have negative repercussions for entire communities. To address this, CRIDF undertakes gender and social analyses as part of its project preparation cycle, thus ensuring that infrastructure and related

[80] UNOPS. 2021. Infrastructure for gender equality and the empowerment of women.
[81] OECD. 2021. Women in Infrastructure: Selected stocktaking of good practices for inclusion of women in infrastructure.
[82] UNOPS. 2021. Infrastructure for gender equality and the empowerment of women.
[83] Cervigni, Neumann, Liden & Strzepek. 2015. *Overview* in Enhancing the Climate Resilience of Africa's Infrastructure

service delivery are designed to address the needs of all social groups within beneficiary communities. CRIDF developed a Gender Equality and Social Inclusion (GESI) toolkit that includes research, focus group discussions, stakeholder engagement and capacity strengthening

Table 8 below provides an overview of the benefits and challenges of climate-resilient infrastructure84. The scale of the benefits experienced will be context-specific, and not all projects will yield all of these benefits. Exploring different options during the project preparation phase will provide deeper insights into the advantages and additional costs of integrating climate resilience. Finance is key in providing decision-makers with options to transition to low-emission climate-resilient options. However, policymakers must still make trade-offs between climate resilience and other policy objectives

Table 8: Benefits and Challenges of Implementing Climate-Resilient Infrastructure

Benefits of Implementing Climate-Resilient Infrastructure	Challenges of Implementing Climate-Resilient Infrastructure
Increased reliability of service provision through reducing the frequency and severity of disruption.	Increased costs in increasing the reliability of service provision, for example, adding redundancies or designing assets to account for a wider potential of climates.
Reduces the need for users to invest in backup measures, such as relying on generators to power households and businesses.	Some benefits of increased climate resilience may occur beyond the time horizons decision-makers consider, while the costs must be incurred in the short term. This may reduce incentives to invest in climate-resilient infrastructure, particularly when there are limited resources or an unfavourable political climate.
Increased lifespan along with reduced costs for repair and maintenance. There are also avoided costs of retrofitting and reduced risk of stranded assets.	Uncertainties about future climate projections and other factors may impact infrastructure resilience. Factors such as economic and social dynamics will also evolve. Thus, infrastructure must be designed to provide maximum benefit within several possible future scenarios.
Increased efficiency of operations relative to BAU approaches, such as better management of hydropower resources.	Accessibility and availability of climate information, including climate risks at the required scale, may be limited or not in a usable format to inform investment decisions.
When combined with green infrastructure, climate-resilient infrastructure can deliver an equivalent service to traditional approaches with co-benefits in biodiversity, for example.	Additional capacity is needed to support decision-makers and financiers in making informed decisions based on the climate information available and the levels of uncertainty of the climate projections.
	Policy misalignments at the country and regional level could distort incentives and discourage the use of innovative and ecosystem-based solutions.
	Externalities - potential benefits such as amenity value may not generate revenue for the infrastructure operator.

Source: Authors own tabulation from the OECD[85]

For the continent, investments in climate resilience are increasingly being seen as necessary. Still, financial resources, technological accessibility, capacity, and political contexts present challenges to the widespread adoption of this approach. At the global level, financiers have been designing ways to approach climate resilience in the infrastructure sector. For example, the Green Climate Fund (GCF) has published several sectoral guides with practical resilience-building approaches. An example of this is presented in Box 3 below for solar renewable projects.

[84] OECD. 2018. Climate-resilient infrastructure.

[85] Ibid.

Box 3: Applied Example of Mainstreaming Resilience into Solar Renewable Projects[86]

1. Planning Stage: In the planning stage, comprehensive national and site-specific assessments, including multi-hazard risk evaluations, guide decision-making. Site selection factors in climate projections focus on vulnerable areas, such as drought-prone areas. Integrated solutions, like Nature-based Solutions (NbS) and sustainable drainage systems, coupled with geological studies and careful orientation, form a resilient foundation.
2. Design Stage: The design phase incorporates existing hazard profiles, embedding considerations into architectural, engineering, and operational designs. Adjustments are made to elements to enhance overall resilience. Addressing potential hazards during design ensures readiness for climate-related challenges.
3. Procurement, Construction, and Quality Assurance Stage: Climate Resilience Infrastructure (CRI) considerations are integrated into the basis of design and contractual obligations during procurement, construction, and quality assurance. This proactive approach aligns processes with the goal of climate resilience, thus contributing to long-term effectiveness.
4. Operation and Maintenance: A resilient approach anticipates challenges during operation and maintenance. Spare parts availability and assessments of contextual water capacity for cleaning are crucial—community capacity building through concessional arrangements fosters collaboration. Regular monitoring, early failure identification, and tracking performance under changing climatic conditions ensure ongoing resilience.

3.2 Enabling Environment for Climate Resilient Infrastructure

Investments in the enabling environment are required at the local, national, regional, and continental levels. Given differing regulatory and policy contexts across countries, large-scale transboundary projects, for example, are more likely to fail without these investments. The following section discusses factors contributing to a supportive enabling environment.

3.2.1 Policy and Regulatory Frameworks

Aligning regulatory and policy frameworks at different scales is key to achieving the goals of Article 2.1(c) concerning financing infrastructure. Given the cross-sectoral nature of infrastructure, mainstreaming climate change at various scales (regional, national, local) and across sectors is necessary, as decisions at the national scale may constrain climate-resilient infrastructure options at the local level. Aligning various climate plans and policies at the national level, including NAPs and NDCs, with infrastructure development plans can support the identification of risks and provide entry points for resilient infrastructure prioritisation and design. Integrating climate change at the early planning stage can help reduce downstream costs and avoid locking in maladaptation. Considering climate change early also gives planners more options to incorporate ecosystem-based approaches to support infrastructure service provision into planning and diversify the pool of financiers.

Thus, national governments must set clear principles or standards for project owners and financiers to design and implement climate-resilient infrastructure. The standards will need to evolve as climate risks evolve; for example, Ghana's government published a resilient infrastructure roadmap in 2022 to build systemic resilience and mobilise finance for climate resilience[87]. The roadmap assessed 156 nationally significant built and natural infrastructure assets, four hazard types and the enabling environment. The final roadmap includes several project concept notes, including adaptation investment recommendations, the impacts of the interventions, and how the project meets the country's NDC and SDGs. This holistic view of projects is anticipated to lead to most project concept notes moving forward in the project preparation phase.

In addition to developing appropriate standards, national governments can strengthen existing tools, such as Strategic Environmental Assessments and Environmental Impact Assessments, to account for climate risk. Climate resilience could also be integrated into public procurement processes for infrastructure projects and building codes.

[86] Green Climate Fund. 2023. Climate-resilient infrastructure for renewable energy.
[87] Adshead, Thacker, Fuldauer,, et al. 2022. Ghana: Roadmap for resilient infrastructure in a changing climate.

3.2.2 Access to Information for Decision-making

Decision-makers need access and the capability to use different types of knowledge in planning and designing climate-resilient infrastructure. Historically, decision-makers have relied on historical data to inform the planning and design of infrastructure. However, this approach does not consider how vulnerabilities, exposure and climate hazards are expected to change. Historical data thus needs to be viewed, together with projections about how these trends may change. Both data types have limitations, which decision-makers must consider when relying on. For example, historical data provides a critical baseline, but smaller events may not have been recorded. There are also limitations to future climate projections as they depend on the data quality and are inherently uncertain, particularly for precipitation[88].

Access to climate information has been challenging for African countries, as the continent has a less-developed observation network than other continents. This challenge has been exacerbated by a decline in the number of observation stations (from 57% in 2011 to 22% in 2019) that fully meet the standards set out by the World Meteorological Organisation[89]. Furthermore, where data does exist, climate models may disagree on the projections, particularly for precipitation. Improving both the short-term forecasting and medium-to-long-term future projections of hydroclimatic extremes is a key challenge[90].

Thus, decision-makers must use a combination of tools, including climate risk assessments, which can be qualitative, quantitative assessments of risk and economic costs, robust decision-making, and real options analysis. In addition, well-designed inclusive, participatory approaches will be critical in improving decision-making, as it will require drawing on local and indigenous knowledge to identify vulnerabilities and impacts that may not be well known, given climate risk's highly localised and contextual nature[91]. Having diverse stakeholders (communities, public and private sectors, civil society, academia) at various scales participating in identifying priorities and design processes will improve decision-making processes and contribute to building resilience.

3.2.3 Access to Climate Finance

Africa receives far less finance than it needs to be able to design and implement effective climate actions[92]. Further, adaptation costs are expected to rise significantly as the scale of global warming increases. This leaves a burden on African countries to finance and implement climate action within a context of increasing debt, competing development priorities, and increased global warming. African governments are already investing in adaptation through, for example, drought relief and agriculture support programmes, with an average of 3.4% of GDP spent on adaptation from domestic budgets[93].

The continent faces many hurdles in accessing climate finance, particularly from multilateral sources, without intermediaries. These include but are not limited to institutional capacity to become accredited and develop appropriate projects, cumbersome application processes, and long processing times. In addition, project owners often need to make upfront investments for feasibility studies and, consequently, must have access to reliable data and evidence to determine the climate rationale for interventions.

To support the transition towards more climate-resilient infrastructure, project owners must be able to easily access climate finance, which targets the additional elements required to make infrastructure resilient. Integrating climate resilience could add between 1-2% of the total cost of infrastructure projects on average[94]. Climate finance can spur greater public and private capital into climate-resilient infrastructure.

3.2.4 Institutional Capacity

Institutions are critical for supporting the transition to climate resilience and sustainable development. To design and implement resilient actions, institutions need various capacities, including regulatory capacity, to design, implement, and enforce technical standards. Institutions need to support policy and financial innovation at various scales to navigate the changing climate contexts and support resilience building. Drawing on diverse knowledge bases, policymakers and financiers must be able to use different types of knowledge at various points in the infrastructure development cycle. Information on possible risks and benefits, available adaptation solutions, and trade-offs must be combined with local innovations and knowledge if

[88] OECD. 2018. Climate-resilient infrastructure.
[89] Factors for the decline include lack of investments in maintaining and in increasing stations.
[90] Al-Zu'bi, Dejene, Hounkpè, et al. 2022. African perspectives on climate change research.
[91] OECD. 2018. Climate-resilient infrastructure.
[92] Climate Policy Initiative. 2022. Landscape of Climate Finance in Africa.
[93] African Union. 2022. African Union Climate Change and Resilient Development Strategy and Action Plan (2022 - 2023).
[94] OECD. 2018. *Climate-resilient infrastructure.*

infrastructure is to contribute to reducing vulnerability drivers. Decision-makers should seek a balance in a truly inclusive process to support the overall resilience of infrastructure.

