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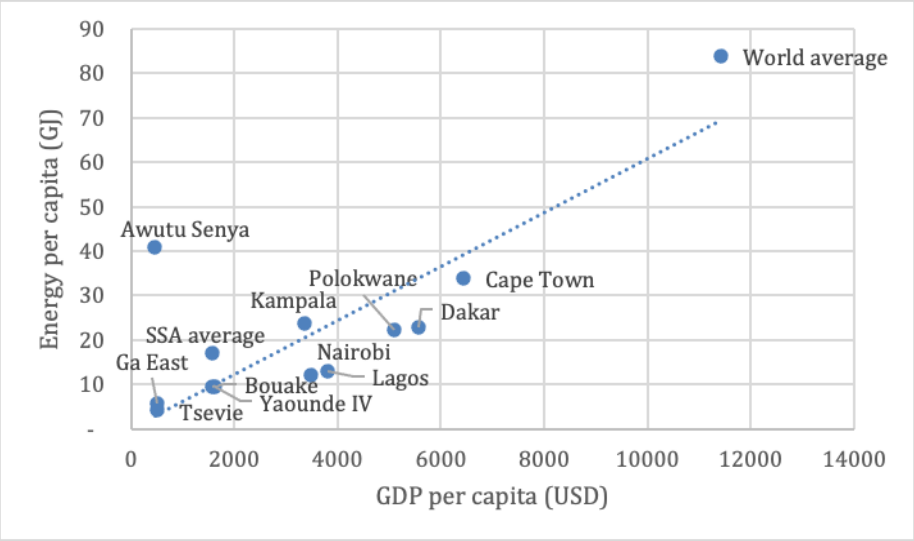
Rethinking the urban energy transition in Sub-Saharan Africa

Sub-Saharan Africa (SSA) is home to the world's most rapidly growing cities, driving up urban energy demand and placing a vastly increased burden on urban governance. This has motivated African governments and development agencies to support increased data creation, modeling, and policy analysis with an urban focus. But a lack of data on urban energy transitions continues to be a major constraint on local action. This brief draws on a recent publication on energy data from twelve SSA urban areas (Metros: Cape Town, Nairobi, Dakar, Kampala, and Lagos; Secondary cities: Yaoundé IV, Polokwane, and Bouake, Towns: Jinja, Kasese, Awutu-Senya, and Tsévié, Ga East) to formulate recommendations for advancing sustainable high-energy urban transitions.[1,2]

There are no low-energy, wealthy cities

Gross domestic product (GDP) per capita is clearly linked to energy consumption: the higher the income, the greater the per capita final energy demand (Figure 1). Average energy use per person in metropolitan cities is 27 gigajoules (GJ), more than double the average across the other urban areas in the study. This disparity highlights the importance of urban nodes as engines of energy-hungry economic growth. However, 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. In a global market where affordable, reliable, sustainable, and modern energy is a key ingredient for a thriving and competitive economy, African cities (and the commercial and industrial sectors in particular) need much more of it.

FIGURE 1: Energy consumption and GDP per person for selected SSA cities[3]



SSA's emerging urban energy picture

The share percentages of energy consumed by various sectors and by fuels in selected SSA cities are depicted in Figures 2 and 3.

- **The residential sector accounts for 54-73% of total final energy consumption in smaller cities and towns**, compared to 22% globally.[4] But higher shares of residential energy use are an indicator of low economic activity, rather than abnormally high residential consumption.
- **The transport sector makes up a disproportionate share of energy use in the larger urban economies**, accounting for 41% and 58% of total final demand in the metropolitan and secondary cities respectively, compared to only 15% of total final energy consumption across SSA's energy sector as a whole. This is partly due to better transport infrastructure, a wealthier populace (resulting in higher car ownership rates), and greater economic activity (leading to increased freight).
- **At the regional level, industrial production only makes up 14% of total energy consumption.** The combined share of energy consumption for commercial and industrial uses varies significantly by urban area, ranging from 3% of total final demand in Tsévié to 64% in Jinja. Commercial and industrial use of energy is inextricably linked to economic activities and varies based on the dominant industrial sector.
- **Traditional biomass (in the form of wood and charcoal) represents more than 50% of final energy consumption in the smaller and less industrialized cities**. Biomass is also the main fuel used most by businesses, due to limited access to alternatives.
- **Although the study cities consume higher levels of electricity than the regional average, lighting accounts for the bulk of electricity use**, with slightly higher shares for refrigeration equipment and other appliances only in the secondary and metropolitan cities.

