



CONCEPT NOTE

WEST AFRICA DIALOGUE

on

***Ethanol Clean Cooking Solutions: Social, Health,
Economic, Environmental and Climate Impacts***

Host: ECOWAS Centre for Renewable Energy and Energy Efficiency
(ECREEE)



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Webinar and Program Agenda

1. Context and Background

The Nationally Determined Contributions (NDCs) to UN of several countries is lagging behind in achieving 2030 SDG commitments and actions. The pandemic became a bottleneck in the development process of the nations. Like Africa many other countries have expressed interests to look at biofuel for alternate energy needs for both household and transportation markets. Ethanol becomes a viable, feasible, transportable and attractive alternate option due to its sustainable feedstock potential based on waste to energy options, agriculture and circular practice development impacts in rural areas, and most importantly a source of clean cooking fuel to replace the dirty primary biomass use. Similar is the commitment from West Africa region countries. With about 3 billion people deprived of access to clean cooking methods in the households and community across the globe. *As per The World Bank report on Report: Universal Access to Sustainable Energy Will Remain Elusive Without Addressing Inequalities, and quoted “The state of access in the Sub-Saharan African region is characterized by population growth outpacing gains in the number of people with access, so that 910 million in the region lack access to clean cooking.”*

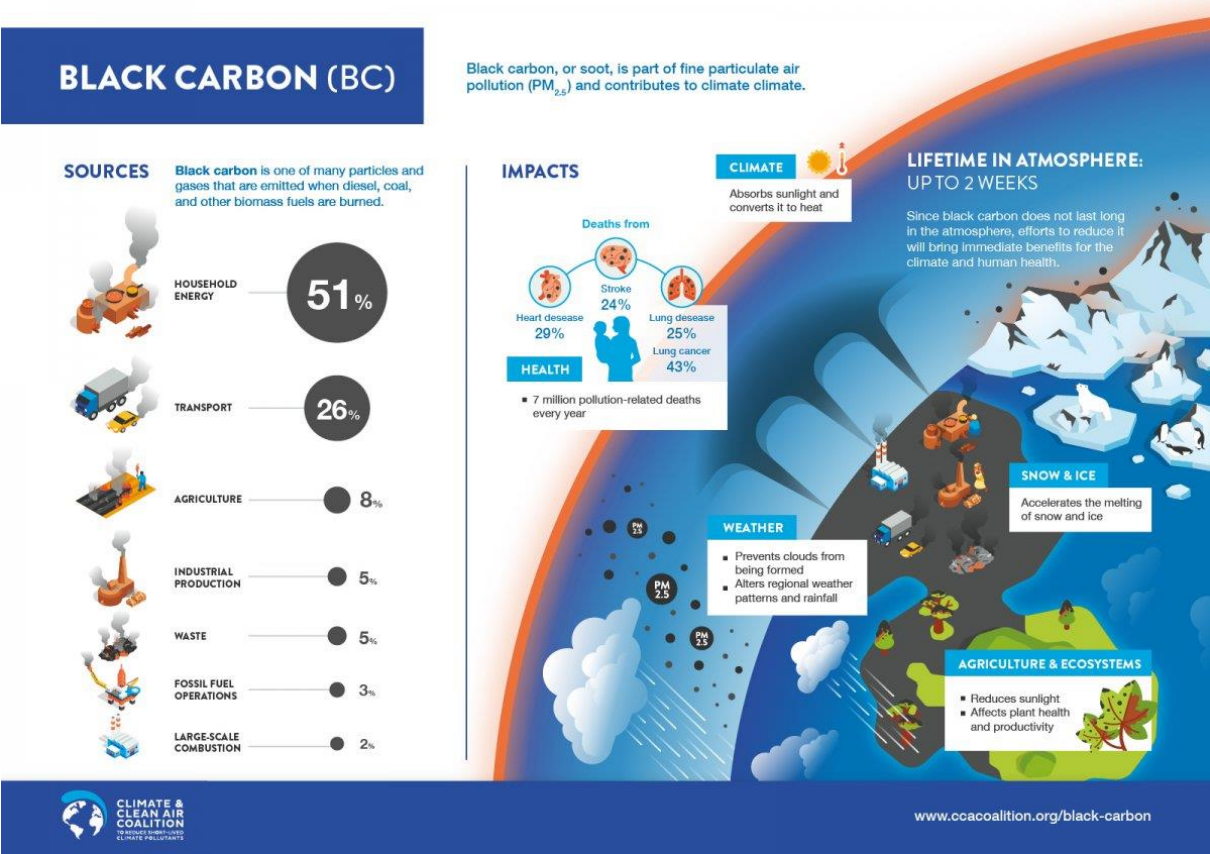
While there are other national programs like improved cook stove, the ethanol clean cooking is safe, easy to made locally, price affordability with local suppliers and distributors, and coupled with ethanol cook stoves available locally is the best suited for the households and community. Largely such program will contribute to the well-being of the households towards better health, equity and gender perspectives, women empowerment, enterprise development, and also importantly address climate change, and create a value chain from Farm to Cooking. This will enable the households and the women with dirty cooking habits and get rid of kerosene and wood biomass.