3.2.5 Monitoring and Evaluation

Monitoring and evaluation frameworks are necessary to identify effective approaches and barriers to implementation at various scales. The lack of data limits the ability of institutions to achieve evidence-based, risk-informed infrastructure planning, delivery and management. Currently, there is no common understanding of climate-resilient infrastructure, which makes it difficult to assess project resilience. Complicating this is the difficulty of establishing standardised metrics and targets due to the contextual and localised nature of adaptation options and their implementation. While countries have identified various metrics to track the implementation of NAPs, specific metrics for climate-resilient infrastructure are limited[95]. At the global level, the United Arab Emirates Framework for Global Climate Resilience may yield further insights into how countries design metrics for resilient infrastructure[96].

Another challenge in developing and implementing monitoring frameworks is the mismatch between the timescales for resilience and the timelines for the results of the interventions. Project owners will need to consider how they can continuously track resilience over the lifetime of the infrastructure asset, given the anticipated evolving nature of climate hazards.

The IPCC has summarised several approaches to address these challenges[97]:

- The hazard approach measures the magnitude of identified climate hazards that the infrastructure asset can accommodate.
- The impacts approach measures resilience as actual or avoided impacts, i.e., tracking successful adaptation over extended periods. This will be suitable for both national and regional levels.
- The systems approach uses qualitative and quantitative indicators to monitor different elements of resilience. These indicators can be proxies for resilience and can be relied upon even when no climate hazards or service disruptions are experienced.

In addition to tracking resilience measures, there is a need to monitor financial flows for climate-resilient infrastructure, as well as the reporting on material physical risks by financiers and financiers and project owners reporting on project results.

3.3 Policy Responses at the Continental and Regional Levels

Policy frameworks at the national, regional and continental levels promote climate-resilient pathways, foster cross-border collaboration and enhance regional resilience. As most of Africa's infrastructure will be greenfield developments, integrating climate risk is essential for achieving the continent's long-term development vision.

At the continental level, no specific policy currently addresses the planning and design of climate-resilient infrastructure. However, the African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) outlines actions to support investments in climate-resilient infrastructure. Recognising the need for different types of infrastructure (grey, social and ecosystem-based approaches), the Action Plan emphasises the importance of analysing interdependencies between different sectors to manage climate risks effectively[98]. For example, in the water sector, the Action plan recognises that traditional approaches to infrastructure design for long-term assets and investments do not fully consider future climate projections. Thus, proposed interventions include increasing financial investment in the industry, developing and transferring technologies to support climate resilience, strengthening transboundary water management and cooperation, and strengthening the mandate to undertake a climate risk assessment of major investment decisions.

The Action Plan highlights finance as a key challenge for infrastructure, which needs to be addressed through regulatory reform, enhanced planning, and robust project pipeline development. In the transport sector, for example, actions include changing development banks' project financing and evaluation requirements to prioritise resilience and access equity, as well as establishing and prioritising resilience designs

[95] Climate Policy Initiative. 2022. Tracking Investments in Climate Resilient Infrastructure.
[96] Beauchamp. E. 2024. What is the UAE Framework for Global Climate Resilience and How Can Countries Move it Forward?
[97] IPCC. 2022. Climate Change 2022: Impacts, Adaptation, and Vulnerability.
[98] African Union. 2022. African Union Climate Change and Resilient Development Strategy and Action Plan (2022 - 2023).

and standards for road transport that benefit the most people. There is a need to build on the Action Plan with a way forward for climate resilient infrastructure specifically as actions are currently spread across different objectives. Given the significant financial investments required, collaboration at scale will lead to efficiencies in pooling resources and ensure that infrastructure standards are met.

Despite the absence of specific policy frameworks on climate-resilient infrastructure, several initiatives have been launched to support the development of such projects on the continent, detailed in Annex 2. These initiatives are focused on the project preparation phase, which determines how bankable projects will be and whether the projects will be climate resilient. Some challenges which have been highlighted for CRI in the project preparation phase include:

- Limited access to climate finance to integrate climate change risks. This is twofold, both in terms of the capacity of project developers to apply for climate finance and to integrate climate risks into the design. Secondly, some climate finance sources are unwilling to fund certain projects due to the anticipated emissions or social risks.
- Political will at the national level to integrate climate risks into infrastructure projects varies. In some countries, policymakers do not provide guidance, so project developers do not see it as a priority despite the existing climate risks.
- The availability and accessibility of down-scaled climate information impact the quality of information decision-makers have when planning and designing projects.

At the regional level, RECs have prioritised infrastructure development as a prerequisite for regional integration. However, coordination amongst Member States remains challenging, leading to project delays alongside issues of insufficient finance and limited bankable projects. Climate change has been identified as a cross-cutting issue across RECs, but uniform approaches to identifying, prioritising and addressing climate risks are lacking. There is a large gap in knowledge about how best to do this, with very few examples from which to glean lessons. Furthermore, adaptation and resilience are either partially or not addressed in infrastructure master plans, and this extends to climate policies where there is often a lack of clarity as to how to integrate climate risk and resilience into infrastructure design or how to climate-proof existing infrastructure.

For example, the Economic Community of West African States (ECOWAS) identified the resilience gap in its infrastructure plans in their Regional Climate Strategy and Action Plan (2022- 2030). The Strategy and Action Plan recognises that regional economic losses from climate change will mainly be in the agriculture and infrastructure sectors. With the region adopting various infrastructure plans, such as the master plan for developing regional infrastructure (2020-2045) in 2021, the climate policy acknowledges that the infrastructure projects identified and prioritised throughout the region do not fully consider adaptation and climate resilience[99]. For example:

- There is a lack of assessment of how the infrastructure will work under different climate scenarios.
- Questions about how the infrastructure will be resilient to the impacts of climate change and how the infrastructure projects identified will contribute to the broader resilience of the area.
- There is limited understanding of the impacts of climate change on cross-border infrastructure.
- Assessments of expenditures on infrastructure maintenance and repair, losses in trade flows, and prices of goods and services are lacking.

The lack of policy coherence limits the extent to which climate-resilient infrastructure can be mainstreamed and implemented. Further, it highlights the enduring challenges of different ministries operating in silos and the limited expertise of other ministries to consider, assess and design appropriate interventions that address climate risks. Table 9 below gives an overview of the extent to which climate-resilient infrastructure is included in REC's climate policies and infrastructure master plans.

[99] ECOWAS Commission. 2022. ECOWAS Regional Climate Strategy and Action Plan (2022- 2030).

Table 9: Climate-Resilient Infrastructure in Select Regional Economic Communities

Regional Economic Community	Sector Priorities for Infrastructure	Climate Change Policy and Key Infrastructure Development Policies	Explicit Demand for Climate-Resilient and/or Climate-Proofed Infrastructure
Common Market for Eastern and Southern Africa (COMESA).	Transport (rail, road, aviation, maritime and inland water), ICT and energy (both fossil fuels and renewable energy).	Climate Regional Resilience Framework[100].	Implicit demand. Recognition that climate risk has to be addressed but not necessarily that infrastructure assets themselves need to be climate-proofed.
East African Community (EAC).		EAC Climate Change Master Plan[101].	Explicit demand for climate-resilient infrastructure through integrating climate risks into all phases of infrastructure development.
Economic Community of West African States (ECOWAS).		ECOWAS Regional Climate Strategy and Action Plan (2022 – 2030)[102]. ECOWAS master plan for regional infrastructure development (2020 – 2045)[103]. ECOWAS master plan for developing Regional Power Generation and Transmission Infrastructure (2019 – 2033)[104].	The climate change policy notes that infrastructure projects have been identified and prioritised through the various master plans, but these plans do not fully consider building resilience to the impacts of climate change into the plans.
Southern African Development Community (SADC).	Water, transport, power, and telecommunications.	SADC Climate Change Strategy and Action Plan[105]. Regional Infrastructure Development Master Plan[106].	Explicit demand for promoting climate-proofing infrastructure for social and economic development. Further demand for increasing public and private knowledge on climate-proofing public infrastructure.

4 THE ROLE OF ARTICLE 2.1(C) IN FINANCING CLIMATE-RESILIENT INFRASTRUCTURE

Article 2.1(c) of the Paris Agreement delineates a dual objective: to align financial flows with pathways that (1) reduce GHG emissions and (2) foster climate-resilient development. While the discourse has centred on low-emission pathways under the Article, relatively less attention has been given to exploring climate-resilient development pathways that are crucial for Africa. The implications of Article 2.1(c) for infrastructure development on the continent have largely been unexplored. This section seeks to provide a conceptual understanding of Article 2.1(c) and its relevance to infrastructure development in Africa. Further, the section will discuss the financing gap for climate-resilient infrastructure, examining the existing financial landscape and other financial instruments that can promote the goals of Article 2.1(c).

4.1 Current Understandings of Article 2.1(c)

Within the United Nations Framework Convention on Climate Change (UNFCCC), there remains a lack of agreement regarding the scope (public finance, private finance, domestic sources, international sources), execution and stakeholder responsibilities related to Article 2.1(c)[107]. In addition, further disagreement revolves around the relationship between Article 9 and Article 2.1(c) in terms of the obligations of developed countries to provide financial resources to developing countries. These

[100] COMESA. 2022. Climate Regional Resilience Framework.
[101] EAC. 2011. EAC Climate Change Master Plan.
[102] ECOWAS Commission. 2022. ECOWAS Regional Climate Strategy and Action Plan (2022- 2030).
[103] ECOWAS. 2021. ECOWAS master plan for regional infrastructure development (2020-2045).
[104] ECOWAS. 2018. ECOWAS master plan for developing Regional Power Generation and Transmission Infrastructure (2019 - 2033).
[105] SADC. 2015. SADC Climate Change Strategy and Action Plan.
[106] SADC. 2012. SADC Regional Infrastructure Development Master Plan.
[107] Standing Committee on Finance. 2023. Report of the Standing Committee on Finance: Synthesis of views regarding ways to achieve Article 2, paragraph 1(c) of the Paris Agreement.

discussions are occurring alongside calls for reform in the global financial system, which include enhancing the representation of developing countries in international finance institutions, lowering the cost of sovereign borrowing for developing nations and creating long-term solutions for addressing debt distress in developing countries.

