

The Biomass Challenge in Kenya

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Introduction

Globally, almost 50% of the wood harvested from forests is used to generate energy, especially for cooking and heating services. Of the total wood fuel used for cooking, 17% is converted to charcoal with the production of charcoal expected to rise (van Dam, 2017). Worth noting is that the informal charcoal sector predominantly creates income opportunities for over 40 million people.

However, the sector does not have a regulation structure, something that leads to the unsustainable extraction of forests that consequently results in deforestation and degradation of forests as well as the emission of greenhouse gases (GHGs) (van Dam, 2017). Considering the harmful effects that the use of biomass has on the environment, urgent measures ought to be taken to address the problem. The urgency of mitigating climate change was affirmed by world leaders during the 2015 Paris Agreement where commitments were made to minimize the emission of greenhouse gases as outlined in the nationally determined contributions (NDCs).

Despite all the efforts taken to address the biomass problem, it remains to be a crucial energy source for families and small businesses in underdeveloped nations. Approximately a third of the global population depends on biomass fuel for cooking while several small industries use firewood and charcoal for activities such as brick-making and food preparation. Wood biomass is thus responsible for the emission of 1–2.4 Gt of carbon dioxide every year, an amount that is equivalent to 2 to 7% of the total GHG discharged through anthropogenic activities where sub-Saharan Africa (SSA) accounts for a third of all the emissions (van Dam, 2017).

Moreover, the rate of urbanization and economic growth in SSA has resulted in a marked shift in the consumption of charcoal and firewood. The increasing demand for charcoal is directly attributed to population growth in several cities. It is projected that the demand for biomass energy will rise by 40% by 2040 in SSA (Smith et al 2019). 75% of growth in urban areas within SSA is expected to take place in cities that have a population of fewer than 1 million people with the transformation of big villages into secondary urban centers.

At the national level, biomass production and use results in the emission of almost 35 MT CO₂eq into the atmosphere, which is the equivalent of approximately 35% of the total greenhouse gas (GHG) being discharged in the country (Dalberg, 2018). In as much as wood is classified as a renewable resource if harvested sustainably, the inefficient production and consumption of charcoal are responsible for the emission of GHG.

Key Messages

- Approximately 50% of the wood harvested from forests throughout the world is used to generate energy, with 17% of the total wood fuel used for cooking converted to charcoal which creates income opportunities for over 40 million people.
- Despite all the efforts taken to address the biomass problem, it remains to be a crucial energy source for families and small businesses in underdeveloped nations. Approximately a third of the global population depends on biomass fuel for cooking while several small industries use firewood and charcoal for activities such as brick-making and food preparation.
- A bigger proportion of the charcoal consumed in Kenya is produced in arid and semi-arid lands (ASALs), which covers more than 70% of the land mass in the country with the Mau ecosystem, Ukambani region, and the coastal region being the major charcoal production zones.
- The Modern Energy Cooking Service (MECS) Program can help solve the problem of biomass by transitioning the population of the world that is still relying on polluting fuels to cook to clean cooking options such as electric cooking in line with SDG 7.

Recommendations

- The need to formulate and implement suitable government policies to attract investments required to introduce clean cooking technologies.
- All pertinent stakeholders from the government, private bodies, producers, and consumers have to be involved in planning and decision-making processes for them to own the idea and see the need to transition to clean cooking technologies.
- Communities have to be continuously sensitized on the benefits associated with the adoption of clean cooking technologies through evidence-based research and practical demonstration programs.
- The need to empower decision makers at the household level to facilitate the uptake of clean cooking appliances.

Charcoal Demand in Kenya

The total demand for biomass fuel in 2000 was 34.3 million tonnes with the demand for charcoal accounting for 16.5 million tonnes and 15.1 million tonnes for firewood (Ndegwa et al 2020). However, recently, the demand for solid biomass has grown such that it cannot be met by what is being supplied. It is currently estimated that Kenya has a wood fuel demand of 41.7 million m³ vis-a-vis a potential supply of 31.4 million m³.

It is important to note that whereas firewood tends to be locally available and freely collected within a range of not more than 5km, wood for charcoal is usually gathered from woodlands and rangelands in ASAL areas with low productivity of roughly 3% per year. As such, poor regeneration of the trees that have been harvested is witnessed, something that may help explain the limited supply when compared to demand.

A bigger proportion of the charcoal consumed in Kenya is produced in arid and semi-arid lands (ASALs). Worth mentioning is that the ASALs cover more than 70% of the land mass in the country with the Mau ecosystem, Ukambani region, and the coastal region being the major charcoal production zones (Ndegwa et al 2020). Nevertheless, most people, especially those in Nairobi, tend to prefer charcoal from the Ukambani region because of its high heat content.

For example, Kitui is among the regions in Ukambani known for the production of charcoal, most of which is through selective logging. In Mutomo District, Kitui County, approximately 59% of the population engages in charcoal production. Several private farmlands as well as communal and non-protected government lands have been extremely depleted of preferred tree species for charcoal production.

Consequently, this has seen production extend into forests and woodlands that are protected such as South Kitui National Reserve which functions as a wildlife conservancy and wild animal migration corridor (Ndegwa et al 2020). Hillside trees that have enjoyed years of protection from the community due to their important role as water catchment areas and grazing land during the dry season have also not been spared by charcoal producers. Such activities, apart from contributing to climate change due to the greenhouse gases emitted in the process of their production, also contribute to the loss of ecosystem services and possible desertification.