Household air pollution and health key facts¹:

- Around 2.6 billion people cook using polluting open fires or simple stoves fuelled by kerosene, biomass (wood, animal dung and crop waste) and coal.
- Each year, close to 4 million people die prematurely from illness attributable to household air pollution from inefficient cooking practices using polluting stoves paired with solid fuels and kerosene.
- Household air pollution causes non-communicable diseases including stroke, ischaemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer.
- Close to half of deaths due to pneumonia among children under 5 years of age are caused by particulate matter (soot) inhaled from household air pollution.

¹ WHO Fact sheet

Alarming black carbon emission from the household energy:



(Source: Climate and Clean Air Coalition)

Our consortium of International Consulting for Development of Impact (ICDI), Vienna and India, Project Gaia (PGI), US and Africa, and The Energy Nexus Network (TENN), Africa have joined hands for Stakeholders dialogues in West Africa. The three partners bring in impact program design, policy dialogues and interventions, manage and implementation (ICDI), science and chemistry, technology, innovation and scalability (PGI) and local knowledge, network and reach in West Africa (TENN). Our host partner as Economic Community of West African States (ECOWAS) brings in local requirement and community engagement process and its member states.

ICDI - ICD Impact (ICDI) based in Vienna/Austria, is a collaboration of experienced managers, consultants and associates in public and private sector, with a main focus in creating positive social impact through projects and programs that are beneficial for communities and their environment, following the United Nation’s SDGs and other selective impact indicators as guideline.

PGI - Project Gaia promotes clean cookstoves that are powered by alcohol fuels – fuels that are clean, safe, and efficient. We help communities become energy independent by establishing locally-owned microdistilleries. We believe than an investment in clean energy makes a resounding impact on family health, empowers women and girls, reduces deforestation, and mitigates harmful environmental emissions. We only promote truly clean technology.

TENN - Provides leadership, best practices, research and advisory support on the synergies between energy and crucial energy-enabling SDGs in West Africa and East Africa.

ECOWAS & ECREEE - The Economic Community of West African States (ECOWAS) is a regional political and economic union of fifteen countries located in West Africa. It promotes development activities in West Africa and engages in dialogues with all relevant stakeholders for the social and economic development of the region. ECREEE's mandate is also perfectly aligned with the broader strategic goals of ECOWAS vision, namely, (1) A region that anchors its development on sustainable development, including agricultural and mineral resource development strategy, and on planned agricultural and industrial strategies; a region that develops its infrastructure and makes services accessible to its citizens and enterprises. (2) 'A region that conserves its environment and resources, promotes modes of equitable and sustainable development in economic, social and environmental fields; a region which brings its contribution to bear on resolution of the common problems and challenges confronting the planet.

