



Reframing the Potential of Sustainable Urbanism for Africa

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About the Reframe Conversation Series

Against the backdrop of the COVID-19 pandemic and its subsequent exacerbation of many African urban challenges, the African Centre for Cities at the University of Cape Town, along with supporting partners Alfred Herrhausen Gesellschaft, Dark Matter Labs, the Gothenburg Centre for Sustainable Development and PEAK Urban, present the Reframe Conversations Series to promote informed debate and proposition on how best we can programmatically advance sustainable and inclusive African cities. The Conversation Series, hosted free of charge online, takes place weekly from 23 September to 21 October 2020 and seeks to provide a set of coordinates for multilateral partners, knowledge institutions, social movements, governments, networks and concerned business to gravitate around.

About the African Centre for Cities

The African Centre for Cities, based at the University of Cape Town, is a leading knowledge centre conducting meaningful research on how to understand, recast and address pressing urban crises, particularly on the African continent. Since most urban challenges—for example, food security, climate change adaptation, economic inclusion, cultural vitality and tolerance—are inherently interdisciplinary and spatially layered, ACC nurtures the co-production of knowledge favouring and cultivating critical Southern perspectives. Through its research ACC aims to develop imaginative policy discourses and practices to promote vibrant, just and sustainable cities. This purpose has become all the more pertinent with the adoption of *Agenda 2063* at a pan-African level, which chimes with the 2030 global agenda for sustainable development.

About the Authors

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COVER IMAGE: Cityscape, Johannesburg, Gauteng, Image courtesy of South African Tourism, Flickr.





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Introduction

The purpose of the Reframe Initiative by the African Centre for Cities and partners is to forge a shared pragmatic vision about how to harness urbanisation for inclusive and sustainable development in line with the cultural aspirations of *Agenda 2063*. We have witnessed a sea change in political outlook on urbanisation over the last decade, concretised in various African Union declarations, including the *Common Africa Position* in the lead up to Habitat III in 2016.¹ However, this awareness seems to have stalled and there is not the necessary boldness of vision and action from African governments to optimise the opportunities that a commitment to sustainable urbanism offers.

Part of the reason for this is the lack of a shared understanding about: what sustainable urbanism might mean in conceptual and practical terms; how such an understanding can be translated into policy priorities and actions when de facto institutional systems militate against it; and how all facets of societies can make the necessary contribution. The Reframe Conversation Series seeks to kickstart an African-driven deliberative process to address this lacuna.

This primer provides a starting point for a series of curated conversations. It begins with an overarching proposition to anchor the series. This proposition is firmly located in the policy convergences of 2020, amid the unfolding of Covid-19 and its aftermaths. The policy convergence is further anchored by a brief description of what development stakes are confronting the African continent in a world that is shirking from a global politics of multilateralism, solidarity and basic decency in the face of extreme deprivation and low-intensity violence. It is important that we strive for a shared language that is not afraid to name the horrors of our world, without giving up on vital moral horizons and potentialities.² Against this contextualisation, the primer specifies what exactly our challenge is and makes the case for sustainable infrastructure as unique pathway to a more sustainable, employment-rich and vibrant future. The final part explores some of the key questions and knowledge gaps we can explore during the conversation series and beyond as we commit to establishing endogenous innovation systems capable of generating the scientific evidence and armatures to experiment with a variety of solutions that make sense in our landscapes.

Overarching Proposition

Cities can drive Africa's economic imperative to achieve structural transformation. Sustainable infrastructure is one critical catalyst for green industrialisation and thriving settlements.

Policy Convergence

There are four major development policy agendas that inform the proposition.

First, the Sustainable Development Goals (SDGs) provide a comprehensive agenda for action to simultaneously eradicate poverty, transition to a low-carbon economic system and reverse deepening inequality. The SDGs offer an undeniable critique of extractive capitalism and insist on a new generation of production and consumption that does not exceed environmental systems but also regenerates ecosystems. While crafted in a consensual tone of diplomacy, they in fact provide a radical critique of dominant economic, trade, income and distributional systems.

Second, the Special Report on 1.5 degrees by the International Panel on Climate Change (IPCC) demonstrate that “curbing global warming to 1.5°C will require rapid advancements in how societies develop and navigate transitions in four systems: energy, land and ecosystems, urban and infrastructure, and industry.”³ It goes on to argue that the “urban system, and urbanisation, is a factor in each of the other necessary system transitions.” Given that Africa has the largest infrastructure deficits of any world region and will double its urban population over the next three decades, the policy agenda spelled out in the IPCC's Special Report is of particular relevance.

Third, the International Resource Panel of UNEP published its pathbreaking report, *The Weight of Cities* in 2018 and it addresses the material intensity of existing urban systems and implications of future growth up to 2050.⁴ It provides a compelling evidence base for the importance of decoupling economic growth from resource consumption, articulating what this means for re-engineering the infrastructure systems and governance of cities and regions. Pointedly, the report also arrives at the conclusion that how we build infrastructure and buildings, and spatially organise urban settlements, hold the key to achieving decoupling. There is an important overlap between this finding and the SDG ambition to achieve sustainable production and consumption.

Fourth, the African Union's *Agenda 2063* spells out an African vision for reckoning with our colonial and postcolonial pasts of brutal exploitation and mismanagement of abundant natural and human resources. It posits that, alongside a commitment to human rights, the rule of law, and democratic governance, we need to draw wisdom from indigenous knowledge systems and embrace the potential of the knowledge economy. *Agenda 2063* effectively

1 Pieterse, E. (2019) Embedding national urban policies in Africa. In: Abdullah, H. (ed.) *The Place and Role of Cities in Global Governance*. Barcelona: CIDOB.

2 See the compelling call to action by leading African intellectuals: “COVID-19: An open letter from African intellectuals to Africa's leaders”, *African Arguments*. Url: <https://africanarguments.org/2020/04/16/coronavirus-open-letter-african-intellectuals-africa-leaders/> [Accessed on 21 April 2020]

3 IPCC (2018) *Global Warming of 1.5°C*. Geneva: IPCC.

4 International Resource Panel (2018). *The Weight of Cities: Resource Requirements of Future Urbanization*. A Report by the International Resource Panel. Nairobi: United Nations Environment Programme.