*Sacks of charcoal being ferried to the market using motorbikes.
Photo: Kipsang Joseph*

The Dilemma

While efforts are being continuously made to transition the world population that is still using biomass energy for their cooking needs to clean and alternative sources of fuel, the proportion of jobs created through the charcoal industry cannot be overlooked. For example, in terms of the energy consumed per terajoule, charcoal can create 200 to 350 jobs, a figure that triples the jobs created through electricity and 20 times those created by kerosene, something that qualifies it as a significant source of livelihood (Smith et al 2019). In Kenya, the charcoal industry is among the major significant sources of employment for approximately 66% of households in rural areas. The income derived from the sale of charcoal comprises more than 50% of the total revenue for many families (Ndegwa et al 2020; Bar et al 2021). For example, in 2013, the charcoal sub-sector employed 0.64 million people either directly or indirectly and its market value was Ksh. 135 billion (\$1.6 billion), something that highlights the vital role it plays in the economy of the country (Ndegwa et al 2020; van Dam, 2017).

Forests are a crucial resource that provides a wide range of products and ecological services to the lives of millions of people. Globally, forests directly contribute to the livelihoods of approximately 800 million people who live adjacent to tropical forests and savannahs (Smith et al 2017). As such, income derived from forests greatly forms an important source of revenue for rural dwellers and can reduce the vulnerability of households by providing an opportunity for saving, building assets, decreasing the levels of poverty, and improving the well-being of communities. For that reason, alternative sources of income-generating activities have to be identified which communities depending on the charcoal business can transition to ensure that they can continue fending for the needs of their families.

Modern Energy Cooking Services

The Modern Energy Cooking Service (MECS) Program aims to transition the population of the world that is still relying on polluting fuels to cook to clean cooking options such as electric cooking in an attempt to address the biomass problem in line with SDG 7. In Kenya, numerous campaigns have been carried out in efforts to create awareness and stimulate demand for different clean cooking alternatives including e-cooking.

While the campaigns are yielding fruits, there is a need for extended promotional programs on the technology to ensure its adoption on a wide scale. Besides, when encouraging the use of e-cooking, local communities, especially those in rural areas, have to be educated on the need to engage in economic activities that do not cause damage to the environment, something that will help ease pressure on the forest resources and also guarantee that households can earn a living.

As such, while promoting the need to adapt to clean cooking options like e-cooking, community members have to be sensitized on why they should embrace sustainable income-generating activities as well. County officials have to work closely with the local members and initiate community support groups that will enable them to generate income while preserving the environment at the same time.

A good example can be drawn from the case of a group of [Maasai women from Narok County](#). Just like Kitui, Narok is among the regions whose forest ecosystem has been degraded to meet the charcoal demand for both rural and urban households. With time, the business became unsustainable and they had to look for alternative sources of income through the assistance of county officials. The group which is known as the 'Maasai Women Environment Conservation Champions (MWECC)' has a membership of 2000 women who resorted to sustainable ways of making money. Rhoda, the group leader, narrates her experience:

“When I reflect on the income I got from selling charcoal, it was so little, yet I was immensely destroying the environment. For example, I sold a sack of charcoal for as low as Ksh.50. Here, I make as much as Ksh.500 by beading a necklace at my comfort. No cutting trees. No immense smoke from burning charcoal. No trouble with authorities. No worries over diseases due to smoke.”

In so doing, the two-fold problem of charcoal demand and how to sustain livelihoods will be addressed.

Recommendations

To attract investments required to introduce clean cooking technologies, suitable government policies have to be formulated and implemented. An abiding policy vision will be needed to expand and democratize clean energy alternatives to minimize pressure on forests aggravated by increasing charcoal demand. At the moment, a National Clean Cooking Strategy is being developed alongside an e-cooking strategy. The two will help give guidelines that will facilitate the adoption of clean cooking technologies both at the local and national levels.

Planning and the process of decision-making towards the need to effectively transition to clean cooking technologies will also benefit from the involvement of all pertinent stakeholders from the government, private bodies, producers, and consumers. This will enable the involved parties to own the idea and take it within themselves to spearhead the process. Besides, local communities have to be continuously sensitized on the benefits associated with the adoption of clean cooking technologies through evidence-based research and practical demonstration programs. This will help to debunk the existing myths revolving around technologies such as cooking with electricity. Most importantly, men as the major decision makers at the household level ought to be empowered and engaged in clean cooking initiatives to ensure that they accept and embrace the use of such equipment in their homes.



*E-cooking demonstration campaign
Photo: Haron Akala*

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About MECS

Modern Energy Cooking Services (MECS) is a five-year Programme funded by UK aid which aims to spark a revolution through rapidly accelerating the transition from biomass to clean cooking on a global scale. By integrating modern energy cooking services into energy planning, MECS hopes to leverage investment in renewable energy (particularly in electricity access, both grid and off-grid) to address the clean cooking challenge. Modern energy cooking is tier 5 clean cooking, and therefore MECS also supports new innovations in other relevant cooking fuels such as biogas, LPG and ethanol. The intended outcome is a market-ready range of innovations (technology and business models) which lead to improved choices of affordable, reliable and sustainable modern energy cooking services for consumers. We seek to have the MECS principles adopted in the SDG 7.1 global tracking framework and hope that participating countries will incorporate modern energy cooking services in energy policies and planning.

Disclaimer: This research is funded by UK aid. However, the views expressed do not necessarily reflect the official policies of the UK government.