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**SUSTAINABLE CHARCOAL PRODUCTION
FOR FOOD SECURITY AND FOREST LANDSCAPE RESTORATION**

I. BACKGROUND

1. Secured access to energy, including wood energy, is a basic need to ensure shared prosperity and security in Africa and achieve the 2030 Agenda for Sustainable Development, including sustainable development goal (SDG) 7 to “ensure access to affordable, reliable, sustainable, and modern energy for all”. The Agenda 2063 of the African Union Commission calls upon “harnessing all African energy resources to ensure modern, efficient, reliable, cost-effective, renewable and environmentally friendly energy to all African households, businesses, industries and institutions...” (African Union Commission, 2015)¹.
2. Charcoal made from wood has been in use as energy source since ancient times and is still widely used nowadays in many countries. As a locally available and relatively clean fuel compared to burning wood or agricultural residues, charcoal provides basic energy services for cooking and heating to millions of people with limited options of alternatives, particularly those who live in the urban and peri-urban areas in sub-Saharan Africa (SSA).
3. Compared to burning wood directly as a fuel, charcoal has obvious advantages. Due to the removal of moisture and volatile matters from wood, charcoal fires can generate high temperature and last longer with little smoke. Furthermore, it is relatively easier and less costly to transport charcoal than wood, particularly over long distance. These comparative advantages combined with its availability, affordability, and reliability in local markets makes charcoal an important popular cooking fuel in many countries, particularly in areas without reliable access to modern energy services

¹ Agenda 2063 – The Africa we want (African Union Commission, 2015)

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or in case of humanitarian crisis. For instance, a recent study in Uganda found that consumption of charcoal by refugees is significantly higher compared to that of host communities, making woodfuel one of the main drivers of forest degradation.

4. From the energy point of view, however, charcoal may not be the ideal fuel for cooking and heating, if compared to electricity, cooking gas or other modern energy sources. Along with economic growth, around 60 percent of the global population have gradually secured access to clean cooking fuels or technologies, but there are still 2.4 billion people who continue to use inefficient open fires or simple cook stoves today, out of which 848 million people live in SSA (IEA, 2019)². While woodfuel dependence has declined or remained steady in most other regions of the world, the total consumption of woodfuels continues to increase in SSA with 2-3 times higher per capita consumption than in any other region (FAO, 2017)³.

II. CHARCOAL PRODUCTION AND CONSUMPTION TRENDS

5. Globally, more than 2.4 billion people rely on the use of woodfuel, including charcoal, for cooking, and small enterprises use fuelwood and charcoal as important energy providers (FAO, 2014)⁴. FAO estimates that the global production of wood charcoal was about 53.2 million tons in 2018, of which 34.2 million tons (or around 64 percent) were produced in Africa. Data from FAOSTAT indicate that around 90 percent of the wood removed from the forests and woodlands in Africa are used as fuel⁵, of which about 29 percent are converted into charcoal. Due to steady increase in market demand, the production of wood charcoal in Africa has almost doubled in 20 years from 1998 to 2018 and accounted for roughly two-thirds of the global production.

6. The cooking fuel mix in SSA has remained relatively stable in recent years, particularly in rural areas where fuelwood and charcoal are the main energy sources. According to the Africa Energy Outlook 2019, a special report of the International Energy Agency (IEA), charcoal will remain an important source of energy in SSA by 2040 with increasing demand for cooking from urban areas. The increase is likely linked to population growth and to the urbanization process at initial phases, with a large number of people shifting from fuelwood to charcoal for domestic cooking and heating. It may also closely relate to the fact that charcoal production and supply do not require an enormous amount of upfront investment for the development of capital-intensive and durable infrastructure, such as those for electricity or natural gas, and therefore comes with lower economic and social barriers.

7. A national charcoal survey in Uganda⁶ indicates that about two-thirds of the households in urban areas use charcoal and one-third use fuelwood for cooking (with only a very small percentage of households completely rely on gas or electricity). Studies conducted in Ghana (UNDP, 2015)⁷, Kenya (MoE, 2019)⁸, Malawi (MNREM, 2017)⁹, and Tanzania (World Bank, 2009)¹⁰ show similar situations and trends in charcoal production and consumption. For example, in Malawi 54 percent of urban households and around 11 percent of all households nationally relied on charcoal for cooking in 2015. While charcoal production generates income to support livelihoods of many rural people, it also leads to burden of deforestation, reduced wood supply and environmental degradation. Corrective efforts in the past focusing on prohibition of charcoal production did not help much in addressing these problems, but promoted illegality in its production, transportation and marketing. This is likely part of the reasons that led the Government of Malawi to develop a national charcoal strategy, prioritizing

