



Urban Pathways

REGIONAL POLICY ADVICE PAPER

AFRICA



**Wuppertal
Institut**

UN HABITAT
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The Urban Pathways project helps delivering on the Paris Agreement and the NDCs in the context of the New Urban Agenda and the Sustainable Development Goals. It has established a facility in close cooperation with other organisations and networks active in this area to support national and local governments to develop action plans and concrete implementation measures to boost low-carbon urban development. This builds on UN-Habitat's role as "a focal point on sustainable urbanisation and human settlements including in the implementation and follow-up and review of the New Urban Agenda". The project develops national action plans and local implementation concepts in key emerging economies with a high mitigation potential. The local implementation concepts are being developed into bankable projects, focusing on the access to urban basic services to create a direct link between climate change mitigation and sustainable development goals.

Project concept

The project follows a structured approach to boost Low Carbon Plans for urban mobility, energy and waste management services that deliver on the Paris Agreement and the New Urban Agenda. The project works on concrete steps towards a maximum impact with regards to the contribution of urban basic services (mobility, energy and waste management) in cities to global climate change mitigation efforts and sustainable and inclusive urban development. This project makes an active contribution to achieve global climate change targets to a 1.5°C stabilisation pathway by unlocking the global emission reduction potential of urban energy, transport and resource sectors. The project will contribute to a direct emission reduction in the pilot and outreach countries, which will trigger a longer term emission reduction with the aim to replicate this regionally and globally to make a substantial contribution to the overall emission reduction potential.

Project aims

This project implements integrated urban services solutions as proposed in the New Urban Agenda providing access to jobs and public services in urban areas, contributing to equality and social coherence and deliver on the Paris Agreement and the Sustainable Development Goals. This is the first dedicated implementation action oriented project, led by UN-Habitat to deliver on inclusive, low-carbon urban services. Securing sustainability and multiplier effect, the project aims to leverage domestic and international funding for the implementation projects that will follow from this initiative

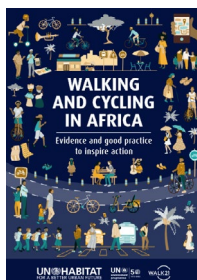


Urban Pathways



Urban Pathways Project and Replication Cities

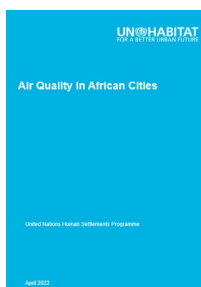
This report illustrates a compilation of the insights retrieved from sectoral policy papers developed with support or contributions from Urban Pathways, including the following:



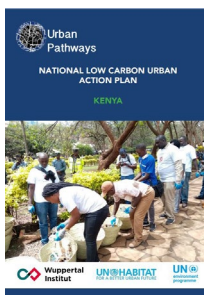
[Walking and cycling in Africa – Evidence and Good Practice to inspire action](#)



[Quick Guide to Bus Sector Modernization](#)



[Air Quality in African Cities \(upcoming\)](#)



[National Low Carbon Action Plan for Kenya](#)

OVERVIEW OF LOW CARBON URBAN SERVICES IN AFRICA

MOBILITY

Active mobility

Data on walking and cycling infrastructure in Africa is notoriously scarce¹. Many decision-makers cite inaction on walking and cycling as a consequence of a lack of data. Often, walking and cycling records, where they exist, provide an inaccurate understanding of the reality of mobility for millions of people.

While useful, there are three key issues that typically reduce the visibility of walking and cycling in modal split data collection: i) there is no consistent methodology. ii) collection usually focuses on ‘main mode’, which does not include trip stages nor multiple trips and thus often does not include walking or cycling. iii) walking and cycling are lumped together (often referred to as non-motorized transport), making it difficult to understand the unique travel patterns of each mode.

Few countries in Africa measure walking and cycling levels as a mode share of transport trips at all. Typically, the data only focus on the commute trip and only record trips of more than 1.5 km. Moreover, there is little research relating to walking and cycling behavior in middle-income countries in Africa. Although many countries already collect travel survey data, not all surveys collect data on gender, accessibility, social inclusion, walking and cycling trip objectives, distances and travel time. In addition, surveys are not always conducted frequently enough, and cities may find themselves with outdated data to make crucial planning decisions.

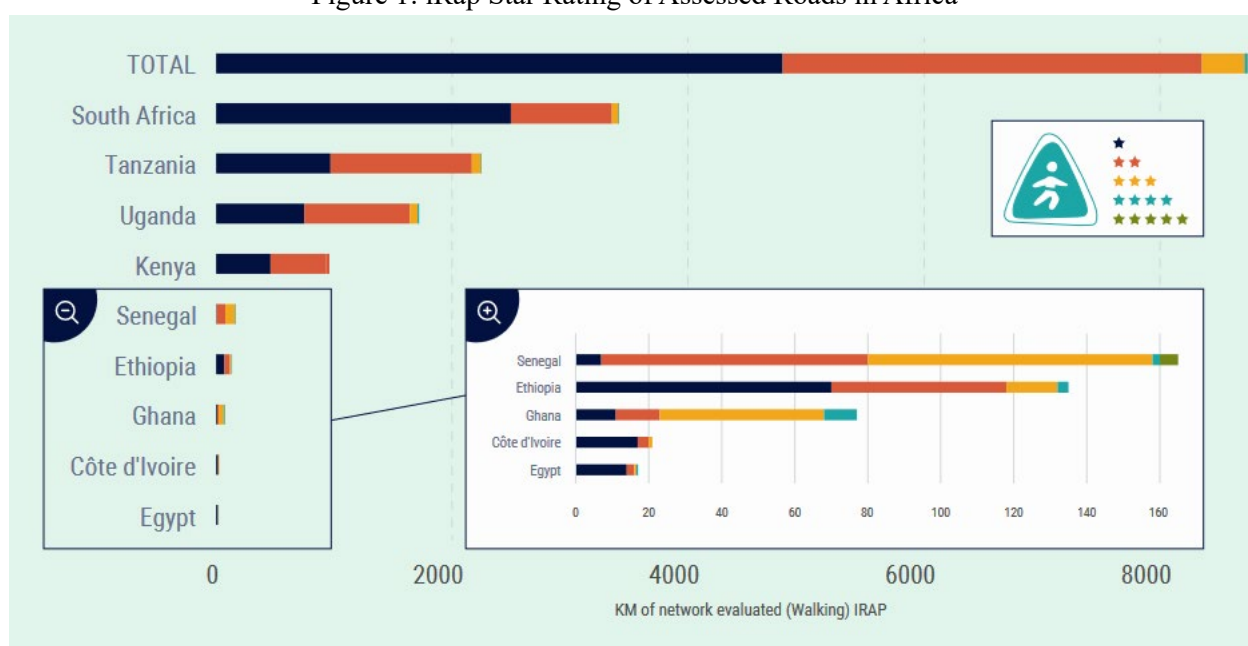
Despite this, walking is the primary mode of transport for the majority of people in Africa. Up to 78% of people walk for travel everyday to access healthcare, education, shops, jobs and public transport - often because they have no other choice. Addis Ababa, Nairobi, Dar es Salaam, and Lagos all have bike and walk modes shares of more than 40%. The majority of the population relies on these modes out of necessity – resulting from a lack of affordability of any other form of motorized transport.

However, the infrastructure is not safe for these modes with approximately 261 pedestrians and 18 cyclists being killed every day. This consistent lack of essential infrastructure makes the experience of walking and cycling difficult, unpleasant, and incredibly dangerous. Africa has only 3% of the world’s registered vehicles, but 20% of global road traffic deaths. Estimates indicate that more than 260,000 people were killed on African roads in 2019. Of these 36% were pedestrians and 3% were cyclists.

1 UNEP (2017) NMT POLICY DEVELOPMENT Lessons Learned from the “Share the Road” Programme. Available at: [https://wedocs.unep.org/bitstream/handle/20.500.11822/22500/NMT_Policy_Development%2520.pdf?sequence=1&isAllowed=y#~:text=An%20NMT%20policy%20\(either%20stand,this%20negative%20investment%20cycle%20through%3A&text=Setting%20out%20the%20intent%20of%20a%20Government%20regarding%20NMT.](https://wedocs.unep.org/bitstream/handle/20.500.11822/22500/NMT_Policy_Development%2520.pdf?sequence=1&isAllowed=y#~:text=An%20NMT%20policy%20(either%20stand,this%20negative%20investment%20cycle%20through%3A&text=Setting%20out%20the%20intent%20of%20a%20Government%20regarding%20NMT.)

Of the roads in Africa assessed using the International Road Assessment Programme (iRAP) 5 star rating system, 95% fail to provide an acceptable level of service for pedestrians and 93% fail to provide an acceptable level for cyclists. Most roads are 1 star meaning that they have no cycle paths, no safe crossings and high vehicle speeds.

Figure 1: iRap Star Rating of Assessed Roads in Africa



Source: Walking and Cycling in Africa – Evidence and Good Practice to Inspire Action (UNEP & UN-Habitat, 2022)

People in Africa are walking or cycling for transport for 56 minutes per day. The global average is 43.9 minutes. People in Niger (77.6% active) are walking and cycling the most for transport in Africa of all countries for which data are available, averaging 141,6 minutes per day.

Under this context, Urban Pathways child projects in Ethiopia, Kenya, Mozambique and Guinea supported by the United Nations Road Safety Fund, aim to promote safer infrastructure for walking and cycling to maintain and enable active mobility users, while targeting co-benefits of climate change, urban liveability, better air quality among others.

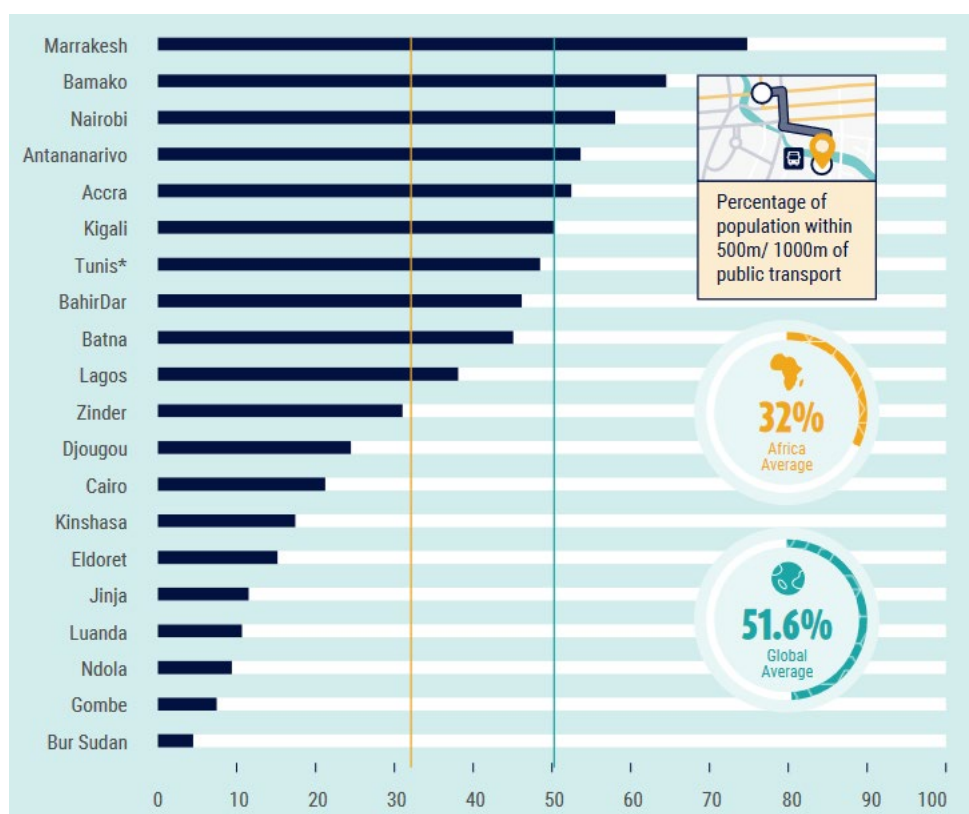


Public transport

Africa has the lowest level of accessibility to public transport in the world. Based on the existing data collected by UN-Habitat in Africa for measuring action for Sustainable Development Goal 11 which covers 137 cities and urban areas from 23 countries, only 31.7% of the population in Africa can access public transport within a walking distance of 500m/ 1000m (depending on carrier capacity). The global average in 2020 was 51.6%.

