BIO4AFRICA

POLICY BRIEF

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Senegal

Clean energy solutions promise a better future for rural communities in Senegal: Why action is needed now

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Summary

- Nearly 40% of Senegal's primary energy is drawn from biomass most of which non-renewable.
- Communities in Senegal stand a chance to access cleaner energy that will lead to better environmental and economic outcomes.
- The Bio4Africa project is promoting Biochar production from crop residues such as maize and sorghum stover, production of biogas from biowastes and a technology that utilizes special equipment to compact numerous types of waste biomasses to produce fuel briquets.
- The development and commercialization of these technologies however faces challenges related to research and development, prohibitive taxation regimes, weak coordination, inadequate capacity, enforcement of standards and discriminative land tenure systems.
- This brief suggest policy options to deal with these challenges.

The potential for the Bioeconomy in Senegal

Nearly 40% of Senegal's primary energy is drawn from biomass most of which non-renewable, mainly firewood and charcoal supplemented by kerosene and LPG gas (1). The number of people relying on traditional biomass for cooking grew by 50% from 6.5 Million in 2000 to 12.5 Million in 2023 (2).

This puts pressure on the country's forest resources and the impact on households is already being experienced given higher prices of firewood and charcoal in major urban centers. Intensified efforts to promote the development and use of environmentally safe energy sources are necessary. Although Senegal doesn't have a specific policy on Bioeconomy, the renewable energy sector is regulated through the Energy Sector Development Policy Letter (LPDSE 2019-2023) (3) which outlines the action plan for the energy sector and will soon be replaced by the ten-year Integrated Low-Cost Plan (*Plan Intégré à Moindre Coût* PIMC) and the next LPDSE (2).

These policy frameworks seek to guide implementation of actions in the energy sector to achieve facilitate access and sustainable utilization of energy in Senegal. As Senegal gears towards the implementation of its policies, it will be critical for the country to prioritize clean cooking programmes overall and renewable energy sources, while borrowing experiences from other countries in Africa and elsewhere (2).

Briquettes for use in improved cooking stoves

Biogas production

Biochar for soil conditioning

The current interventions by the Bio4Africa project seeks to provide options for cleaner energy in the country. Further the proposed solutions support environmental management through utilization of crop residues and other wastes for energy and soil conditioning products. This brief provides profiles of proposed solutions and identifies challenges that may hinder their development and commercialization as well as suggest policy options to deal with these challenges.

Biobased technologies promoted by Bio4Africa in Senegal

The **Bio4Africa** project supports the deployment of the bioeconomy in rural Africa via the development of bio-based solutions and value chains with circular approach to drive the cascading use of local resources and diversify the income of farmers. The focus of the project is on transferring simple, small- scale, and robust bio-based techs adapted to local biomass, needs and con- texts in Africa. In Senegal the project has been championing for three technologies: Fuel briquettes, biogas production and biochar production.

Briquettes for use in improved cooking stoves

The **Briquetting technology** utilizes special equipment to compact numerous types of waste biomasses, such as cashew shells, peanut shells and millets/ Maize stover, into biomass briquettes. The compaction of the biomass improves its combustion properties and makes transport, distribution, and storage easier and more cost-effective. The annual demand of the raw materials is estimated at 576 tons for peanut shells, 250 tones for cashew shells and 300 tons for millet/corn stems. The technology will also require 126 tons of wheat flour annually to be used as a binder. The pellets that will be used in improved stoves or gasifiers to meet the energy needs for cooking in households. In addition, this technology allows improvement of the living conditions of women in the households by practicing clean cooking with less risks of contracting respiratory diseases. At the same time the technique enables farmers to earn extra income and reduces green house gas emmission (4).

Biogas production

Biochar for soil conditioning

The **bio digester** is a system for producing biogas from biodegradable organic materials such as cow dung, mahogany apples. Biogas is produced from the anaerobic

decomposition of organic feedstock such as manure, agricultural residues, agro-industrial by products, energy crops, food waste. These residues are placed into anaerobic digesters (biogas plant) in which specific micro-organisms at controlled conditions break down the organic materials producing biogas and digestate. Pre-treatment technology (i.e, mechanical devices, trace elements supplementation, enzymes) can be used to optimize the process. The effluent from anaerobic digestion is called digestate and it is a natural fertilizer. Studies have proven that the installation of biogas plant results in economic, social and health improvements by reducing expenditure of fuel and fertilizer along with time saving and lessen cases of disease (5,6).

It is returned to the land by irrigation ("fertigation") recycling a large fraction of the mineral nutrients and increasing soil carbon levels with soil fertility benefits (organic farming).

Pyrolysis is a technique where green matter is subjected to combustion with- out oxygen at very high temperatures (approx. 450-600 ^{0}C) leading to the formation of charcoal like product called **biochar**. This process utilizes crop- based feedstock such as peanut shells, cashew shells or millet and maize stalks. The finished product is used for soil conditioning. When added to farms, this helps to enhanced soil fertility, reduced acidity and ability of soil to catch and store carbon. Because of better management of crop wastes, this also leads top cleaner environment and environmental sustainability (7).

Bioeconomy stakeholders in Senegal have identified the challenges that are hindering the production and marketing of biobased products. Addressing these issues that need to be prioritized to enable communities in Senegal access full benefits from the Bioeconomy. The following are the key issues:

Challenges in Senegalese Bioeconomy

1. The high cost of small off grid electricity generation systems as a result of taxes has led to limited access by users.
2. The investment of the private sector in the bioeconomy and renewable energy is limited by the lack of targeted tax related instruments such as tax breaks and subsidies in favor of renewable energy and bioeconomy related technologies.
3. Due to limited awareness, there is low adoption of products from biobased technologies such as biogas and briquets.
4. Although the government established Promotion des Investissements et Grands Travaux
5. (APIX), a Na- tional Agency responsible for the Promotion of In- vestment and major Works in Senegal, many investors don't make use of the established mechanisms.

6. The Land tenure that limits access to land by disadvantaged groups such as **women and youth** to produce biobased feedstock.
7. Lack of **technical advice and advisory services** to sup- port acquisition and maintenance of new and advanced equipment and tools to shift to more innovative approaches.
8. Low private sector involvement in renewable energy manufacturing
9. Generally, Senegal does not have quality standards for Biobased products neither does it apply international standards such as the Global Gap to facilitate quality control and standardization of products emanating from Biobased technologies.
10. Limited funding on renewable energy research

Recommendations

- Establish a renewable energy fund and other policy support instruments for renewable energy such as tax breaks, subsidies and incentives for the investment in solar energy and other renewable energy.
- Waive taxes on the equipment or Zero rate the import duty on renewable energy related equipment to encourage the importation of such equipment at low cost.
- Popularize the National Agency for the Promotion of Investments and Major Projects (APIX) through awareness creation campaigns and linkages with investors.
- To facilitate the access to low cost credit to finance investments in the bioeconomy and green energy, the Government of Senegal is encouraged to establish an investment guarantee fund.
- Establish a policy to support the formulation and commercialization of bio-based fertilizers.
- Enhancing the flexibility of existing guarantees to facilitate access to land by disadvantaged groups such as women and youth.
- Intensify and diversify the agricultural production through strategies that encourage production of certified seeds and adoption of hybrid varieties to boost the production of feed stock.

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