COPENHAGEN CENTRE ON ENERGY EFFICIENCY
SEforALL EE HUB

Building Efficiency Accelerator

ENERGY EFFICIENCY IN BUILDINGS

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Nairobi, Kenya

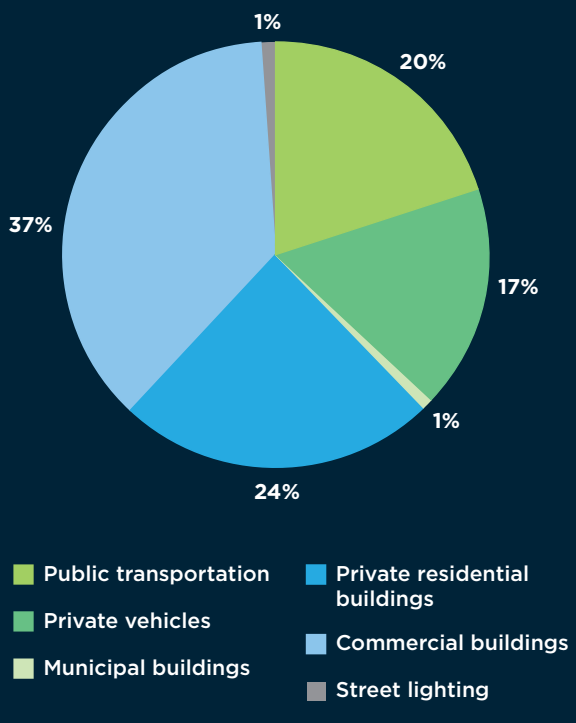
STATUS AND TRENDS

With over 4 million inhabitants and a growth rate of over 4% annually, Kenya's capital city Nairobi is the largest and most populous city in the country, and the tenth largest city in Africa. It is an established hub and the main commercial centre of the country with a well-developed business infrastructure, and is estimated to generate more than 63% of Kenya's gross domestic product (World Bank, 2015).

Nairobi has a diverse industrial base with railways being the largest single industrial employer. Light-manufacturing industries produce beverages, cigarettes, and processed food, while tourism is also important (Encyclopaedia Britannica, 2018). Nairobi has the largest concentration of industries and wealthy homes in the country, with half of the country's large power users located in the city's industrial areas and central business district. Remarkably, Nairobi County accounted for more than half of Kenya's national electricity consumption in the four years to June 2017, reflecting the capital city's economic dominance over the other 46 counties (Daily Nation, 2018).

In terms of sector consumption, industry consumes the lion's share of available electricity generation. Of total electricity consumption of 8,410 GWh in 2017, industry accounted for 60%, households accounted for 22% and commercial buildings for approximately 16%. In 2017 there were 2.1 million electricity connections in Nairobi, with over 2 million of these being residential, pointing to the importance of energy efficiency in large industry to Nairobi's aims of increasing electricity access to 100%.

Figure 1. Non-industry energy spend in Nairobi (World Bank 2015)



Despite its equatorial location, Nairobi has a subtropical highland climate due to its elevation of 1,795 m above sea level, which reduces the need for cooling while seasonal variations are relatively minimal.

The real estate and construction sector contributed 13.8% of Kenya's GDP in 2016 and this percentage is growing. Investment between 2018-25 in new buildings for Nairobi is estimated in the region of USD 8-9 billion: residential construction of approximately USD 5.5 billion will be driven by multi-unit residential projects that are projected to grow at 6.5% per year, while commercial investments will be split predominantly between offices, warehouses, educational facilities and hotels, the latter of which is expected to play a lead role in the green building market.

Once all buildings currently under construction are completed in the near term, it is estimated (JLL, 2016) that Nairobi will have 400,000 m^2 of retail space, including three modern international standard shopping centres; 620,000 m^2 of total gross lettable office space (an 80% increase on 2016 A and Prime grade stock levels); and approximately 10,700 hotel rooms spread across 79 hotels of more than 45 rooms. The total area of all municipal buildings is approx. 430,000 m^2 which includes 22 health centres, Pumwani hospital, City Hall, City Hall Annex offices, crematoriums and mortuaries, 15 office blocks, 15 markets, 36 city depots, 2 fire stations, 38 dispensaries and 18 municipal halls. Small energy consuming municipal buildings include residences and 220 schools (note that schools and hospitals are considered 'commercial' buildings for the purposes of Figure 1 above).