The webinar program "Ethanol Clean Cooking Solutions: Impact on Social, Health, Economic and Environment" will be a series of dialogues in Africa for sensitization and awareness for all stakeholders, capacity building of the government authorities, national and municipal resources, institutions (academia, research, funding, etc.), private sector, and other organizations in this eco-system. Followed by policies, program design, management and implementation to achieve result based outcomes at country's national and sub-national levels in West Africa.

In this context this Alliance intends to organize "West Africa Dialogue" on "Ethanol Clean Cooking Solutions: Impact on Social, Health, Economic and Environment" for all relevant stakeholders and deliberate on the clean cooking with ethanol and identify strategies to create an impact by 2030 through SDGs.

2. SDG Alliance - People, Planet and Prosperity

We all know that climate change is for real and affecting all human beings, social, economic development and the largest environmental threat. Each country's alliance with the SDGs and its impact will keep it abreast, and collectively address well-being of people, planet and prosperity. With the development of this dialogue "Ethanol Clean Cooking Solutions: Impact on Social, Health, Economic and Environment" will lead to value chain development in the ethanol and biofuel energy industry in West Africa, clean stove manufacturing, supply distribution network, enterprise development through dealers, repair and services partners, men and women entrepreneurs, knowledge and capacity building, and local economic development and upliftment of social livelihood and community development.

We have 17 SDGs and 169 targets. All the SDGs are interconnected for progress and prosperity. Our dialogues and program will essentially address these SDGs that are addressed in the program and which can support commitments to the National Democratic Commitments (NDC) of each country in West Africa.

- **SDG1-No poverty and SDG2–Zero Hunger:** The development of local ethanol and biofuel energy industry will reduce poverty by offering small farmers the possibility to increase and diversify their crop production, feedstock and generate additional revenues. Facilitate enterprise development and create entrepreneurial eco-system and generate earnings for the men and women entrepreneurs. SDG2 has direct impact.
- **SDG3-Quality health and well-being, SDG4-Quality education and SDG5-Gender equality:** Ethanol being a biofuel does not emit thick black smoke and less pollution women

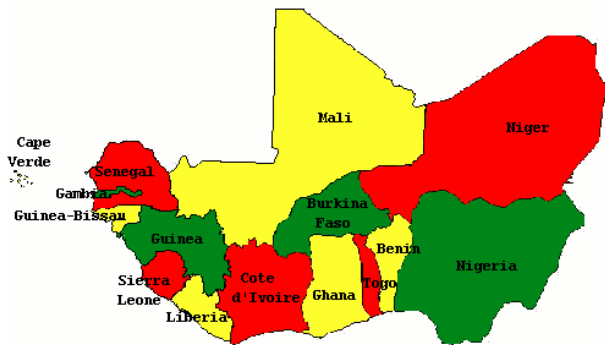
spend long hours in cooking. With reduction in poverty, earnings sources and good health, education and leaning becomes easier. Women spending long hours on cooking can resort to clean stove for cooking practice and engage in other income generation activities, and sense of disparity in efforts as to men is well balanced.

