

# Evaluating Evidence-Based Ecosystems-Based Adaptation for Food Security Assembly (EBAFOSA) and Nasarawa State University (NSUK) Initiatives: Decarbonization, Clean Cooking Energy Promotion, and Cassava Food Chain Entrepreneurship in Nigeria

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**Abstract:** **Background:** This article examines the enterprise-focused efforts of the Ecosystems-Based Adaptation for Food Security Assembly (EBAFOSA) and Nasarawa State University (NSUK) in decarbonizing the domestic energy sector, particularly in Nigeria, while drawing lessons applicable at the continental level. **Aims:** The study aimed to assess the impact of EBAFOSA and NSUK initiatives on decarbonization, focusing on the adoption of clean cooking energy and entrepreneurship within the cassava food chain, with a particular emphasis on household engagement and economic outcomes. **Method(s):** The research engaged up to 60 households in Nasarawa, Nigeria and evaluated the efficacy of interventions such as the displacement of charcoal with briquettes in cassava processing. Data collection involved assessing energy cost reductions, shifts in energy sources, and economic implications for local actors. **Results:** Findings indicate significant reductions in household energy costs (by 2–3 times) and a notable transition from charcoal to briquettes among garri processors, with approximately 36 processors (representing a conversion rate of about 65%) adopting this cleaner energy source. This shift led to a 46% reduction in fuel costs for these actors. **Conclusions:** The multifaceted issues faced by Africa’s decarbonization efforts serve as an opportunity to ignite innovation and foster significant change. Collaborations like NSUK and EBAFOSA and their innovative approaches to sustainable energy show the promise of scalable solutions.

**Keywords:** clean cooking energy, decarbonisation, entrepreneurship, EBAFOSA, NSUK, Nigeria

**JEL Codes:** E21; F64; L25; O13; Q18; Q42

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## Background and Objectives

Reports from the IPCC and UNEP clearly show that the world is on track to exceed the safe 1.5°C warming limit set by the Paris Climate Agreement. The IPCC's 6th Assessment Report, aptly called "a code-red for humanity," was clear that the globe is on track to breach the

1.5°C warming threshold in 20 years. The 2023 UNEP emissions gap report states that global emissions trends continue toward unsafe warming levels of 2.5°C–2.9°C (UNEP, 2023). We see that with the globe already about 1.1°C warmer than in the late 1800s, emissions continue to rise. To keep global warming to the 1.5°C warming target, we need to reduce emissions by 45% by 2030 and reach net zero by 2050 (United Nations, n.d.). The current levels of commitment fall far short of that goal. It is estimated that to date, governments' commitments fall far short the requirements. Commitments from up to 195 countries are set to increase global emissions by 9% by 2030, compared to 2010 levels. Cumulatively, climate change threatens to wipe off 4–18% of global GDP (Marchant, 2021).

However, the need for decarbonization is not the only driving stimulus. Embracing circularity and low emissions pathways also portends significant economic opportunities across the globe. For example, in Europe, circularity can reduce pollution by 72% by 2040, remove 70% of CO<sub>2</sub> emissions by 2050, and save up to \$1 trillion by 2050 while preserving material that would otherwise be lost (Schaible, 2021). In Africa, the estimates show that a competitive, low-carbon manufacturing sector could help the region generate an additional \$200 million – \$2 billion in yearly revenue by 2030 while creating up to 3.8 million jobs over the next 30 years (McKinsey, 2021).

However, Africa is unique for being the lowest emitter. With up to 17% of the global population, the continent accounts for the least emissions at 4%, which makes it a net positive. On the profile of these continental emissions, the African Development Bank (2020) records that up to 57% of emissions are land-based, emanating from agriculture, land-use change and forestry, and one of the leading sources is high dependence on wood-based energy. Specifically, Hinneh (2019) notes that firewood and charcoal provide over 80% of domestic cooking energy in sub-Saharan Africa. In terms of numbers, World Bank (2020) records that up to 900 million people across Africa use unclean cooking energy. This has come at a significant cost to human and environmental health. Sedano, Silva, Machoco, and others (2016) report that fuel wood causes up to 67% of forest degradation, making it a major source of Africa's land-based emissions. On the human health front, indoor pollution from charcoal and firewood use causes 490,000 to 700,000 premature deaths annually in Africa, according to Nature (2023).