It must however also be noted that many cities in Africa have a high prevalence of informal public transport systems which are not fully mapped and/or complex to map. As a result, a low value may not necessarily mean lack of public transport options, since some informal systems in these countries provide very high levels of connectivity, but often at low levels of service quality.

Figure 2: Proximity to Public Transport



Source: Walking and Cycling in Africa – Evidence and Good Practice to Inspire Action (UNEP & UN-Habitat, 2022)

African cities will add over 900 million new residents by 2050², making Africa the most rapidly urbanizing region on the planet. Yet the promise of opportunity remains out of reach for vast communities living in urban areas, where poor access to jobs, education, health care, and social opportunities severely limit people's ability to escape poverty and enter the middle class.

Many African cities do not yet offer modern and clean public transport systems. Informal, uncoordinated paratransit services still comprise up to 80% of public transport in African cities. In Johannesburg, for example, only 4.7% of poorer residents living in the vast periphery have access to rapid transit – an especially tenuous lifeline to economic opportunity³. Public transport and existing catchment areas not only face the challenge of poor service provision, but also of inequality⁴. The poor quality of public transport disproportionately affects vulnerable users. Poorer workers living in the urban periphery typically endure one- to two-hour commutes via uncoordinated informal services, with half of these workers spending 30-40% or more of their take-home pay on bus fares.



² WorldOMeters, based on United Nations Population Division. 2019. Last accessed September 1, 2019 at: <https://www.worldometers.info/world-population/africa-population/>

³ M. Marks, J. Mason, G. Oliveira, 2016. "People Near Transit: Improving Accessibility and Rapid Transit Coverage in Large Cities". Institute for Transportation and Development Policy. Last accessed August 22, 2019 at <https://www.itdp.org/2016/10/11/people-near-rapid-transit-metric/>

⁴ Stockholm Environment Institute (2021) Mainstreaming gender in urban public transport lessons from Nairobi, Kampala and Dar es Salaam. Available at <https://cdn.sei.org/wp-content/uploads/2021/05/mainstreaming-gender-in-urban-public-transport-2021.pdf>

Private Motorization

As Africa urbanizes and incomes rise, the absence of high-quality public transport is promoting personal vehicle use to grow faster than the global average. Vehicle travel is poised to increase by 230% from 2015 to 2050.⁵ Almost the entire sub-Saharan African (SSA) vehicle fleet is fossil-fuels based, including a high proportion of dirty imports. Furthermore, roadway construction requires enormous energy for concrete and asphalt.

Africa's contribution to global transport demand has historically been low, and has remained so relative to other regions. Nevertheless, Africa has the highest growth in transport CO2 emissions between 2000 and 2017. For example, transport emissions during these years in Kenya increased by 231%.⁶

Transport in the African NDCs

While 75% of countries in Africa highlight transport as a mitigation source in NDCs, only 5 African countries have defined transport emission mitigation targets in NDCs.⁷ Research suggests that concern over climate change is a low priority in African cities compared to other more immediate needs like reducing road fatalities. This suggests that low carbon mobility interventions need to focus on the co-benefits that can be achieved by investing in low carbon mobility, such as active mobility and public transport.

Gender perspective - Nairobi's case

Approximately 70% of Nairobi's 4.4 million commuters use matatus to travel into Nairobi daily (Masinde, 2016). The [Gender Sensitive Mini-Bus Services & Transport Infrastructure for African Cities: A Practical Toolkit](https://slocat.net/wp-content/uploads/legacy/TCC-GSR-Africa-infographic.pdf) (UN-Habitat, 2019) shows that the majority of these commuters are women, and that over half of women who use matatus - commuters and workers - either experience or witness sexual harassment every single day. Without clear channels for reporting harassment cases, and little faith that anything can be done to stop them, the incidents persist and deeply impact women's wellbeing.

In detail, UN-Habitat's toolkit shows that 76 per cent of female operators (drivers and conductors) have either experienced or witnessed sexual harassment and that 25 per cent of those cases go unreported because victims and witnesses feel that perpetrators will not be held accountable. Moreover, 94 per cent of surveyed women working in Nairobi's minibus industry said that they do not have formal contracts with the employing informal saving and credit cooperatives societies (SACCO). The research also found that commuters feel that drivers and

⁵ <https://slocat.net/wp-content/uploads/legacy/TCC-GSR-Africa-infographic.pdf>

⁶ <https://slocat.net/wp-content/uploads/legacy/TCC-GSR-Africa-infographic.pdf>

⁷ <https://slocat.net/wp-content/uploads/legacy/TCC-GSR-Africa-infographic.pdf>

conductors are often the major perpetrators of sexual harassment.

Women therefore look for alternative means of transport such as private cars or taxis, while others choose not to use a particular service provider or even opt not to travel at all. Most managers in the transport industry are unaware of this as they do not have customer feedback mechanisms to capture the information.

The toolkit revealed the lack of sexual harassment policies in public transportation organizations and the belief by managers of transportation organizations that such policies are unnecessary because cases are handled like any other complaint and reported to the police. However, the toolkit shows the reluctance of survivors to report these incidences due to lack of clear reporting mechanisms and the belief that perpetrators will not be held accountable.

Further reading:

- Walking and Cycling in Africa – Evidence and Good Practice to Inspire Action (2022): <https://unhabitat.org/walking-and-cycling-in-africa-evidence-and-good-practice-to-inspire-action>
- Streets for Walking and Cycling – Designing for safety, accessibility, and comfort in African cities (2018): <https://www.itdp.org/publication/africa-streets-walking-cycling/>
- A Quick Guide to Bus Sector Modernization (2020): <https://unhabitat.org/sites/default/files/2021/03/quick-guide-to-bus-sector-modernisation-201023.pdf>
- Gender Sensitive Mini-Bus Services & Transport Infrastructure for African Cities: A Practical Toolkit: <https://unhabitat.org/gender-sensitive-mini-bus-services-and-transport-infrastructure-for-african-cities>

WASTE MANAGEMENT/ RESOURCE SECTOR

The value of Municipal Solid Waste (MSW) generated in Africa is estimated at USD8 billion annually, and opportunities to develop the waste as a resource remain largely unexplored (UNEP 2018). In 2016, Sub-Saharan Africa (SSA) accounted for 9 per cent of global waste generated and is projected to increase to 10 per cent by 2025 and further to 15 per cent by 2050. The Middle East and North Africa accounted for 6 per cent of global waste generated. Africa's rate of waste generation per capita is estimated at 0.46 kg per person per day, which is the lowest globally, though national averages range from 0.11 to 1.57 kg per person per day. The aggregate waste generation for SSA is forecast to triple from 174 million tonnes in 2016

to 516 million annually by 2050 (Silpa, K. et al. 2018).

The composition of waste in SSA is such that about 43 per cent is organic, but it is evolving as consumption patterns change and new streams of waste are becoming significant. The other streams of waste include electronic waste, plastics, and marine litter for coastal countries (Silpa, K et al., 2018; UNEP, 2018). According to the Global e-waste Monitor 2017, e-waste is among the fastest-growing streams of waste. Although there is limited information on the amount of waste that is generated and recycled in Africa, most African countries are cognizant of the challenge and strengthening the governance framework for e-waste management.

In SSA, access to waste collection services is about 44 per cent, though there are wide variations across and within countries, with higher rates of collection in cities. Uncontrolled dumping and open burning of waste is practised in many parts across Africa to deal with the problem of uncollected waste. Usually, waste management is a decentralized function, and the main service providers are sub-national government, private sector, informal sector players, and community-based organisations (CBOs). Waste segregation at source is also limited or non-existent due to people's attitudes and lack of infrastructure.

The main drivers of waste on the continent include rapid urbanization, population growth, economic growth, and expansion in international trade. As cities grow, so does the amount of waste that they generate. However, development of waste management infrastructure in most African cities is not keeping pace with population growth, resulting in issues such as low waste collection rates and open dumping (UNEP 2015). The growth in waste poses challenges related to waste management, including limited or lack of access to waste collection services, uncontrolled disposal, and open burning, which pose a threat to human health and the environment.

Countries in Africa are being flooded with second-hand goods (especially electronic scrap), some of which are either already obsolete, or close to end of life on arrival (Switzerland Federal Office for the Environment 2011). In some cases, export of second-hand goods is used to circumvent regulations governing waste disposal and transboundary movements in order to get rid of waste products cheaply in developing countries. Traded goods include such things as used tyres, end-of-life vehicles (ELVs), and used and end-of-life electronic products (Osibanjo 2012). African countries often have no capacity or infrastructure for environmentally sound treatment or disposal of such waste, hence these traded goods end up as waste in dumpsites.

URBAN ENERGY

The African continent faces manifold energy challenges as large parts of its population still lack access to affordable, reliable electricity, and clean cooking. Tackling these issues is becoming all the more critical as energy needs are forecasted to rapidly grow in the upcoming years, as the population increases, and the continent develops.

According to Yongoua et al.⁸ SSA cities still use significantly less energy per capita than the world average, due to factors including poor affordability, endemic low access rates, and low levels of economic development. This means that to become competitive economies, the countries will have to consume more (hopefully low carbon) energy in the future.

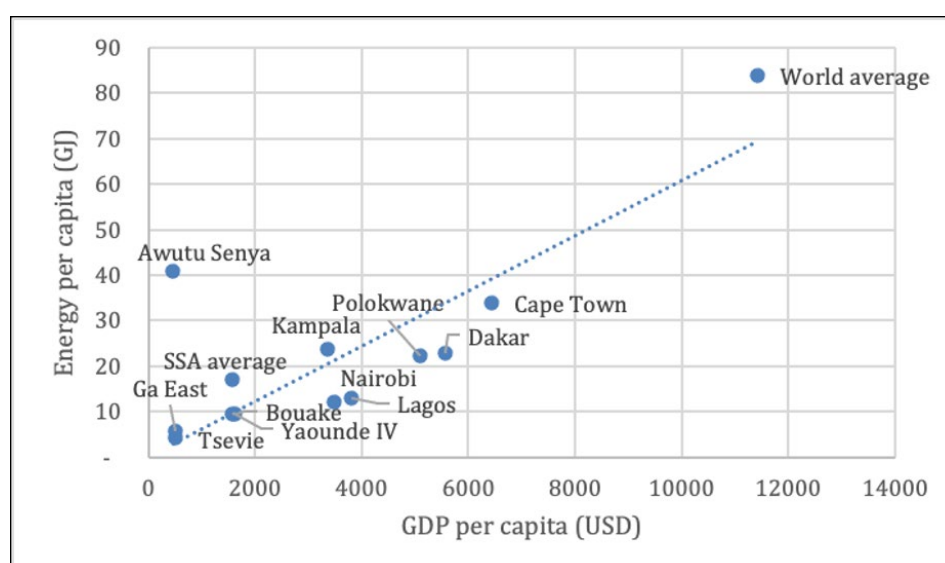


Figure 3: Energy consumption and GDP per person for selected SSA cities⁹

Transitions towards low-carbon energy solutions have been initiated in several African countries, yet much stronger support and policies are needed to meet present and future energy demand and sustainability needs¹⁰.

African cities need more energy to develop and diversify their economic sector. However, energy access in Africa is highly fragmented. Even in countries providing comparatively higher access, issues of regional affordability and reliability persist. In addition, climate resilience is

⁸ Joel Yongoua N., Mark Borchers, Zanie Cilliers (2022). Energy and emission profiles of sub-Saharan African cities: Building the Evidence-Base to Empower Cities in Responding to Energy and Climate Change Issues. Urban Energy Transition. In press.