- **SDG7-Affordable and clean energy:** This also has the most direct impact. Developing local ethanol and biofuel energy industries has not only a direct impact on an overall access to affordable, reliable, sustainable, and modern energy across the globe, but positively contributes to economic, social, and environmental challenges and well-being of the planet.
- **SDG8-Decent work and economic growth:** The local biofuel ethanol and biofuel energy market will facilitate business, employment opportunities, training and capacity building, career path and lead to better and robust economic activities and decent economic growth from the agriculture and feedstock industry, distillery industry, clean stove industry and allied service industry.
- **SDG9-Industry innovation and infrastructure:** Overall will lead to value biofuel resources. The improvement of existing practices, the introduction of new and innovative technologies and the enhancement of the infrastructure along the whole value chain in sugar and other agriculture feed stocks, and clean stove industry.
- **SDG10-Reduce inequalities:** From two aspects, one is opportunity for creating and developing industrial cluster feedstock production, ethanol distillery, clean stove and its components in rural areas. The other is bridging the wage gap of women workers with vocational training and skill development programs.
- **SDG11-Sustainable cities and communities:** Production, promotion, and consumption of ethanol and other biofuels contribute to the improvement of the environment, reduction of fossil fuel consumption especially in the household and transit contributing to more liveable and sustainable cities and communities. Here we emphasize on rural households and community.
- **SDG12-Responsible consumption and production:** Production process of ethanol and biofuel and bottling plant adhere to zero waste and proper waste water treatment and management. Use of bio-degradable packaging barrel, jar and bottle for transit, clean cook stove components and its parts may be recycled with circular economy practices. The food chain and food security will not be affected engaging in such production.
- **SDG13-Climate change:** This also an important SDG with direct impact towards GHG mitigation. Within the biofuel economy, the development of biofuel energy reduces emissions and carbon sequestration through sugarcane and other feedstock agriculture practices and adaptation mechanism towards climate change.
- **SDG15-Life above land:** Balance of flora and fauna is maintained through indigenous sustainable agriculture practice that makes the natural resources, environment and eco-system liveable with nature. Sustainable practices will help prevent land degradation, desertification and retain ground water and keep the soil fertile for crop production.
- **SDG17-Partnerhips for the goals:** Creating local and global partnerships (glocal), collaboration of research, knowledge and experience, underlying challenges and the lessons learned, theory of change, behaviour and transition with supports steady growth and contribution to country's GDP by ethanol and other biofuel economy at national and sub-national region.

Note that the SDG6-Clean water and sanitation, SDG14-Life below water and SDG16- Peace, justice and strong institutions are excluded.

1.1. The ECOWAS region

Figure 1: ECOWAS Region



The Economic Community of West African States (ECOWAS) is an organization of fifteen member countries in the western Africa region.

The ECOWAS region covers a land area of more than 5 million square kilometers and is home to about 400 million people, roughly one third of Africa's total population.

Eleven member states of the ECOWAS community are still considered Least Developed Countries (LDCs).

3. The Potential of Biofuel and Ethanol

Global production² of ethanol amounted to 98.4 billion liters in 2018. More than half of this amount was produced in the USA in about 200 ethanol production plants (primarily corn). Second biggest player was Brazil, producing about one quarter of global ethanol in close to 400 ethanol production plants (primarily sugarcane). The USA and Brazil jointly represent 85% of global ethanol production. About 5% of ethanol was produced in the EU in about 50 ethanol production plants (primarily wheat, sugar beet and corn). Globally, about 46% of ethanol was produced from corn, followed by 38% sugarcane and 5% wheat.

Ethanol as cooking fuel:

Around 60% of the world population, equaling more than 4.35 billion people, has access to clean cooking fuels (i.e. natural gas, LPG and electricity) and technologies today, with the highest shares being in North America, Europe and Australia (ESMAP, 2018). Although millions of people have gained access to clean cooking facilities in recent years (including 450 million in India and China since 2010), progress in the switch from traditional to clean fuels continues to be uneven across regions and often outpaced by population growth. In 2018, 63.1% of people without access to clean cooking energy lived in developing Asia, and 34.1% lived in Sub-Saharan Africa (SSA) (REN21, 2020).

Ethanol as transport fuel:

Only six countries had a fuel ethanol production of more than 1 billion liters. The majority of biofuels production is policy driven, mainly through mandates, which effectively stipulate fuel blending at low levels. Biofuel blending mandates are the most widely adopted policy for increasing renewable fuels in the transport sector. They are prevalent across all regions in more than 70 countries.