Beyond the UNFCCC, various efforts are underway to explore nuances and mechanisms for operationalising Article 2.1(c). Recently, Mbewe et al. (2024) suggested that frameworks and principles for operationalising the Article will vary depending on the nature of finance flows—public versus private or domestic versus international—all of which aim to maximise competing or differentiated objectives[108]. Developing countries with competing priorities must make strategic choices about maximising financial flows to meet climate resilience goals. Further, Whitley et al. (2018) propose a framework to translate Article 2.1(c) into tangible actions, specifically government-led tools and levers (subsidies, taxes, mandated climate-related financial disclosure, and climate-resilient budgeting) that can support the transition and alignment of financial flows with the Paris Agreement[109].

A persistent challenge in climate finance has been defining what constitutes climate finance. This challenge is central to Article 2.1(c) when determining what contributes to climate resilience. Mullan and Ranger (2022) developed a framework for "climate resilience aligned finance", which focuses on "*ensuring financial flows are consistent with those needed to achieve climate-resilient development at a societal level*"[110]. The framework focuses on alignment within the OECD and emerging economies while acknowledging unique challenges faced by Small Island Developing States (SIDS) and least developed countries LDCs) face unique challenges in financing adaptation.

They propose three principles for climate-resilience-aligned finance:

- Physical risk management: Identifying and managing physical risks proactively through forward-looking analysis, considering hazards, exposure, and vulnerability to ensure comprehensive risk mitigation.
- Do no significant harm: Managing risks in a way that does not increase risks for others.
- Alignment with adaptation strategies and objectives: Ensure financial and investment decisions align with prevailing adaptation goals, plans, or strategies, including those in established frameworks such as NAPs.

Emphasising climate resilience in financial flows is critical for Africa, given its unique socio-economic landscape and existing climate vulnerabilities. A nuanced understanding of the varying capacities and circumstances within developing nations is important as shifts in financial flows significantly impact a country's development trajectories. Unilateral implementation of finance, policy and trade measures, for example, is likely to have unintended consequences, having both economic and social impacts. Thus, the principles of equity and common but differentiated responsibilities and respective capacities (CBDR-RC) must be integrated in operationalising the Article.

4.2 Relevance of Article 2.1(c) to Infrastructure

Globally, infrastructure contributes to nearly 79% of all GHG emissions and is responsible for 88% of adaptation costs[111]. Yet only a small fraction of the annual USD 2,7 trillion global infrastructure investments is directed towards climate-resilient infrastructure projects[112]. These financial flows will have to shift as we move towards implementing the Paris Agreement.

The scale of infrastructure needs in Africa underscores the deep-rooted development challenges that must be addressed. Due to the substantial infrastructure needs still to be met, Africa presents a unique opportunity to prioritise the development of climate-resilient infrastructure. Unlike the costly process of retrofitting existing infrastructure for climate resilience, integrating climate considerations into the planning and design stages offers environmental benefits and significant economic advantages. Moreover, investing in climate-resilient infrastructure can help avoid even greater costs associated with future climate impacts and the need for retrofitting.

As Africa moves forward with infrastructure expansion, for example, PIDA, careful consideration of factors such as infrastructure type, location, and environmental impact is essential. Failure to incorporate climate projections into infrastructure planning could result in substantial economic losses and social consequences. For instance, neglecting climate

[108] Mbewe. S., Rahman, P., Tredoux, A., & Dobson, B. 2024. Exploring Operational Pathways for Article 2.1(c) of the Paris Agreement in Africa: A Case of High Carbon Financial Assets and Financial Sector Transformation in South Africa.
[109] Whitley, Thwaites, Wright, and Ott, 2018. Making finance consistent with climate goals: Insights for operationalising Article 2.1c of the UNFCCC Paris Agreement.
[110] Mulan, and Ranger. 2022. Climate resilient finance and investment: framing paper..
[111] UNOPS, UNEP & University of Oxford. 2021. Infrastructure for Climate Action.
[112] Mullan, & Ranger. 2022. Climate-Resilient Finance and Investment: Framing Paper..

risks could lead to lost revenue opportunities in sectors like hydropower or worsen the impacts of climate-induced disasters on coastal communities[113]. Therefore, integrating climate resilience into infrastructure development is prudent and imperative for sustainable growth and development in Africa.

Aligning infrastructure development with Article 2.1(c) of the Paris Agreement presents an opportunity for financiers and policymakers to prioritise climate-resilient projects and set robust development standards. *However, operationalising Article 2.1(c) for infrastructure development raises several key questions that need addressing*:

4.2.1 Public and Private Sector Partnerships

- How can both sectors be incentivised to prioritise investments in climate-resilient infrastructure?
- How can capacity constraints, particularly in the public sector, be addressed to better maximise these arrangements for resilience?
- What policy mechanisms can promote collaboration between public and private entities?

4.2.2 Financial Requirements:

- What quantum of finance is needed to support the transition to low-emission, resilient infrastructure?
- How can funding mechanisms be structured to support the differing adaptation and resilience contexts that need to be financed?
- Given the large financial disparities across regions and countries, how can sufficient resources be made available to all countries?
- How can investments for project preparation be mobilised effectively to support the development of CRI projects?

4.2.3 Technology Transfer

- How can new technologies, crucial for developing resilient infrastructure, be shared or disseminated across borders and at what cost?
- What role can international cooperation play in facilitating technology transfer?

4.2.4 Social Inclusion

- What approaches for social inclusion have worked for infrastructure projects?
- How can initiatives guarantee social inclusion for marginalised and vulnerable communities in the planning and implementation of CRI projects?

Addressing these questions is imperative, given the projected costs of climate change impacts on infrastructure. Proactive measures aligned with Article 2.1(c) can pave the way for resilient infrastructure, ensuring Africa's sustainable growth while safeguarding against the escalating impacts of climate change.

4.3 The Climate Finance Gap

Whilst there is agreement that infrastructure needs to be more climate resilient, investments remain predominantly directed towards projects not defined as climate resilient. The CPI (2022) estimates that for every USD 1 spent on climate-resilient infrastructure, USD 87 was spent on infrastructure projects not defined as climate-resilient[114]. Given the increasing climate risks countries face, the resilience of infrastructure assets is crucial for their climate-resilient development pathways. In addition to the societal benefits of reducing disruptions to infrastructure services during and after extreme weather events, investing in resilient infrastructure can yield significant cost savings. For example, it is estimated that for every 1 USD spent on resilient infrastructure, it can save up to USD 4 in post-disaster scenarios[115].

However, adaptation financial flows have been limited on the continent. Between 2017 and 2018, USD 19 billion of public finance went to sub-Saharan Africa as climate finance, with a mere 5% going towards adaptation[116]. The majority of finance flowed into agriculture, water supply and sanitation, accounting for nearly half of the total adaptation finance[117]. The adaptation finance gap is widening, with the estimated adaptation costs at 10-18 times higher than international public adaptation finance flows[118].

As the scale of global warming increases, adaptation costs are expected to rise significantly. For example, adaptation costs for the continent are projected to range from USD 20 - 50 billion per year for 1.5℃ warming, USD 18 - 60 billion per year for over 2℃, and USD 100 - 437 billion per year for 4℃ of global warming[119]. Based on submitted NDCs and NAPS, approximately 25% of the financing needs are allocated for infrastructure and settlements[120]. However, these estimates may significantly underestimate the actual costs due to methodological limitations such as variations

[113] Cervigni, Neumann, Liden & Strzepek. 2015. *Overview* in Enhancing the Climate Resilience of Africa's Infrastructure
[114] Climate Policy Initiative. 2022. Tracking Investments in Climate Resilient Infrastructure.
[115] Ibid
[116] IPCC. 2022. *Climate Change 2022: Impacts, Adaptation, and Vulnerability.*.
[117] Ibid.
[118] UNEP. 2023. Adaptation Gap Report 2023.
[119] Ibid.
[120] Ibid

in how adaptation is defined and measured, high levels of uncertainty about future climate risks and socioeconomic scenarios, and which of these scenarios countries use to assess costs.

These same challenges are found when assessing how much financiers invest in climate-resilient infrastructure. This is further compounded by the limited transparency regarding how much finance has been disbursed at the project level and how it is reported[121]. There has been a push for multilateral financiers to shift all their investments to align with achieving the Paris Agreement's goals. The recent publication of a framework and common principles for aligning investments with the Paris Agreement by Multilateral Development Banks aims to guide alignment efforts[122]. However, the impact of these principles on developing countries, particularly in Africa, remains to be seen where there is demand for higher-emission infrastructure projects[123]. To that end, CBDR-RC are key to applying the principles. In assessing the alignment of mitigation projects, for example, the approach considers the country's long-term strategy, consistency with associated public policies, and the types and carbon intensity of technologies and infrastructure[124]. Assessments will be based on available information and tools but rely on countries self-defining low emissions and climate-resilient development pathways. For adaptation and climate resilience, projects will be assessed for their ability to manage material physical climate change risks, how consistent they are with a country's adaptation and resilience strategies and how they contribute to the country's climate-resilient development pathway.

Notwithstanding, there is still a risk that some projects that countries see as critical for their development pathway may be unable to access finance. Countries must ensure they have clearly defined their low-emission, climate-resilient development pathway, which will impact their ability to access finance. Support from partners to ensure that, for example, NAPs adequately include infrastructure considerations will be critical.

4.4 Climate Finance Needs for Infrastructure

Based on the analysis of climate finance needs in Africa, the CPI (2022) estimates that the continent would require at least USD 2.8 trillion between 2020 and 2030 to implement the NDCs[125]. However, the CPI noted some challenges in assessing the finance needs that include (and therefore may have resulted in over/under or inaccurate estimation):

- Not all countries provide estimated costs of their infrastructure needs in their NDCs.
- Not all sectors have subsectors, so it is difficult to know where infrastructure investments are needed.
- Not all countries presented disaggregated data, leading to estimates based on a smaller sample size. Consequently, the needs are anticipated to be much higher.
- Countries use different methodologies for costing needs.

Given these limitations, the scale of climate finance needs is expected to exceed the estimates in Table 10 below. The focus of infrastructure in the NDCs has predominantly centred on mitigation. Furthermore, climate finance flows have largely been concentrated in a few countries. For example, Egypt, Kenya, Morocco and Ethiopia account for 74% of all transport climate finance[126]. This highlights the disparities in accessing climate finance and underscores the need to address structural barriers to accessing climate finance at scale to ensure that no country is left behind.