To address these risks, countries have put forth plans to transition communities to liquid petroleum gas (LPG) as a cleaner cooking solution. According to Pope and Puzzolo (University of Liverpool, 2021), some countries have set targets to increase LPG use by 35–58% by 2030. However, inflationary pressures compounded by the lingering effects of COVID-19 and the Russia-Ukraine conflict caused a price surge of up to 48% in some countries, according to Guguyu (2022), making this option out of reach of more people. The World Bank (Kammila et al., 2014) observed that only about 5% of Africa's population used LPG. However, during periods of high inflation and rising costs, more people returned to using charcoal. In some countries, this fall in LPG demand also hurt business, causing some vendors to scale down by up to 90% to adjust to a slow market according to Africa News (2022).

According to Goswami (2018), we may observe a similar situation in Nigeria. The country is the largest producer of charcoal in Sub-Saharan Africa (Lansu, Bos, & Ivens, 2020), an activity

linked to deforestation and forest degradation. Nigeria has one of the highest deforestation rates globally at 5% annually and has lost 50% of its forests in the past two decades. About 80% of Nigerians live in rural or semi-urban areas and depend solely on fuel wood for their energy needs. In total, 90% of the wood demand from forests goes to fuel wood. On the health front, household air pollution causes approximately 93,000 – 95,000 premature deaths annually, and women who do most of the cooking and their children are the most vulnerable (CCACOALITION, n.d.; ICEEDNIGERIA, 2024). Furthermore, like the rest of Africa, global inflation caused cooking gas prices to rise by up to 83.7% between 2021 and 2022 (Ibrahim, 2022; Imam 2022). This development forced many households to switch to unclean alternatives, especially charcoal and kerosene (Vanguardngr, 2022).

Across Nigeria and Africa, these inflationary pressures revealed the propensity of market preferences to shift to cheaper, unclean cooking energy options, which harms the long-term consistency of transitioning populations into clean cooking. It also lays the basis for a need for cheaper, cleaner cooking options accessible to the majority. The Nasarawa State University, Keffi (NSUK), in collaboration with the Ecosystems-based Adaptation for Food Security Assembly (EBAFOSA) has been working to enhance the uptake of affordable clean cooking solutions and generate data to inform lessons for continental impact. The collaboration between the NSUK and EBAFOSA began with the local governance structure of the Emir of Nasarawa. Recognizing the need for partnership between academia and the UN's lead environmental agency, they aimed to create environmental enterprise opportunities in the emirate and ensure sustainable market practices in Nasarawa and beyond.

This article aims to discuss efforts showcased by EBAFOSA and NSUK on reducing carbon emission and promoting the use of clean cooking energy (briquettes) as well as the promotion of garri production; one of the cassava value chains in Nigeria. This is the first of its kind in Nigeria on narrating practical efforts with evidence-based data in promoting decarbonisation, clean cooking briquettes, and cassava value chain entrepreneurship in Nigeria. This study responds to the need for practical solutions to advance uptake of clean cooking solutions which are critical to enhance Africa's decarbonisation efforts considering that the continent's main emissions sources are land based. Following this introductory part, the paper has five sections. Next section will present the literature review on few studies that have outlined decarbonisation efforts in Africa, focusing on addressing land-based emissions from unclean/biomass energy; next, the article will discuss the methodology, then results, discussion, and it will end with conclusions.

## Literature Review

According to estimates, globally, up to 2.4 billion people use solid fuels like wood and charcoal for energy (Belopolosky, 2023). These fuels release harmful pollutants and greenhouse gases. Consequently, the global economy loses over \$2.4 trillion annually because of damage to the climate and local economies, while up to 3.2 million people lose their lives prematurely each year primarily from indoor pollution arising from unclean cooking. Moreover, unsustainable harvesting and incomplete biomass combustion contribute an estimated 1.9–2.3% of global emissions.

