Private Infrastructure Development Group

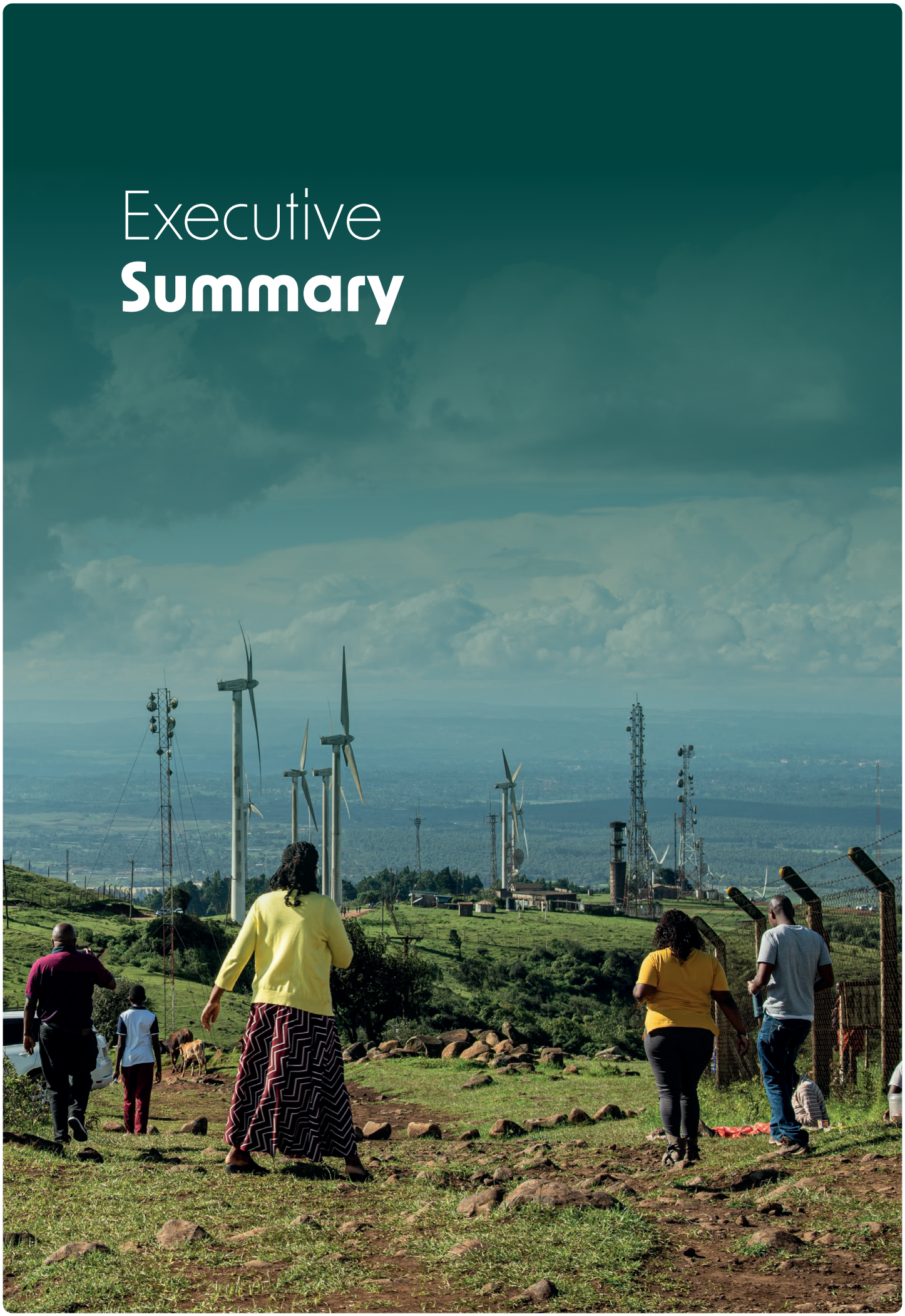
University of Exeter

Executive Summary

Africa Climate Solutions

Investing in Infrastructure for Climate Resilience across Africa

Executive **Summary**



At the inaugural Africa Climate Summit (ACS) in Nairobi in September 2023, African heads of state emphasised that: "Africa possesses both the potential and the ambition to be a vital component of the global solution to climate change. As home to the world's youngest and fastest-growing workforce, coupled with massive untapped renewable energy potential, abundant natural assets and an entrepreneurial spirit, our continent has the fundamentals to spearhead a climate-compatible pathway as a thriving, cost-competitive industrial hub with the capacity to support other regions in achieving their net-zero ambitions."