⁹ <https://www.energyforgrowth.org/memo/rethinking-the-urban-energy-transition-in-sub-saharan-africa/>

¹⁰ Corfee-Morlot, Jan, et al. "Achieving clean energy access in Sub-Saharan Africa." Organisation for Economic Co-Operation and Development: Paris, France (2019).

a significant challenge as more extreme climate events will impact energy systems. These disparities have immense impacts on economic development for both households and industry¹¹. Most of the urban dwellers – living in informal settlements - are considered energy poor. In fact, they spent a big share of their income (more than 10 %) on energy services. Moreover, high electricity tariffs and unreliable grids hamper industrial growth – circa 80% of companies experienced frequent power outages in 2018¹².

In 2018, 75% of the population (900 million) lacked access to clean cooking in 32 sub-Saharan African countries (IEA, 2019), while about 55% (600 million people) of the population lacked access to electricity, reaching more than 75% in 13 countries (IEA 2020).

Current energy patterns are not sustainable as the population grows. Traditional use of biomass, primarily for cooking, still amounts to approximately half of the overall energy consumption in many countries and emits large amounts of air pollutants. Indoor air pollution is responsible for about 500,000 premature deaths annually in Africa¹³. Additionally, collecting firewood for charcoal production contributes to forest depletion and deforestation, while putting a massive burden on women and children who traditionally carry out these tasks.

These challenges are expected to grow as energy demand considerably increases over the next two decades, driven by urban population growth, industrial production, increased mobility among other key developments necessitating significant scale-up of energy infrastructure and services. In a business-as-usual scenario, fuel demand in Africa is expected to significantly grow, at a quicker pace than in China, and just behind India. Electricity demand more than doubles in a BAU scenario, and more than triples in a scenario of full access to electricity and clean cooking.

Africa is endowed with natural resources that are key for a sustainable energy transition, yet insufficiently harnessed. Therefore, African countries are yet to reap their full benefits. The continent has the highest solar radiation in the world, but for now solar PV installation is minimal.⁹ The IEA states that solar energy can, in a targeted scenario, overtake hydropower and fossil fuels as the largest electricity source in terms of installed capacity on the African continent.¹⁰ Considering these multifaceted issues, the challenge at stake now is to take an integrated, holistic approach that reconciles the three goals of energy access, sustainability

¹¹ World Bank (2020). Global Photovoltaic Power Potential by Country, Washington, DC.

¹² IEA (2019). Africa Energy Outlook 2019, Paris.

¹³ WHO (2018). Ambient and household air pollution and health, Geneva.

transitions, and economic development.

Despite the potential for green energy solutions in Africa, growth has been limited by a number of factors such as focus on urban areas, inefficiencies in the value chain or lack of access to appropriate funding. Much of the technological development and green innovation actions have been concentrated in urban areas with rural populations being left behind.¹⁴ In contrast, a substantial portion of the populations reside in rural areas, for example in Kenya (more than 70%), South Africa (more than 30%), and Namibia (more than 45%) according to 2018 demographics. The rural communities have hardly been engaged, or their capacity sustainably built into mainstream innovation activities that could lead to new income opportunities or sustainable green energy transitions ensuring basic livelihood. Exclusion has led to social inequality, which is inherently problematic towards sustainable long-term socio-economic development.¹⁵ Wider political and social powers that go beyond exclusion continue to dominate, and further cement the status quo.¹⁶

Under this context, Urban Pathways' child project, [Smart Energy Solutions for Africa](#) (SESA), aims to support leapfrogging sustainable energy solutions while substituting fossil-fuel-based energy. Embracing a cross-sectoral, interdisciplinary and collaborative approach, the target is to mitigate climate change and avoid lock-in situations while improving access to sustainable energy under affordable, reliable conditions.

AIR POLLUTION

The air quality issues in African cities are expected to grow at least proportionally as the continent continues to urbanize over the next decades. Air pollution sources include among others vehicles, open air burning of solid waste, industrial activity and domestic cooking using biomass. In the transport sector for instance, the use of old cars, poor quality fuel, the rise of motorcycles and unorganised public transport with inadequate facilities for walking and cycling, transport contributes to worsening air quality.

It is estimated that 94 per cent of the annual 8 million premature deaths related to poor air quality worldwide occur in low and middle-income countries. In addition, air quality is intimately related to global warming, identified as a major health threat in Africa, especially for the more vulnerable layers of society.

¹⁴ Klochikhin, Evgeny. (2011). Linking Development and Innovation: What Does Technological Change Bring to the Society?. *European Journal of Development Research*. 24. 10.1057/ejdr.2011.20

¹⁵ Joseph, E. Stiglitz. "the price of Inequality: how today's Divided Society endangers our Future." (2012).

¹⁶ Heeks, Richard & Foster, Christopher & Nugroho, Yanuar. (2014). New models of inclusive innovation for development. *Innovation and Development*. 4. 175-185. 10.1080/2157930X.2014.928982.

On the African continent, air pollution is closely linked to poverty. According to research of the University of Nairobi, particularly people in the slums are highly affected by open fires and charcoal burning in their homes, burning of plastics, inadequate incineration and traffic.¹⁷ This is a particular challenge for this continent where more than 60% of the population live in slums¹⁸.

City-wide levels of air pollution in African cities often exceed international guidelines, with some evidence for more elevated levels in certain neighborhoods, with negative health impacts on residents. Despite the setting of standards, and the putting in place of policies in some countries and cities, the lack of an adequate air quality monitoring system has prevented authorities from developing a comprehensive understanding of its air quality challenge.

¹⁷ <https://www.theguardian.com/cities/2016/jul/10/no-escape-nairobi-air-pollution-sparks-africa-health-warning>

¹⁸ <https://unhabitat.org/sites/default/files/2014/07/World-Habitat-Day-2014-Backgrounder.pdf>

REGIONAL POLICY GAPS AND BARRIERS FOR UPSCALING LOW-CARBON URBAN ACTION IN AFRICA

URBAN MOBILITY

Limited consideration of pedestrians and cyclists in policy-making

Walking and cycling in Africa has long been a peripheral priority in transport planning and engineering. This is surprising since more people walk than use any other form of transport.

National and city-level policies on walking and cycling are increasing in volume across the continent. In 2016, 9 countries were noted as having a relevant national policy (16%) for walking and cycling. The Share the Road Global Outlook Report¹⁹ stated that policies and plans in developing countries had not yet made sufficient impact. Nor had they been adequately enforced, implemented or assessed for effectiveness. The report identified South Africa as having strong but ineffective policy. Tanzania, Cote d'Ivoire and Uganda had weak and ineffective policy and Kenya, Zambia, Mozambique, Rwanda, Ghana, Namibia and Malawi had no effective policy to note.

In 2019, 19 of the 54 countries in Africa were reported to have a walking and cycling policy (35%). This means that more than half of the total population in Africa has a policy or strategy document to support the most common mode of transport. However, there are some consistent challenges with implementation, and the policies often lack a funded action plan with time-bound targets and clear performance metrics.

Maintaining the share of low carbon modes in emerging cities is an important short to medium term policy plan²⁰. In most, if not all, urban areas of Africa, walking is the dominant mode. Yet pedestrian infrastructure where it does exist, is often used as impromptu parking, or by street vendors. Making walking attractive and comfortable is an important “shift” strategy that would maintain and potentially increase the modal shares of both walking and cycling²¹. In October 2020 relevant commitments to walking and cycling were made by 10 African countries in their nationally determined contributions to reducing carbon emissions. Most focus on infrastructure improvements, but also campaigns and supportive land use planning. The extent of these commitments requires further analysis to understand how these connect to other policies. The countries with reference to walking and cycling in their NDCs include: Burundi, Cabo Verde, Ghana, Lesotho, Malawi, Rwanda, Seychelles, Sierra Leone, Tanzania and Togo.

¹⁹<https://wedocs.unep.org/bitstream/handle/20.500.11822/17030/globalOutlookOnWalkingAndCycling.pdf?sequence=1&isAllowed=1>

²⁰ Dalkmann H, Brannigan C (2014) Urban Transport and Climate Change. Module 5e. Sustainable Transport: A Sourcebook for policy-makers in developing cities. Available at: https://city2030.org.ua/sites/default/files/documents/GIZ_SUTP_SB5e_Transport-and-Climate-Change_EN.pdf.

²¹ M Stucki, op. cit. note 100

Low priority is given to climate risk and resilience

Some African governments are using policies and strategies to incorporate goals that are central to achieving Sustainable Development and Climate ambitions. Newer policies have references to economic vitality; improved public health and greater social cohesion. New goals and strategies often take into account the special needs of disadvantaged populations by focusing on universal access and the needs of vulnerable groups. This approach requires that professionals from different sectors such as health, finance, education, transport and urban planning are able to take advantage of the cross-sector benefits.

Reducing pollution and focusing on the climate impact of transport is among the most urgent priorities. Few cities monitor air pollution holistically or have carried out source apportionment studies. However, for those that have, transport is consistently identified as a main contributor²².

On a policy level there is a distinct focus on local air pollution and greenhouse gases. The Nigerian Federal Non-Motorized Transport (NMT) policy aims to meet ambient air quality norms 350 days a year²³. The Zambian Non-Motorized Transport Strategy indicates that “the government will prioritize urban transport modes that minimize emissions of harmful local pollutants and greenhouse gas emissions.” The Namibian transport strategy encourages greater use of NMT and public transport in urban centers as a first point in reducing vehicular emissions and the creation of liveable cities²⁴.

However, generally speaking, low priority is given to climate risk and resilience in practice. Research suggests that concern over climate change is a low priority in African cities compared to other more immediate needs like reducing road fatalities. Greater awareness of the impact of climate change and the co-benefits of taking low carbon action in the transport sector is needed²⁵.

Need for improved policy frameworks to enable a transition to a modern public transport

Existing public transport services in African cities can vary from completely unregulated minibusses to sophisticated government public service contracts with internationally competitive, modern companies. However, when public transport services are not properly regulated, various problems can result including drivers speed to maximize revenues, inefficiencies in terms of the supply of vehicles, old and highly polluting vehicles, among others.

22 M Stucki (2015) Policies for Sustainable Accessibility and Mobility in Urban Areas of Africa. SSATP. Available at: https://www.ssatp.org/sites/ssatp/files/publication/SSATPWP106-Urban%20Mobility_IO_0.pdf

23 UNEP and ITDP (2020) Case Study: NMT Policies in Nigeria. Available at: http://airqualityandmobility.org/STR/NMTStrategy_Nigeria_200402.pdf

24 Namibian Transport Policy (2018) Implementation Period (2018 - 2035). Available at: https://mwt.gov.na/documents/576663/953883/Namibian+Transport+Policy_Print.pdf/2fdd3bc7-dd66-14fd-92d6-ebb777d1ab4d

25 G Haq, C Muhoza, G Njoroge, D Mwamba, W Yusuf Arby, A Ngabirano (2020) Assessment of needs of transport stakeholders including disadvantaged groups. Available at: <https://www.sei.org/publications/inclusive-climate-resilient-transport-in-africa-needs-assessment/>

Many of these challenges stem from the underlying regulatory structures and business models that govern the existing public transport system. Unless these factors are addressed, temporary punitive measures aimed at achieving better regulatory compliance are unlikely to succeed. Better management of the sector requires attention to both the regulatory structure and the structure of the commercial entities operating public transport services.

The government's approach to public transport regulation is a crucial factor in determining the type of transport companies that emerge. The government must be a strong, consistent, and fair regulator of the transport market, with the interest of the traveling public in mind. Sophisticated government regulation and tendering influences improved quality of service, multiple successful competitive companies offering a high quality of service.

With regard to paratransit systems, many of the associated challenges stem from the way in which drivers are compensated. Informal public transport services typically operate on the "target" system, where the crew is required to pay daily rent to the vehicle owner. The crew receives the net revenue after paying for fuel, maintenance, and other expenses. Drivers and conductors operate at the will of the vehicle owner, with no workplace benefits or job security. Crews face constant pressure to maximize the number of passengers, leading to speeding, overloading, and risky driving behavior. A change in the incentive structure for the crew is key if the system is able to overcome these undesirable outcomes.