Table 11 below provides an overview of the traditional and climate finance flows in each of the subsectors for the continent. The scale of climate finance required to respond effectively to the impacts of climate change surpasses the existing climate finance flows and infrastructure investment commitments. To bridge the financing gap, it is necessary to bolster both public and private financial flows, strengthen project pipeline development and invest in governance. Financing infrastructure will require mainstreaming climate change into traditional finance as climate finance (in its current form) cannot meet the financing demands for climate-resilient infrastructure. It will be crucial to diversify investment sources and for international and public finance to leverage private-sector investment into the

[121] Climate Policy Initiative, 2022. Tracking Investments in Climate Resilient Infrastructure.
[122] MDB. 2023. Joint MDB Methodological Principles for Assessment of Paris Agreement of new operations: direct investment lending operations.
[123] The framework focuses on six areas - mitigation, adaptation and climate resilient operations, scaling-up climate finance, engagement and policy development support, reporting and aligning internal activities.
[124] MDB. 2023. Joint MDB Methodological Principles for Assessment of Paris Agreement of new operations: direct investment lending operations.
[125] Guzmán, Dobrovich, Balm, & Meattle. 2022. The State of Climate Finance in Africa: Climate Finance Needs of African Countries.
[126] Climate Policy Initiative. 2022. Landscape of Climate Finance in Africa.

infrastructure sector. Public and international institutions play a further role in providing estimated costs of climate-resilient infrastructure so that there can be a clear picture of the needs.

Unfortunately, few countries estimate the costs to ensure infrastructure is climate-proofed or climate-resilient. Given the scale of infrastructure needs and the annual investment required, shifting existing financial flows towards climate resilience is essential. For new infrastructure, costs are expected to increase due to rising risks and the need to protect the growing stock of infrastructure assets.

Table 10: Estimated Climate Finance Needs for Infrastructure

Sector	Estimated Finance Needs (USD bn)	Type of Activity (Mitigation or Adaptation)
Transport	657.8* (of which 615.8 is for South Africa)	Mitigation The majority of this is for investment in South Africa
Energy	275.7 (of which South Africa is 117.2)	Mitigation
Water and sanitation	8.8	Mitigation
Buildings and infrastructure	0.3	Mitigation
Water	29	Adaptation
Buildings and infrastructure	21	Adaptation

Source: Author's tabulation from the CPI (2022).[127]

4.5 Challenges for Financing CRI

Low-emissions climate-resilient infrastructure faces different financial challenges than traditional infrastructure. These include[128]:

- Higher upfront costs
- Higher technology risks
- Higher regulatory risks as returns rely on government subsidies and policies.
- Different risk perceptions by financiers.

There is insufficient data to comprehensively outline the scale of finance required to make infrastructure climate resilient. Contributing factors include[129]:

- The focus on resilience and finance for resilience is developing; thus, there is no common methodology for tracking financial flows.
- Context-specific understanding of resilience makes it difficult to define whether projects contribute to resilience.
- Lack of standardised, easily accessible information on investments in climate-resilient infrastructure.
- Lack of transparency on disbursements of finance at the project level. Many figures produced currently rely on commitments made.

Beyond costs, climate-resilient infrastructure faces significant barriers to implementation on the continent. These barriers include[130]:

- Inadequate capacity for policymakers to assess risks, vulnerability and impacts and to integrate these into investment strategies at all governance scales.
- Limited access to finance for adaptation and resilience.
- Limited policy guidance is provided at the country level, where infrastructure projects are implemented to ensure climate-resilient and contribute to broader resilience.

[127] Climate Policy Initiative. 2022. Landscape of Climate Finance in Africa.
[128] OECD. 2018.
[129] Climate Policy Initiative, 2022. Tracking Investments in Climate Resilient Infrastructure.
[130] Ibid.

- There is a lack of construction codes, standards, and metrics for integrating climate risk into infrastructure design and financing.
- Lack of a taxonomy that can guide investors towards context-appropriate resilient interventions.
- Investor perception: Investor risk perceptions, compounded by low credit ratings, impact the cost and availability of capital.
- Investor preference: Private investors tend to favour brownfield infrastructure projects due to lower risk exposure. In addition, most private investors only want to hold senior, secured and, if possible, guaranteed debt[131].
- Domestic financial institutions tend not to lend to key low-carbon sectors even with third-party partial guarantees because they have little knowledge of the sector or limited capacity to assess returns on low-carbon projects.[132]

Without addressing these barriers, there is a risk that some of the assets will become stranded, especially those with high emissions, and those designed for a specific climate scenario will not happen. This would lead to significant cost implications for asset owners and operators, increasing exposure and vulnerability. The continent must reassess its current project pipeline, such as projects implemented through PIDA, for its climate resilience.

Table 11: Traditional finance and climate finance flows

Sector	Traditional Financial Flow	Climate Finance Flows
Energy	USD 29 billion[133] and an additional USD 37 billion in subsidies[134]	USD 9.4 billion
Water	USD 8.1 billion	USD 2.6 billion
Transport	USD 34.4 billion	USD 2.6 billion
Buildings and infrastructure[135]	-	USD 1.3 billion

Source: Author's tabulation from the CPI (2022). [136]

4.6 Financial Instruments Enabling CRI

As discussed in Section 3, African governments have funded infrastructure through budgetary allocations. However, this is increasingly becoming challenging given the increased constraints with limited revenue, including reduced official development flows. Countries are, therefore, looking at alternative ways to raise long-term capital to bridge the financing gap that does not lead to unsustainable debt. Thus, in addition to climate finance, various financial instruments can support investments in climate-resilient infrastructure. These include concessional finance and climate-related debt instruments such as green bonds, debt swaps and debt relief. These are discussed in further detail below. When considering the use of any financial instrument, the country's macroeconomic context, policy objectives, existing financing options and government policies, risk perception of various stakeholders, and the existing in-country capacity must be considered to make the best use of these instruments.

4.7 Concessional Finance

Concessional finance comprises loans at below-market interest rates and grants. Sourced from bilateral donors and multilateral financial institutions, it forms one of the largest sources of climate finance for African countries. However, countries face challenges in accessing concessional finance which include[137]:

- Limited project design capacity to meet diverse financing requirements.

[131] Arezki & Sy. 2016. Financing Africa's infrastructure deficit: From development banking to long-term investing.
[132] AfDB. 2022. African Economic Outlook 2022: Supporting Climate Resilience and a Just Energy Transition in Africa.
[133] Banktrack. 2022. Banking on Climate Chaos: Fossil Fuel Finance Report 2022.
[134] Banktrack (2022) estimates that USD 1.4 trillion is planned to be invested by 2050 in new oil and gas projects on the continent.
[135] The focus was on urbanisation and does not include rural infrastructure needs.
[136] Climate Policy Initiative. 2022. Landscape of Climate Finance in Africa.
[137] Belianska, Bohme, Cai, et al. 2022. Climate change and select financial instruments: An overview of opportunities and challenges for sub-Saharan Africa.

- Financiers prefer larger-scale projects and projects based on non-local currency, which may result in the non-funding of critical but small projects.
- Limited funding available for ex-ante resilience measures reduces countries' ability to increase resilience.
- Reliance on international agencies that may not prioritise long-term capacity building.

4.8 Infrastructure Bonds

Infrastructure bonds are debt instruments governments or private companies issue to raise money from domestic and international debt capital markets. Infrastructure bonds have not been widely used on the continent, and the legal and regulatory framework for them is still nascent. Infrastructure bonds were used in Ethiopia, where the government issued interest and non-interest-bearing bonds to Ethiopian nationals and foreign nationals of Ethiopian origin to construct the Grand Ethiopian Renaissance Dam[138]. The dam is the largest hydropower project in Africa and was entirely financed through domestic sources - taxes, donations and government bonds.

4.9 Climate-Related Debt Instruments

There are three climate-related debt instruments: green, blue, and sustainability social bonds, debt swaps, and debt relief or cancellation. These instruments require that some or all of the funds raised be used to support climate action. They have limited adoption and are not widely used globally, even less so in sub-Saharan Africa.

4.10 Green, Blue, Social and Sustainability Bonds (GBSS)

GBSS issuances in sub-Saharan Africa make up 0.3% of total GBSS bond issuances. These have been issued in South Africa, Mauritius, Nigeria, Ghana, Kenya, Seychelles and Namibia[139]. Green Bonds are the most common in this context, with sustainability/social bond issuance being even more limited[140]. They have been used for multiple purposes, including sustainable infrastructure, biodiversity conservation, and forest restoration (see Box 4). GBSS bonds have a longer maturity, allowing projects to generate returns and cover capital costs over the payback period. Bond issuers can access a wider variety of investors, which distributes the risk and lowers risk premiums. Moreover, issuing Green Bonds conveys the message that the issuers prioritise climate action, potentially paving the way for additional avenues of climate finance.

For countries seeking to use GBSS bonds to finance infrastructure projects, a strong pipeline of projects and a good credit rating are essential to attract a broader range of investors. This may limit the applicability of these bonds in most countries that are not rated by a credit agency or do not have a good credit rating.

Box 4: City of Cape Town Green Bond

The worst drought in almost a century hit the Western Cape province of South Africa, following the driest three consecutive wet seasons between 2015 and 2017. In March 2017, the mayor of Cape Town declared the City a disaster area to manage the drought and the water supply[141]. At that point, the City estimated it had 121 days of water left until Day Zero if the consumption levels remained unchanged. In March 2018, the drought was declared a national disaster due to its magnitude and severity.

In this context, the City issued South Africa's first Green Bond worth ZAR 1 billion (approximately USD 75 million) in 2017 to invest in mitigation and adaptation projects, including water resilience projects, building energy efficiency, coastal structure protection and rehabilitation. Its priority was to finance critical water infrastructure in response to the drought. The Green Bond was the first in South Africa to meet the Climate Bonds Initiative requirements (which includes alignment with the Paris Agreement) and receive accreditation. It was also the first in the country to receive Moody's certification, rating the bond GB1 – "excellent[142]". In becoming accredited, the City committed to implementing concrete climate actions that were pro-poor and linked to their then climate action policy. The ten-year bond was oversubscribed when it was launched due to high investor uptake, attributed to a high credit rating, a strong pipeline of projects, and a robust project tracking and information system[143].