The ACS final declaration also expressed "concern that many African countries face disproportionate burdens and risks arising from climate change-related unpredictable weather events and patterns, including prolonged droughts, devastating floods, out-of-season storms and wildfires, which cause massive humanitarian crisis with detrimental impacts on economies, health, education, peace and security, among other risks". While Africa is not historically responsible for global warming, it bears the brunt of its effects, impacting lives, livelihoods and economies.

The ACS called for "climate-positive investments that catalyse a growth trajectory anchored in the industries poised to transform our planet and enable African countries to achieve stable middle-income status by 2050". The final declaration urged global leaders to seize "this unprecedented opportunity to accelerate global decarbonisation, while pursuing equality and shared prosperity".

Accelerating investment in infrastructure, which provides the services that underpin economic growth, lies at the core of seizing this unprecedented opportunity. Yet the ACS also expressed concern that "despite Africa having an estimated 40 per cent of the world's renewable energy resources, only $60bn – or 2 per cent – of US$3tn renewable energy investments in the last decade have come to Africa".

Understanding the varied effects of climate change across Africa will be essential to mitigate the risks they present and deliver sustainable returns on investment for infrastructure that is adaptable and resilient to a changing climate and – most importantly – that builds adaptation and resilience for the two billion people whose development pathway is inextricably linked to global climate outcomes.

Understanding how climate change will alter different regions of Africa is fundamental to enable investment flows, enhance viability of the infrastructure that is built, and to fully appreciate the value that such investments will unlock by building adaptation and resilience for communities and societies. Time is short and action is urgent. We need to accelerate infrastructure investment that catalyses climate-resilient development and avoids maladaptation.

This report builds a map of climate-related hazards in Africa and suggests a set of investor criteria for selecting and shaping infrastructure for climate adaptation and resilience which unlocks climate-resilient development. While not exhaustive, it builds on the latest and most robust evidence of the climate variations expected on the continent, and on evidence and case studies of investments that deliver climate-related development. The aim is to redefine what investing in climate action means in Africa, opening new avenues for investors in the continent and expanding the toolkit at their disposal to make decisions that enable and accelerate climate-resilient development.

Understanding climate impacts, and how they vary across the regions, opens up opportunity for prudent and sustainable investment in the essential infrastructure to navigate climate-compatible pathways for growth. Such investment offers the potential not only for the direct provision of resilient infrastructure, but to strengthen the resilience of economies and society. The report shows that, by appreciating the changes and risks across different regions of the continent, such investment is possible, prudent and a powerful force to drive both economic development and climate resilience.

Key **Findings**

Climate hazards in the form of extreme heat and humidity, drought, heavy rainfall, sea-level rise and flooding are already increasing across Africa, and will increase further in coming decades. There are also widespread, high vulnerabilities in a continent where millions of people don't yet have access to critical power, transport and water services, or are provided for only by under-invested in, aging, overstretched or informal infrastructure solutions.

Extreme temperatures projected to increase across the whole of Africa in scenarios of both 2°C and 4°C by the end of the 21st Century. **Heavy rainfall** is projected to increase across most of Africa, especially in the scenario reaching 4°C global warming by the end of the 21st Century (though in the 2°C scenario increases are less widespread and some areas are projected to see reduced heavy rainfall). **Extreme high sea water levels and shoreline retreat** are projected to increase with global warming across all coasts of Africa. Seasons conducive to fire are projected to become longer across most of Africa, except Northern East Africa.

The risk of heat stress, greatest when both temperature and humidity are high, will be most notable in Western and Central Africa. **Agricultural drought** is projected to become increasingly likely in most regions below 5° North and near the Mediterranean coast but is projected to be decreasingly likely in between. **River flooding** is projected to occur more frequently in the wetter regions of Africa, especially at higher levels of global warming.