FIGURE 2: Share of energy use by sector in selected SSA cities[5]

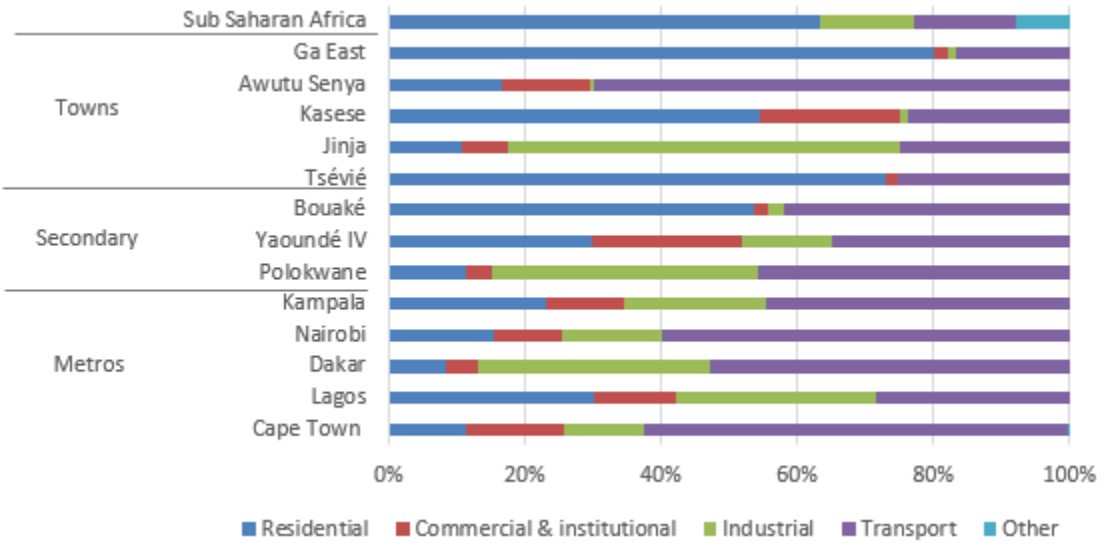
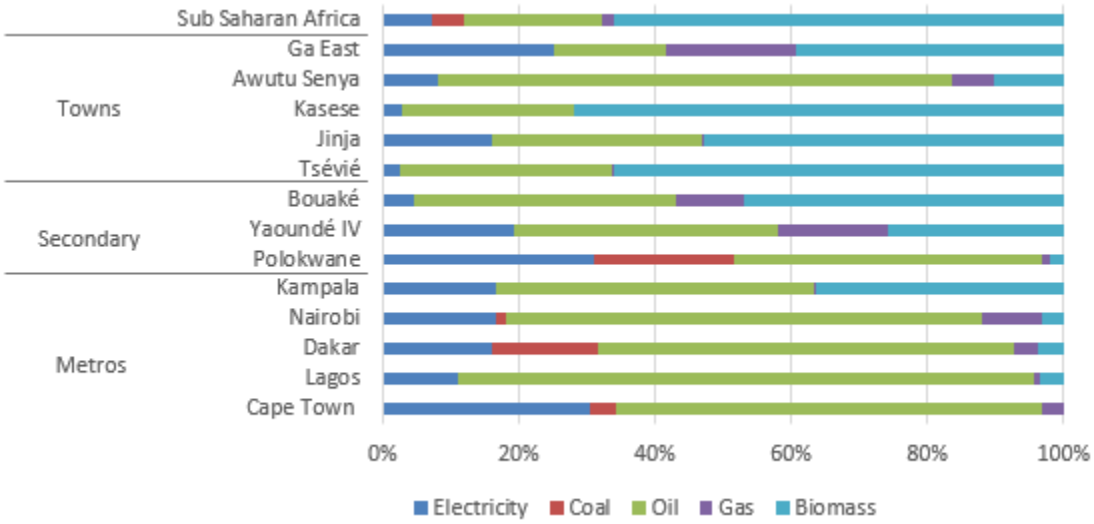