[138] Minney. 2011. Ethiopia plans more bonds for USD4, 7 billion hydropower dam
[139] Belianska, Bohme, Cai, et al. 2022. Climate change and select financial instruments: An overview of opportunities and challenges for sub-Saharan Africa.
[140] Ibid
[141] Petersen. 2017. Cape Drought Officially a Disaster.
[142] Gihub. 2021. Cape Town Green Bond.
[143] C40 Cities Climate Facility. 2022. Banking on a Just and Green Recovery.

4.10.1 Climate-Related Debt Swaps

Climate-related debt swaps involve restructuring or forgiving a developing country's debt in exchange for commitments to invest in climate change projects. Although not widely used, there is increasing interest in how they could fund adaptation activities. High debt levels can exacerbate climate vulnerability by limiting countries' fiscal space to address climate shocks. The design and scale of the swap are crucial as some debt relief may inadvertently benefit non-participating creditors[144]. While suitable for sustainable debt, other instruments like conditional grants or comprehensive restructuring with climate-related conditions may be more appropriate[145]. Climate-related debt swaps have not been used to finance infrastructure.

There are two main ways to structure the swap: a bipartite swap between the creditor and debtor and a tripartite swap between the debtor and a third party. In a tripartite swap, the third party raises funds to buy the debt at a discounted price or loans the money to the government. For example, in 2015, the Nature Conservancy raised USD 28 million to purchase USD 30 million of the Government of Seychelles debt. The debt was then restructured to USD 15 million, with parts of it in local currency and its maturity was extended from 8 to 20 years. The savings from the swap were invested in ocean conservation[146]. In sub-Saharan Africa, debt swaps have predominantly been used in the development and health sectors. Some bilateral debt swaps with climate components have occurred, such as between Cameroon and France in 2006 and between France and the Democratic Republic of Congo in 2019[147].

4.10.2 Climate-Related Debt Relief

Climate-related debt relief is used by countries seeking to have their debt written off, which relies on good faith between the creditor and the debtor. The debtor is expected to use the fiscal space to finance climate-related activities[148]. Debt relief has been used in broader development discussions, the most recent to enable African countries to respond effectively to the COVID-19 pandemic. The pandemic saw a surge in public debt as countries put in measures to prevent the spread and impact. However, there are challenges associated with this instrument:

- Reporting, monitoring, and verifying that the finances are used for their intended purpose can be costly and challenging, depending on the defined parameters.
- It has limited technical capacity of debtors to design and implement relief measures that truly benefit them and enhance climate action.
- Insufficient quality data, including debt statistics and climate information, are needed to inform instrument design.
- Unclear climate objectives may hinder alignment between countries' climate policies and macroeconomic frameworks, impacting debtors' and creditors' expectations.
- Lack of a good project pipeline, essential for the instrument to be effective and attract a wider range of investors, provides a longer-term vision of achievable outcomes.

Climate-related debt relief has not been explicitly used to finance climate-resilient infrastructure.

4.10.3 Examples of Investments in CRI

Several multilateral climate funds have funded different types of infrastructure projects, primarily focusing on ecosystem-based approaches at localised scales. The Climate Investment Fund and the Green Climate Fund (GCF) have utilised different financial instruments to address barriers to investing in CRI, including grants, loans, guarantees and equity tailored to specific sectors and project goals.

Given that the GCF is the largest funding source for climate change action for developing countries, its approach to

financing infrastructure projects may influence other multilateral financiers. Through its built environment thematic area, the GCF has concentrated on catalysing policy shifts toward CRI and unlocking public and private capital at scale.

The GCF adheres to six principles in financing infrastructure projects[149]:

- Infrastructure systems approach that examines assets and their surrounding environments to enhance community resilience by addressing potential cascading failures.
- Climate risk assessments evaluate current and future resilience needs using the best available information.

[144] Belianska, Bohme, Cai, et al. 2022. Climate change and select financial instruments: An overview of opportunities and challenges for sub-Saharan Africa.
[145] Ibid
[146] Ibid.
[147] Belianska, Bohme, Cai, et al. 2022. Climate change and select financial instruments: An overview of opportunities and challenges for sub-Saharan Africa.
[148] Belianska, Bohme, Cai, et al. 2022. Climate change and select financial instruments: An overview of opportunities and challenges for sub-Saharan Africa.
[149] Green Climate Fund. Thematic Brief Climate Resilient Infrastructure.

- Integration of mitigation, adaptation and resilience in deploying cross-cutting solutions.
- Integration of nature-based solutions, using ecosystems and ecosystem services to replace hard infrastructure wherever feasible.
- Conducting studies for project pipeline structuring enables reductions in project preparation costs, avoids maladaptation, and promotes the sustainability of actions.
- Capacity assessment of local institutions, supporting their role in executing and financing climate-resilient projects.

Boxes 5 and 6 below detail two projects that stand out for their goal of attracting further private investments in CRI on the continent, financed by the GCF.

Box 5: The Infrastructure Climate-Resilient Fund[150][151]

Led by the Africa Finance Corporation, this project was approved in March 2023 and is the first large-scale Infrastructure programme in Africa funded by the GCF. The Fund is focused on decreasing risk perceptions and attracting private investors into investing in climate-resilient infrastructure. The project defines climate-resilient infrastructure as "infrastructure built today with the technical specification and structural elements that will prepare them to cope with tomorrow's changing climate". They also apply this term to infrastructure that supports and contributes to climate resilience.

The project recognises that the failure to integrate climate change risk into the design, construction and maintenance of infrastructure ultimately increases costs to project owners and operators but also leaves entire communities exposed and vulnerable to the impacts of climate change. Adaptation is, therefore, critical to reducing costs from climate-related damage to infrastructure and avoiding significant knock-on effects on communities through disruptions to the availability and accessibility of infrastructure services. The Fund will use two main approaches to integrate climate resilience:

1. **Using blended capital strategies:** The costs of integrating climate risk into infrastructure design and construction are typically non-remunerative, thus, the Fund will mobilise concessional finance to absorb the cost. The Fund will use climate, socio-economic and financial analysis to quantify the impacts of changes in climate stressors on an infrastructure asset, to inform decision-making and develop an adaptation pathway strategy to prioritise cost-effective adaptation measures to be integrated as part of the technical and engineering options (both structural and soft measures). An adaptation pathways strategy that considers uncertainties will be proposed to plan measures as climate change scenarios unfold. It will allow the Fund to build multiple options and flexibility into project adaptation plans.
2. **Capacity building preparedness and policy interventions:** Strengthening climate risk assessments to provide robust climate data and information to various stakeholders, including government, project sponsors and investors, will enable them to make more informed decisions and adopt preventive and adaptive measures. The Fund will also strengthen the regulatory framework and incentivise the development of innovative climate risk parametric insurance products for the long-term viability of climate-resilient infrastructure investments in Africa.

The Fund will invest in new infrastructure projects with a limited portion of its portfolio on existing infrastructure assets (up to 25% of the portfolio). For existing infrastructure projects, they will look towards retrofitting or managing assets differently in light of climate risks.

These projects underscore the crucial role of project preparation in CRI investment. Once projects are designed, vulnerabilities may become locked in, making them challenging to address post-construction. Successful financing also hinges on supportive national-level policy and regulatory measures. However, it's too early to gauge the success of these projects, and if successful, scaling up investments over a short period may prove challenging. This is mainly due to the limited climate finance flows to the continent, which is attributed to stringent accreditation requirements and lengthy project development

[150]Green Climate Fund. 2023. FP205.

[151]Green Climate Fund. 2023. Infrastructure Resilient Climate Fund.

timelines[152]. These challenges have been noted in evaluating the GCF's engagement with African countries. Some pilot programmes have been rolled out to address some of these challenges, such as the Project-Specific Assessment Approach, which has been initiated to address these challenges. Still, infrastructure projects have yet to opt for this route.

Box 6: The Development Bank of South Africa (DBSA) Climate Finance Facility Programme[153]

The Development Bank of Southern Africa's Climate Finance Facility Programme is a lending facility that aims to address market challenges related to increasing climate-related investments in the Southern Africa region. The lending facility will include credit enhancements focused on first loss or subordinated debt and tenor extensions to catalyse private sector climate investments.

The CFFP will focus on infrastructure projects that are commercially viable but cannot attract market-rate capital at scale. Thus projects must demonstrate that they are technically and economically feasible and that there is market interest but limited capital availability. Projects must demonstrate that they involve the financial participation of one or more private sector financial parties and will have some transformative effect on markets in terms of scale, improved private sector participation and confidence in clean energy investments.

The project focuses on South Africa during the initial implementation phase with Namibia, Swaziland and Lesotho (ZAR-based countries). The project will focus on the priorities outlined in each country's NDC, which include clean energy, water infrastructure and waste management. To date two projects have been approved for funding. However, since its inception, the programme has faced several challenges related to contractual clauses between the facility, the GCF, and the facility and project owners[154].

[152] Independent Evaluation Unit. 2023. Independent evaluation of the relevance and effectiveness of the Green Climate Fund's investments in the African States.
[153] Green Climate Fund. 2018. Funding Proposal: DBSA Climate Finance Facility.
[154] Green Climate Fund. 2021. General Template of the Annual Performance Report.

5 PATHWAY TOWARD IMPLEMENTING ARTICLE 2.1(C) FOR CRI

Operationalising and implementing Article 2.1(c) of the Paris Agreement presents opportunities for fostering CRI development in Africa. This not only enhances countries' resilience but also yields development benefits. However, there is currently limited guidance on supporting the shifting of finance towards achieving resilience and development goals. This section outlines a pathway for integrating climate resilience into infrastructure investments to align them with Article 2.1(c). It emphasises the importance of multistakeholder engagement, collaboration, capacity building and learning among financiers, policymakers and project owners. By assisting policymakers in defining an appropriate approach tailored to their country's context, this section aims to ensure that infrastructure investments across the continent are climate-resilient, thereby operationalising Article 2.1(c).

5.1 Pathway

As discussed earlier, the continent requires significant financial inflows to address two primary objectives: closing the infrastructure gap and enhancing the quality of infrastructure to meet citizens' needs. Given the long-lived nature of infrastructure, financial flows have to integrate climate resilience in the project cycle to achieve these objectives and contribute to the attainment of Article 2 broadly. The pathway outlines a series of actions that policymakers and financiers must undertake in both the short and long term. As national governments are signatories to the Paris Agreement, the pathway emphasises the actions of policymakers to provide a conducive enabling environment for other actors and drive climate resilience in infrastructure investments. However, this does not preclude private sector and non-governmental actors from taking action within their sphere of control.

