Atlantic Council
GLOBAL ENERGY CENTER

ISSUE BRIEF

# Policy Sprint: Building a Biofuels Industry in Africa

JUNE 2023

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## INTRODUCTION

Many African nations are faced with simultaneous development imperatives to achieve a high-growth, low-carbon economy, while increasing access to modern energy services. Expansion of the biofuels industry across the continent, particularly in regions outside of North Africa, could potentially serve as a solution, albeit a partial one, to support these imperatives. When produced in localized or regionalized supply chains, biofuels—which are made from plants and other biological materials—can serve as a clean energy source to meet two fundamental needs of developing economies in African regions: transportation and—perhaps less intuitively—cooking. However, ensuring the availability of crops for food security is a prerequisite for expanding the biofuels industry.

Dovetailing with this development scenario is the rise in global demand for alternative sources of clean energy and a resulting expansion of the biofuels market. Worldwide production of biofuels has climbed steadily in recent years, and demand is expected to increase by 28 percent by 2026.[1] To support both emissions reductions in transport and greater access to clean cooking, the sector will need to grow even more, and countries in sub-Saharan Africa are well-positioned to meet this need. Countries in this region are home to 60 percent of the world's remaining uncultivated arable land, or around six hundred million hectares.[2] As such, these countries have the potential to develop low-cost biofuel feedstocks using crops that farmers already grow in the region, such as sugarcane, cassava, soybean, and sunflower. Additionally, to avoid

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1 "Biofuels," International Energy Agency, December 2021, https://www.iea.org/reports/renewables-2021/biofuels?mode=transport&region=World&publication=2021&flow=Consumption&product=Biodiesel.

2 Matthew Rochat, "The War in Ukraine and Food Security in Africa," E-International Relations, December 14, 2022, https://www.e-ir.info/2022/12/14/opinion-the-war-in-ukraine-and-food-security-in-africa/.

potentially compromising food security to grow biofuel crops, farms could plant non-food crops, such as castor bean or jatropha, in arid and semi-arid areas that cannot support crops for food.

Many African countries also have a surplus of agricultural waste and byproducts that can serve as feedstocks for biofuels. West Africa, for example, has the potential to generate more than one hundred megatons per year of agricultural residues, enough to supply the equivalent of one-third of Brazil's biofuel industry, the second-largest globally.[3] Residue feedstock, which comes from crop stems, stalks, and leaves, has the potential to displace 20 percent of current transport fuel in South Africa, all transport fuel in Ghana, and several times the amount of transport fuel used in Mozambique, Uganda, and Nigeria.[4] Several countries in Africa—including Nigeria, Kenya, Ghana, Zambia, and Tanzania—are already exploring applications of biofuels to meet immediate energy consumption needs using local resources.

Further expanding this nascent industry will require chipping away at a web of challenges facing continent-wide biofuels production and biorefining, including first ensuring crops for food security are not diverted to biofuel manufacturing. To build out the potential of the biofuels industry in Africa, it is imperative that agricultural practices modernize, and adequate infrastructure be developed to enable the storage, transport, and conversion of feedstocks and fuels.

## BALANCING BIOFUEL PRODUCTION WITH FOOD SECURITY

Before African countries can develop a robust biofuels industry, they must first guarantee that farmers produce enough crops for food. In 2020, around eight hundred million people in Africa were impacted by moderate or severe food insecurity, and 264 million in sub-Saharan regions were undernourished, the highest prevalence of undernourishment among all geographic areas in the world.[5] Farmers across large swaths of the continent will need access to appropriate tools and resources to bring more acreage into production, improve yield, and create new supply chains to address food security. Without this growth in crop production and food security, governments will hesitate to devote scarce fiscal resources toward biofuels production.