Sub-Saharan Africa accounts for about 15% of global population, but accounts for over 34% of the world's usage of traditional cooking fuels and technologies (Durix et al., 2024). Across Africa, up to 2.3 billion people still lack access to clean cooking, while over 850 million of them

depend on wood and charcoal for cooking, and this has come at a high cost to human and environmental health (Diallo, 2022; IPCC WGII, 2023). Environmentally, fuel wood causes up to 67% of forest degradation and is the largest source of Africa's land-based emissions (Sedano et al., 2016; AfDB 2020). Cumulatively, estimates are that biomass fuel is responsible for the deforestation of 2 million hectares annually, twice the size of the Gambia. In human health, every year, 490,000 to 700,000 adult lives are lost prematurely in Africa due to indoor pollution occasioned by the use of charcoal & firewood (Gilpin, 2022; Collins 2019; IEA, n.d.) The impact on children is even worse, with 1.6 million to 3 million African children dying each year from smoke inhalation caused by indoor and outdoor cooking (Gilpin, 2020). Among adults, women suffer disproportionately from this situation because they take on the more significant burden of housework (Whiting, 2021). According to estimates, women spend 3–5 times more time than men on domestic activities (AfDB, 2016). Over time, a vicious cycle is emerging: deforestation is increasing the time burden in many areas, forcing women to travel farther to find fuel. These health impacts also include psychological effects (Whiting, 2021). Cooking primarily with charcoal and wood makes women about 50% more likely to suffer from depression compared to those using gas (Shupler, 2022).

Cumulatively, estimates show that the cost of inaction on clean cooking costs Africa up to \$330 billion every year regarding impacts on climate and health (Durix et. al., 2024).

In response, Africa's efforts to enhance access to clean cooking are well documented. The updated climate action commitments, known as Nationally Determined Contributions (NDCs), show that up to 98 low and middle-income countries (LMICs) have set goals related to household energy or clean cooking, with over 50% of these countries being African (Clean Cooking a, n.d.). Accordingly, 47 of the continent's 54 countries, which is 87% of the continent's NDCs, have prioritised clean cooking targets (Nationally Determined Contributions and Clean Cooking c, n.d.). At the same time, Africa is home to several initiatives aimed at transitioning the region into clean cooking. As an example, the UNDP Climate Promise initiative which also includes clean cooking support, is active in 45 of the 54 countries in Africa – which constitutes 83% of countries (UNCP, n.d.; Diallo, 2022).

The urgency to transition Africa to clean cooking is a core driver of notable initiatives such as the African Union High – Level Panel on Emerging Technologies (APET). This initiative challenges African countries to turn agricultural waste to clean cooking fuel. Waste recovery into clean cooking briquettes, where agricultural residues are compressed into solid fuel pellets, is one of the most efficient and effective methods to achieve this goal. These fuel briquettes also advance circular economy principles as they unlock inclusive enterprise opportunities that can be tapped.

Already several countries across the continent are demonstrating the viability for enterprise around waste recovery to clean cooking fuel briquettes. For example, in Rwanda, the government has set a target to decrease the dependency on charcoal use from 79% down to 42% of the population by 2024. Furthermore, the government in Rwanda actively promotes uptake of fuel briquettes as an alternative to wood and charcoal for cooking purposes through positive narratives and unlocking market opportunities for local enterprises. Consequently, key stakeholders are following que. For example, a local cooperative – the *Coopérative pour la conservation de l'environnement* (COOCEN) produces and supplies briquettes to prisons and schools in Kigali. This prevents the burning of up to 1,800 tonnes of firewood annually and cutting of no less than 9,000 trees every year. This reduces deforestation by up to nine hectares of forest plantation and mitigates approximately 297 tonnes of carbon dioxide emissions annually.

In Kenya, the tea sector which utilises about 1 million cubic meters of firewood annually, is taking steps to adopt new business models towards substituting fuel wood with fuel briquettes. Specifically, Kings Biofuels, a briquette-making company, is in partnership with the Kenya Tea Development Authority (KTDA), a major tea sector regulator in the country, to produce over 200 tonnes of briquettes per month for use in tea drying. The country also implemented policy and legislative measures to increase the use of affordable clean cooking fuels by offering fiscal incentives. Specifically, the Kenya Finance Act of 2021 exempted clean cooking fuels, such as biogas and fuel briquettes, from value-added tax. This aims to provide a sustainable alternative to charcoal, which up to 70% of Kenyans use for cooking, and to generate billions in alternative incomes (Ndegwa et al., 2020). Kenya's charcoal supply chain currently trades up to \$1.6 billion (Wanjiru & Nyambane, 2016). The incentives of the finance Act 2021 make it cheaper to produce cleaner fuels and transition the billions in charcoal into cleaner fuels.