5 African Union (2015) *Agenda 2063. The Africa We Want*. Popular version. Second edition. Addis Ababa: African Union.

calls for a societal embracing of youthful energy that is rooted in the past but determined to occupy the future. It recognises that this implies a profoundly urban imaginary and agenda. “We aspire that by 2063, [...] cities and other settlements are hubs of cultural and economic activities, with modernized infrastructure, and people have access to all the basic necessities of life including shelter, water, sanitation, energy, public transport and ICT; Economies are structurally transformed to create shared growth, decent jobs and economic opportunities for all.”⁵

Our approach assumes that *Agenda 2063* is consistent with the SDGs, the 1.5 degree agenda and *The Weight of Cities*, but it translates those global imperatives to work with the grain of Africa’s history and cultural sensibilities. In other words, it deploys the dual imperatives of excavating indigenous knowledges and embracing the transformative potential of the knowledge economy to come up with contextual priorities and sensibilities. It is in this spirit that the primer goes on to explore the value of sustainable infrastructure as a catalytic action. However, before we undertake an exploration of sustainable infrastructure in Africa, we need to spell out what is at stake. We have no time to waste.

The Stakes at Play

It is very hard to escape the feeling that Africa is uniquely cursed. Not only did it have to endure the largest and longest programme of theft and plunder in human history through the imperialist project of colonialism, it had to overcome that legacy within the institutional and mental parameters of mechanical modernism—the outcrop of the western “enlightenment” project that underpinned racialised exploitation. This dynamic gave rise to uncanny political forms in the postcolonial era, manifest in the interminable wars and civic strife whenever military and dictatorial powers laid seize to national and regional resources, usually with support from former colonial powers, whether it be states or corporations. It is sometimes forgotten that this legacy was only reversed in part from the early 1990s onwards, and the project remains far from complete.⁶

The effects are unmistakable: More than 60% of the labour force is consigned to precarious and underpaid forms of employment, with an enormous knock-on effect in terms of gaining access to adequate shelter, basic services, effective public health care and education, effectively producing a vicious circle of inter-generational poverty. The limited prospect of decent employment, amid a rapidly expanding labour force due to the youthful demographic, is rooted in the lopsided economic structure of most African economies. The Organisation for Economic Co-operation and Development (OECD), African Union (AU) and United Nations Development Programme (UNDP) demonstrates that only five African economies can be deemed as structurally diverse.⁷ Most remain profoundly dependent on primary sectors such as mining, carbon fuels extraction (oil and gas) or agricultural produce such as cocoa or sugar cane. Powerful external lenders, through unjust trade rules and inappropriate macro-economic policies, have ensured the African governments have little bargaining power and little prospect to reshape their position within global value chains.

These dynamics conspire to produce a uniquely malfunctioning urban system characterised by extreme dualisms: the gated middle-class enclave versus the slum; the export processing zone with 24/7 energy security and exempted from tax obligations versus the clusters of informal businesses hobbled by limited (and expensive) infrastructure connectivity and predatory taxation; the formal and financialised land and property markets versus the unregistered and untitled land that carries the constant threat of eviction; the pristine private public spaces versus limited, neglected and unmaintained public areas in the makeshift city. These dualisms are not just the product of structural inequality. They also reflect the long-term underinvestment in infrastructures to support enterprises and homes. Where these infrastructures do exist, and are extended through new investments, they tend to simply reproduce the obsolete model of a car-dependent, resource-intensive and spatially bifurcated city.⁸

This inheritance obviously takes on highly particular characteristics in diverse African countries, regions and specific cities. However, the family resemblance of postcolonial deformity is unmistakable. This is a reflection we need to understand in all of its complicated and traumatic dimensions and take ownership of so that we can do the difficult work of figuring out what transformation might mean in and across different African contexts.

There are two critical considerations in doing propositional work about our cities. One, we need to create a conceptual understanding of the inherently hybrid nature of urban systems. These systems reflect an amalgam of formal infrastructure networks, combined with the subversive extension, hacking, and repurposing that enables those cut off from the formal network to enact social, political, and economic reproduction. Put more simply, even though most African cities have limited infrastructural footprints, city dwellers somehow figure out ways to access energy to feed their families and watch their favourite soap opera or tele-evangelist; stay dry during the rains; access toilets and dispose of household and business waste. The improvised or makeshift infrastructural systems that enable this is as important to understand as the classically engineered network systems that are designed to only serve a small proportion of the urban population. Our foregrounding of hybrid infrastructures allows for this focus.

6 Mbembe, A. and Balakrishnan, S. (2016) *Pan-African Legacies, Afropolitan Futures: A conversation with Achille Mbembe*. Transition, No. 120: 28–37.

7 OECD, AfDB and UNDP (2016) *African Economic Outlook 2016. Sustainable Cities and Structural Transformation*. Paris: OECD.

8 These trends are explored in greater detail in: Pieterse, E. (2019) *The potential of sustainable urbanisation in Africa*. Berlin: Alfred Herrhausen Gesellschaft.

Hybrid Infrastructure Dynamics

Our task is therefore to explore what a transition from the de facto reality to a sustainable infrastructural future might entail. This, in turn, demands a deeper understanding of the logics that currently drive infrastructure investment models and the broader dynamics of hybrid infrastructure systems that arise in its wake.