To meet nourishment needs and build a biofuels industry on the continent, agricultural practices must modernize. Agricultural productivity in Africa trails the rest of the world, at roughly 40 percent of the global average, measured as agricultural value added per worker.[6] To remedy low agricultural productivity, the industry must adopt modern farming techniques for food crops. Small farms, which produce about 70 percent of the continent's food supply, largely rely on rainfed agriculture and unmechanized operations.[7] To improve crop yields, water-management techniques must include irrigation to semi-arid or arid areas with soils suitable for farming. Farmers must also ensure that water resources are utilized efficiently. Mechanization, greater labor-force participation and productivity, and access to modern synthetic fertilizers on an affordable cost basis would also boost yields of small farms. Finally, expanding the availability and use of modern seeds, such as gene-edited crop variants with pesticide- or drought-resistant traits, will also improve agricultural output. To enable all of the above, multilateral and regional development banks, ideally in concert with private investors, will need to provide substantial financial support.

With this support, agriculture can modernize and expand food security across the continent, and farmers can use the same tools to increase production of feedstocks for biofuels in a manner that doesn't compete with growing crops for food. Growers can accomplish this through planting feedstock on land unsuitable for food crops or by increasing the use of crop waste or residue as feedstock for biofuels production.

Producing non-food crops will require its own set of modernization tools and investment. Growing feedstock, such as cas-

3 "Renewable Energy Market Analysis: Africa and its Regions," International Renewable Energy Agency and African Development Bank, 2022, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Market_Africa_2022.pdf?rev=bb73e285a0974bc996a1f942635ca556.

4 "Biofuel Potential in Sub-Saharan Africa: Raising Food Yields, Reducing Waste and Utilising Residues," International Renewable Energy Agency, 2017, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Nov/IRENA_Biofuel_potential_sub-Saharan_Africa_2017.pdf.

5 Ines Schultes, "Spotlight 16: Climate Change Drives Hunger in Africa: Concrete Action Needed at COP26," Mo Ibrahim Foundation, last visited June 8, 2023, https://mo.ibrahim.foundation/research-spotlight-16-covid-19-and-africas-governance#:~:text=Africa%20is%20the%20world's%20most%20food%20insecure%20region&text=Around%20800%20million%20people%20in,in%20any%20other%20world%20region; Seung Mo Choi, "Food Inflation in Sub-Saharan Africa," IMF Blog, December 6, 2021, https://www.imf.org/en/Blogs/Articles/2021/12/06/food-inflation-in-sub-saharan-africa.

6 "Feed Africa," in "Annual Development Effectiveness Review 2021: A Resilient Continent Recovering from the Pandemic," African Development Bank, 2021, https://www.afdb.org/sites/default/files/news_documents/chap2-ader_2021_en_v15.pdf.

7 "Change Starts Here: Small Farmers With a Big Message for the World," International Fund for Agricultural Development, last visited June 8, 2023, https://www.ifad.org/thefieldreport/.

A farm worker manually irrigates a salad field in Senegal. Picture taken June 3, 2020. Source: REUTERS/Zohra Bensemra

tor bean plants, for biofuels in arid and semi-arid areas would benefit from geographic information systems and machine learning, which can use satellite imagery to identify areas that are suited for feedstock crops, but not for food or fodder crops for animals.

## BUILDING BIOFUEL CAPACITY

In addition to support for agricultural modernization and feedstock production, several interlocking pieces of a biofuels industry on the continent must fall into place. Several essential components of the biofuel industry must progress in tandem in order to recognize the fuels' potential. An integrated approach is needed to incentivize public and private stakeholders to invest in new biorefining facilities, encourage an increase in demand for biofuels, and build additional infrastructure to enable the industry's viability.

### Biorefineries

Biorefining is the process of converting feedstock to value-added products, including fuel, through several biochemical reactions. Each type of feedstock—whether it be wood, sugars and starches, oils and fats, or wet biomass—requires tailored sets of biochemical solutions and processes to be efficiently converted to valuable, energy-dense fuel in a cost-effective manner.