Briquettes are also effective at enhancing gender access to economic opportunities (Njenga & Mendum, 2018). For example, in Ghana, women fish smokers shifting from charcoal and firewood to fuel briquettes register up to 10% more in energy cost savings (Gebrezgabher, Amewu, & Njenga, 2018). When considering the cost of labour for splitting firewood in addition to buying price, the total saving by switching to briquettes increases to 26%. Meanwhile, in Uganda, the accessibility of briquettes as an enterprise area empowers marginalized women to retail fuel briquettes to their local community (Clean Cooking b, n.d.). Up to 160 women retailers have been established, each earning at least \$152 per month, a decent wage from retailing fuel briquettes.

Across the continent, briquettes application has shown several benefits, including (Ramsay & Njenga, 2021): providing opportunities for small enterprises, lowering domestic energy costs to enhance household savings, lowering the risk of indoor pollution, helping to re-purpose waste, ecological benefits by protecting forests among key benefits. However, to succeed at scale, briquette making must become a viable enterprise, and a number of business models to this end are applicable (Charcoal Project, 2021). Some notable examples include "Fusing Agroforestry and Small-scale Manufacturing to Boost Livelihoods and Create Sustainable Fuel" in Kenya, which oversees up to 200,000 hectares of dryland landscape managed with agroforestry, while tree residues serve to produce charcoal briquettes that generate 20–40% in profit margins for local communities while reducing fuel costs by 30–70%. Another model "Scaling Charcoal Briquette Enterprises," still in Kenya, is recovering charcoal waste in the capital Nairobi, and transforming it into fuel briquettes to further substitute charcoal use. The foundational premise of this enterprise is that 10–12% of charcoal consumed in the city is discarded as dust and fines, which can accumulate to up to 150 tonnes per day. This enterprise has employed up to 70 persons and sold up to 200 tonnes per month in local markets. The model "Marketing and Manufacturing Charcoal Briquettes in an Urban Setting" in Uganda has seen an enterprise produce up to 60 tons per month of briquettes, which it sells alongside improved cookstoves designed for firing fuel briquettes. This intervention has employed up to 30 people directly, and another 100 indirectly along its entire supply chain in the Kampala metropolitan area. These examples provide evidence of the enterprise potential of waste recovery to fuel briquettes as a viable strategy to decarbonise the continents land-based emissions sources, and primarily those arising from the prevalence of unclean cooking.

To build on these successes, several key lessons and policy recommendations emerge:

- Charcoal briquettes are a viable alternative to traditional wood charcoal, improving livelihoods and supporting environmental sustainability.

- Briquette producers need to find sustainable alternatives to charcoal dust from the charcoal value chain, as rising competition has increased prices and affected availability.
- Successful production and trade of charcoal briquettes can be cost-effective with affordable, sustainable raw materials, efficient operations, high-quality products, and targeted customer segments.
- Effective enforcement of charcoal regulations would ensure that briquettes are treated equally in terms of taxes, labor costs, and government regulations.
- Financial investments can help small and medium enterprises (SMEs) in the briquette industry grow into larger operations, making price competition more balanced with firewood and charcoal.
- Technological advancements should be carefully managed to avoid driving small-scale, informal briquette enterprises, particularly in urban informal settlements, out of business.
- Among others, additional policy recommendations from literature include:
- The need to legislate policies prosecuting individuals and companies indiscriminately clogging trees for wood fuel and charcoal production binding ministries of forestry, Agriculture and environment with such task.
- Prioritising finance and investments for research towards providing various sustainable raw materials for briquettes production with high calorific value; providing forest guards with adequate resources and welfare to safeguard green cover, wildlife and other natural resources.
- Incentivising affordable credit for SMEs producing briquettes for equipment to support mass production of briquettes to cater for national clean cooking energy needs.
- Creating awareness at the grassroots on the urgent need to combat climate change and its impacts and to protect our green cover and how clean cooking fuel briquettes is strategic to this end.

The literature attests to the practicality of uptake of clean cooking solutions from an enterprising dimension setting the stage for empirical investigation of work by EBAFOSA toward strengthening the call for enhanced enterprise uptake of these solutions. To this end, the NSUK work through the entrepreneurship centre focuses on tapping this niche for Nigeria and creating lessons to inform continental-wide policy and investment shifts.