FIGURE 3: Share of energy use by fuel in selected SSA cities[6]



Key areas to support the urban energy transition

Urban energy consumption in SSA demonstrates how energy access, availability, and use influence (and are shaped by) economic development. In pursuit of closing the energy access gap and providing much-needed energy to SSA cities, three key action areas include:

1. Reassess urban energy service delivery. Energy service delivery in SSA urban areas has historically been the responsibility of government agencies and utilities. Delivering a sufficient

quantum of clean, reliable, and affordable energy at the pace required will necessitate deploying alternative service delivery options already piloted in various places in SSA:

- Energy wheeling (i.e., the transportation of energy from a generator to a remotely located end-user through an existing distribution network) can unlock the potential for significant private sector investment in low-cost renewable energy generation by removing some of the location-based limitations.
- Interconnected mini-grids connected to a Distribution Licensee's network can supply economic clusters while circumventing the traditional power deficit and quality issues associated with the utility grid.

2. Unlock access to finance. Weak fiscal decentralization sets major constraints on revenue mobilization and spending powers of local governments to support large-scale urban energy projects. Despite recent progress in unlocking finance for local action through the establishment of project preparation facilities such as the City Climate Finance Gap Fund,[7] there will *never* be enough time or resources for customized technical and financial assistance to be rolled out across several thousand urban energy projects or to the hundreds of other SSA cities in dire need of these resources. What is required is a greater focus and emphasis on project development to unleash the rapid mobilization of financial resources from both public and private sources. More streamlined and systematic support through innovative financial instruments could address fiscal and regulatory barriers, raise awareness among municipal authorities, build capacity in mobilizing climate finance, and enhance peer-to-peer learning.

3. Enable home-grown technical expertise and human resource capacity. Due to capacity constraints (in skills, experience, and knowledge, as well as human and financial resources), local governments in SSA generally are limited in their ability to play a more proactive role in the clean energy transition. A pioneering approach to local government capacity building includes a structured workstream facilitated by a local intermediary organization, emphasizing that approaches and solutions are locally generated rather than from foreign expert input which inevitably lacks the local context.[8]

Endnotes

1. 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.
2. The study cities were grouped under three clusters based on demographic and economic indicators. Metros are cities with population sizes above 1 million, and often termed prime cities due to their very large sizes relative to other cities in the same country. Secondary cities have population sizes between 200,000 – 1 million residents, and called 'secondary' for their supplementary role to the primary cities. Lastly, towns or small cities are often less industrialized, with populations below 200,000 inhabitants.The selection of these cities was guided by their geographic and socio-economic diversity as well as the availability of data.
3. 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.
4. Ibid.
5. Ibid.
6. Ibid.
7. The City Climate Finance Gap Fund supports cities with early-stage technical assistance for low carbon and climate resilient projects and urbanization plans.
8. Bawakyillenuo, S., Olweny, M., Anderson, M., & Borchers, M. (2018). Sustainable Energy Transitions in Sub-Saharan African Cities: The Role of Local Government. Urban Energy Transition, 529–551. https://doi.org/10.1016/b978-0-08-102074-6.00042-5
9. IEA. (2019). Africa Energy Outlook 2019 – Analysis Scenarios. *World Energy Outlook Special Report*, 288. https://www.iea.org/reports/africa-energy-outlook-2019#energy-access%0Ahttps://www.iea.org/reports/africa-energy-outlook-2019%23africa-case
10. SEA. (2015). State of Energy in South African Cities. https://www.sustainable.org.za/uploads/files/file80.pdf
11. Amegah, A. K., & Agyei-Mensah, S. (2017). Urban air pollution in Sub-Saharan Africa: Time for action. In *Environmental Pollution*. https://doi.org/10.1016/j.envpol.2016.09.042