Key regional findings demonstrate the importance of regional and local approaches to climate resilience:

- **East Southern Africa** requires resilience to increased wildfire risk, even at lower levels of global warming. Extreme drought is more likely, especially away from the eastern coasts, while coastal flooding and shoreline retreat are set to be more pronounced than in other regions.
- **West Southern Africa** needs to adapt to more frequent and pronounced drought. Heat stress is an increasing risk, but not as extreme as in other regions.
- **South Eastern Africa** needs increased resilience against flooding, especially riverine, but also coastal, heightened by population growth in high-risk areas.
- **North Eastern Africa** needs to prepare for more frequent riverine flooding, and increased heat stress risk in some areas.
- **Central Africa and West Africa** face the greatest challenges from heat stress, as extreme temperatures combine with high humidity, along with increased risks of riverine flooding. In West Africa, a particularly dense and fast growing population compounds the risk. Delivering infrastructure to provide resilience against heat stress in this region representing roughly a quarter of Africa's economy is a vital task.
- **The Sahara** region faces extreme heat stress, but diverges in impacts beyond that, with the northern Sahara set to experience extreme agricultural drought, the Sahel, riverine flooding.
- **Mediterranean North Africa** immediately faces increases in drought and wildfire risk, along with potential for extreme heat stress later.
- **Madagascar** needs increased resilience to coastal and riverine flooding, and also drought and wildfire.

From risk to opportunity: infrastructure for climate resilience

The good news is that driving sustainable development is one of the best ways of improving climate resilience, and climate resilience in turn enables and drives sustainable development: sustainable development projects delivered with a climate resilience lens can mitigate the risks of climate hazards and proactively build the climate resilience of the most vulnerable.

Our vision is that infrastructure assets and services be climate resilient themselves, increase the climate resilience of their users, and create outsized, 'transformative' impact. Infrastructure can be designed to drive climate-resilience and development in four ways. These are elaborated on in the Energy, Transport and Water sections.

1. Economic and social development foundations:

Access to electricity, transport and water infrastructure enable better educational outcomes, job and livelihood creation and diversification and better health and gender equality. These improve a community's capability to adapt and respond to climate-related challenges.

2. Direct adaptation benefits:

Infrastructure can provide direct adaptation benefits, from solar-powered refrigeration preventing food loss and medicine preservation in the face of extreme heat and disrupted supply chains; to smart irrigation improving crop yields despite drought; roads designed to enable run-off and water storage for dryer spells; green infrastructure reducing the urban heat-island effect; and waste-to-energy plants removing waste from communities, in turn reducing the health risks of urban flooding.

3. Direct resilience benefits:

Infrastructure can improve the ability to cope with and respond to acute climate hazards. Power enables early-warning signals. Roads are critical for the transportation of people and emergency supplies in the event of disaster. Emergency water storage facilities are necessary to supply communities during extreme heat events.

4. Macro-economic resilience benefits:

Clean power and transport solutions reduce oil-dependency, saving countries vast sums, improving trade balances and opening up economic resources for domestic investments. Better roads can radically reduce the cost of trade, making Africa more competitive internationally. Highly efficient irrigation solutions can expand agricultural productivity, increase exports and reduce domestic food insecurity, while improved water infrastructure can attract investment into a plethora of sectors including manufacturing and tourism - supporting economic diversification and growth.

Projects are emerging and the potential is vast. Africa's entrepreneurs are building solutions which deliver development, adaptation and resilience benefits simultaneously. The continent's need for new infrastructure services creates the opportunity to leapfrog to an integrated approach which delivers on sustainability, adaptation and resilience. Nature-based 'green infrastructure' solutions are emerging and have huge potential given their effectiveness in delivering on resilience, adaptation, and development outcomes all while being typically less costly than conventional infrastructure solutions. New financial approaches are mobilising domestic finance to expand resources available and grow local economies; while blended finance and publicly funded risk-aware, 'catalytic capital' is attracting private investments into areas it previously refused to go. Iteration and collaboration are guiding solutions to complex problems in the face of uncertainty, rural development needs and rapid urbanisation.

In essence, infrastructure investors must use a resilience lens to ensure that their investments deliver on development. In essence, this requires going beyond the question "Is this infrastructure resilient?" towards asking "Will this infrastructure improve the climate resilience of the communities it serves and impacts, by nurturing change which endures and cascades across communities, sectors and economies?"

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