However, blending mandates are not always enforced. (REN21, 2020) Fiscal incentives play an important role in increasing competitiveness of biofuels compared to fossil fuels. Market-specific challenges, such as investment climate, and ensuring of sustainability have to be

² UNIDO Discussion paper on Establishing Ethanol Industries in Developing Countries

considered. Adverse sustainability impacts, for example a competition between energy and food production, have to be avoided (IEA Bioenergy, 2017)

Production and consumption of ethanol in Africa is still at low level, but increasing. In Kenya, the State Oil Corporation signed an agreement with the Government to build a new ethanol plant to meet biofuel mandates. In Zambia, Sunbird Bioenergy Africa² launched a program to develop a sustainable cassava supply chain for ethanol production in order to provide 20% (100 million liters) of the country's gasoline requirements (REN21, 2020). Additionally, Malawi is attempting to achieve a 20% fuel blending target.

Currently, the global share of renewable energy in the transport sector amounts to 4%. IRENA predicted an increase to 22% by 2050. Since global fleet growth will occur more in developing countries, biofuels production should be especially focusing on these countries.

As per the UN classification of countries as Developing countries (DC), Least developed (LDC) and Small island development state countries (SIDS), the development of the biofuel energy industry and ethanol industry provides a great opportunity to these countries. In many of these countries the population is projected to double by 2050 with more food and fuel demand. Many economies are developing bio-fuel or biofuel energy policies and making pathways to transition. For e.g. country like India has already developed a road map for blending 20% of ethanol in petrol by 2025³. The country also has a biofuel policy at national and sub-national level. With the Russia-Ukraine war crisis and geopolitical situation, there will be more and more importance to biofuel policies at macro level and ethanol at micro level rural areas.

Amid this crisis there is pressing demand for food and fuel and its rising prices. To meet these needs these countries can use their substantial resource potential to produce biofuel energy sustainably and be scalable. For every ton of crop grown, residues are available on the field of which a fraction can be collected after harvest. Enough residue (three quarter to a half) will be left behind to regenerate the soil and to be processed into feed for meat and dairy production. The collected agricultural residues as well as the waste from agricultural processing can provide fuel for combined heat and power plants, process heat for first-generation biofuel production, and other feedstock for second-generation biofuel processes. Most of the residue as feedstock can be used for ethanol production sourced locally with a robust supply value chain from farm to factory.

Driven by the desire to reduce energy import bills and carbon emissions by displacing fossil, global biofuel energy use has increased over the last three decades. However, its expansion has been slowed by a perceived conflict between food and fuel production, which has often made it difficult for governments and development agencies to support investment. This debate is coming closure to less effect with sustainable production. Improving yields through modern and sustainable agricultural practices can grow the same amount of food on less land. The freed-up land can be planted with a mix of rapidly growing trees (short rotation coppice) for combined heat and power or second-generation biofuel, high-yielding conventional biofuel crops such as sugar cane, and grasses for lignocellulosic conversion.

Biofuel energy has a promising future in creating a sustainable bioeconomy in DCs, LDCs and SIDSs as only a small fraction of its potential has been exploited so far. That potential can easily

³ Roadmap for ethanol blending by Government of India

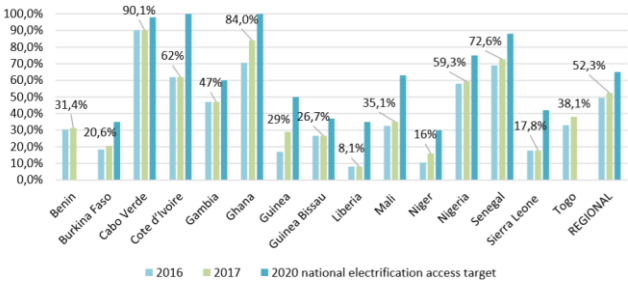
be achieved without tapping into the food crops and experiencing competition with food production. Indeed, there are still huge quantities of bio-residues globally that are not used and that can be converted into biofuel energy. Sustainable agroforestry ecosystems offer an opportunity to meet the growing demand for food and fuel sustainably and to achieve the SDGs and the NDCs of these countries.