The pathway is organised into six areas, collectively guiding the infrastructure sector towards resilience. Capacity building is central to the operationalisation of Article 2.1(c), which enables stakeholders to drive implementation. Article 11 of the Paris Agreement[155] specifically addresses capacity building for developing countries, emphasising those most vulnerable to climate change and least developed countries. Capacity building under the Agreement encompasses various elements, including technology development, dissemination and deployment and access to climate finance. These elements are all essential for achieving the objectives outlined in Article 2.1(c) within African countries, recognising that full implementation may occur on a different timeline than developed countries.

5.1.1 Raising Awareness of the dual objectives of Article 2.1(c) in infrastructure financing

Raising awareness of Article 2.1(c) is pivotal for aligning financial flows with climate resilience imperatives. Few countries have addressed how they will align their financial flows with Article 2.1(c), given the ongoing discussions within the UNFCCC negotiations. Despite the lack of clarity, countries can start considering various elements based on their unique country contexts, their long-term strategy for climate resilience and their long-term development goals. Multiple interpretations of Article 2.1(c) will have different implications for how and what type of infrastructure can be financed.

Raising awareness becomes critical to ensure stakeholders in the infrastructure sector are cognisant of the various ramifications of Article 2.1(c) as it relates to financing, designing, and operating infrastructure. Diverse stakeholders must be brought together in an inclusive process considering both large-scale and small-scale infrastructure and grey and ecosystem-based approaches to infrastructure.

Suggested actions for policymakers (regional and country level) include:

- Convene Relevant Stakeholders: Bring together various infrastructure stakeholders, including government departments and financiers, to share current understandings of the scope of Article 2.1(c) and the risks and opportunities presented for each subsector under different interpretations. Having a continent-wide knowledge of the just and fair outcomes African countries want will be important to contributing to these discussions.
- Consider Unintended Consequences: Policymakers and financiers must also consider the unintended consequences of the global operationalisation of Article 2.1(c) and how it

[155] UNFCCC. 2015. Paris Agreement.

may impact future investments, particularly flows from public international sources. This entails anticipating potential shifts in funding priorities and exploring strategies to mitigate any adverse effects on infrastructure development in Africa.

- Determine Timeframes for Alignment: Based on inclusive stakeholder engagement, establishing timeframes for alignment with Article 2.1(c), taking into account a just transition, the principle of CBDR-RC and current different interpretations of the scope of Article 2.1(c).

5.1.2 Develop a Low-Emission and Climate Resilient Infrastructure Pathway

Article 2.1(c) of the Paris Agreement carries significant implications for the future infrastructure development in Africa. As developed countries align their investments with Article 2.1(c), the continent may face heightened challenges to access various finance streams, particularly for projects with high emissions. Proactively understanding the potential risks ahead is paramount for countries to design and implement appropriate policy and regulatory measures. This necessitates a comprehensive evaluation across multiple areas, some at the project level and others concerning the broader financial ecosystem. Addressing these actions comprehensively requires both capacity building and financial support.

Suggested actions for policymakers and financiers include:

- Assess Exposure to Hazards and Vulnerabilities: Policymakers and financiers should thoroughly assess the exposure to hazards and vulnerabilities of critical existing infrastructure projects. Given the continent's vast scale and limited financial resources, establishing a prioritisation process that involves communities with intimate knowledge of local-level climate risks is essential. Both policymakers and financiers have a role to play in this assessment. For projects identified as vulnerable, developing an action plan that addresses these vulnerabilities and includes adaptation strategies is imperative.
- Develop Financing and Implementation Plans: Based on the assessment, policymakers and financiers should collaborate to develop financing and implementation plans to address the vulnerabilities highlighted. These plans aim to ensure that infrastructure service provision is made resilient to climate impacts, safeguard communities, and enhance the sustainability of infrastructure investments.

For policymakers, additional actions Include:

- Develop a long-term vision for climate resilience: Policymakers should develop a clear-long term vision for implementing climate resilient infrastructure that draws on local-level experiences and is socially inclusive as different groups have different experiences and needs for infrastructure services.
- Establish Clear Parameters: Policymakers should initiate a process of defining clear parameters for financial actors in climate-resilient infrastructure development. This involves developing an understanding of what constitutes climate resilience within their contexts and how it is to be measured (principles and metrics). Policymakers need to draw upon various knowledge bases, including indigenous knowledge, scientific research, and best practices, to inform the definition of climate resilience. Furthermore, they must engage in stakeholder consultations to gather diverse perspectives, ensure that the parameters set are inclusive, and reflect the needs and priorities of all stakeholders involved in infrastructure development.

Additional Actions for financiers include:

- Assessing Climate Risks in Portfolios: Evaluate current portfolios for climate risk exposure and incorporate climate resilience considerations into investment decision-making processes. Ensure that investments align with countries' long-term climate objectives and contribute to building resilient infrastructure.
- Integrate Climate Resilience Criteria: Incorporate climate resilience criteria into investment decision-making processes. This involves considering climate risks and opportunities when evaluating potential infrastructure projects.
- Supporting Vulnerability Assessments: Provide financial and technical support for vulnerability assessments of critical infrastructure projects. Collaborate with policymakers and other stakeholders to develop adaptation plans and financing strategies to address identified vulnerabilities.

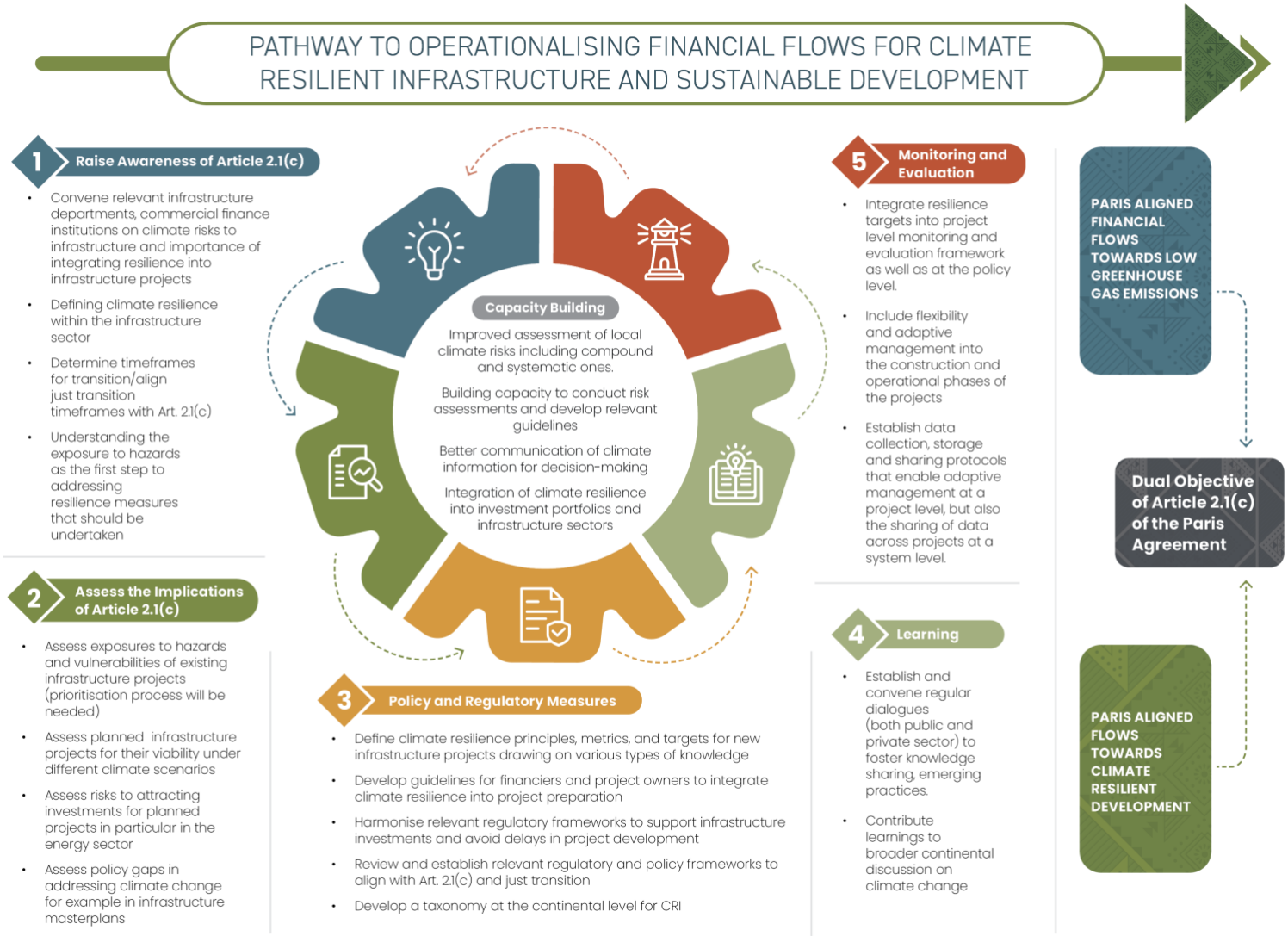

Figure 1: Pathway for operationalising Article 2.1(c) in financing climate-resilient infrastructure development in Africa.

Source: Authors' own conceptualisation.

- Promoting Climate-Resilient Investments: Offer financial incentives and support mechanisms to encourage investments in climate-resilient infrastructure projects. Explore innovative financing mechanisms, such as green bonds and climate risk insurance, to mobilise additional funding for resilient infrastructure development.
- Engage in Risk Management: Develop risk management strategies to address climate-related risks in infrastructure investments. This includes assessing and mitigating risks associated with climate change impacts on project viability, performance, and financial returns.

5.1.3 Strengthen the Policy and Regulatory Environment to support Climate Resilience

Policymakers at the country, regional and continental levels (including institutions such as the African Union and NEPAD) play an integral role in driving climate-resilient infrastructure development. Their actions in designing and implementing policy and regulatory interventions are pivotal in directing financial flows towards climate resilience. These measures not only facilitate behavioural change and innovation but also support the effective implementation of climate action initiatives. Moreover, policymakers must ensure that stakeholder engagement processes are inclusive, considering gender and social inclusion considerations to enhance the long-term impact and sustainability of the measures.