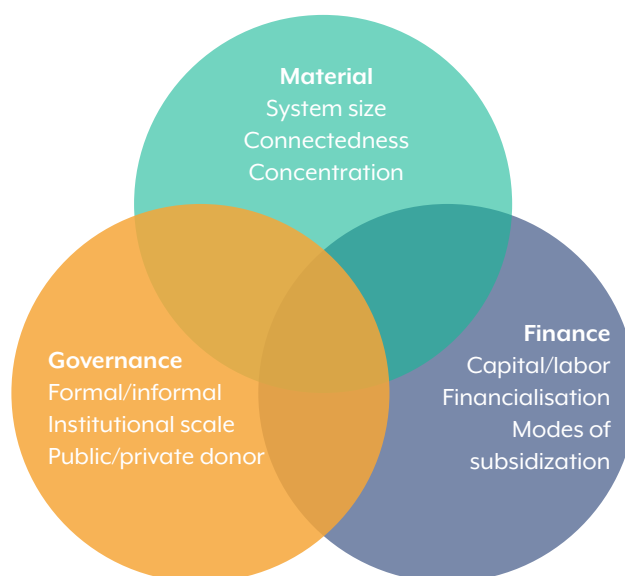
There is a very strong narrative which underpins much of the infrastructure investment in African cities. This modernist narrative aligns with the business model of multi-lateral financiers and assumes that the most efficient way to address urban service demands is to develop large centralised service networks, administered by agencies/authorities who are semi-autonomous (read financially viable and politically independent).

In most of Africa, this model has not proven effective, nor does it describe how most urban citizens actually access services. Large centralised systems have proven resource intensive, insurmountably expensive to develop and maintain, and prone to corruption. There are examples of these systems destroying the natural environments and social fabrics that had previously sustained livelihoods.¹⁰ The ongoing discovery of natural resource deposits in many African countries has seen an expanding array of options for national governments in Africa to access infrastructure finance through bilateral agreements (not only through the 'Belt and Road' initiative, but also through the Middle-East and Europe). This has accelerated centralised infrastructure mega-projects; the common focus on infrastructure to enhance regional and international trade, logistics, and mobility agendas often overlook the more traditional notions of universal access to basic services needed to sustain everyday life in cities. The same infrastructure dynamic has compounded the marginalisation of local authorities from decisions around the location, design and affordability of infrastructure projects. Despite impacting on city development processes, local governments are often side-lined in infrastructure mega-projects as funding, and by extension decision-making, is channelled through national agencies. Coupled with generally low levels of revenue collection in exchange for services, the result has been severe gaps in the infrastructure networks, especially for cities.

Alternative, albeit often fragmented, modes of service delivery emerge as fundamental to maintaining the access of the majority to the basic services needed to sustain urban life. Saying that infrastructure is hybrid is self-evident. All infrastructure systems have a mix of public and private, fixed and variable, big and small components. It is therefore necessary to say exactly what makes hybrid infrastructure useful for thinking about the future of cities, and particularly cities in Africa.

In the context of this primer, hybridity refers to the heterogenous blend of pathways through which production, distribution, and consumption of a particular urban service (e.g. energy, transport, water, waste) is achieved. Hybridity features in several interconnected domains: the material, the financial, and the governance of a service. In each, there is a spectrum of ways this hybridity manifests. In other words, adopting a perspective that engages with hybridity does produce more complexity instead of neat answers. However, as with everything else, diversity, complexity and paradox are all in a given in the rich cultural fabric of the African continent.

Figure 2: Dimensions of Hybrid Infrastructure



SOURCE: Cirolia and Hermanus

¹⁰ Dodman, D., Leck, H., Rusca, M., and Colenbrander, S. (2017) African Urbanisation and Urbanism: Implications for risk accumulation and reduction. *International Journal of Disaster Risk Reduction*, No. 26: 7-15.

Of course, what this means for different infrastructures/service delivery systems will vary. In Table 1 we provide a stylised review of the key urban services: energy, transport, waste, water and sanitation. The purpose of this table is to demonstrate the potential for doing things differently if we consider scientific knowledge, a deep understanding of everyday practices, and the emergence of new business models that seeks to optimize distributed logics (instead of centralised ones), enabled by digital platforms.¹¹ To enable discussion, the typology identifies two dimensions of each infrastructure:

- **Status quo:** The status quo hybridity in most African cities includes both the large scale and centralised networks which serve small pockets of the city, and the off-grid, incremental, informal, and makeshift service delivery systems that have emerged to fill the gaps.
- **Sustainable alternatives:** It is vital to develop alternative delivery pathways which are grounded in the realities of African cities, but reflect the principles, parameters, and aspirations of the sustainable urban infrastructure agenda. Key to this is ensuring that investments to extend, enhance, govern and adapt hybrid infrastructure systems reflect guiding principles and work to support environmental and ecological systems through circular economies; support job-creation/livelihoods both directly and indirectly; and prepare for posterity, in the context of unknown urban risks. Of course, building alternative approaches not only require understanding the possible ways that hybridity can be harnessed, but also what would be needed to curate this transformation.

Table 1: Infrastructure approach and potential alternatives

	Status quo model for delivery	Building alternative approaches
Energy	<p>Most African cities draw their electricity from, centralised energy utilities operating in vertically integrated monopolies responsible for generation, transmission and distribution. Generation is generally linked to commodities (coal, hydro and gas) and industrial strategy with little regard for environmental externalities. In the processes of transmission and distribution, there are low levels of innovation and cost recovery. Grid extensions are limited to those that can pay and grid electricity is characterised by daily outages that frustrate industry and small businesses.</p> <p>Experiments with privatisation, independent power producers and emergency power producers have created opportunities for renewable energy and new investment, but have also proven difficult to structure in terms of off-take prices, grid integration and the balance between supply and demand over the medium term (e.g. Ghana).</p> <p>Those who cannot access or afford the networked electricity system use various forms of onsite technologies for cooking and lighting (including charcoal, paraffin and batteries). Tapping of the formal network to create illegal connections to the grid is widespread, with its own agents and payment modalities but increases fire and safety risks and undermines the finance model for grid extension. Regional examples of off-grid photovoltaic installations at the household scale have brought improvements (e.g. M-Kopa Solar in East Africa) but have not established grid ties or formed part of electricity supply-side strategies.</p>	<p>The required alternative involves reform of state-owned utilities to enable grid extension and avoid a “utility death spiral”. Reforms should draw on a hybrid of emerging energy supply solutions in striking a locally appropriate balance between three imperatives: universal access, least-cost electricity, low-carbon development. Necessarily this involves creating an independent market operator, distinct from the state-owned utility. Rather than seeing off-grid systems as competition to state-owned utilities, the alternative involves enfranchising them in energy security and grid extension in a shared-value model. Where this alternative is able to anticipate rising urban demand for electricity, and the competitive advantage opportunity that awaits low-carbon industries, it will be able to draw on a combination of public, private and climate related finance.</p> <p>Effective alternatives will further pre-empt the “stranding” of fossil-fuel powered generation capacity and networks of charcoal suppliers to urban households, and manage a dignified transition of workers away from these industries towards cleaner alternatives. They will also reduce the variability that currently accompanies hydro-electric power and its dependence on rainfall. New digital technology that tracks and control the supply and demand of electricity in real time has a role to play in managing newly extended electricity grids.</p>