² World Energy Outlook 2019 (IEA, 2019)

³ Incentivizing sustainable wood energy in sub-Saharan Africa (FAO, 2017)

⁴ State of the World's Forests 2014 (FAO, 2014)

⁵ FAOSTAT - Forestry Production and Trade (FAO, 2019)

⁶ National Charcoal Survey for Uganda 2015 (Ministry of Energy and Mineral Development, 2016)

⁷ NAMA Study for a Sustainable Charcoal Value Chain in Ghana (UNDP, 2015)

⁸ Kenya Household Cooking Sector Study (Ministry of Energy, 2019)

⁹ National Charcoal Strategy of Malawi 2017-2027 (MNREM, 2017)

¹⁰ Transforming the Charcoal Sector in Tanzania (World Bank, 2009)

actions to be undertaken on short-, medium- and long-term over 10 years from 2017 onward (MNREM, 2017).

8. In many countries throughout SSA, wood for charcoal production is often sourced from natural forests or woodlands with minimal management or produced as a by-product of land clearance for agriculture. Charcoal producers, mostly rural people on part-time basis, may need a license or permit to cut wood for charcoal production, depending on the existence of applicable regulations. Most of such regulatory measures, including quotas, licenses, permits, taxation, and in some cases sustainability certification, have had mixed results so far due to the complexity of this informal sector¹¹. Transition to a sustainable charcoal sector requires major changes such as land-tenure reforms, sustainable forest management plans and practices, organization of charcoal producers as well as adequate measures to improve traceability along the value chain from source to market.

III. IMPACTS OF CHARCOAL PRODUCTION ON FOOD SECURITY AND FOREST LANDSCAPES

9. Charcoal production and consumption have multiple social, economic, and environmental impacts that are closely linked to at least eight SDGs, including SDG1 (poverty reduction), SDG2 (food security and nutrition), SDG3 (health), SDG5 (gender equity), SDG6 (clean water), SDG7 (sustainable energy) and SDG15 (including elements such as sustainable management of forests, reducing forest and land degradation and deforestation, land degradation neutrality, biodiversity conservation)¹². The sector also has linkages to climate change (SDG 13), through its impacts on forest degradation or deforestation, or due to emissions of greenhouse gases during charcoal production. The production and use of fuelwood and charcoal contributes between two and seven per cent to the global emission of greenhouse gases, with SSA accounting for one-third of these emissions, mainly due to unsustainable forest management, insufficient charcoal manufacture and woodfuel combustion (FAO, 2017)¹³.

10. Sustainable production and supply of charcoal play important roles in food security, including food production, processing, utilization and access to food through income generation. Charcoal is often readily available in local markets compared to other cooking energy options such as electricity or modern liquid or gaseous fuels, particularly in the urban and/or peri-urban areas in African countries. Reliable access to affordable cooking fuels enables food being well cooked, making it more digestible and enhancing the uptake of nutrients.

11. Also, cash income from charcoal production and trade provides means to purchase food or to invest in agriculture production. FAO estimated that about 195 million people in Africa, or roughly 20 percent of the population in the region, engaged in the production of fuelwood and charcoal, mostly on part-time basis, with a total income of about US\$10 billion from charcoal alone in 2011¹⁴.

12. Charcoal production can be integrated in food production systems, such as through agroforestry practices. Studies found that some agroforestry systems can provide wood resources for year-round charcoal production combined with staple agricultural crops¹⁵. Furthermore, woodlots and tree plantations established for sustainable charcoal production may provide forest foods, animal fodder and fuelwood simultaneously and contribute to global efforts to halt and prevent deforestation.