Some suggested actions for policymakers include:

- Review and Establish Frameworks: Once clear parameters are defined, policymakers must comprehensively review existing regulatory and policy frameworks to assess their alignment with climate resilience goals. This review process involves evaluating the effectiveness of current frameworks in promoting climate resilience and identifying areas for improvement. Policymakers should consider factors such as the legal and institutional landscape, regulatory coherence, and policy gaps related to climate resilience. Based on the review's findings, policymakers should take proactive steps to establish new frameworks where necessary, ensuring they are robust, adaptive, and conducive to climate-resilient infrastructure development.
- Harmonise Regulatory Frameworks: After establishing and reviewing frameworks, policymakers should harmonise regulatory frameworks across different jurisdictions to enhance climate resilience in infrastructure investments. This involves aligning regulations, standards, and guidelines to ensure consistency and coherence in approaches to climate resilience. This will need to be done at the national, regional, and continental scales to ensure that transboundary risks can be accounted for and aligned with various regional integration initiatives underway. Additionally, efforts should be made to streamline permitting processes, facilitate cross-border infrastructure investments, and promote regulatory convergence among stakeholders.
- Develop Guidelines for Project Owners: With clear and harmonised regulatory frameworks in place, policymakers should develop comprehensive guidelines for project owners to integrate climate resilience into all phases of infrastructure projects. The guidelines should consider the targets and metrics identified under the Assessing implications of Article 2.1(c) pillar. Project owners should be encouraged to conduct robust risk assessments, identify climate-related hazards and vulnerabilities, and implement appropriate adaptation measures. Moreover, guidelines should address capacity-building needs, stakeholder engagement strategies, and mechanisms for monitoring and evaluation to ensure the effectiveness and sustainability of climate-resilient infrastructure investments.

Suggested actions for financiers include:

- Engage with Policymakers: Collaborate with policymakers to align investment strategies with national and regional climate resilience goals. Participate in policy dialogue and advocacy efforts to promote supportive regulatory frameworks for climate-resilient infrastructure investment.

5.1.4 Coordination, Learning and Collaboration

Coordination, learning, and collaboration are pivotal to shifting existing and new investments towards a low-emission and climate-resilient pathway. Strengthening coordination and cooperation between sectors and stakeholders is essential to maximise synergies and minimise trade-offs in CRI planning and implementation. Establishing learning spaces at various levels fosters knowledge sharing, innovation, and efficiency improvements, contributing to enhancing infrastructure projects across different scales. This multi-layered approach can improve small, medium and large-scale infrastructure projects. At the continental level, institutions such as NEPAD, which are actively involved in implementing programs such as PIDA, serve as platforms for knowledge sharing and capacity building. Regional bodies like Regional Economic Communities (RECs) and cross-border collaborations between countries also provide opportunities for learning and collaboration.

Suggested actions for policymakers include:

- Convene Multi-Stakeholder Dialogues: Organize multi-stakeholder dialogues to facilitate knowledge sharing and emerging practices in the private and public sectors. These dialogues provide platforms for stakeholders to exchange insights, best practices, and innovative approaches to CRI planning and implementation.
- Contribute Insights to the UNFCCC: Share learnings and insights from coordination and collaboration efforts with entities like the Africa Group of Negotiators. These insights can inform negotiations on the operationalisation of Article 2.1(c).

5.1.5 Monitoring and Evaluation in Support of Building Climate Resilience

Tracking climate resilience investments is indispensable for gaining insights, tracking progress, and identifying gaps in infrastructure development in different contexts. When measuring resilience, it is essential to consider the social and political contexts in which infrastructure projects are implemented. Leveraging indigenous knowledge can enrich understanding of local-level climate resilience, contributing to more effective and contextually relevant solutions.

Governments bear the long-term responsibility for owning and monitoring infrastructure investments, ensuring their resilience throughout their lifecycle. Various tools have been developed to support governments in this endeavour. For instance, the World Bank's Resilience Rating system assesses individual projects during the design phase, evaluating the extent to which climate and disaster risks are considered. Additionally, the World Bank offers a disaster and climate risk stress methodology to help project designers achieve a high resilience rating. These tools can be helpful for policymakers in tracking infrastructure projects.

Suggested actions for policymakers include:

- Establish a Robust Monitoring and Reporting Framework: Develop a comprehensive framework for monitoring and reporting resilience-related metrics at different scales, ensuring a systematic data collection and analysis approach.
- Integrate Resilience Targets: Incorporate resilience targets into project-level monitoring and evaluation frameworks, aligning them with overarching policy objectives. This integration ensures that resilience considerations are embedded throughout the project lifecycle.
- Promote Flexibility and Adaptive Management: Introduce flexibility and adaptive management practices into the construction and operational phases of infrastructure projects. This approach allows for real-time adjustments in response to changing environmental conditions and emerging risks.
- Establish Data Collection and Sharing Protocols: Develop protocols for collecting, storing, and sharing data that facilitate adaptive management at the project level while enabling cross-project data sharing at a system level. This promotes knowledge exchange and enhances decision-making processes across infrastructure projects.
- Enhance Stakeholder Engagement: Foster stakeholder engagement throughout the monitoring and evaluation process, ensuring diverse perspectives are considered. This inclusivity promotes transparency, accountability, and the co-creation of effective solutions.
- Conduct Regular Reviews and Assessments: Schedule periodic reviews and assessments to evaluate the effectiveness of resilience measures and identify areas for improvement. These reviews should involve all relevant stakeholders and incorporate lessons learned from past experiences.
- Invest in Capacity Building: Provide training and capacity-building initiatives for policymakers, financiers, and project implementers to enhance their understanding of monitoring and evaluation methodologies. This investment ensures stakeholders have the necessary skills to assess and manage climate resilience in infrastructure projects effectively.

5.1.6 Capacity Building Interventions in Support of Climate Resilience

Capacity building, coupled with the provision of financial resources, lies at the core of implementing Article 2.1(c) for the African continent. Interventions must be tailored to support policymakers and financiers in enhancing their capabilities to identify and assess effectively. Capacity-building initiatives should seek to empower stakeholders across the project cycle, including communities in which infrastructure assets will be located.

Suggested target areas for capacity-building actions include:

- Support to Identify and Appraise Climate Risks: Evaluate the existing capabilities of policymakers and financiers to identify and appraise climate risks, including compound and systemic risks, at the local level. Develop targeted training programs to enhance expertise in assessing climate-related vulnerabilities and opportunities.

- Integrate Climate Resilience Across Investment Portfolios and Sector Plans: Support policymakers and financiers in integrating climate resilience considerations across investment portfolios and infrastructure sector plans. Offer technical assistance and guidance on incorporating climate risk assessments into project appraisal and long-term planning strategies.
- Utilising Climate Information in Decision-making Processes: Equip policymakers and financiers with the necessary tools and skills to use climate information in decision-making processes effectively. Offer training on interpreting climate data, forecasting techniques, and scenario planning to inform policy development and investment decisions. This may include establishing partnerships with local research institutions.
- Developing, Implementing, and Monitoring Climate Resilience Policies and Regulations: Support the development, implementation, and monitoring of policies and regulatory measures that integrate climate resilience across the infrastructure sectors. Provide guidance on designing robust regulatory frameworks that incentivize climate-resilient investments and ensure compliance with international climate agreements.

6 RECOMMENDATIONS

In operationalising Article 2.1(c) within the infrastructure sector on the continent, stakeholders should consider the following short- to medium-term actions. These recommendations are not exhaustive:

Development Partners and Multilateral Financiers

- **Increase investments in project preparation.** Given the significant infrastructure gap and the limited bankable project pipeline, investing significantly in the preparation of infrastructure projects will reduce the costs of the project when climate risks are considered and rapidly increase the pipeline of climate-resilient projects. This could be done, for example, by supporting (financial and technical) existing project preparation facilities to integrate climate resilience.
- **Increase investments in climate information data collection and sharing**. The availability and accessibility of down-scaled climate information are crucial to enabling policymakers, financiers, and project owners to design and implement CRI. Increasing investments in local institutions (meteorology departments, universities) to provide these services would contribute to the sustainability of these investments over time.
- **Increase investments in capacity-building interventions**. This will help both policy and financial actors understand climate resilience, measures that can be designed, and various tools and approaches that can be used. This will enable a shift towards a low-emission and climate-resilient development pathway.
- **Establish a common approach to financing climate resilience and not just adaptation.** This will require a systems approach to financing projects as it asks whether the project is aligned with a country-specific resilient development pathway and whether it addresses material physical climate risks and vulnerabilities. Given the various contexts and scales in which development partners and multilateral financiers operate, this will be challenging. However, a common approach informed by the county's long-term strategies would enable resilience to be further integrated.
- **Collaboration and learning with private sector financiers**. Development partners and multilateral financiers have developed decision-making tools and guidelines for considering climate risk that can be useful for private sector financiers investing in infrastructure on the continent. This can help attract and support private sector actors in financing resilience at scale.

Private Sector Financiers

- **Develop internal capacities and policies** to identify and appraise climate risks, identify compound and systemic risks and integrate climate resilience across investment portfolios.
- **Improving reporting** on physical climate and transition risks requires bridging data gaps in identifying and managing risks. This will enable them to implement measures that enhance their assets' resilience and long-term sustainability, diversify their portfolio where necessary and build investor confidence.
- **Strengthen stakeholder engagement processes** to ensure that infrastructure investments are socially sustainable. For large-scale infrastructure, in particular, where there can be conflict over whether and where infrastructure is placed, inclusive, participatory engagement can lead to better outcomes.

Policymakers

- **Develop a clear, low-emission, and climate-resilient infrastructure development pathway.** This will provide a clear, long-term perspective of the country's goals and where investments must go to enable the shift towards alignment with the Paris Agreement goals. It should include specific resilience principles and targets.
- **Mainstream climate resilience across infrastructure development plans and policies.** Ensuring that these are aligned with other climate plans and policies, such as Nationally Determined Contributions and National Adaptation Plans, will be key to ensuring that the proposed interventions align with the country's low-emission climate-resilient development pathway.
- **Enhance collaboration and coordination of actors across different scales** to drive climate resilience into infrastructure projects' planning, design and financing. Infrastructure projects are cross-sectoral and, as such, will require a variety of actors to collaborate. The cross-sectoral nature will require trade-offs to be considered and addressed based on the country's priorities, as enhancing resilience in one sector may result in less resilience in another. Some examples could be joint project review mechanisms,

including climate resilience as a significant criterion for evaluating projects. For transboundary projects, this could, for example, bring together relevant national ministries, REC departments and civil society.