As per the International Renewable Energy Agency (IREA) the Sub-Saharan Africa possesses considerable resources to produce sustainable liquid biofuels, based on biomass feedstocks that would neither conflict with food supplies nor add to carbon dioxide emissions.

Fulfilling the region’s biofuel potential would depend on increased residue collection from food crops and forest products, as well as intensified cultivation of farmland – beyond food needs – and reducing waste and losses in the food chain and agriculture waste management. Hence ethanol becomes the best cooking fuel for the households and the community.

3.1. Energy context of the ECOWAS region

Figure 2: Energy context ECOWAS



Biomass has a share of almost 80% in the final energy consumption, varying from 60% (Senegal) to over 90% (Niger, Guinea Bissau).

In 2017, only 52.3% of the ECOWAS population had access to grid electricity. Rural electrification rates are less than 10% in countries such as Guinea, Niger, Liberia, Guinea-Bissau, and Sierra Leone.

(Source: Regional Progress Report, 2017): Share (%) of Population Connected to an Electricity Grid in 2017 and 2016

3.2. Biofuel energy: Linking Agriculture and Industry to Economy

Agriculture is the main practice of DCs and LDCs. The agriculture sector contributes considerably to their GDP. Agro-processing industries are an important instrument to add value to agricultural products and get a better value to their produces. Agro-industries also stimulate exports of excess products and bring in additional foreign exchange. Since they generate huge amounts of agro-wastes and residues in one place, the potential to apply circular economy principles and generate by-products including energy is enormous in reducing post-harvest losses, thereby increasing the productivity and profitability of industries and related value chain. Creation of organised cluster and linking them to unorganised clusters will make more feasible and viable for sustenance.

There is immense potential for DCs and LDCs as well as SIDSs to produce ethanol and other biofuels from local resources and reduce the import of fossil fuels which can help them to become self-reliant in energy cooking and energy security as well as reduce importation of fossil fuels from outside the country again saving enormous amount of foreign exchange which can be diverted to other economic activities.

As per the US Department of Energy, Ethanol feedstock and quoted, are almost any plant-based material can be an ethanol feedstock. All plants contain sugars, and these sugars can be fermented to make ethanol in a process called "biochemical conversion." Plant material also can be converted to ethanol using heat and chemicals in a process called "thermochemical conversion". Nearly all ethanol produced in the world is derived from starch- and sugar-based feedstocks. The sugars in these feedstocks are easy to extract and ferment, making large-scale ethanol production affordable. Corn is the leading U.S. crop and serves as the feedstock for most domestic ethanol production. For a country like Africa, the major share would be from sugar feedstock.

Benefits and drivers for the development of an ethanol industry:

Establishing an ethanol industry is a promising opportunity to contribute to economic development, job creation, modern energy access, reduced pollution and climate change mitigation in developing countries. Biomass feedstock for ethanol production include cassava, corn, sorghum, wheat and sugarcane (sugarcane juice and molasses). These new ethanol industry expansions or developments should be integrated with existing and future agricultural industries. Sugarcane has attracted specific interest as the well-established sugar industry in many developing countries can support value chain and technology development as well as ethanol market penetration based on its long-term management experience.

Furthermore, **ethanol used as clean cooking fuel** significantly reduces harmful emissions and indoor air pollution. Cooking with ethanol stoves reduces kitchen concentrations of PM_{2.5} (Particulate Matter) and CO, two pollutants responsible for negative health impacts of indoor smoke, by 84% and 76%, respectively compared to the use of wood fuels for cooking. The replacement of wood and charcoal fuels has the added benefit of reducing deforestation from unsustainable wood harvesting practices.