¹¹ Incentivizing sustainable wood energy in sub-Saharan Africa (FAO, 2017)

¹² The State of the World's Forests 2018 (FAO, 2018)

¹³ The charcoal transition: greening the charcoal value chain to mitigate climate change and improve local livelihoods (FAO, 2017)

¹⁴ State of the World's Forests 2014 (FAO, 2014)

¹⁵ Industrial plantations and agroforestry for the benefit of populations on the Batéké and Mampu plateaux in the Democratic Republic of the Congo. Bois et Forêts des Tropiques, 301 (Bisiaux et al, 2009)

13. On the other hand, unsustainable charcoal production and fuelwood collection – favoured by open access with a lack of clear and secure forest and tree tenure – currently constitute the main cause of forest degradation, particularly in SSA¹⁶. Large-scale production of charcoal, especially in areas serving the markets of major urban areas, may have significant adverse impacts on the forests and other natural resources putting at risk their sustainability. An earlier study on the linkages between charcoal production and forest degradation and deforestation in Tanzania¹⁷ found that charcoal production was responsible for the degradation of 25 percent of closed woodland, as well as the deforestation of 20 percent of closed woodland and 51 percent of open woodland in the catchment area to the west and north of Dar es Salaam that supplied charcoal to the city.

14. Different from fuelwood use, which is mostly produced and consumed locally in a more decentralized manner in rural areas, the intensive and continuous demand for charcoal from large urban areas drives long-distance transportation of charcoal and makes the environmental impacts of charcoal production going far beyond the forests in proximity, likely resulting in negative impacts at landscape level.

15. The Africa Energy Outlook (IEA, 2019) indicates that forest degradation, sometimes leading to deforestation, is a serious consequence of the unsustainable harvesting of fuelwood, mainly driven by inefficient charcoal production for cities¹⁸. Though systematic and sound data are still not enough to clearly attribute forest degradation and/or deforestation to concentrated charcoal production to supply urban markets, many studies¹⁹ have established connections between them.

IV. IMPROVING SUSTAINABILITY OF CHARCOAL PRODUCTION

16. The concerns around charcoal production sustainability are focused on three key issues covering the entire value chain – the sourcing of wood for charcoal production (cutting trees and harvesting wood), the wood-to-charcoal conversion efficiency (carbonization process), and the effectiveness in the governance of the charcoal sector (policies, regulations, and enforcement).

17. Wood for charcoal production may be harvested by cutting trees in natural forests or managed woodlots through clear felling or selective cutting. It may also come from land clearance for agriculture, silvicultural thinning, or residues from forest harvesting and timber processing. In most cases, the cost share of sourcing wood in the final market prices of charcoal is very low, with or without fees paid for official permissions (licensing) from the forestry authorities for wood cutting. This profit-sharing structure may not provide adequate incentives to charcoal producers to pay due attention to sustainable wood sourcing from forests or woodlots, not to mention dedicated woodlot plantations for charcoal production, particularly given the current land tenure structure and the easy access to public or community forests. For sustainable sourcing of wood in the long run, adequate regulations may have to be established to ensure that the sourcing costs better reflect the value of the wood, trees, or forests.

18. In the carbonization process to convert wood into charcoal, the most popular kilns are earth-mount or earth-pit with relatively low efficiencies, mostly in the range of 10-15 percent, compared to 35 percent or even higher with modern charcoal kilns²⁰. Upgrading the conversion efficiency of charcoal kilns from 15 percent to 25 percent would save 40 percent of wood for the same amount of charcoal produced. The shift from traditional to highly efficient kilns could reduce greenhouse gas emissions by 80 percent (FAO, 2017)²¹. Such technical improvement, however, rarely happens on the ground, unless supported by funded projects, most likely because the investment would not be offset

¹⁶ Sustainable woodfuel for food security (FAO, 2017)

¹⁷ Charcoal Potential in Southern Africa (SEI, 2002)

¹⁸ Africa Energy Outlook 2019 (IEA, 2019)

¹⁹ Drivers of Deforestation and Forest Degradation (Kissinger, et al 2012); Charcoal, livelihoods, and poverty reduction: Evidence from sub-Saharan Africa (Zulu, et al 2013)

²⁰ The Charcoal Transition (FAO, 2017)

²¹ The Charcoal Transition (FAO, 2017)

by saving wood and the labour costs for wood cutting under the current cost structure and the regulations on wood sourcing for charcoal production. Higher share of wood sourcing costs in the value chains would help promoting efficient charcoal production.

19. Charcoal production has been an informal sector that is crosscutting the domains of various government agencies in many countries, including forestry, energy, environment, agriculture, rural development, and land traffic control, among others. This makes the inter-agency coordination complex and difficult, which in turn leads to weak governance of the sector. Having noted that the roles of charcoal in energy access and livelihoods support are likely underestimated and that ineffective regulations have complex social, economic, and environmental consequences, some countries have started addressing this issue through more integrated policies, strategic initiatives and programs at national or local levels. The development of national charcoal strategies, as done in Malawi with prioritized actions over 10 years (2017-2027) can be an example of addressing the charcoal issues in a more systematic way, including its integration into national development strategies and the involvement of all stakeholders covering all relevant sectors such as decentralized structures, national agencies in charge of forests and energy as well as national statistics offices.