In terms of overcoming financial risk, while governments would like to demand the highest quality of service and place all financial risk on the private operator, private operators would like to place all financial risk on the government and avoid responsibility for quality of service. Since the private operator is not fully responsible for changes in ridership, which can result from an economic downturn or a host of other reasons, the government needs to share some financial risk with the operator, and in exchange it can require the operator to maintain the level and quality of the service even during a downturn.

WASTE MANAGEMENT/ RESOURCE SECTOR

Lack of or weak legislation and enforcement

The legal framework for waste management is often fragmented and the provisions dealing with municipal solid waste, weak. This was found in the case of Egypt, for example, where there is no clear distinction between roles and responsibilities of the governorates, municipalities, service providers and waste generators (NSWMP 2011). Similarly, Nigeria has a plethora of legislation relating to the environment that touches on waste management, but with a lack of implementation and enforcement of the laws (Nwufo 2010). Although South Africa has strong legislation, it has not been translated into practical action plans, which resulted in government not meeting the National Waste Management Strategy targets set for 2016 (DEA 2012).

Although most African countries have ratified multilateral environmental agreements (MEAs) on wastes and chemicals, they have typically not domesticated them into national laws (UNEP 2014). And while most African countries have some legislation to manage waste, competing needs or the failure to enforce this legislation gives rise to a culture of impunity and weakens the effectiveness of waste management in general (UNEP 2014). As a result, waste merchants take advantage of weak controls to engage in illegal transboundary movement of hazardous wastes.

Low public awareness and negative attitudes

Limited public awareness of proper waste handling and recycling, and poor household attitudes towards waste management as a service, are major constraints to integrated waste management in Africa. Typical issues include (i) a low level of public awareness; (ii) limited involvement of households as key stakeholders in service provision; (iii) a community attitude of waste disposal as a welfare service to be provided as a free social service by government; (iv) delays in the payment of collection fees by households; and (v) a collegial relationship between the households and the collectors that leads to non-payment of the services (Poswa 2001, Jatau 2013, Chengula et al. 2015). Additionally, social norms that focus on men for decision-making mean that community consultation processes often fail to take gender equality into consideration, thereby neglecting the needs of women. “Unless explicit measures are taken to ensure women’s participation, their priorities, responsibilities and needs as far as waste generation and management will not be heard.” (Woroniuk and Schalkwyk 1998).

Political instability and conflicts

Waste management problems have been shown to be worse in African countries afflicted by conflict and political instability (Mwesigye et al. 2009). Conflicts create environments conducive

to illegal transboundary movement of waste and a general lack of or weak governance and institutional capacity to support improved waste management in African countries and cities (Clayton 2005, Wilson 2007, Ognibene 2007, Lambrechts and Hector 2016).

Poor Collection and transport infrastructure

In African cities, good road infrastructure can often only be found in the city centres, with the roads in suburbs being of a poorer standard (GIZ 2014). As a result, the waste service delivery model or method may be different for different urban settings, and within and between cities and towns. In low-income areas and informal settlements where the roads are poor and often narrow, communal collection and block collection using manual equipment (e.g. push carts, tricycles or wheel barrows) are common (GIZ 2014).

Traditionally, waste collection services have been provided by formal actors such as the municipality or private waste contractors. In many African cities, however, the role of the informal sector in waste collection is equally important.

Lack of Effective Waste Management in Rural Areas

Effective waste collection services are generally difficult to provide in rural areas because houses are sparsely scattered over long distances. Rural wastes that are not reused or recycled are often illegally dumped or openly burned on site (Hangulu and Akintola 2017). This has become particularly problematic with increasing consumption of plastic, health care materials and disposable diapers. There is scarcity of information on rural waste generation (Jakobsen 2012), including waste quantity, composition, sources and management.

Uncontrolled Dumping

Open dumping (uncontrolled and controlled), with associated burning of waste, is the most common waste disposal method in Africa (Hoornweg and Bhada-Tata 2012, Johannessen and Boyer 1999). According to UNEP (2015), 19 of the world's 50 biggest dumpsites are located in Africa, all in sub-Saharan Africa. Uncontrolled dumping of waste in African cities has the potential to cause significant direct and indirect impacts¹¹ on communities and receiving environments (Mpofu 2013, Jerie 2016). Residents, particularly those living adjacent to dumpsites, are at risk from the improper disposal of waste, owing to the potential of the waste to contaminate water and food sources, land, air and vegetation (Kimani 2012). Furthermore, the impacts of open dumping and burning on human health and environment can be diverse.

ENERGY

Sub-Saharan Africa has the largest number of people relying on traditional solid fuels for energy generation (cooking and heating), with substantial adverse effects on human health²⁶. It is of high urgency that the continent's energy needs are addressed in order to unlock its development potential. Up to date, investments in energy related infrastructure and the establishment of effective governance systems have been weak. Often, there has also been poor coordination between national and local level actors, as well as with utilities. While Africa is endowed with a diversity of energy resources, including various renewable sources (geo-thermal, hydropower, wind, solar etc.), they have not been properly harnessed.



Africa is rich in renewable energy resources, which are however vastly untapped (Source: IEA Africa Energy Outlook 2014)

There has also been little effort in most countries to tap into innovative energy funding approaches, pooling various forms of financing including public, private, external and domestic resources.

In recent years, according to the Energy Sector Policy by the African Development Bank (AfDB)²⁷, African countries have undertaken a range of reforms in the energy sector, the most significant being the formulation of more comprehensive energy policies and the incorporation of the private sector's role in the national development agenda. However, according to AfDB's

²⁶ https://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Energy_Sector_Policy_of_the_AfDB_Group.pdf
²⁷ https://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Energy_Sector_Policy_of_the_AfDB_Group.pdf

analysis, “implementation of these reforms has been inadequate in most countries due to inappropriate design, lack of implementation capacity and financial resources.”

On the urban scale, energy is crucial for the socio-economic development of African cities. However, access to modern energy in Sub-Saharan Africa cities remains low, and the use of unsafe and unhealthy fuels is widespread, energy infrastructure is poorly developed, and electricity supply is often unreliable. As urban areas are generally the most energy intensive nodes, the attention of energy transition initiatives on the continent will need to be increasingly on urban areas. Policies to date are often inadequately tackling energy in a scattered manner, and not addressing all issues related to energy access, urban energy service delivery, finance, local governments’ technical expertise etc.

With increasing trends towards decentralized energy supply rather than just centralized national utilities, options such as grid-connected rooftop solar PV have the potential to become a significant, urban-based component of the energy supply mix on the continent, however, are yet under-explored.

It is estimated that a large share of the total electricity generated in the African continent is used in buildings alone, consuming more energy than the transport and industry sectors. In East Africa, it is around 40%²⁸. According to UN-Habitat, this energy wastage is the result of “inefficient design and construction using inadequate materials for the climate, combined with poor understanding of thermal comfort, passive building principles and energy conscious behaviour”. It becomes obvious that improved building designs can create significant gains in energy performance of buildings. In this context, UN-Habitat, under the Urban Pathways project, supported the prototype of a Tiny House, to showcase an affordable, energy-efficient building.

AIR QUALITY

While there is an increase in air quality regulations and pilot monitoring efforts by various stakeholders on the continent, many African cities and countries still do not have an institutionalized air quality policy or monitoring system.

Despite the setting of standards, and the putting in place of policies, the prohibitive cost of reference air quality monitoring systems has prevented many countries and cities from further efforts. The pilot studies using low cost sensors, such as in Nairobi, Kenya, have provided an indicative understanding of the air pollution levels, however, city-wide data is lacking.

More research is needed to fully characterize the drivers of air pollution action in the region and formulate evidence-based plans to improve air quality in affected cities in coordination with climate policies and general development strategies.

Also, weaknesses exist in terms of enforcement and compliance practices of existing policy and regulations. Another challenge arises from the range of sources of pollution in African cities, common in fast growing cities in the global south as well as elsewhere. This implies that interventions are required in an integrated, cross-sectoral manner, however, so far action on reduction of air pollution is undertaken in a sectoral, not integrated, manner.

Specific programmes with an impact on air quality do exist, particularly in the transport and energy sectors. However, more action needs to be taken to improve the well-being of residents and avoid devastating future economic and social costs resulting from deteriorating health of citizens.

REGIONAL GOOD PRACTICE POLICY FRAMEWORK CONDITIONS THAT CONTRIBUTE TO UPSCALING LOW CARBON BASIC SERVICES

MOBILITY

Case Study: Green Recovery from COVID-19 to ensure sustainable mobility

There are some inspiring actions when it comes to climate actions and green recovery from COVID-19. Ethiopia has for instance committed to building “sustainable transport systems for resilience through enhanced access to mobility.”²⁹ This includes having up to 69 cities and towns with dedicated non-motorized transport lanes for bicycles by 2030 (506 km). Ethiopia has included Active Travel in their Nationally Determined Contributions (NDC). Rwanda’s NDC also incorporates a goal of increasing resilience of transport infrastructure and improving health outcomes by investing in sustainable mobility infrastructure, including non-motorised transport lanes³⁰.

Case Study: A comprehensive policy for Addis Ababa, Ethiopia

With support from the Urban Pathways child project “Scaling up Safe Streets in Ethiopia”, funded by the [UN Road Safety Fund](#), in 2019 the Addis Ababa Road and Transport Bureau (AARTB) launched its Non-Motorised Transport (NMT) Strategy 2019-2028, a ‘roadmap for the development of high-quality walking and cycling facilities across the city’. The plan proposes the construction of 3,000km of walking and cycling facilities and the introduction of 4,800 e-buses in the next decade. It was developed following extensive stakeholder meetings and workshops from a variety of government departments and authorities, private and civil society organizations, and academic practitioners. The development of the Strategy included site visits across multiple towns and centers in the country.

The city level effort was followed by the development of a National NMT Strategy, 2020 - 2029. The Federal Transport Authority, under the national Ministry of Transport, will monitor progress of the strategy, tracking progress toward implementation targets, and measuring

29 107

30 https://unhabitat.org/sites/default/files/2022/07/walking_and_cycling_in_africa.pdf

strategic outcomes. 69 cities were selected and expected to benefit from implementation, to ensure safe walking and cycling planning and infrastructure design in secondary and tertiary cities. This also guarantees a nation-wide focus rather than sole attention to Addis Ababa. The strategy commits to a walking and cycling network, greenways, street lighting, intersection improvements, bike rental and parking, traffic parking and vendor management. Responsibilities for the actions, led by the Transport Minister, are allocated to 10 areas of government. The policy includes 7 implementation targets and 6 outcome indicators aiming to maintain demand, reduce risk and improve equity and air pollution.

Case Study: A mobility plan with funding for Yaoundé, Cameroon

The city of Yaoundé developed a SUMP over a 12-month period. The process included an extensive collection of data which identified that walking is the main mode of transport in the city, with more than four million trips every day. It was completed in 2019 and has attracted nearly \$1 billion USD of investment. As a result, the plan concluded that all new road projects needed to have a pedestrian component, through the construction of footpaths and safe road crossings as a minimum in the short term. It also recommended a long-term standalone ‘pedestrian plan’ to ensure sufficient attention is paid to understanding where people are walking, the location of footpaths and the identification of ‘dysfunctions’ or breaks in connectivity of the continuous network. Commitments include a future focus on where destinations generate a lot of foot travel such as bus stations, markets and shopping centres to improve walkability. The plan program was estimated to cost (\$1.076bn). International funding from the French Agency of Development and the European Union supports a national budget from the Ministry to enable the policy. A budget of €6.4 million (\$7.7m) was allocated in the first phase to improve the walkability of the city. This example can be found in the Walking and Cycling Report: https://unhabitat.org/sites/default/files/2022/07/walking_and_cycling_in_africa.pdf

Case Study: Bus Sector Reform in Kigali

Kigali, Rwanda, has made substantial progress in public transport reform since 2008. Reforms were initiated by the government of Rwanda and the mayor of Kigali as a means to respond to the city’s growing population and the need for better coordination of public transport services.