Modern biorefining technology can meet the challenges of converting diverse feedstocks into fuel, as well as other refined products. To date, biofuels have primarily served to lower carbon emissions of light-duty vehicles, principally via ethanol made from feedstocks such as corn or sugarcane. However, with the advent of second-generation biofuels made with non-food feedstocks, modern biorefining can help expand access to clean cooking. With continued technological advance-

ments, they can fuel heavy-duty vehicles and other types of transport—even aviation. Modernizing advanced feedstock production will be necessary to realize the potential for creating residue-based fuels. Nonetheless, to develop such biofuels, the industry would need three to four times the amount of capital investment required for biofuel derived from traditional food crops such as corn and cassava.[8]

The ability to maximize the use of feedstock and minimize waste from its refinement has been made possible through the development and deployment of integrated biorefineries.[9] However, these refineries are largely absent across Africa, and will require significant upfront capital and technological expertise to develop.

| TYPES OF FEEDSTOCK | FUEL OUTPUT | REFINING PROCESS | USE CASES | GENERATION |
|---|---|---|---|---|
| **Sugars and starches**<br>Sugarcane<br>Maize | **Ethanol** | **Fermentation** | **Internal combustion engine (substitute gasoline)**<br>**Sustainable aviation fuel**<br>**Heat and power**<br>**Cooking** | **First generation** |
| **Oils and fats**<br>Vegetable oils *(e.g., jatropha, castor bean, rapeseed, sunflower, palm, and soy oil)*<br>Animal fats | **Biodiesel** | **Esterification** | **Internal combustion engine (substitute diesel)**<br>**Sustainable aviation fuel**<br>**Heat and power** | **First generation** |
| **Biowaste**<br>Dung<br>Sewage waste<br>Industrial waste | **Biogas** | **Anaerobic digestion or hydro-thermolysis** | **Gas turbine power generation**<br>**Sustainable aviation fuel**<br>**Heat**<br>**Cooking** | **First generation** |
| **Cellulose**<br>Woody biomass<br>Crop residues<br>Algae | **Butanol**<br>**Ethanol** | **Gasification, hydrolysis, or pyrolysis** | **Heat and power**<br>**Sustainable aviation fuel**<br>**Cooking** | **Second generation ("advanced biofuels")** |

8 William T. Coyle, "Next-Generation Biofuels: Near-Term Challenges and Implications for Agriculture," United States Department of Agriculture, June 1, 2010, https://www.ers.usda.gov/amber-waves/2010/june/next-generation-biofuels-near-term-challenges-and-implications-for-agriculture/.

9 "Integrated Biorefineries: Reducing Investment Risk in Novel Technologies," United States Department of Energy, August 2016, https://www.energy.gov/eere/bioenergy/articles/integrated-biorefineries-biofuels-bioproducts-and-biopower.

### Demand Growth

The output from biorefineries must be met with a consistent source of demand to create favorable conditions for investment in these facilities. In sub-Saharan nations, demand draw for a biorefinery's product slate will likely focus on transportation, cooking, and, potentially, the power sector. As one solution to enable the growth of this step in the value chain for biofuels, governments on the continent may need to consider implementing incremental mandates for the use of biofuels in the transportation sector. Biofuels presently account for only about 0.1 percent of road energy use, a level that is not conducive to the development of a local industry.[10] The creation or implementation of mandates by African governments for the use of biofuels may allow for a viable demand case to develop, which will lower the costs of production and enable supply to scale for other end uses, such as cooking.

As new biorefineries come online, incorporating the facilities in localized or regionalized supply chains for the domestic production of biofuels in African economies will require growth in demand for offtake agreements.[11] In the early phases of biofuels adoption in these markets, importing a portion of the supply of biofuels may be necessary to create a demand signal that will attract the investments in infrastructure that supports biofuel demand. To retain a focus on developing a biofuels sector in African markets, those liquid-fuel imports should be accompanied by foreign technical assistance, technology sharing, and actions to de-risk investments in new facilities, such as through the use of innovative blended finance structures by multilateral development banks and private partners.