¹¹ ICA, AfDB and Italian G7 Presidency (2017) *Toward Smart and Integrated Infrastructure for Africa. An Agenda for Digitalisation, Decarbonisation and Mobility*. Milan: Italian G7 Presidency.

Figure 2: Dimensions of Hybrid Infrastructure (cont.)

	Status quo model for delivery	Building alternative approaches
Water	<p>Networked water tends to rely on large dams and aquifer exploitation. These systems are linked to bulk treatment facilities and distribution networks which provide water services to fee-paying customers, often at a deficit to the utility. Maintaining this reticulation and treatment infrastructure is often compromised by budget constraints leading to a vicious cycle of under-investment, water leakages, truncated access, contaminated storage and water cuts. Water supply to many major cities remains highly dependent on natural resources and climate patterns (such as rainfall) which are increasingly unpredictable.</p> <p>The imperative of water access in conjunction with unmet water demand, results in the State-owned water utilities co-existing with local solutions. These range from the collaborative “fundi” system in Tanzania to rent-seeking water cartels in Kenya, and are frequently the source of social and political tensions.</p>	<p>Water alternatives require novel approaches to water supply, and a general shift from supply-side solutions to demand side management. Proven technologies are now available for easier water billing, better utilisation of water resources including grey water recycling systems at the city-scale (‘toilet to tap’) and at household scale (biodigesters), leak detection and fixing and more water-efficient households appliances and irrigation.</p> <p>Alternatives will also recognise the complementarity between water infrastructure and the natural water resource. In so doing they will save money by ensuring healthy water catchments improve water yields, delay dam siltation and buffer against flood damage.</p>
Sanitation	<p>Large scale sanitation treatment plants are developed at great cost but serve very small parts of the city (sometimes less than ten percent). Sprawling urban settlements increase the cost of extending sewerage infrastructure and the pumping of sewerage back to treatment plants draws significant electricity. Most of the urban population relies on open defecation, septic tanks, and pit latrines. Sewerage spills and leakages contaminate water and present health risks, as does the practices of manually emptying tanks and latrines.</p>	<p>There are many alternatives to centralised, waterborne sewerage systems. Biodigesters, composting toilets, reverse osmosis at treatment plants are some examples, at different scales, that have been tested in various contexts. In addition, public sanitation centres and community facilities can serve as important social infrastructures and even as commercial opportunities (including methane capture). The most effective options enable brown water recycling and repurpose sludge as an energy feedstock or fertiliser. (See figure 3)</p> <p>Restoring and maintaining healthy water catchments, wetlands and riparian zones creates work opportunities, and can complement engineered water treatment. For example, wetlands (or artificial wetlands) can support water purification and enhance flood buffers and functional catchments and riparian zones can reduce sediment build up in treatment plants.</p>
Waste	<p>Landfills are developed on the outskirts of cities to dump solid waste indiscriminately. Alternatively, waste is incinerated or burnt on site. Waste is not formally separated or recycled. Waste picking is a common livelihood and contributes to the informal recycling and reuse market while reducing the burden on landfills, but is often criminalised or associated with acute health risks.</p>	<p>Alternatives focus on the “urban metabolism” – the passage of material into and through cities – and views this material as a resource, not waste. This alternative encourages reuse, recycling, and composting in partnerships between the formal state-operated waste sector and waste entrepreneurs that collect, sort and repurpose waste. Examples range from reverse vending machines or apps that reward waste pickers with cash, airtime and food vouchers, to the use of recycled plastic in bricks and paving, the repurposing of calcium in eggshells for the pharmaceutical industry</p>

Figure 2: Dimensions of Hybrid Infrastructure (cont.)

	Status quo model for delivery	Building alternative approaches
Waste <small>cont.</small>		<p>and the flaring of landfill methane to produce electricity.</p> <p>Regulating the packaging used in food and goods supply chains can reduce the waste burden and create markets for recycled materials. Industrial symbiosis programmes reduce industrial waste and can enhance resource efficiency.</p>
Transport	<p>African cities are among the fastest growing locations for private car ownership and congestion and air pollution have already become expensive urban problems at prevailing levels of car ownership around 10%. Most African cities experience high accident and casualty rates, especially among pedestrians.</p> <p>State investments focus on roads and highway construction and new airports. Newer 'big bang' investments in Bus Rapid Transit and light-rail are allocated to special agencies and overlaid on deteriorating public bus services and unevenly maintained road networks. Insufficient co-ordination sees investments in BRT and light rail unable to catalyse precinct development or Transit Oriented Development.</p> <p>Most urban citizens rely on paratransit, partially regulated systems of busses, motorcycles, three-wheelers and walking.</p>	<p>Alternatives improve the existing paratransit systems by implementing reforms which regulate, coordinate, and digitise minibus taxis, motorcycle taxis, and three-wheelers and enhance safety.</p> <p>Where large investments are made in BRT or light-rail systems these are combined with precinct development and land value capture to ensure financial viability.</p> <p>Enforcement of fuel standards and roadworthiness standards combine with investments in digital and low-carbon retrofit of safe (mini)buses to create a disincentive for private car use.</p> <p>Interventions to curb urban sprawl and low-density peripheral development are combined with investments in pavements and safe pedestrianisation, so as to improve the functionality and affordability of public transport systems and to link public transport hubs with commercial opportunities</p>
Building standards	<p>Sophisticated, high-rise buildings are created for business, gated community and tourist ventures using imported materials.</p> <p>Majority of urban households erect structures comprising a combination of cement bricks, uncertified timber and zinc sheets most of which is imported and lacks any form of structural guarantee.</p> <p>Reliance on a few multi-national suppliers (e.g. Dangote Cement or PPC) or local building cartels result in high building costs and few linkages to local commodity chains.</p> <p>No consideration of thermal or sustainability properties of building material.</p>	<p>Better regulation of building supplies and building standards ensure that construction sector supports the domestic industrial strategy, curtails rent-seeking by material suppliers and is safer.</p> <p>Buildings across the socio-economic spectrum are constructed with local energy and water constraints in mind.</p> <p>Greater use of local material (including timber) and recent innovations around renewable energy, water efficiency and flood and fire resistance are inserted in building codes and practices.</p>