The available minibuses, known as Twegerane, had a carrying capacity of 18 passengers and were old and dilapidated. The minibuses were run by individuals, and owners could decide at what time and in which routes to operate. Minibuses were often overcrowded, and at times the rush led to chaos at bus stops and terminals. Women, children, disabled people, and elderly could not adequately access public transport.

The minibuses were grouped into an association, the Association des Transports en Commun (ATRACO), in a bid to improve coordination. This however proved ineffective, and service remained inadequate. The government requested the intercity and upcountry public transport operators, Office National de Transport en Commun (ONATROCOM) buses, and other private bus services such as Volcano Express and Tebuka to support the city's public transport operations during peak hours. In order to address the frequent chaotic scenes witnessed at bus stations and stops, the government also introduced a queueing system. Insecurity in bus stations abated and vulnerable groups were able to access public transport more easily. This culture of waiting queues is still practiced today.

In 2011, the Ministry of Infrastructure initiated the development of the first public transport policy and strategy for Rwanda. A committee to draft the policy was composed of technical staff from the Ministry of Infrastructure (MININFRA), the City of Kigali, and the Rwanda Utilities Regulatory Authority (RURA). The policy was approved by the cabinet in October 2012 and became the guiding document for the formalization of public transport in the city of Kigali. It was implemented actively by the City of Kigali Council and RURA.

The public transport formalization process was led by the City of Kigali through the mayor's office, coordinated by MININFRA, and overseen by the Office of the Prime Minister. A steering committee comprised of government institutions and private sector operators was formed to plan and design solutions to address public transport challenges and expedite the formalization process.

The reforms included forming cooperatives and companies in place of the former associations. However, implementation of the new guidelines faced strong resistance from minibus owners, since they did not understand how they would benefit from operating within cooperatives. The public transport steering committee played a major role in convincing them to form cooperatives and companies. Bus owners could get credit and loans from banks and would have the ability to bid for government tenders for public transport operations. The cooperatives formed by the minibus owners later united to form the Rwanda Federation of Transport Cooperatives (RFTC), currently the largest bus operator in the City of Kigali. Other individual minibus owners formed companies such as Royal Express and the Kigali Bus Service (KBS). Minibus owners under RFTC have equal shares and earn profits based on equity. Royal Express and KBS operate as companies with individual owners run by appointed management teams.

Through a competitive tendering process, RFTC, KBS, and Royal Express won tenders to operate the Kigali public transport system. The process took approximately six months and the five-year public transport contracts were signed between RURA and the bus operators in August 2013. The government of Rwanda spearheaded the reforms by helping cooperatives

build capacity by training cooperative members. Some of the drivers and conductors joined the revamped modern system. They received regular training and were offered licenses and certificates of good conduct. Importation taxes on the high capacity buses were waived and the government facilitated access to loans for the companies.

Large capacity buses tended to operate on major trunk routes while minibuses operated on feeder routes. Over time, the smaller 18-seat minibuses were phased out entirely. The quality of public transport improved due to the increased routine inspections by the steering committee. Smart card payment technology was introduced on a pilot basis on designated routes in 2014, and officially replaced conductors in 2015. Due to the increased profits and the improved operations, the initial resistance slowly faded over time.

Drivers were among the major beneficiaries of the revamped system. Prior to the reforms, drivers did not have salaried pay. Minibus owners would set minimum returns and the drivers' wage would then depend on the remaining balance. Under the new reforms, these working conditions have improved and drivers are offered salaried contracts from RWF 110,000 to 180,000 and universal medical insurance. The working hours were also drastically reduced. Each bus is expected to have two drivers, each working fifteen days a month. A driver typically works for eighteen hours each day, every other day. Apart from having stable jobs, these drivers and conductors also have access to bank loans from the RTFC microfinance and additional job opportunities in stations, bus depots, and garages owned by RTFC.

Rwanda is currently working on the second phase of the public transport reforms, which aim to include strict bus scheduling and real-time monitoring of buses. RURA also hopes to improve coordination of public transport routes based on data collected from the automated fare collection system.

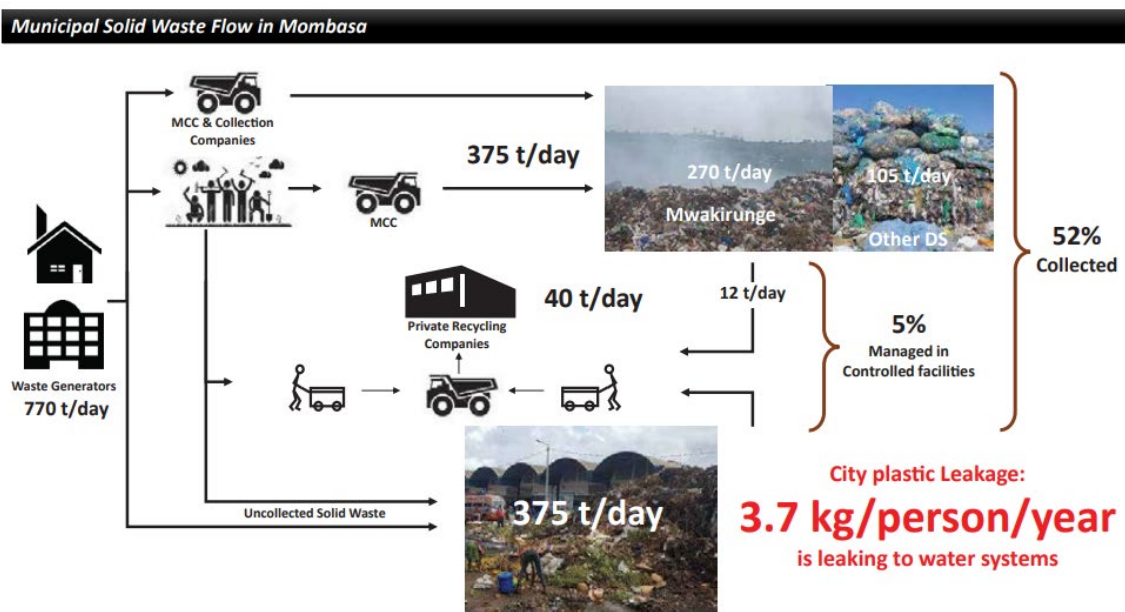
This example can be found in the Bus Sector Modernization Guide: <https://unhabitat.org/sites/default/files/2021/03/quick-guide-to-bus-sector-modernisation-201023.pdf>

WASTE MANAGEMENT/ RESOURCE SECTOR

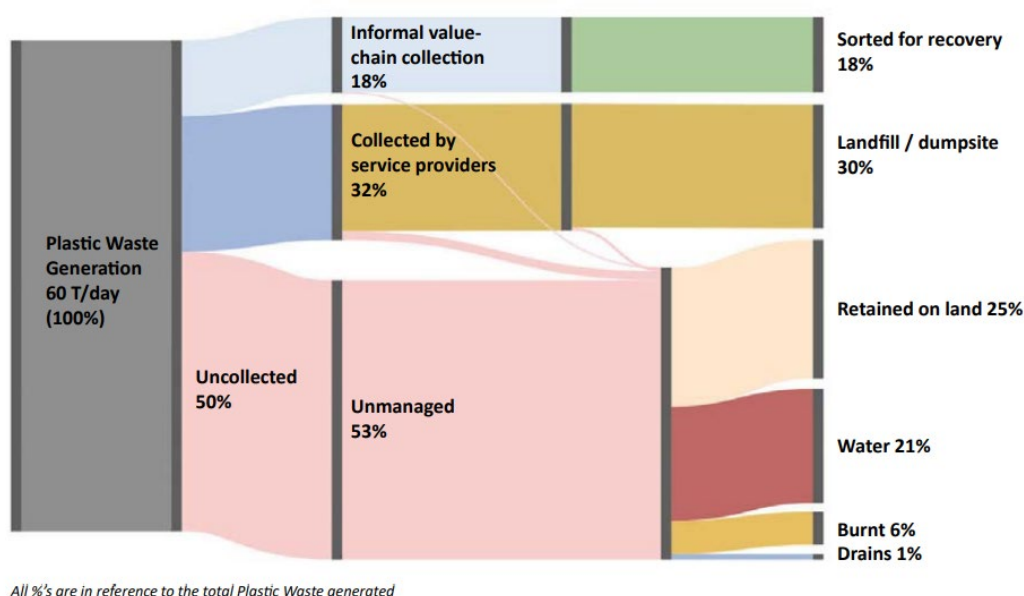
Case Study: Application of Waste Wise Cities Tool (WaCT) informing Solid Waste Action Plan in Kenya

UN-Habitat launched Waste Wise Cities on World Habitat Day in 2018 with a call to action to tackle the global challenge of waste management. Waste Wise Cities has four key action areas namely: 1) knowledge and best practice sharing; 2) waste data and monitoring; 3) education and advocacy and 4) finance and bankability support. Waste Wise Cities aims to support cities and local governments in achieving the Sustainable Development Goals related to waste and as well as in implementing the New Urban Agenda. UN-Habitat is the custodian agency of SDG Indicator 11.6.1 “*Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal solid waste generated, by the city*”. UN-Habitat has worked on the development of the monitoring methodology for this indicator coherent with other waste statistics systems in the world. This has crystalized into the current “Waste Wise Cities Tool” (WaCT).

In Africa, the Waste Wise Cities Tool has been field-tested in Nairobi (Kenya), Mombasa (Kenya). It has been developed in parallel with the Waste Flow Diagram, a tool which enables estimation of plastic waste emissions to the environment. The first figure below depicts the results from the SDG 11.6.1 assessment in Mombasa, a Kenyan coastal city of 1.2 million inhabitants. Results show that about 774 t/day of MSW is generated, of which 52% is collected and 5% is managed in controlled facilities. Around 375 t/day remain uncollected.

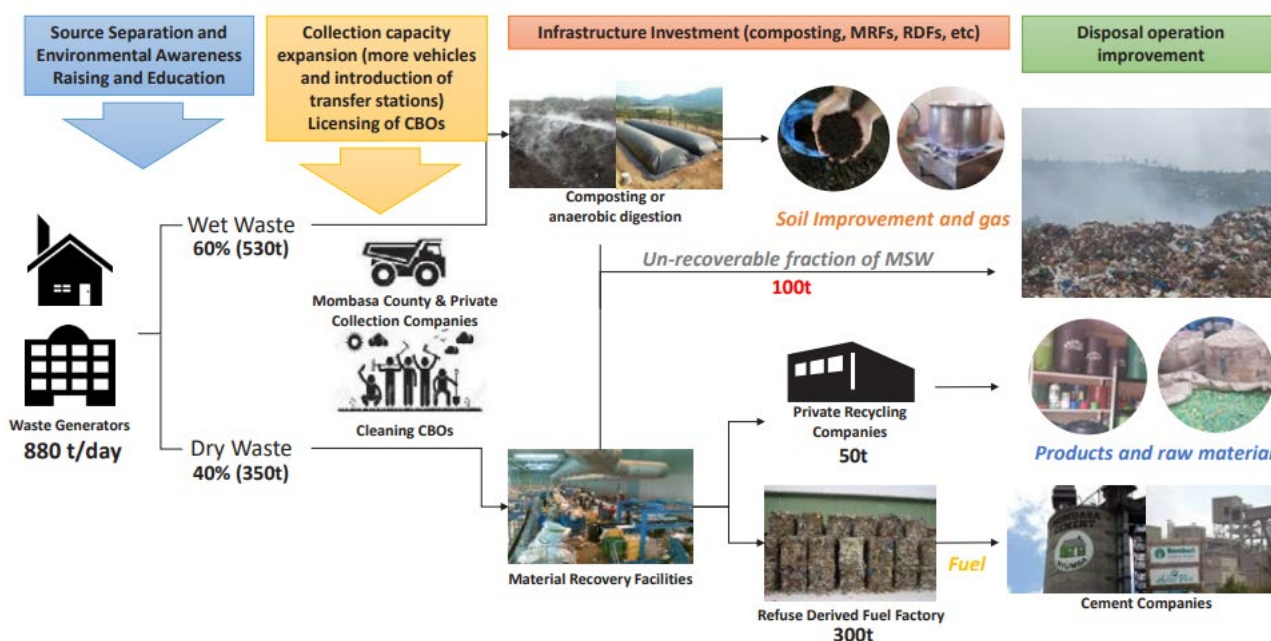


Based on this data and using the WFD plastic leakage is estimated to be 3.7 kg per person/year. The second figure below breaks down and categorises the sources and pathways of plastic leakage as identified with the two tools.