20. Sustainable charcoal production can be an element in major global or regional efforts promoting forest and landscape restoration (FLR) and sustainable development, including the United Nations Strategic Plan for Forests 2030, The Bonn Challenge, the African Forest Landscape Restoration Initiative (AFR100)²², the nationally determined contributions (NDCs), the Land Degradation Neutrality targets, the United Nations Sustainable Development Agenda 2030, and the Goal 7 for environmentally sustainable and climate resilient economies and communities in the framework of the Africa Union Agenda 2063, among others. An assessment of future trends in charcoal consumption and production at regional level would be useful to inform decision-making and provide guidance for the integration of appropriate policies in national implementation strategies related to above initiatives, which should be monitored at regional and global levels.

21. Some national and international organizations have initiated programs to address relevant issues along the charcoal value chains such as: (i) Promotion of Sustainable Charcoal through a Value Chain Approach in Angola; (ii) Energy Efficient Production and Utilization of Charcoal through Innovative Technologies and Private Sector Involvement in Sierra Leone; (iii) Addressing Barriers to the Adoption of Improved Charcoal Production Technologies and Sustainable Land Management Practices through an Integrated Approach in Uganda; (iv) Sustainable Management of the Miombo Woodland Resources of Western Tanzania; and (v) more recently the GEF-7 Sustainable Forest Management Impact Program on Dryland Sustainable Landscapes under development by FAO, African countries (Angola, Botswana, Burkina Faso, Kenya, Malawi, Mozambique, Namibia, Tanzania, Zimbabwe) and partners.

22. FAO together with partners have been working to address concerns on woodfuels for decades. Major activities cover a wide variety of issues, including woodfuel data collection and analysis, woodfuel demand and supply assessment at country or regional level, policy studies and support, and technological improvement, among others. Some of the ongoing efforts include: (i) Mapping charcoal initiatives in Africa; (ii) National dialogues (in Ghana and Togo) on wood energy and FLR in the framework of the Global Bioenergy Partnership; (iii) Support establishment and capacity development of charcoal producers associations in the framework of the Forest and Farm Facility in Kenya and Zambia; and (iv) Assessment of forest degradation associated to woodfuel consumption in refugee hosting areas in Uganda. Lessons learned from the above programs and activities should be assessed to provide systematic guidance on good practices to promote sustainable charcoal production.

23. The UN Decade on Ecosystem Restoration (2021-2030) and the UN Decade of Family Farming (2019-2028) together with the AFR100 initiative can serve as platforms, providing different

²² See dedicated Secretariat paper: FO/AFWC/2020/5 on AFR100

stakeholders and partners an opportunity for stimulating interest in and mobilizing resources and investments for forest related value chains development, including that of charcoal, while strengthening resilient landscapes and livelihoods in Africa.

V. POINTS FOR CONSIDERATION

24. The Commission may wish to invite countries to:

- recognize the value and importance of charcoal in meeting the increasing demand for affordable and reliable cooking fuels from urban areas as well as the consequences it may have on land degradation, climate change and rural livelihoods;
- formulate and implement national charcoal strategies with prioritized and coordinated actions to promote sustainable charcoal value chain development, including possible references to decentralized structures providing technical advise on charcoal production as well as its integration into national implementation strategies related to ecosystem restoration and sustainable development;
- strengthen the enabling environment for sustainable charcoal production by promoting, among others, effective regulations on wood sourcing and efficient wood-to-charcoal conversion;
- assess the feasibility of establishing dedicated woodlots plantations for charcoal production to serve major urban centers as well as to prevent and halt ecosystem degradation.

25. The Commission may wish to recommend that FAO supports countries by:

- conducting an outlook study on the roles of sustainable woodfuels in the sustainable development vision of Africa, particularly in the framework of The Agenda 2063 of the African Union;
- identifying and disseminating good practices of relevant national and regional programs, policies, and regulations in African countries that aim at promoting i) the sustainability of charcoal production, wood-to-charcoal conversion efficiency, value chain development and governance of the charcoal sector as well as ii) suitable and accessible substitutes for wood charcoal;
- integrating sustainable charcoal production in FAO's implementation framework in Africa, in particular related to food security, climate actions and ecosystem restoration.