SOURCE: Cartwright, Cirolia, Hyman & Pieterse

Thinking with Emergent Experiments

A central plank of our argument is that there is no blueprint that African cities can follow. Instead, deliberative fora need to be established in all cities where diverse actors can co-produce contextual strategies to work with local potential towards the advancement of hybrid sustainable infrastructure solutions. This demands solid research, exchange and learning from other contexts. To illustrate the value of an emergent approach and cross-context learning, we introduce three short examples.

Example 1: Energy

According to the International Energy Agency (IEA) around 1045-million people in Sub-Saharan Africa do not have access to electricity.¹² In many low-income areas in Africa, households and communities create their own energy connections to existing electrification infrastructure. At times, these incremental material investments connect areas which have been excluded entirely from the centralised network. At other times, areas which are connected, but have been planned and serviced to support much lower densities, add additional connections to address the unplanned for demand. Both cases reflect a bottom up process of incremental improvisation and adaptation, whereby communities connect themselves to existing centralised systems of provision, acting as agents in their own service provision. There are, of course, many risks – including putting strain on the system, fires hazards, non-payment for services and others.

However, there are also many benefits which adaptive models of service delivery can provide – if properly regulated. A good example of this sort of connectivity is documented by Silver in Accra's low-income community of Ga Mashie. Modern energy infrastructure was delivered to this vibrant suburb during the 1960s. Today, however, the system is aging, insufficient to meet the growing demand, and costly for residents. The choice to incrementally adapt the network responds to these limitations. At the interface between their homes and the wider network, residents have alternated and extended the system to suit more contemporary needs and aspirations. While many issues have arisen (including contests with the SOE responsible for energy delivery), these practices can also support bottom-up planning, social solidarity, and the expansion of service delivery systems.¹³ Recognising informal energy networks as Independent Power Producers (IPPs) is one way in which they can be integrated into the plans of urban authorities and utility providers. In addition, formalising feed-in tariffs through which cogeneration and smart grids can supplement the grid can also support integration.

Example 2: Mobility

Decades of underinvestment in public busses and commuter trains in African cities have left significant gaps in the mobility networks. In most cities, privately operated and partially regulated minibuses (seating between 7 and 18 people), provide flexible and demand driven services to most parts of cities. In some cities, additional modes of paratransit supplement the minibuses, such as bicycle taxis, motorcycle taxis, and three-wheel *tuk tucs*. These various modes of paratransit respond both to the gaps in formal public transit delivery, as well as the unique physical characteristics of many African cities – including low-density sprawl which makes BRT and trains unviable, poorly paved roads which require careful manoeuvre, and limited ability to pay. A good example of the important role played by paratransit is in the small Kenyan city of Kisumu. In Kisumu, there is no state provided public transport system at all. The minibuses – called 'matatu' – provide the majority of the services. These minibuses are organised into fixed routes, paying fees to the county government to operate. They are not, however, allowed to enter the city center. For city center mobility, people use *boda-boda* (motorcycle or bicycle taxis), *tuk tuk* or simply walk. This division between longer trips to the suburbs and outer lying urban centers, and short trips within the city, provides for a hierarchy of movement that responds to the unique needs, demand, and regulations of the city.

Paratransit is vital to the functioning of many African cities; however it is also seen to be dangerous and costly. The dangers include the risks of accidents due to poor driving, vehicle maintenance, and road quality. Its high costs are largely a function of the complete absence of subsidisation, coupled with the formal and informal fees which drivers pay to operate. In response to the challenges of safety and accountability, there are increasingly attempts by private sector to invest in digital platforms. For example, SafeBoda in Kigali, AftaRobot in Johannesburg, and uberBoda in several African cities allow for drivers to be hailed, traced, and rated. These technologies also have the potential to decrease the costs for end users by enhancing the efficiency of systems and offering the potential for demand-side subsidies (such as tokens).

Example 3: Sanitation

The current African backlog in improved sanitation, which is primarily in Sub-Saharan Africa, is estimated at 570-million people.¹⁴ In many cities, waterborne sewerage only covers a small part of the city. The majority of urban areas are served by on-site options, such as septic tanks and pit latrines. Some cities with extreme deficits, like Port Harcourt, open defecation is the only alternative accompanied by acute public health concerns. Even

12 Association internationale pour l'évaluation du rendement scolaire. (2017) *Energy Access Outlook 2017: From Poverty to Prosperity*. Paris: IEA.

13 Silver, J. (2014). Incremental infrastructures: Material improvisation and social collaboration across post-colonial Accra. *Urban Geography*, 35(6): 788-804.

14 Water Research Commission and the Toilet Board Commission (2019). *The Sanitation Economy Opportunity for South Africa: Sustainable Solutions for Water Security & Sanitation: A Business Perspective*.

in cities where they have upgraded wastewater treatment plants to increase capacity (such as Addis), limited distribution infrastructures and user preference have resulted in these large bulk investments operating at under capacity. In this context, there is significant scope to test new decentralised technologies and solutions. In particular, the reuse of wastewater and low-flush technologies allow for limitation in water supply to be overcome. Decentralised systems can also protect water resources and reduce the risk of contamination, protecting valuable natural assets and assisting to mitigate risks of climate change.