## Research Method and Material

This study utilised a mixed-method research strategy combining narrative methodology and desk studies. The narrative methodology was suitable because the study aimed to discuss EBAFOSA's and NSUK's efforts to reduce carbon emissions, promote clean cooking energy, and support cassava value chain entrepreneurship in Nigeria. I applied narrative methodology because the study focused on narrating the efforts, presenting generated data for informed policy in course of EBAFOSA-NSUK collaborative implementation. Moreover, I employed desk studies because literature review of published works on decarbonising domestic served as strategy to lay the case of the importance of decarbonising domestic energy in an enterprise dimension, and to corroborate and validate findings of the work by EBAFOSA-NSUK.

Specifically, leveraging the policy framework of EBAFOSA and engaging youth people to retool especially working with young entrepreneurs across Nigeria to support them in retooling their skills and engage in devising environmental solutions to meet key on-demand areas in communities. Waste recovery to clean cooking solutions of fuel briquettes has been among

the most critical demand areas. Accordingly, through these interventions, market trials generated data that showed the market viability of this approach. By using the governance structure of the Emirates of Nasarawa, communities were encouraged to adopt fuel briquettes, which had lower production costs and thus offered cheaper market prices than charcoal. The impacts demonstrated the technical and market feasibility of this solution.

## Results and Discussion

Up to 60 households in Nasarawa were engaged, demonstrating the market and technical feasibility of these solutions through various impacts. Households reduced their energy costs by 2–3 times. While 1 kg of fuelwood goes for about N600–650 (\$1), equivalent to about 2 litres of kerosene, which sells for N800 (\$1.3), the price of a kilo of briquettes was between N250–300 (\$0.4) but produced the same amount of energy.

I leveraged data on these empirical successes by households to engage markets beyond households and target commercial applications. Accordingly, one of the major cassava processors turning cassava into a local edible called garri, operating in Azuba, was also engaged in displacing charcoal with briquettes in processing the cassava into garri. Once again, multiple impacts were registered, and up to 36 garri processors, representing a conversion rate of about 65%, shifted from charcoal to garri. Specifically, adopting and using briquettes reduced Azuba actors' fuel costs by 46%. Up to 3000 kgs of charcoal was displaced. Fuel costs were reduced and profitability increased. The processors increased their profitability from 3000–5000 naira per bag to between 5800–8000, and this resulted from a 50% reduction in fuel costs. The quality of garri improved because of non-smokiness, resulting in a 52% increase in clients among the processors. Moreover, reduced smoking enhanced the aesthetic appeal of briquettes as an alternative to charcoal, resulting in more young people engaging in garri processing, earning up to 1,500 Naira per day.

To enhance the reach of these solutions, the results of these trials served to inform the development of a climate action entrepreneurship curriculum under the NSUK School of Entrepreneurship. A new course "climate action and entrepreneurship" was introduced in years 3 and 4. This aimed to train more young people to expand the reach of clean cooking solutions in communities and self-employment/enterprise opportunities for youth across Nigeria. The first class attracted 20 students with different disciplinary backgrounds who are now being trained to develop and decentralize clean cooking solutions from an enterprising lens.

Cumulatively, the total savings generated by one primary charcoal user who switched to briquettes was estimated at ₦14,500 per week. If we extrapolate for the estimated 140 million charcoal users in Nigeria (Remteng et al. 2021), this means \$4.2 billion worth of household savings recouped weekly to be engaged in other areas of the Nigerian economy.

## Lessons and Policy Implications

Most importantly, these developments have highlighted the following strategic enablers for expanding affordable and accessible clean cooking solutions in Nigeria and across Africa.

a) Skills retooling – to increase market access to clean cooking solutions, there is a need for adequately trained human capacity to develop and decentralize these solutions competitively. There is no vacuum in the market, and the majority use charcoal and firewood. This means that clean cooking solutions will need to be more competitive to displace the current unclean

biomass solutions. Consequently, there is a need to train adequately – especially young people – to be well placed in devising more affordable solutions that are higher quality in terms of burning better and non-smoky, compared to conventional charcoal and firewood. The NSUK Entrepreneurship Centre is leading the way in helping youth retool their skills. It enables them to use low-cost waste-to-fuel briquette solutions to generate income and promote cleaner cooking options in their communities.

b) Enabling policy basis – the pursuit of clean cooking solutions needs to be based on the fulfilment of country development priorities to enhance acceptability, especially at the policy level. Accordingly, in Nigeria, the climate action commitments, popularly called Nationally Determined Contributions (NDCs), provide a much-needed basis. Nigeria’s Nationally Determined Contributions (NDCs), including updated commitments (Climate Watch, n.d.), prioritize tackling unclean cooking. The targets include a 13% increase in households using improved cookstoves by 2030, equating to an additional 7.3 million households. This provides high-level policy endorsement of clean cooking solutions as a priority for Nigeria and legitimizes NSUK efforts.