The city is the location of one of the largest slums in the world (Kibera), and it is estimated that 61% of residents of Kenya's cities live in slum conditions (Kuo, 2017), while approximately 22% of the city's residents are considered to live in poverty. The difficulty of keeping pace with infrastructure and accommodating the influx of people migrating from rural parts of the country to Nairobi has meant significant dilapidation of the road network and increasing traffic problems. The government has responded with recent large-scale investments in city physical infrastructure and directing growth away from Nairobi to create decentralised building nodes well apart from the congested Central Business District.

INSTITUTIONAL FRAMEWORK

The Nairobi City Council (NCC) was created by an Act of Parliament in 2010 to provide services to residents of the city. The County Governments Act provides a degree of devolution from central government to the local authority, including limited responsibilities related to local housing, electricity and gas reticulation and energy regulation.

Within the County Government, the Department of Lands, Housing, and Physical Planning has a high degree of regulatory control over building functions, as it determines and enforces regulations for low consuming or net-zero energy buildings, as well as target setting in performance contracts entered into with service providers. The Department of Health Services also has an important role as it determines the functionality of public facilities such as schools and hospitals which are generally high and inefficient energy consumers.

Under the broader auspice of Kenya's Vision 2030 long term planning strategy, the former Governor of Nairobi outlined seven pillars to address Nairobi's development challenges across security; resource management; enterprise development/employment; water and sanitation; transportation, housing and infrastructure; education; and rights of the marginalised. Several energy efficiency interventions were embedded across these pillars in priority sectors that have energy efficiency potential and reinforce co-benefits, such as security, public health, and safety. This 'co-benefits' emphasis for energy efficiency in Nairobi was further reinforced through the Nairobi Integrated Urban Development Master Plan (NIUPLAN) 2014-2030 prepared with assistance from JICA (2015).

The yet-to-be- enacted Energy Bill 2017 expands the jurisdiction of counties with respect to energy efficiency, notably through s. 193-6 which establish a degree of autonomy for counties in amending building codes for local circumstances and showing leadership on energy efficiency measures, including (s. 194) administering an energy efficiency fund at the county level.

POLICY FRAMEWORK

The NCC has estimated that wastage and losses of energy in industries, commercial buildings and institutions accounts for about 35% of supply (Oyake-Ombis, 2015). Efforts have therefore been focused on reduction of transmission and distribution losses as well as more demand side efficiency measures.

The NCC has estimated energy savings of 15–20% in existing buildings through efficient lighting, ventilation, pumps, and motors, and there is a recognised potential to realize low-cost opportunities by integrating solar passive design principles within building codes for new buildings. At present, NCC spends a disproportionately high percentage of the total municipal budget on energy costs for municipal buildings compared with similar cities (World Bank, 2015). Several factors contribute to the high energy use, including the use of older inefficient technologies, poor maintenance, split air-conditioning units in some offices, implications of climatic conditions not fully implemented in building designs, and limited awareness among staff about how to reduce wasteful consumption.

Beyond the national aspirations and targets set in the Energy Act and Kenya's NDC, there have been relatively limited policy efforts articulated at the county level to improve energy efficiency in buildings in recent years, due to a lack of internal capacity and political uncertainties at both the county and national level. While draft green building codes exist, there is a need for the green building codes to be enforced for new buildings to demonstrate

commitment. At the county level, NCC has been active in drafting a Solid Waste Management Bill which recognizes the need to exploit the possibility of waste-to-energy, and in targeting more efficient street lighting.

INTERNATIONAL SUPPORT

In 2017 NCC joined the SEforALL Building Efficiency Accelerator (BEA), a global innovative public-private collaboration which provides cities with guidance and technical advice on how to speed up the energy efficiency improvement of their buildings.