### Additional Infrastructure

Beyond the challenges surrounding supply and demand, key enabling infrastructure for biofuels is largely absent in most African countries, and must expand to promote the industry's viability. Biofuels require adequate feedstock collection, processing, storage, blending, transport, and retail distribution facilities.[12] Developing this commercial and physical infrastructure will require substantial investment and clear regulatory guidance through quality-control programs. One means to promote this development is through the use of a "hub" model, which initially focuses investment on areas with co-located supply and demand.

The potential growth of biofuels in Africa has started to attract external interest. In 2022, Italian energy company Eni completed the construction of an oilseed-collection and processing plant in Kenya that will provide non-food vegetable oil for biofuel production.[13] It plans to construct additional processing plants in several other countries in Africa, including Republic of Congo, Mozambique, Angola, Benin, Ivory Coast, and Rwanda. The company is also looking to develop a facility to convert agricultural residue into bioethanol to blend with gasoline.[14] These new solutions are part of a broader suite of infrastructure and technologies that can improve the availability of feedstock from non-food biomass.

### Integrated Approach

Because of the need to resolve supply and demand simultaneously, scaling the capacity for biorefining on the continent will need coordination through targeted policy spanning the value chain, including outside of the biorefining segment itself. It will be necessary to incentivize the production of feedstock that is calibrated to preexisting or planned facilities, with corresponding refining processes designed for the feedstock supply. In one example of an effort to increase feedstock production with new refining capacity and to drive infrastructure changes, a biorefinery in Ghana requested, soon after opening, that local farmers increase their output of a specific crop, cassava, for its ethanol product line.[15] To satisfy such requests, farmers need to improve yields for existing crops, and the biorefinery and government need to partner to modernize infrastructure to enable the transportation of crops to refining facilities.

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10 "Africa Energy Outlook 2022," International Energy Agency, June 2022, https://iea.blob.core.windows.net/assets/6fa5a6c0-ca73-4a7f-a243-fb5e83ecfb94/AfricaEnergyOutlook2022.pdf.

11 "Integrated Biorefineries."

12 "Ethanol Production and Distribution," Alternative Fuels Data Center, US Department of Energy, last visited June 8, 2023, https://afdc.energy.gov/fuels/ethanol_production.html; "Biofuel Potential in Sub-Saharan Africa: Raising Food Yields, Reducing Waste and Utilising Residues."

13 "Eni Launches the First Production of Vegetable Oil for Biorefining in Kenya," Eni, press release, July 18, 2022, https://www.eni.com/en-IT/media/press-release/2022/07/eni-launches-first-production-vegetable-oil-biorefining-kenya.html.

14 Rachel Elbaum Stafler, "An Energy Change in Kenya: Eni is Trying to Develop Biofuels that could Transform the Kenyan Energy Industry and Serve as a Model for Other African Countries in the Future," Eni, last visited June 8, 2023, https://www.eni.com/en-IT/global-energy-scenarios/kenya-energy-change.html.

15 Meghan Sapp, "Ghana's First Ethanol Producer Diversifying and Seeking More Cassava," Advanced Biofuels USA, January 20, 2017, https://advancedbiofuelsusa.info/ghanas-first-ethanol-producer-diversifying-and-seeking-more-cassava/.

## BENEFITS OF A BIOFUELS INDUSTRY IN AFRICA

Overcoming the challenges facing a biofuels industry in Africa could lead to certain economic and social benefits. Biofuels produced in African countries can enable lower-carbon transportation on the continent itself and beyond, create new industries, and decrease dependency on harmful cooking fuels such as charcoal or woody biomass.