The assessment was followed by a local stakeholders workshop, which identified key intervention areas and service/infrastructure investment gaps. Workshop attendees included stakeholders from the waste management chain such as local government officials, environmental regulators, collection service operators, disposal facility managers, formal and informal recyclers, representatives of manufacturers and residents, and many more. The following figure shows the future waste flow envisioned by participants during the workshop in Mombasa.

Future Waste Flow in Mombasa



Following the application of the Waste Wise Cities Tool in Nairobi, a local stakeholders' workshop was organised, of which the discussion results have evolved into the Sustainable Waste Management Action Plan for Nairobi, developed by Inter-Agency Task Team for Nairobi's Municipal Solid Waste Management led by Ministry of Environment and Office of President. The collected data and workshop results have also catalyzed the development of Kenya Plastic Action Plan by Kenya Association of Manufacturers.

In order to sensitize the public and to create awareness around how much plastic we are in contact with every day and explore ways to avoid it, Urban Pathways with partners organized a Plogging Challenge in October 2019 in Nairobi's CBD. Plogging is a combination of jogging with picking up litter (Swedish: plocka upp). At the end of the collection process, through the help of UN-Habitat's waste management experts, Association of Kenyan Recyclers and an experienced recycler at Dandora Dumpsite, the public was educated on waste categories and went through a waste separation exercise.

See more at: <https://www.youtube.com/watch?v=g6FrdDdEcRA>.

ENERGY

National Energy Policy in Kenya promoting renewable energy generation incl. geothermal energy

Kenya's National Energy Policy³¹ dates back to 2018. Its overall objective is to “ensure sustainable, adequate, affordable, competitive, secure and reliable supply of energy at the least cost geared to meet national and county needs while protecting and conserving the environment.” In its sub-objectives, the policy encourages the generation of electricity from renewable resources, to build and maintain the necessary distribution and transmission infrastructure. The Policy has enabled increased private sector participation in the development of the sector whilst focusing on improved management and delivery of energy services. Among the key actors is the Kenya Electricity Generating Company Limited (KenGen), a State Corporation with government shareholding of 70% and private shareholding of 30% as at June 2014. It is mandated to generate electric power, currently producing the bulk of electricity consumed in the country. The company currently utilises various sources including hydro, geothermal, thermal and wind to generate electricity. According to Elbarbary et al. 2022³², “Kenya is the African leader for operational geothermal power plants, with its geothermal power production totaling more than 40% of the country's total electricity production. Kenya launched an investigation into geothermal energy during the late 1970s. As indicated by the Geothermal Council Resource, Kenya's progress in geothermal applications is within the top ten ranks in the world.”

Case Study: The Sustainable Living Unit in the Tropics

African cities need to promote energy demand management in all the sectors. Modern buildings in Africa consume more than 54 % of total national energy. Most of this energy is wasted due to the poor building design that is not adapted to the tropical climate. It is therefore important to design buildings with bioclimatic architecture principles. Priorities should be given to activities and appliances that consume less energy to promote the transition towards Net Zero Carbon.

Urban Pathways therefore supported the Sustainable Living Unit in the Tropics, a prototype of an affordable house provided with all basic services including: clean energy, food production, onsite waste management, natural lighting and ventilation and many more sustainable design principles. The prototype was designed under the “Promoting Energy Efficiency in Buildings in East Africa” project to promote energy efficiency in buildings in collaboration with the governments of Kenya, Tanzania, Uganda, Rwanda and Burundi. The design addresses the

³¹ https://repository.kippira.or.ke/bitstream/handle/123456789/1947/BL4PdOqKtxFT_National%20Energy%20Policy%20October%20202018.pdf?sequence=1&isAllowed=y
³² <https://geothermal-energy-journal.springeropen.com/articles/10.1186/s40517-022-00219-1>

challenges of sustainable and affordable construction with a small footprint that reduces land demand while maintaining a sense of spaciousness through innovative space-saving techniques.

See more at [UN-Habitat's Tiny House is showcased on TV](#) and [UP Factsheet](#)



Case Study: The SESA project's Kenya Living Lab

Under the Urban Pathways child project [Smart Energy Solutions for Africa](#) (SESA), the Living Lab in Kenya aims to develop a modular demonstration project to provide sustainable energy access solutions that are relevant for validation and replication in both urbanized and rural contexts in Africa, creating opportunities to generate sustainable off-grid electricity, with sector linkages such as cooking, lighting, fishing, water pumping, mobility and waste management, and combining energy solutions with local Info Spots for access to information, on energy, climate change and digital skills.

The initial living lab concept will be implemented in Western Kenya in a rural (Homa Bay) and urban (Kisumu) context through two self-sustaining solar hubs. The partners will co-develop two project sites, design and construct one Solar Hub at each site with the objective of providing

sustainable energy access. In addition, the partners will co-develop the business models, set up and demonstrate different user cases for productive use at the solar charging hubs such as pumping and purification of drinking water, charging and leasing of fishing lanterns, solar cooling and drying for local fish value chain, battery pack rental for business. With a focus on circular economy, energy storage and re-use- Local innovators will be engaged to develop components of the innovations such as the electric two wheelers, solar mini grids including charging stations and second life appliances of lithium battery cells.



AIR QUALITY

Air Quality policy framework in Nairobi, Kenya

Nairobi has made significant progress towards improving the policy and regulatory framework for urban air quality. Key policies are the Air Quality Action Plan (2019-2023), developed in collaboration of Nairobi City County (NCC) and UN Environment in 2019, with support of the Urban Pathways project, as well as the Nairobi City County Air Quality Policy (NCC, 2020). The AQ Plan was developed in a multi-stakeholder technical committee and outlines priority actions to reduce harmful air pollution in the city. It defines the basic strategy, responsibilities, resources needed and links to other relevant plans to achieve four main goals:

- Build scientific evidence for policy, legislative and regulatory interventions for air quality management in Nairobi City. This implies the development of an urban emission inventory and projections both for air quality pollutants and GHGs, and the development of a formal AQ monitoring network.
- Raise public awareness on health and environmental impacts of air pollution in Nairobi City through the development and implementation of a communication and public participation strategy.
- Develop effective mechanisms to adopt policy, legislative and regulatory options for air management that incorporate mandatory requirements, voluntary and market-based approaches.
- Build an effective implementation and enforcement programme for Nairobi City's air quality legislation by enhancing the executive capacity of the city government. It contemplates setting up a specific, properly trained air quality unit.

The Policy proposes an integrated approach in all sectors and institutions to air quality management in Nairobi, while strengthening the institutional capacities and legal/institutional framework to provide for effective coordination and management of air quality. It also aims to promote education, public awareness and research, as well as participation of key stakeholders in air quality management.

In addition to these strategies, there have been various collaborative pilot activities to collect air quality data some of them supported by Urban Pathways such as on the pedestrianized street Luthuli Avenue which represented a collaboration of UN-Habitat and UN Environment with the County Government of Nairobi. During those pilot activities, low-cost sensors were mounted along streets temporarily closed to traffic during and after the activity, to measure the impact of those closures on air quality. Although the immediate impact of such interventions is limited, they have been found beneficial to advocate for greener and more inclusive cities and to increase public awareness and involvement.

See more at: [Nairobi Air Quality Action Plan, 2019-2023](#)

[Transformation of Nairobi Streets](#)

REGIONAL RECOMMENDATIONS ON POLICY CONDITIONS THAT WOULD HELP UPSCALE LOW CARBON BASIC SERVICES IN AFRICA

MOBILITY

Addressing the mobility challenges in Africa requires a paradigm shift in urban and transport planning. The bias towards private motor vehicles needs to change in favor of reliable public transport systems integrated with walking and cycling. This would include that:

- African governments need to prioritize walkable streets through mixed use and more compact urban planning. Policy interventions should aim to retain the levels of walking to minimize the negative effects and costs of congestion, poor air quality, non-communicable diseases and compromised public safety. Walking and cycling should become the first choices for mobility within the African cities, based on an integrated public transport system. People should be retained, protected and enabled to walk and cycle, and not be forced into it out of necessity. Governments need to implement complete streets that cater safely and efficiently for everyone.
- African governments need to strengthen the role of public transport and facilitate public transport reforms that enable a modernization of the operations with more robust business models and stronger government support and regulations. Integrated and modern mass transit systems must become the backbone of the mobility system, combined with active, shared and on-demand modes. This redefinition of public transport is necessary to provide door-to-door seamless journeys that eliminate the need for a private car. Governments should explore ways to cross-subsidize public transport operations from collecting fees from car parking, land value capture, congestion charging or taxing fuel. Investments into public transport in African cities are social investments.
- African governments need to ensure financial incentives and a policy and regulatory framework for an emission transition in the transport sector. Governments should set up funds to assist with public transport operations & the procurement of cleaner vehicles.

- African governments need to establish and implement an institutional framework with fully fledged and funded institutions responsible for the coordination of an integrated public transport system. These could be Metropolitan Transport Authorities that are set up for the functional area (and not just for the city boundaries). Examples include the Dar Rapid Transit agency in Dar es Salaam, Tanzania, or the Lagos Metropolitan Area Transport Authority (LAMATA) in Lagos, Nigeria.
- African governments need to further invest in clean energy sources and make them accessible to further reduce the carbon footprint of mobility systems. Incentives need to be identified for a shift towards more renewables that can power electric mobility.
- African governments need to facilitate greater collaboration among stakeholder groups, especially between public and private sector actors to jointly advance climate actions in mobility. Cities, academia and businesses have to co-develop and co-implement urban climate solutions incl. sustainable mobility.

During the **UN-Habitat Assembly in 2019**, the Urban Pathways project convened a Policy Dialogue on “Innovative Urban Mobility for Sustainable Cities in Africa”. The participants in this High Level Session, co-organised by UN-Habitat, the Africa Transport Policy Programme (SSATP) and the International Association of Public Transport (UITP), comprising officials and experts from national, regional and local governments, public transport undertakings, international organizations, academic and research organizations, NGOs, business and entrepreneurs, agreed upon the following policy recommendations, which complement the ones listed above:

- (i) To take measures to prioritize “mobility of people” over infrastructure development to accommodate car-based traffic;
- (ii) To promote the coordination and integration between national transport and urban policies;
- (iii) To ensure participation of civil society, businesses and all stakeholders in the preparation of investment projects; to ensure the participation of women and other vulnerable groups;
- (iv) To provide incentives for a shift from car-based traffic to public transport integrated with better facilities for walking, cycling and shared mobility;
- (v) To develop appropriate fuel pricing schemes, parking pricing, road-pricing and

congestion charging schemes that can cross-subsidise the costs for sustainable measures such as improvement of public transport and provision of foot-paths and bike-lanes;

(vi) To provide incentives for sustainable transport such as bike-sharing schemes integrated with public transport;

(vii) To assess the potential for take-up of e-mobility including in off-grid areas by strengthening renewable energy and transport nexus and promote a move to low emissions mobility;

(viii) To establish Metropolitan Transport Authorities for metropolitan areas with empowered jurisdiction over land-use planning; transport planning; transport infrastructure development and maintenance; operation of public transport;