An example of a context ripe for experimentation with alternative technologies and institutional approaches is in South Africa. Addressing the sanitation needs of South Africa's urban informal settlements has been an incredible challenge. However, several donor projects have tested new models. For example, a 'social franchising model' was implemented in Butterworth Education District in the Eastern Cape. The social franchising model was a business-to-business partnership approach; small locally based enterprises entered into a business partnership with a larger established enterprise to deliver innovative service systems. In the test case in Eastern Cape, this focused on sanitation services in schools and resulted in the formation of six franchised micro-enterprises.

These above examples are by no means a full illustration of all of the ways in which hybridity does, and could, feature in African cities infrastructural systems. However, they provide instances of what is actually happening on the ground and provide some foundation to consider how to build on and enhance these existing economies and networks. Having concretised what we have in mind with hybrid emergent infrastructure approaches, the next section will delve deeper into the concept of hybridity to lay the basis for a more nuanced framework to identify potential solutions for the African context. To be clear, **we are not advocating for specific solutions or technologies, rather a way of structuring policy debate and learning to generate models and solutions that will be both contextual and in line with broader imperatives to transition from the status quo to sustainable infrastructure models.** The political, policy and technical landscapes are complex and murky but unavoidable if one is serious about an inclusive and sustainable trajectory.

Unpacking Hybridity

Hybridity, in and of itself, does not produce better infrastructure systems. In fact, much of the current hybridity which is experienced in African cities has many problems. From the environmental hazard of septic tanks to the rent-seeking prices charged by water cartels, hybridity can have many dangers. It is therefore necessary to develop the capacity, particularly of government agencies, donors and decision-makers, to discern when and how hybridity is productive and how to improve its operations. This capacity moves the infrastructure analysis beyond the currently bifurcated views in which the focus falls exclusively on either large-scale public utilities or community-based initiatives, engineered infrastructure or socio-ecological systems; public or private finance; and crucially moves beyond the idea that all informal sector projects are either 'good' or 'bad'. Instead, an analytical approach to hybridity engages with the situation in a given location and context and reframes it through the lens of 'guiding principles' to identify strategic levers to shift in the direction of sustainable infrastructure. The point is to find hooks in the existing system that can be leveraged for a purposive transition.

Guiding principles

The aim must be to improve the ways in which hybrid service delivery systems operate. The larger objective is for a universalisation of access to basic services ("leave no one behind") while meeting performance standards around **safety, affordability, and reliability**. Safety references gendered insecurity in popular neighbourhoods when children and women have to access certain services, e.g. collecting water or using sanitation facilities. Affordability is critical in contexts where most households have low and variable incomes. Reliability is self-evident but impossible to overstate when most urban dwellers on the continent live with frequent black-outs and dry taps as a matter of course. The economic impacts of unreliable systems, especially for smaller enterprises which rely on city systems, are also immense.

While safety, affordability and reliability are the basics of a 'new universalism' which African cities should strive for as the first priority, there are further principles that ensure a transition towards sustainability. Thus, where possible, service delivery systems should aim to:

- Support environmental and ecological systems through circular economies;
- Support job-creation/livelihoods both directly and indirectly; and
- Prepare for posterity, in the context of unknown urban risks.

Practically speaking it is important to keep in mind that infrastructural approaches and standards are established at a national government level and local governments are expected to develop implementation and financing plans. As we move the discussion to a reflection on how best to achieve institutional and system change, this distinction will be important because action at both levels of policy development are crucial, and of course, they need to be effectively articulated. The next section explores how we can grow an urban policy movement across Africa to institutionalise an action-oriented discussion on sustainable infrastructure and structural transformation.

Urban Policy Movement

In the interest of establishing a shared understanding it is necessary to briefly define the features of a strong movement. First, an impactful movement has a strong vision linked to a compelling narrative about the causal drivers of a problem and how to tackle them. Second, an effective movement is able to translate its vision and agenda for change into clear strategies that are coherent and can be broken into specific tactical actions with clear timeframes and expected outcomes. Third, an enduring movement relies on, and fosters distributed leadership so that a plurality of actions are encouraged but these also coalesce into the achievement of strategic goals and deepening the cultural identity of the movement. Fourth, movements need tangible examples of the future they seek to bring into the world. It is therefore important that proof-of-concept is established through testbed experiments to demonstrate potential and refine the founding vision and strategy. Fifth, this implies commitment to transparency, learning and openness to adapt based on real-world feedback.

In terms of this understanding, an African urban policy movement is propelled by a vision for future cities that satisfies the basic needs of all citizens, functions within environmental guardrails and in fact regenerates ecosystems, whilst encouraging intense cultural pluralism and democratic passion; making cities wellsprings of Africa's renaissance. Strategically, the focus will fall on the vital operating systems of cities and transforming them in ways that makes future development economically inclusive and compatible with an intensely variable climate. The tools for transforming infrastructural systems fall within the realms of national urban policies that pertain to economic and territorial development, infrastructure planning and finance and the regulatory systems that undergird all of these.

Tactically, the focus falls on policy forums that define and shape National Urban Policies (NUPs) at a national level, and strategic plans and/or integrated infrastructure plans at the urban scale. Ideally, in both spheres a commitment to a transition to inclusive and sustainable infrastructure can be exacted on the basis of international agreements (e.g. SDGs, Paris Climate agreement, New Urban Agenda) and *Agenda 2063*. The key is to translate such a commitment into resource pots to finance critical experiments that can demonstrate what is possible in a given context. This is why an urban movement has to be broad-based and include actors from the finance space, research institutions, social movements, trade unions, local government associations, the public sector and cultural civil society organisations, alongside entrepreneurs and companies associated with real estate, construction, engineering services and planning.