### Enabling Low-Carbon Transportation within Africa

One of the most obvious applications for biofuels in Africa is to provide low-carbon fuel for anticipated growth in light-duty road transport. Vehicle sales on the continent are expected to triple by 2030 from current figures—only 2.5 percent of Africans own a car today.[16] Over the next decade, energy used for all road transportation in Africa will increase by nearly 40 percent; the majority of the growth will be in secondhand or thirdhand light-duty vehicles imported from the United States, Europe, and Japan that are gasoline and diesel powered, rather than electric.[17] This expected increase in vehicles provides an opportunity to promote biofuels in the transportation sector across African economies as a means to support the economic benefits that arise from increased access to transportation, while simultaneously dampening the corresponding growth in carbon emissions.

Many African nations, however, lag in the adoption of biofuels for transportation, which account for only 0.1 percent of the continent's road energy consumption, both private and public.[18] In comparison, biofuels for transportation now represent 3.6 percent of global transport-energy demand.[19]

Efforts to boost biofuel use across the continent have been uneven. Several African countries have adopted mandates that specify the minimum percentage of biofuels that must be blended with conventional fuels. Nigeria, for example, has one of the most ambitious biofuel blending mandates in Africa, requiring gasoline and diesel blends to include 10 percent ethanol and 20 percent biodiesel, respectively.[20] Other countries, including South Africa, Zambia, Mozambique, and Tanzania, have also committed to blending mandates for road transportation fuels. However, the majority of African governments have not followed suit, and existing mandates are poorly implemented. By creating and enforcing these mandates, governments can increase the use of biofuels and capitalize on their potential to enable low-emissions transportation across the continent.

### Producing Aviation Biofuels for Export

Globally, biofuels will play an important role in the aviation sector. Certain feedstocks can produce aviation biofuels that reduce CO2 emissions by up to 80 percent relative to conventional jet fuels, and they can be used in existing aircraft engines without the need for modifications.[21]

Accounting for only 2.1 percent of worldwide air traffic, the African continent has a light footprint on aviation.[22] Nonetheless, as the global aviation industry looks to reduce its carbon footprint, African nations could produce the biofuels to lower emissions of global flights and promote the growth of aviation on the African continent.

Biofuels for jets currently account for 0.1 percent of all aviation fuel used globally, but, according to the International Energy Agency, its use could increase to more than 5 percent by 2030.[23] To aid in this growth, advanced economies are creating incentives to support the use of sustainable aviation fuels (SAFs)—a category of fuels that includes biofuels, although SAFs are not always biologically based. The United States' Inflation Reduction Act, for example, developed a tax credit from 2022 to 2025 to help reduce costs of SAFs.[24] The European Union established a similar program through

16 "Africa Energy Outlook 2022."

17 Ibid; "Global Trade in Used Vehicles Report," United Nations Environment Programme, October 25, 2020, https://www.unep.org/resources/report/global-trade-used-vehicles-report.

18 "Africa Energy Outlook 2022."

19 "Biofuels," International Energy Agency, September 2022, https://www.iea.org/reports/biofuels.

20 "Biofuels Blending Mandate," International Energy Agency, last updated February 25, 2021, https://www.iea.org/policies/5696-biofuels-blending-mandate.

21 "Net Zero 2050: Sustainable Aviation Fuels," International Air Transport Association, last visited June 8, 2023, https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet---alternative-fuels/.

22 Shayera Dark, "Do Airlines and Airports Treat African Passengers Differently?" Al Jazeera, January 21, 2020, https://www.aljazeera.com/features/2020/1/21/do-airlines-and-airports-treat-african-passengers-differently.

23 "Biofuels."

24 "Sustainable Aviation Fuel Credit," Internal Revenue Service, last updated January 31, 2023, https://www.irs.gov/credits-deductions/businesses/sustainable-aviation-fuel-credit#:~:text=Amount%20of%20Credit,that%20the%20reduction%20exceeds%2050%25.

its ReFuelEU Aviation Initiative, which aims to expand the use of SAF at European airports.[25] These programs will benefit farmers outside of African agricultural markets, but nonetheless may aid the development of demand for SAFs among major airlines.