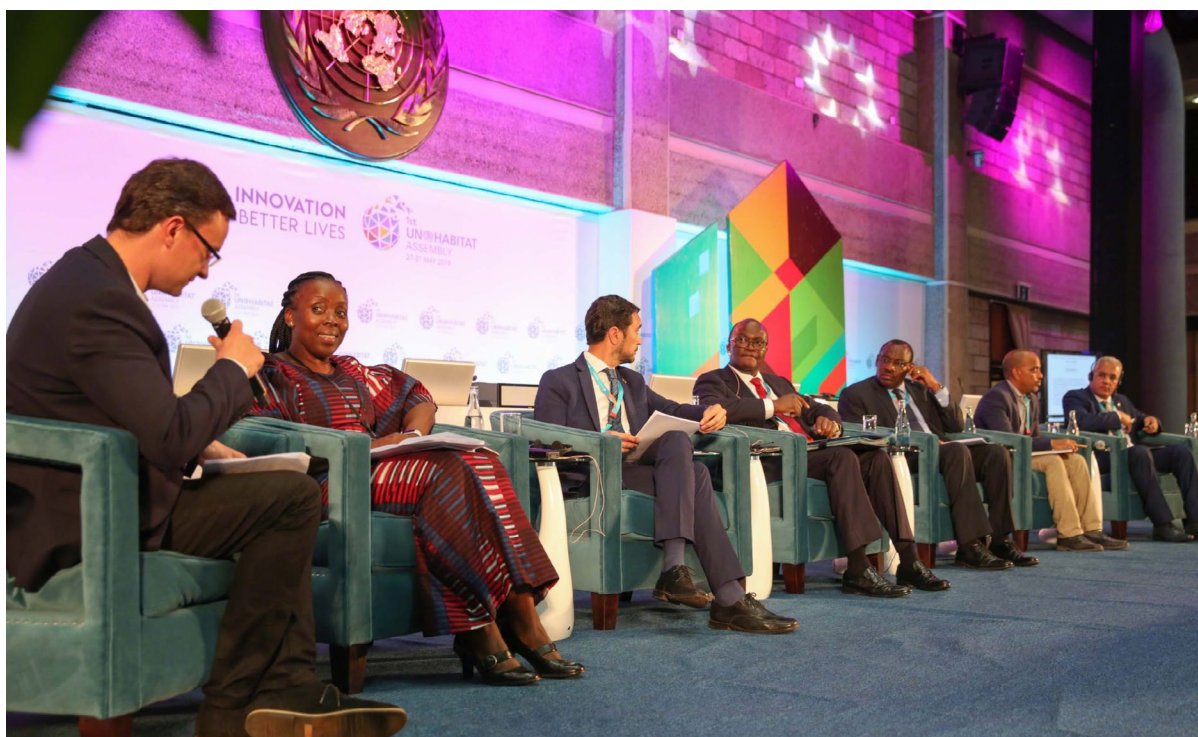
(ix) To develop investment plans and proposals for sustainable transport systems; considering also innovations like Transit Oriented Development to recover investment and operations costs of transport systems from rising land-values;

(x) To develop pilot/ lighthouse projects to test and replicate innovative solutions;

(xi) To provide an enabling environment that encourages start-ups and entrepreneurs in developing innovative solutions to tackle mobility problems;

(xii) To put in place measures to coordinate the work of National Statistical Offices, city administrations, transport operators and relevant International Associations to track progress against the SDG targets 11.2 and 3.6, as well as the mobility related commitments of the New Urban Agenda.

Full communicate can be found at this link, and also in Annex 1: https://unhabitat.org/sites/default/files/2019/06/communicue_mobility_and_innovation_-_unha_2019.pdf



Urban Pathways moderating the high level session at the UN-Habitat Assembly incl. African Minister's of Transport
(source: UN-Habitat)

WASTE MANAGEMENT/ RESOURCE SECTOR

Current global Municipal Solid Waste (MSW) generation levels are approximately 1.3 billion tonnes per year and are expected to increase to approximately 2.2 billion tonnes per year by 2025. It is estimated that 1.6 billion tonnes of CO₂ emissions were generated from the treatment and disposal of waste in 2016 – representing about 5% of global emissions. The largest source of GHG emission is landfill methane (CH₄). Under the current business as usual scenario, GHG emissions from the solid waste sector are likely to reach 8-10% by 2025.

There are large uncertainties concerning direct emissions, indirect emissions and mitigation potentials for the waste sector. These uncertainties could be reduced by consistent national definitions, coordinated local and international data collection, standardized data analysis and field validation of models as well as regulatory frameworks, at national, regional and local level.

GHG emissions from waste are directly affected by numerous policy and regulatory strategies that encourage energy recovery from waste, restrict choices for ultimate waste disposal, promote waste recycling and reuse, and encourage waste minimization.

In Sub-Saharan Africa, it is estimated that only 54% of the total MSW generated is collected and 19% is managed in controlled facilities. Poor MSW collection and management trigger severe threats to public health and pollute air and water. Furthermore, uncollected, and mismanaged waste is the main source of marine plastic pollution. The region struggles to provide solid waste collection services and at least reach the basic environmental level of control for recovery and disposal facilities.

Managing MSW properly is essential for building sustainable and livable cities, but it remains a challenge for many countries and cities in Africa. Effective MSW management is expensive, often comprising 20%–50% of municipal budgets. Operating this essential municipal service requires integrated systems that are efficient, sustainable, and socially supported. This would include:

- access to complete and quality MSW data. Most African cities and countries do not have MSW data, meaning they are not aware of the total MSW generation, collection and recovery rates nor MSW composition. This paucity of evidence-based data hinders the development of MSW strategies and action plans as well as constrains investment decision-making in infrastructure and service expansion, leading in many countries to insufficient or absent MSW management services. Therefore, policy interventions should request municipalities to collect MSW data to make evidence-based decisions, establish baselines and realistic targets as well as monitor the progress towards the targets. Monitoring system should be put in place to regularly collect MSW data, assess if the planned interventions are being effective and make necessary adjustments, if needed to the action plans and strategies. Data is also key to allow cities to allocate adequate financial resources to build the right kind of infrastructures, appropriate for the context.
- regulatory frameworks and policy instruments should be developed in a participatory way, involving all the actors of the MSW chain, both formal and informal, private and public, from waste generation to final disposal. This involvement will facilitate ownership by the different stakeholders of the regulatory frameworks and policy instruments as well as their involvement and contribution in their enforcement and implementation. Special attention should be paid to the informal waste and recovery sector, also considering the upcoming global instrument to end plastic pollution. It is essential that the informal waste and recovery sector is involved in the design of the regulatory frameworks and policy instruments, and regarded as a knowledge provider for innovation and low carbon MSW practices.
- decentralized recovery facilities. Policy should foresee the establishment of cost-effective and decentralized solutions for recyclables and organic waste recovery

to avoid transport's emissions, high costs for fuels and maintenance of the vehicles. Decentralized solutions could include micro-scale composting facilities, community biodigesters, sorting transfer stations in strategic areas, etc.

- allocation of appropriate financial. Policy instruments should include incentives and mechanisms to access financial resources to pay for MSW services. Waste taxes should be in place and proportional to the income level of the generators. Extended Producer Responsibility regulation will play a key role to subsidize MSW collection services in low income areas, where the population often cannot afford to pay any waste fees.
- competent and adequate human resource. Policy instruments should foresee regular mandatory training and capacity building programmes to ensure the MSW staff is equipped with necessary knowledge and skills to take effective and efficient decisions for the management of the MSW system of the city. It often occurs that human resources do not have adequate qualification for their role and do not know the several regulatory frameworks and policy instruments that regulate MSW, leading to their lack of enforcement and poor MSW services.

ENERGY

Improve the urban energy situation

A sustainable urban energy system will need low carbon technologies on the supply side, and efficient distribution infrastructure as well as lowered consumption on the end-user side. Cities therefore need to shift from the current unsustainable fossil fuel energy generation towards using renewable energy sources, not only because of looming resource depletion but also to curb the negative externalities such as pollution and greenhouse gas emissions. At the same time, energy consumption must be reduced by changing consumption patterns and adopting energy saving techniques.

Lastly, because energy is paramount to revenue generation, its distribution needs to become more inclusive and fair to foster universal development, especially for the urban poor. Although renewable energy technologies (RET) such as wind, water, solar, and geothermal are becoming more accessible -- and already cover the energy demands of some neighborhoods if not whole cities in certain areas -- intermittence of supply and high upfront costs are the main deterrents of a wider adoption. Nevertheless, benefits in the long run will outweigh the initial challenges, both from an environmental and economic perspective.

For instance, once a renewable energy generation system is in place, future running costs are usually very low due to an inexpensive and abundant supply of the energy source. Cities also need to assess their meteorological and geographical specificities to best transform the surrounding natural resources into power. To tackle intermittency, several renewable energy sources should be combined to overcome source-specific shortages, such as solar at night, or wind during doldrums. Solutions can also come from waste and heat recovery technologies that can be used to bridge supply gaps.

Smart grids – electric grids that harmonize supply and demand – provide another solution for the intermittent power supply by helping to balance variable power generation and end-user needs. These grids are also more efficient in transmission and distribution, thus reducing energy loss. Machine shifts can be automated to run during hours of the day when there is enough power to meet demand.

Lower energy consumption

The major change, however, needs to come from the end-users – residents, businesses, industries – who must control their consumption. The less energy that is used, the less needs to be produced. Technology can also assist in optimizing energy use. Smart grids can be paired with smart appliances or even a whole smart home or building, which respond to varying electricity supply and prices. Households, offices, and factories can program smart meters to operate certain appliances when power supplies are plentiful. For example, a washing machine can be set up in such a way that it will only start operating when there is enough power in the grid or when the price is under a certain threshold. Buildings themselves have huge energy saving potential if they embrace green or low-energy building concepts and passive design principles.

Savings can be made by integrating efficient heating, cooling, insulation, lighting, and water distribution systems in new or rehabilitated buildings that will increase energy retention. Likewise, on site alternative energy sources such as solar panels on a roof can supplement power from the grid. The use of recycled, reused, or low energy building materials will also contribute to a better energy balance. To cut fossil fuel use for transportation needs, cities need to develop attractive public transport systems and must increase the share of non-motorized transport in developing specific infrastructure (such as cycling lanes and walkways), and optimize delivery of goods, (for instance by promoting the use of rail for cargo transport). Cities can also opt to introduce electric mobility to lower their emissions from transport. However, for cities to fully benefit from the transition to electric mobility, these efforts need to be implemented in the overall context of better and more compact urban planning with a focus

on accessibility and urban liveability. This will require close collaboration between public and private actors in which governments can bring forward enabling regulatory frameworks and provide incentives to encourage the uptake of electric mobility.

Food production and water distribution are huge energy consumers. Curbing food and water waste will therefore also contribute to lowering overall energy use. Besides reducing energy on the production and delivery side, cities also need to promote urban agriculture, such as rooftop farming (it is estimated that 30% of urban spaces could be covered). Consumption habits need to change, residents should be encouraged to use more local produce and to take on prosumption, the production of one's own food. The same reasoning can be extended to consumption habits in general, with residents adopting more sustainable consumption habits and recycling concepts. Cities need to ensure that industries pool their resources in order to create synergy effects. This can be achieved by establishing eco-industrial parks, where waste and by-products of one industry serves as the raw material of another, thereby improving material and energy efficiency and decreasing environmental emissions. From an economic perspective, this would also make companies more competitive, as better waste management results in cost savings and a higher environmental and business performance.