Reformatting National Urban Policies/Plans

It is heartening to learn from a recent report that up to 38 African countries have fully fledged NUPs or are busy formulating them.¹⁵ However, most NUPs do not focus on how best to articulate macro-economic policies to achieve structural transformation with integrated infrastructure plans with clear spatial plans on optimal deployment and time-frames.¹⁶ Furthermore, most NUPs are not driven by policy agendas forged at the city level and fed into inclusive national deliberative forums. Given the imperatives of establishing a fine-grained understanding of urban specificities at the urban scale so that national policies can be attuned to regional differences, it is important to recognise that a lot of work remains to be done to improve the embeddedness of NUPs as well as the scientific evidence-base and normative outlook. Two examples from ACC's recent work in Tanzania and Ghana are instructive.

BOX: Tanzanian and Ghana - divergent approaches to NUPs, but shared outcomes¹⁷

In many ways Ghana and Tanzania's National Urban Policy development processes book-end the range of experiences of African governments working on urban development and urbanisation. Ghanaian politics has recognized the centrality of cities and towns since independence in 1957. With assistance from Cities Alliance, the country was the first to approve a National Urban Policy under the UN-Habitat programme in 2012. Ghana's NUP is both detailed and sophisticated in its attempt to "Promote a sustainable, spatially integrated and orderly development of urban settlements with adequate housing, infrastructure and services, efficient institutions, and a sound living and working environment." A 2019 review of NUP progress commissioned by the Ministry of Local Government and Rural Development, however, found limited and spatially inconsistent, implementation over the first 5 years.

In contrast, Tanzania has vacillated between devolution and centralisation since independence in 1961. The country's Five Year Development Plan articulates the importance of cities and industrialization. However, implementation has been piecemeal and the country's Urban Development Policy has been in a draft status since 2006. The recent period has been defined by reluctance to devolve budgets and decision making to urban authorities for fear of strengthening political opponents and undermining accountability.

In spite of the starkly different enthusiasm for NUPs, rapid urbanisation has overwhelmed state capacity to supply infrastructure and services in both countries, contributing to humanitarian crises and the hemorrhaging of opportunities in rapidly expanding cities. Neither country has managed practical coherence regarding which of the multiple urban

15 UN-Habitat and OECD (2018) *Global State of National Urban Policy*. Nairobi: United Nations Human Settlements Programme.

16 Cartwright, A., Palmer, I., Taylor, A., Pieterse, E., Parnell, S., Colenbrander, S. (2018) *Developing Prosperous and Inclusive Cities in Africa-National Urban Policies to the Rescue?* London and Washington DC: Coalition for Urban Transitions. <http://newclimateeconomy.net/content/cities-working-papers>.

stakeholders is responsible for what aspects of urban development and with what budget. Both countries lack the qualitative and quantitative information that would enable central government to engage and calibrate the detail of urban service delivery needs and affordability. The result in both Tanzania and Ghana is a low-level equilibrium defined by inadequate local services, meagre local revenue collection and ongoing dependence on transfers from the central fiscus to cities. The centrally planned urban infrastructure that has been built by State-Owned utilities and the private sector, invariably lacks a spatial logic, runs up against contested tenure arrangements, and struggles to balance the imperatives of universal access with financial viability and ongoing maintenance. In this way, truncated service delivery co-exists with weak connections between the infrastructure and services that has been built, and the socio-economic multipliers that are so desperately required.

The respective experiences of NUPs in two countries with very different histories when it comes to urban development, suggests that conventional NUPs may be necessary but insufficient to unlock the potential of sustainable infrastructure. As a minimum, the existing NUPs in Tanzania and Ghana need to be complemented by novel approaches, designed around the aspirations of urban citizens, and capable of linking citizen-led resourcefulness, new infrastructure financing opportunities, industrial development ambitions and the advantage of being able to plan and build African cities with climate change in mind.

Evidence-base for NUPs

If NUPs are going to become the pre-eminent policy workhorse to connect infrastructure investment, with territorial planning and (green) industrialisation, they will have to be better informed. To enable the kinds of targeted analysis and experimentation intimated in this primer, the following information should be foundational for a NUP:

- Diagnostic assessment of each infrastructure sector in terms of coverage, technological underpinning, institutional design for construction and service delivery, as well financing model. (Note, life cycle analysis tools can be incorporated here.) Various actors and entities, and their relative power and positioning should be included in the diagnostic.
- Description and analysis of both the formal service delivery systems associated with a given infrastructure sector as well as the co-dependent makeshift system.
- Identification of any forms or pockets of innovation across the entire system with an eye on isolating where potential for transition resides.
- Identification of potential champions for sectoral innovation alongside existing initiatives to test alternatives.

This kind of research should not be farmed out to consultancy firms or project preparation teams of financing institutions. Governments need to tap research skills within domestic universities and link them with the analytical teams of various UN agencies, pan-African development agencies, professional associations related to the built environment, pan-African networks for research and capacity building such as the African Urban Research Initiative and the Association of African Planning Schools, to name a few. More importantly, given the scale of the required research and evidence-base, nothing short of national research strategies are called for to drive directed and applied research for innovation.