c) Investment plans – there is a need to translate policy commitments into investment plans that clearly elaborate the social, market, policy, financial, and political enablers toward expanding enterprises in the clean cooking value chain. This is critical to attract more players to invest in actions that drive the uptake of clean cooking in the economy. Such investment plans need grounding in empirical data based on successes already underway in the country. NSUK will enhance this aspect by integrating trained youth into a network of data generators. Their work will help inform the development of investment plans.

d) Innovative finance – one of the most critical limitations to enterprise engagement, especially by youth and the informal sector, which are the vastest constituency of ground actors, is capital affordability across Africa. Up to 80% of the population is engaged in the informal sector, while youth constitute over 60% of the population. In Nigeria, the informal sector accounts for up to 50% of GDP and up to 90% of employment, while youth constitute about 70% of the population (Monye & Oyintare, 2020; Chimezie, 2023). Tapping these constituencies to invest in clean cooking solutions is critical to bridge the accessibility gap. But the big question is on access to capital. Cumulatively, Africa’s informal sector-driven enterprises face an over \$330 billion financing gap (African Business, 2019). At the same time, the cost of credit in Africa is among the highest globally. Seven of the top 10 highest lending rate countries in the globe are in Africa (The Global Economy, 2023). Nigeria has the 31st most expensive cost of credit globally and the 13th most expensive in Africa (The Global Economy, 2023). We see these high market rates reflect in government borrowing, where countries on the continent pay 5–10% interest rates when they borrow in international financial markets, compared to near zero to negative rates for Europe and America (Mutize, 2020). The leading cause of this costly credit is the perceived high risk of the continent’s economies in general. This means that establishing structures to reduce risks for enterprises—particularly in new areas like waste-to-clean-cooking solutions, and especially those run by youth and the informal sector—is crucial for ensuring the availability of affordable capital for these businesses. This is where blended finance de-risking tools come in. Simply put, such tools convene a menu of actions that cumulatively lower enterprises’ default risk. These actions include targeted training for enterprises to undertake circularity in plastics. It includes insurance cover for products made from circularity in plastics to cover for market risks on the loss of demand and income. It includes cash guarantees to cover financiers against default risk in cases where enterprises default on their repayments.



Such de-risking tools are critical and should be prioritized to create an enabling financial environment for enterprises.

e) Data for policy recalibration – there is a need to ensure recalibration of policy incentives focuses on addressing gaps and opportunities aligned to expanding empirical successes. Accordingly, NSUK collaborates with other policy actors to organize periodic “data for policy” forums, where data on the impacts and successes of youth-driven enterprises driving uptake of clean cooking solutions are shared to inform recalibration of diverse policies toward addressing opportunities and gaps needed to expand these pockets of successes into the mainstream. Moreover, NSUK provides a framework that leverages data from successful enterprises to identify key gaps and opportunities, helping to expand these successes across the country. This is a critical success factor to drive the uptake of clean cooking in Africa.

## Conclusions

The multifaceted issues faced by Africa’s decarbonization efforts, specifically in the clean cooking sector, serve as an opportunity to ignite innovation and foster significant change. The experience of the work in Nigeria underscores the resilience of the African spirit, demonstrating how clean cooking solutions such as fuel briquettes can transform communities environmentally, economically, and socially. This journey had its obstacles, from economic fluctuations to the high costs of traditional fuel sources and their significant health risks.

However, collaborations like NSUK and EBAFOSA and their innovative approaches to sustainable energy show the promise of scalable solutions. Endeavours in education, policy enhancement, market viability assessment, investment planning, and innovative finance are an encouraging paradigm shift for Nigeria and the entire African continent.

While the road to full decarbonization in Africa may be long and fraught with challenges, it is a journey worth embarking on. It constitutes an opportunity to champion clean, affordable energy solutions and work collectively for a sustainable future. The triumphs and learnings of initiatives like fuel briquettes represent an inspiration to tackle the environmental crises of our time, embodying the African proverb: “If you want to go far, go with others.” Together, we can harness our shared wisdom and achieve sustainable success in Africa’s decarbonization journey.

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The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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