The city has benefitted from numerous training support programs, including those run by the Kenya Green Building Society in partnership with UN Environment (headquartered in Nairobi) and ICLEI, through which NCC officers have been trained on aspects of green buildings, including the application of national regulations, using example training guidelines for South Africa.

Through the SEforALL BEA program, NCC staff, UN Habitat and Kenya Green Building Society commenced development of green building guidelines for use in the county. The guidelines are set to further support public awareness and policy development.

LOCAL IMPLEMENTING CAPACITY

There are multiple challenges for the implementation of energy efficiency in buildings and enforcement of existing national policy provisions at the local level in Nairobi. Some of these challenges include:

- Insufficient or incomplete data on energy efficiency and energy utilization in industrial and commercial sectors;
- A high level of informal settlements and energy losses;
- A lack of awareness of energy efficiency opportunities, particularly in the residential sector;
- Limited credit and financing mechanisms such as dedicated funds or public guarantees;
- Inadequate capacity to promote and monitor enforcement of the existing standards and regulation regime for buildings and appliances;
- Limited number of trained, qualified and certified personnel to undertake energy efficiency assessment, project development and implementation. For example, an impact assessment conducted in 2014 by the Kenya Association of Manufacturers revealed that about 45% of companies and buildings that had conducted energy audits required more training to be able to implement a successful energy management program;
- Low energy tariffs; and
- Low energy efficiency technical capacity among building professionals.

The NCC does not currently have a clearly established authority to handle matters of energy use in buildings or energy efficiency in general.

RECOMMENDATIONS

There are many possibilities and options for Nairobi to pursue greater energy efficiency in the buildings sector, including:

- Empowering an internal NCC team responsible for designing and enforcing local building-sector policies on green building design and energy efficiency;
- Establishing energy efficiency codes and standards for new buildings that where possible go further than current provisions of national codes in recognition of Nairobi's circumstances, and allocate additional resources and responsibilities for enforcement;
- Provide financial and tax incentives to builders and building owners to improve the energy efficiency of existing buildings;
- Encouraging the development of third party suppliers in industry such as ESCOs and energy auditing firms;
- Support adoption of energy efficient appliances and lighting among households including through continued rollout of appliance and lighting energy efficiency minimum performance standards and labelling, and consider introduction of energy certificates for all buildings so that tenants are aware of a building's performance with regard to energy;
- Continue to promote the use of clean cookstoves by households and solar water heating among households, hotels, and public organisations, and integrate energy efficiency into urban and slum redevelopment strategies and plans;
- Consider leakage reduction programs for municipal water supply: water audits conducted in some Kenyan water companies reveal up to 70% of the treated water cannot be accounted for, and energy used for pumping could therefore be reduced dramatically by addressing this issue;
- Conduct training for building professionals and municipal staff for the integration of energy efficiency measures in the planning approvals and construction process. Carry out skills gap analyses for both municipal staff and wider industry stakeholders on issues related to energy efficiency;
- Gradually lower the threshold for energy audits in commercial buildings to below the 15,000 kilowatt-hour annual energy consumption level currently set within the national policy framework, and include all municipal buildings within the scope. At the same time, energy efficiency targets and guidelines for existing municipal buildings could be developed, and dedicated municipal energy managers and information systems put in place, to show leadership in this area;
- Develop programs specifically aimed at raising awareness, building capacity and incentivising identified targeted audiences (e.g. industry professionals, product manufacturers, developers, building owners, and householders) through commercial real estate firms, residents' associations, NCC staff, and advertising; and
- Participate in city networks (e.g. BEA, C40, Covenant of Mayors) and benefit from learning from the experiences in other cities around the world, as well as the information and expert support offered by the networks. For example, Nairobi is a signatory of the Covenant of Mayors and could develop an inventory for GHG emissions (including the buildings sector), set a target and develop a Sustainable Energy Action Plan, following the guidance and materials provided by the initiative, as an important step for prioritising energy efficiency in the city.

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