Biofuels for aviation are often produced from feedstocks such as algae, camelina, jatropha, sugarcane, and waste products, and are blended at concentrations of up to 50 percent with traditional jet fuel. For example, South Africa has substantial sugarcane production capabilities; it could produce more than three hundred million liters of sugarcane-based sustainable aviation fuel per year, while balancing ecological needs in South Africa.[26] Additionally, it would provide sizable benefits for the biojetfuel supply chain, while creating about one hundred thousand new jobs.[27] To achieve these benefits, public and private stakeholders in active aviation markets will need to partner to continue developing the demand that farmers in African markets could service. This may provide an incentive for increasing the collection of feedstocks from farmers for the production of biojet fuel. Only then will biofuels play a major role in helping the aviation industry reduce greenhouse gases and support the growth of many African rural economies.

### Providing a Clean Cooking Solution

In addition to supplying low-carbon power for transportation, the development of a biofuels industry in Africa could support much-needed, expanded access to clean cooking. An estimated 940 million people across the continent in 2020 were using kerosene, coal, or biomass, including wood and charcoal, for cooking—methods that negatively impact the environment, low- and middle-income communities, and gender equality.[28]

Burning crude biomass, such as charcoal and woody material, for cooking leads to significant deforestation, lost economic opportunities, and serious public health issues, particularly for women and girls. In many African countries, women and girls must collect wood for cooking, which can take up to twenty hours a week, preventing girls from attending school and women from earning additional income through other work.[29] Women and children in low- and middle-income countries are disproportionately affected by prolonged exposure and inhalation of cooking-related pollutants. This exposure leads to serious health issues, including heart disease, stroke, cancers, chronic lung diseases, and pneumonia.[30] Cooking over open fires or stoves fueled by kerosene or woody biomass can produce one hundred times the acceptable level of fine particulate matter.[31] In sub-Saharan Africa alone, 490,000 premature deaths per year have been linked to household air pollution.[32] Biofuels, including ethanol, are preferred for indoor use because they meet the World Health Organization's air-pollution limits for fine particulate matter and carbon monoxide, reducing the health risks associated with crude biomass.

Recognizing the economic and health benefits of replacing biomass with clean cooking fuels such as ethanol, some countries are taking action. The Kenyan government, for example, created an ethanol cooking-fuel industry master plan, and has welcomed companies that deliver clean cooking solutions. For example, in 2019, Nairobi-based energy company KOKO Networks launched its business model to deliver clean cooking solutions by overcoming accessibility and affordability barriers. KOKO uses commodity-grade ethanol from Vivo Energy Plc (operating under a license from Shell) and retails the ethanol directly to end-use consumers.[33] KOKO sells ethanol stoves at a subsidized price, and has established a network of "fuel ATMs" to deliver a clean and affordable cooking solution in urban and semi-urban communities.

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25 "European Green Deal: Commission Proposes Transformation of EU Economy and Society to Meet Climate Ambitions," European Commission, July 14, 2021, https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3541.

26 Tjaša Bole-Rentel, Farai Chireshe, and James Reeler, "Fuel for the Future: A Blueprint for the Production of Sustainable Aviation Fuel in South Africa," World Wildlife Fund for Nature, 2022, https://wwfafrica.awsassets.panda.org/downloads/fuel_for_the_future.pdf?39122/fuel-for-the-future.

27 Ibid.

28 "Access to Clean Cooking," International Energy Agency, 2022, https://www.iea.org/reports/sdg7-data-and-projections/access-to-clean-cooking#.

29 Kirstie Jagoe, et al., "Sharing the Burden: Shifts in Family Time Use, Agency and Gender Dynamics After Introduction of New Cookstoves in Rural Kenya," Energy Research & Social Science 64 (2020), https://doi.org/10.1016/j.erss.2019.101413.