- **Introduce disclosure requirements** for financiers; however, this will need to consider existing capacities to monitor and enforce as well as the maturity of the financial markets to avoid undue administrative burdens.
- **Develop peer-to-peer learning exchanges** over specified time frames, for example, twice a year, that bring together different actors to share experiences and approaches to integrating climate resilience, costing, financing, monitoring, and evaluation within infrastructure development. This can support the scaling-up of action across the different sectors.
- **Address regulatory and policy barriers** to enable a wider pool of financiers to participate in infrastructure development. For example, pension funds typically do not invest significantly in infrastructure due to regulations that prevent them from building large exposure to long-term infrastructure projects. However, this requires careful consideration of the various options.

8 Conclusion

Infrastructure development plays a pivotal role in shaping the trajectory of Africa's socioeconomic advancement, serving as the backbone of sustainable development across the continent. However, climate change poses a significant threat to existing and future infrastructure developments, exacerbating vulnerabilities and undermining resilience. Extreme weather events have had significant human, social and economic consequences. However, there has been considerable underinvestment in infrastructure on the continent, with an infrastructure financing gap estimated at USD 68 - 108 billion per year and the largest financing gap in the water sector. The continent faces significant challenges in addressing this finance gap, ranging from continued risk perceptions of financiers, which lead to capital being scarcer and more expensive, to a weak enabling environment, including political will and an insufficient project pipeline.

Implementing Article 2.1(c) will require shifting capital away from a high emissions and low resilience pathway to one that is low emissions and climate resilient. The continent can benefit from this shift in the infrastructure sector, where enhancing resilience provides both environmental and development benefits. By integrating climate resilience into the planning, design, financing, and implementation processes, stakeholders can mitigate risks, capitalise on opportunities, and build a more resilient and inclusive future for the continent. Taking a proactive approach can lessen the risk of investing in future stranded assets.

The extent to which the continent can capitalise on these opportunities will be determined by how policymakers create and prioritise an enabling environment for climate resilience for project developers and financiers. There are still some challenges to investing in climate resilience, such as the localised nature of climate resilience, which makes scaling up solutions challenging; limited data, which makes it difficult to design and finance appropriate interventions; and higher upfront costs and different risk perceptions of financiers. These could be overcome through investments by the public sector (including from development partners) to de-risk investments, scale up access to data and improve the regulatory and policy environment. Capacity building, together with climate finance, can shift investments towards climate resilience and low-emission options for the continent.

In conclusion, the pathway outlined in this paper supports policymakers and financers as they navigate the complexities of operationalising Article 2.1(c). By focusing on six key areas informed by ongoing discussions in the UNFCCC, the pathway provides a structured approach to defining a strategy for shifting financial flows towards resilience. It emphasises the importance of proactive engagement, inclusive participation, capacity building and collaboration amongst various stakeholders to integrate climate resilience into investment decisions and policy frameworks contributing to Article 2.1(c) implementation.

ANNEXURE

A. Project Preparation Facilities

Project preparation facility (PPF)	Managed by	Sectors financed	Type of financing	Mobilised/budget/finance	Climate risk screening/support	Focus
African Water Facility	AfDB	Water	Grants, technical assistance	€151.2 million, of which project preparation accounts for 75% of the budget	Screens all projects for climate risks and social inclusion (with a specific emphasis on gender)	Expanding pilot projects, enhancing private sector participation and supporting financial closure
DBSA	Government of South Africa	Energy, health, ICT, transport, water and sanitation	Loans, equity, credit enhancement and non-ECA cover (the uncovered portion of an Export Credit Agency-backed transaction)		Projects must meet certain criteria, including alignment with SDG and demonstrate development impact, including climate and social impact	Early-stage project preparation
EU-Africa Infrastructure Trust Fund156	European Investment Bank	Energy, transport, water and ICT	Grants, technical assistance, interest rate subsidies, and financial instruments, including local currency lending, risk-sharing instruments, direct financing and risk capital	Euro 483 million Euro 330 million for renewable energy and energy efficiency		
ECOWAS Project Preparation and Development Unit	ECOWAS	Transport, energy, Water and ICT with an emphasis on regional integration projects				• Identifying, selecting and prioritising projects, mobilising resources for project preparation and infrastructure financing

[156]European Investment Bank. EU Infrastructure Trust Fund.

						• Capacity building for national and intergovernmental institutions responsible for implementation and promoting PPPs
Public-Private Infrastructure Advisory Facility[157]	World Bank		Grants, technical assistance			• Research and tools • Capacity building to scale infrastructure delivery, support sub-national entities to access finance without sovereign guarantees
Sustainable Energy Fund for Africa	AfDB	Energy, renewable energy and energy efficiency	Technical assistance Concessional finance instruments - results-based financing, loans and equity			• Increase renewable energy in power systems • Green mini-grids • Energy efficiency
NEPAD Infrastructure Project Preparation Facility	AfDB	Energy, transport, ICT, and transboundary water		USD 111.4 million	Mainstream climate change, gender, fragility and resilience in project preparation	Pre-feasibility and feasibility studies, project structuring, capacity building for infrastructure development, facilitation and creation of an enabling environment for regional infrastructure development
SADC Project Preparation and Development Facility[158]	DBSA	Energy, transport, ICT, water, meteorology and tourism				Pre-feasibility and feasibility studies, advisory services, technical assistance

[157] PPIAF.

[158] Project owners need to contribute 5% of the total cost of the proposed preparatory activity. Only projects requiring a grant of a minimum of USD250, 000 will be considered for support. Private sector actors can only apply for funding if the project involves the participation of public sector entities and the applicant has a letter of support from the respective government representative.

B. Initiatives to Scale Up Investments in Climate-Resilient Infrastructure

Initiative	Overview	Focus Areas
Africa Climate Resilient Investment Facility	AFRI-RES is a partnership between the AU, AfDB, United Nations Economic Commission for Africa (UNECA) and the World Bank Group. It supports governments, planners and private developers in Africa to integrate climate change in project planning and design, thereby attracting funding from both development and climate finance sources.	• Project level technical assistance in the form of grants which includes climate risk assessments, capacity building, climate studies and hiring technical experts. • Developing a climate knowledge and data portal • Developing sectoral guidelines, standards and good practice notes • Outreach, dissemination and training.
Africa Adaptation Acceleration Programme[159]	A joint initiative between the AfDB and the Global Centre on Adaptation seeks to mobilise USD 25 billion over five years to accelerate and scale adaptation. The infrastructure pillar aims to scale up investment in rural and urban settings in key sectors - water, transport, energy and waste management. The programme aims to mainstream innovative climate resilience solutions into USD 7 billion in new infrastructure investments. The innovative financial initiatives will support the design of innovative public and private financial instruments that may include resilience bonds and debt for resilience swaps to aggregation mechanisms for adaptation investment assets and the design of innovative public and private financial instruments that may include resilience bonds and debt for resilience swaps to aggregation mechanisms for adaptation investment assets and monetisation of adaptation benefits.	• Mainstream climate resilience solutions (including nature-based solutions) across water, transport, water, energy and urban systems.
The Africa 50 - Infrastructure Fund [160]	Africa50 is an investment platform focused on facilitating project development and mobilising finance for high-impact national and regional projects in the energy (power generation and midstream gas), transport, ICT, healthcare, fintech and education sectors. By investing in infrastructure, the platform seeks to promote sustainable economic growth, create jobs, and improve the lives of the people on the continent while preserving natural resources for future generations and creating value for shareholders. Africa50 has funded projects of over USD 5 billion aggregated value using its three investment vehicles.	• Provide early-stage equity funding and project preparation support to move projects to financial close. • Works with stakeholders close to or after financial close and funds projects through equity and quasi-equity with flexible exit options. • Infrastructure Acceleration Fund catalyses further investment flows into infrastructure, working with private and institutional investors from within and outside Africa.

[159] AfDB. 2023. Africa Adaptation Acceleration Program.

[160] Africa 50. 2023. ESG & Climate.

Alliance for Green Infrastructure in Africa (AGIA)	AGIA was launched at COP27 in Sharm El-Sheikh in Egypt in November 2022. The Alliance brings together the African Union, African Union Development Agency, the AfDB, Africa50 in partnership with the European Investment Bank, the European Bank for Reconstruction and Development, the French Development Agency, the Rockefeller Foundation, the US Trade and Development Agency, the Global Center on Adaptation, the Private Infrastructure Development Group and the African Sovereign Investors Forum[161]. The Alliance seeks to raise capital to finance the continent's just and equitable transition to Net-Zero emissions and will develop a pipeline of transformational bankable projects and catalyse finance at scale and speed for infrastructure. The platform will raise up to USD 500 million to provide early-stage project development capital. This is projected to generate up to USD 10 billion worth of investments in green infrastructure, which include co-investments, co-financing, risk mitigation and blended finance. The focus sectors are energy, transport, water and sanitation, health, information and communications technology, urban and rural infrastructure.	• Project preparation and development which seeks to develop a pipeline of bankable green infrastructure projects • Project ratings - which will establish green eligibility criteria and project rating guidelines for infrastructure projects. It will also include technical assistance that builds capacity within the public sector • Co-financing and de-risking - provides derisking instruments to facilitate investment and develop a clear framework to mobilise equity and debt financing for green infrastructure from AGIA members and other sources • Institutional investors - facilitates the mobilisation of funds from global and African institutional investors and leveraging African and international capital markets to drive.

[161] AfDB. 2022. COP27: African and global partners launch multi-billion alliance for green infrastructure.

DISCLAIMER

This paper, titled "Exploring Operational Pathways for Article 2.1(c) of the Paris Agreement in Africa: The Case of Financing Climate Resilient Infrastructure in Africa", is a product of the Aligning Financial Flows with the Paris Agreement in Africa (AFF) project, implemented by SouthSouthNorth (SSN). The project receives funding from the International Climate Initiative (IKI) of the Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK). The views expressed and information contained in this document do not necessarily reflect those of IKI or BMWK, nor of the entities managing the AFF project. These parties disclaim any responsibility or liability for the views expressed, the completeness or accuracy of the information, or any reliance placed on them.

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