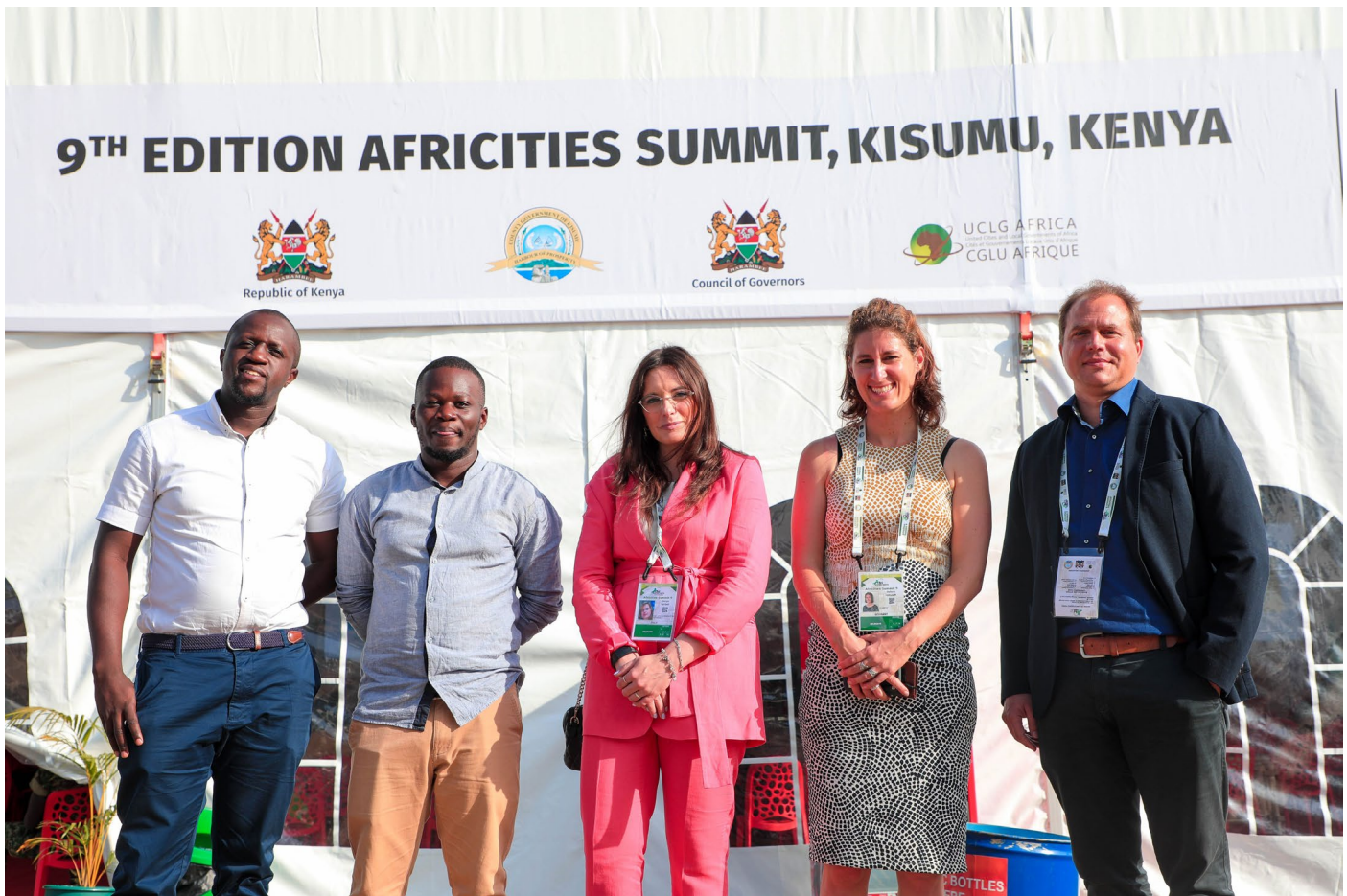
Regulate and drive change

Cities need to establish strong policies and standards to develop sustainable urban energy systems and to reduce the use of unsustainable technologies and practices. Governments must not only institute legislation to regulate energy use and consumption, but must also set up incentive measures that promote research, innovation, and, most importantly, the adoption of greener and more efficient technologies. Sound collaboration and mutual understanding between the private sector -- which runs most of the world's energy systems -- and overseeing authorities is therefore paramount for short-term commercial interests not to overshadow long-term environmental concerns and sustainable development opportunities.

Governments should also pursue collaboration between local and international partners in order to enable local companies to strengthen their knowledge, expertise, and market reach. Governments of developing countries should consider private-public partnerships to develop their energy systems, as current costs cannot be carried by a country alone. For each city to be able to adapt to its own local particularities, authorities need to design decentralized energy systems and infrastructure, and also be permitted to have specific legislation and tax systems to either promote the use of sustainable energy, or to curb and dissuade the use of polluting, inefficient technologies and consumption habits.

There are specific recommendations drawn from the SESA session at the Africities conference

2022:



National governments

- National governments should set the example by adopting policies that facilitate the deployment of green building principles and the use of locally available and low carbon building materials to address the housing shortage.
- Passive building principles exist and should be given priority over building practices that do not integrate local climate in their design.
- National government should encourage the adoption of renewable energy technologies and promote their research and development at the academic level.

Local and subnational authorities

- Local governments should take bold decisions, be visionary and plan for immediate and long term program
- Municipalities should emulate the example of Kisumu County that is developing its 100% Renewable Energy Visioning and strategy. This will help the county to transitioning gradually to carbon neutral development.
- Local solutions on smart energy exist and should just be un-packed and allocated sufficient resources for their exploitation.

Development partners should

- Assist both national and local government in capacity development; demonstration and sharing of best practices.
- Facilitate the transfer of the technologies in the energy, building and transport sector.
- Help national and local governments to avoid making the same mistake as developed countries

Possible recommendations to the African Union Commission,

- Develop continental wide roadmap to Carbon neutral development.
- Mainstream energy and resource efficiency in the AU 2063 Agenda.
- Develop a policy on the investment and adoption of locally available building material.

Possible recommendations to the Regional Economic Communities,

- Create more spaces, discussion, and regional conferences to share best practices on smart energy solutions (policies-technologies-financial mechanism – lessons learned etc.) on energy access, energy efficiency, renewable energy technologies and sustainable mobilities.

Possible recommendations to the continent's financial institutions

- Investment on demonstration projects

- The continent is endowed with huge renewable energy potential and only a small fraction is developed. Financing institution should replicate successful energy projects using the copycat principle and avoid unnecessary autocracy

AIR QUALITY³³

- Set up air quality standards (with a particular focus on PM2.5) and ensure effective enforcement of policies and regulations; the development of city-level Clean Air Action Plan is recommended in African cities
- Ensure consistent and reliable data on air quality. Cities should invest in a network of properly sited, continuously operated, reference monitoring stations. Low cost sensors complement but might not substitute high quality and reliable air quality monitoring systems, as problems of calibration, certification, quality control and reporting remain to be solved.
- Develop local governments' monitoring capabilities and strengthen the local level in its responsibility to tackle air pollution.
- Harmonize policies and measures to abate emissions and reduce population exposure with other strategies to provide for public services including waste management, clean water and public transport, which are closely related. Coordinated and adequate urban and territorial planning is of key importance.
- Establish, strengthen and operationalise inter-sectoral strategic partnerships focusing on air quality with lead agencies on transport, energy, waste, industry, health, weather & climate change, finance, agriculture as well as water & sanitation. Of particular importance will be the establishment of relevant and well-articulated health-environment indicators and other advocacy instruments that should be communicated to policy makers as well as the public.

³³
mu, Kenya

Recommendations build on the elaborations in the upcoming UN-Habitat publication "Air Quality in African Cities" which was pre-launched during Africities 2022 in Kisumu, Kenya

- Collaborate closely with universities and research institutions on data collection and analysis of air quality.
- Strengthen city-scale GHG emission inventories to prioritise action on the variety of emissions sources affecting urban air quality and to monitor progress and to assess the efficiency of plans and measures. Strengthen modelling and forecasting capabilities of local actors.
- Ensure open access to air quality data, emission inventories and health indicators is an essential need to involve policy makers and to engage relevant stakeholders and the general public in improving air quality
- Road transport is a key sector in most African cities, hence develop stronger emission inspection schemes and interventions to promote clean and efficient public transport integrated with safe walking and cycling infrastructure.
- Strengthen data collection and public awareness on the health implications of urban air pollution, particularly in the informal settlements.

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Annex 1: Communique: High Level Session on Innovative Urban Mobility for Sustainable Cities in Africa at UN-Habitat Assembly 30 May 2019



Nairobi Communique – Outcome of the High-Level Session on Innovative Urban Mobility for Sustainable Cities in Africa at UN-Habitat Assembly, 30 May 2019

We, the participants in the “High Level Session on Innovative Urban Mobility for Sustainable Cities in Africa” co-organised by UN-Habitat, the Africa Transport Policy Programme (SSATP) and the International Association of Public Transport (UITP), comprising officials and experts from national, regional and local governments, public transport undertakings, international organizations, academic and research organizations, NGOs, business and entrepreneurs;

Recognizing:

- (i) The rapid pace of urbanisation in the African region;
- (ii) Increasing sprawl and fragmentation of neighborhoods;
- (iii) Persistent poverty and growing inequality;
- (iv) The growth of metropolitan areas;
- (v) Increasing levels of motorization in urban areas;
- (vi) The large and increasing numbers of deaths and injuries from road traffic accidents;
- (vii) Rapidly increasing CO₂ and local emissions from transport; congestion and air pollution in urban areas;
- (viii) The need for adequate, safe, affordable and reliable public transport for all citizens;
- (ix) That shared and informal transport accounts for the majority of all public transport in African cities;
- (x) The special needs of women and vulnerable groups like people with disabilities;
- (xi) The need to design and build footpaths and bicycle lanes that are safe and convenient for pedestrians and cyclists including vulnerable groups;
- (xii) The need to ensure integration between footpaths and bicycle lanes with public transport stops and stations;
- (xiii) The potential of new and emerging digital technologies in developing mobility solutions;
- (xiv) The potential of increasing employment by including women and encouraging the development of new technologies and mobility solutions;

Recognizing also:

The role of transport in the sustainable development of cities; regions and countries; **And;**

With a view to achieving the Sustainable Development Goals and the New Urban Agenda; particularly

Target 11.2 of the SDGs: “by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons”

And;

Target 3.6 of the SDGs: “By 2020, halve the number of global deaths and injuries from road traffic accidents”;

And;

Paragraph 114 of the NUA: “We will promote access for all to safe, age- and gender-responsive, affordable, accessible and sustainable urban mobility and land and sea transport systems, enabling meaningful participation in social and economic activities in cities and human settlements, by integrating transport and mobility plans into overall urban and territorial plans and promoting a wide range of transport and mobility options [...]”;

Taking note of:

- (i) Innovative solutions to improve mass public transport such as the Bus Rapid Transit Systems and urban railways;
- (ii) Innovations using digital technologies for better planning and to map informal public transport for integrated sustainable transport networks;
- (iii) Emerging innovations to optimize all forms of public and shared transport to provide better services to citizens;
- (iv) Emerging innovations to reduce travel demand and encourage a modal shift to sustainable forms of transport e.g. for goods transport and increase occupancy of cars through car and ride sharing apps;
- (v) Emergence of low emissions and electric mobility and use of “local and big data”;
- (vi) Encouraging measures taken by some countries to promote clean mobility;

Recommend to Governments:

- (i) To take measures to prioritize “mobility of people” over infrastructure development to accommodate car-based traffic;
- (ii) To promote the coordination and integration between national transport and urban policies;
- (iii) To ensure participation of civil society, businesses and all stakeholders in the preparation of investment projects; to ensure the participation of women and other vulnerable groups;
- (iv) To provide incentives for a shift from car-based traffic to public transport integrated with better facilities for walking, cycling and shared mobility;
- (v) To develop appropriate fuel pricing schemes, parking pricing, road-pricing and congestion charging schemes that can cross-subsidise the costs for sustainable measures such as improvement of public transport and provision of foot-paths and bike-lanes;
- (vi) To provide incentives for sustainable transport such as bike-sharing schemes integrated with public transport;
- (vii) To assess the potential for take-up of e-mobility including in off-grid areas by strengthening renewable energy and transport nexus and promote a move to low emissions mobility;
- (viii) To establish Metropolitan Transport Authorities for metropolitan areas with empowered jurisdiction over land-use planning; transport planning; transport infrastructure development and maintenance; operation of public transport;



- (ix) To develop investment plans and proposals for sustainable transport systems; considering also innovations like Transit Oriented Development to recover investment and operations costs of transport systems from rising land-values;
- (x) To develop pilot/ lighthouse projects to test and replicate innovative solutions;
- (xi) To provide an enabling environment that encourages start-ups and entrepreneurs in developing innovative solutions to tackle mobility problems;
- (xii) To put in place measures to coordinate the work of National Statistical Offices, city administrations, transport operators and relevant International Associations to track progress against the SDG targets 11.2 and 3.6, as well as the mobility related commitments of the New Urban Agenda.



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