30 "WHO Publishes New Global Data on the use of Clean and Polluting Fuels for Cooking by Fuel Type," World Health Organization, January 20, 2022, https://www.who.int/news/item/20-01-2022-who-publishes-new-global-data-on-the-use-of-clean-and-polluting-fuels-for-cooking-by-fuel-type.

31 "Household Air Pollution," World Health Organization, November 28, 2022, https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health.

32 "Access to Clean Cooking."

33 Antony Sguazzin and Bella Genga, "Koko Networks Provides Kenyans with Cheaper, Greener Cooking Fuel," Financial Mail, November 1, 2022, https://www.businesslive.co.za/bloomberg/news/2022-11-01-koko-networks-provides-kenyans-with-cheaper-greener-cooking-fuel/.


A woman fills a canister at a Koko cooking fuel dispensing ATM, in Nairobi, Kenya. Picture taken September 17, 2021. Source: REUTERS/Baz Ratner

The participation of governments will be critical to the success of the deployment of clean cooking fuels to replace charcoal and woody biomass. The ethanol market for urban cooking in Kenya alone has a potential value of about $600–800 million, and significant potential exists for the maturation of additional markets on the continent.[34] However, subsidizing the purchase of stoves and clean cooking fuels, such as ethanol, may be required as a first step to realize this potential. For instance, the Kenyan and Rwandan governments have agreed to remove value-added taxes on the KOKO fuel and cookers, which are positive developments in accelerating the deployment of ethanol fuel as a clean cooking solution.[35]

## CONCLUSION

While the African continent experiences rapid population growth, its governments and industries need to heed social and environmental considerations, as they also promote economic development. Establishing a robust biofuels industry in Africa could aid efforts to accomplish this balance by expanding access to energy through clean cooking solutions and enabling low-carbon transportation. These outcomes would necessarily follow the deployment of modern agricultural mechanisms and an increase in land use for sustainable agricultural development.

34 David Whitehouse, "Ethanol for Cooking can Help Reduce Africa's Energy Poverty," Africa Report, June 25, 2019, https://www.theafricareport.com/14506/ethanol-for-cooking-can-help-reduce-africas-energy-poverty/.

35 Sguazzin and Genga, "Koko Networks Provides Kenyans with Cheaper, Greener Cooking Fuel."

To realize this vision, the value chain for biofuel products will require substantial support from private and public sources of investment, regulators, and local market participants. Across the continent, establishing a biofuels industry will require coordinated efforts to build a supply of feedstocks and to develop adequate market-driven mechanisms for the collection and transport of feedstock to processing or refining facilities. Expanding the industry will also require feedstock-calibrated refining capabilities and distribution systems to transport biofuels to end users.

Progressing to this end state will hinge on the presence of public-private partnerships to match suppliers with demand sources, technology-sharing initiatives between African nations and other economies with large biofuel industries, and targeted efforts to de-risk investment in pioneering projects and facilities through the use of concessional finance or innovative blended-finance structures, paired with technical assistance. As a first step, governments should consider the deployment of hub models wherein sources of supply can be matched with sources of demand, and where new investments in facilities such as refineries can obtain firm supplies of feedstock, as well as contractual offtake for biofuels across various end uses.

While full-scale deployment of biofuels may require the synchronization of several intermediate steps, the benefits are clear. Developing the biofuels industry in African countries can partially incentivize much-needed agricultural modernization across the continent, produce valuable low-carbon fuels to meet growing domestic and worldwide demand, and promote access to clean cooking, provided that food security is addressed as a prerequisite—although such efforts may be mutually reinforcing. The question that remains is whether policymakers, investors, and industry will come together in support of these outcomes.

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## ACKNOWLEDGMENTS

The authors are grateful for the support of the US Grains Council, and for the valuable insights provided by Aubrey Hruby, Gerard Ostheimer, and Douglas Faulkner. The authors based this paper on research and the insights that emerged from a private roundtable discussion.

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