Sustainable Infrastructure Innovation Factories

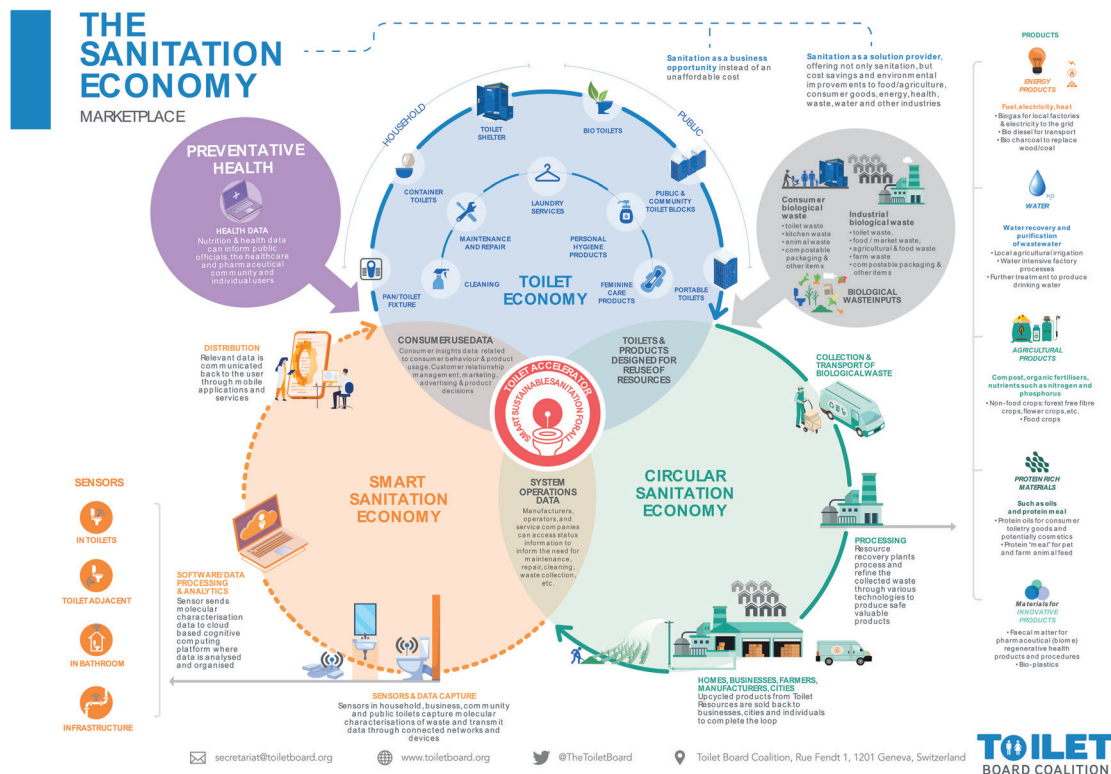
Looking back at Table 1, it is important to stress that contextually specific work will have to be done to figure out how best to transition from the status quo to the alternative approach. This is a complex matter since alternative designs will have to consider at least three critical parameters: scale of operation; technologies to be deployed; and suitable institutional design to ensure efficiency, accountability and maximum participation. Furthermore, since sustainable infrastructure inherently optimises the co-location of certain infrastructures, innovation will arise when sectoral silos are broken down to explore the potential of nexus thinking, e.g. how does water, food, waste, and energy systems lend themselves to distributed infrastructure systems that can be operated by various kinds of social enterprises?

A recent investigation by the Toilet Board Coalition and the Water Research Commission of South Africa developed an alternative imaginary for the intersection of toilet, circular and digital economies. Figure 3 illustrates the potentiality, but the operational and financing detail of the reforms required to implement this model will be highly specific in different countries, and even cities within one country. But this is exactly the level of effort and focus that is called for. We therefore propose that NUP processes are connected with Sustainable Infrastructure Innovation Factories—and we use this industrial form to evoke the labour required to piece together appropriate experiments with the potential to scale with adaptation¹⁸. Furthermore, the intellectual property of such factories needs to be open-source and invite civic input and critique.

17 Inkoom et al., (2019) *Half a Decade of Implementation of Ghana's Urban Policy*. Coalition for Urban Transitions Background Paper, London/ Washington DC; Lameck W, Kinemo S, Mwakasangula E, Masue O, Lyatonga I, and Anasel M, (2019) *Relationship Between National and Local Government in Tanzania*. Report prepared for Tanzania Urbanisation Laboratory (TULab). Coalition for Urban Transitions Background Paper, London/ Washington DC.

18 Cloete, B., Ramkolowan, Y., Kaziboni, L., Malik, A. and Ohemeng, W., 2019. *The Macro-Economic Impact of Two Different Industrial Development Pathways in Ghana*. GUTT Background Paper.

Figure 3: Alternative Sanitation Approach¹⁹



Ideally, national innovation factories will instigate numerous city-level experiments and create the learning platform between such experiments. Again, open source learning and dissemination will be essential²⁰.

What Next?

This Primer makes the argument that we are at a moment of confluence in terms of development policy and prioritisation with an alignment between global agreements and African desires as expressed in *Agenda 2063*. At the core of this agenda is the untapped potential to deploy urbanisation as the trojan horse that will effect a radical shift from the de facto development model trapped by 20th century assumptions. We have an opportunity to optimize the relatively low carbon emission levels (except for South Africa) and forge a growth path that optimizes the imperatives to build our cities and towns in ways that make our infrastructure systems consistent with the imperatives of circular economies. By definition, this model has to be rooted in contextual dynamics, which creates an impetus for African innovation. Importantly, this vision depends on multi-stakeholder buy-in and participation at all levels of policy formulation and testing: nationally, through the crafting of next generation NUPs and locally, through city-level strategic plans and infrastructure programmes. It also requires institutional cooperation and coherence at a pan-African level with targeted support from international partners.

Practically, we anticipate the following next steps:

1. Critique and enrich the perspective offered in this primer through active engagement with the Reframe Conversation Series that commences on the 23 September and will run until 21 October 2020.
2. Identify examples of existing innovations that support the propositions in this argument so that we can learn from emergent practice.
3. Map out the potential of a version of the imagined (national) process for substantiating NUPs and city-level strategies and engage processes in your immediate environment in order to lay the seeds for a Continental learning platform and urban policy movement.
4. Actively use the Reframe series to deepen our collective conversation. Disseminate the Primer and convene discussions in your organisation or network and feed that into the series.
5. Explore whether or not there is merit to reposition your own practice to speak to and expand the knowledge commons on sustainable infrastructure and urban policy transitions in Africa.

Refocussing our understanding and efforts to address the development challenges of Africa in a post Covid-19 era must embolden us. Addressing the growing phenomenon of urbanisation with foresight and a strategic focus— instantiating sustainable infrastructure as a key plank in a green industrialisation platform—is an opportunity to be bold and radical.

¹⁹ Water Research Commission and Toilet Board Coalition (2019) *The sanitation economy. Opportunity for South Africa. Sustainable solutions for water security & sanitation*. Pretoria: WRC and Toilet Board Coalition.

²⁰ For a fuller argument about how and why opensource experimentation protocols are essential, see: Dark Matter Lab, Cities for All (2019) *Legitimacy-cities. Notes on Innovating our Cities from the Sidewalk Up*. London: DML.



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