3.3. Liquid Biofuels

Liquid fuels are the most portable of fuels; they are an efficient and affordable way to transport energy to distant areas. Liquid biofuels are produced from organic matter through one of several physical, biological, or thermochemical processes, including fermentation, pyrolysis, gasification and catalytic conversion or direct extraction and transesterification. Liquid biofuels are also produced by anaerobic digestion and direct partial oxidation or gas synthesis. Fuels produced by the recombination of hydrogen and carbon are referred to as synthetic or synfuels. The most developed of liquid biofuels are ethanol, methanol, and biodiesel.

Liquid biofuels are traded globally and have been historically used in transportation, lighting, heating, cooking and electricity generation. They lost currency with the rise of petroleum fuels and were displaced by kerosene, gasoline and diesel fuel. However, they have regained popularity for fuel blending and flex-fuel engines. For example, in Brazil and the United States (US), the production and use of bioethanol was supported by forward-looking policies,

including the National Alcohol Programme (ProAlcool) in Brazil, 1975, and the Renewable Fuel Standard (RFS), 2005, in the US. Further Climate Ethanol Alliance Promotes Biofuels at COP23.

Ethanol and methanol, the two simplest alcohols, have begun to emerge out from under oil's dominance for compelling reasons. These include their environmental benefits, such as their potential to be renewable and to recycle waste, the fact that they burn cleanly, are biodegradable, and are low-carbon fuels. Their socio-economic benefits include their ability to be produced cheaply, through well-established pathways with relative ease, on a large or small scale. Liquid biofuels also have significant health benefits over other fuels, including wood and kerosene, whose use for cooking has been discouraged by the World Health Organisation.

Ethanol is produced most easily from sugar and starch feedstocks, which are often by-products or wastes of other agro-industrial processes, such as sugar, food and beverage production. It can be produced in almost every country, including DCs and LDCs as well as SIDS and can be used for widespread applications in meeting the local energy demand. Ethanol becomes the best choice when it comes to cooking with better combustion, efficiency and reduces health hazard and indoor and outdoor pollution.

Biofuels can be classified into 3 generations⁴: First, second and third generation. The 2nd generation biodiesel includes liquid fuels derived from Jatropha seed oil and from a catalytic conversion process of synthetic gas from the gasification of biomass. The 2nd generation ethanol is a liquid fuel from non-food bio-materials such as biomass and bio-waste having high cellulose. It was found that the GHG performance of biofuels is the key to achieving a low-carbon transportation sector and meeting this roadmap's vision. However, given the extensive nature of the potential supply and use of biofuels and their interaction with the agricultural and forestry sectors, all three pillars of sustainability; i.e. (i) environment, (ii) economic and (iii) social, need to be fully considered and appropriately addressed on policy level.

Second Generation Bio-ethanol Technology

Second generation ethanol feedstocks are mainly from agricultural wastes such as corn stover, sugarcane baggase and also from wood, grasses or the non-edible parts of plants. It is produced from lignocelluloses, a structural material that comprises much of the mass of plants. The ethanol is derived not from the starch component like the first generation ethanol, but from the lignocellulosic component of the feedstock. Large sources of lignocellulose are available including non-food wild plants that grow in non-cultivated and non-arable lands. The second generation ethanol feedstocks overcome the two main bottlenecks for the first generation feedstock: adverse effects on food prices and inability to scale.

Cellulosic ethanol is a biofuel produced from wood, grasses or the nonedible parts of plants. It is a type of biofuel produced from lignocellulose, a structural material that comprises much of the mass of plants. Lignocellulose is composed mainly of cellulose, hemicellulose and lignin. Corn stover, switchgrass, miscanthus, woodchips and the byproducts of lawn and tree maintenance are some of the more popular cellulosic materials for ethanol production. Production of ethanol from lignocellulose has the advantage of abundant and diverse raw material compared to sources like corn and cane sugars but requires a greater amount of

⁴ UNFCCC document (produced by <http://www.ctc-n.org>)

processing to make the sugar monomers available to the microorganisms that are typically used to produce ethanol by fermentation.

Lignocellulosic materials, which provide structure to plants, are found in the stems, stalks, and leaves of plants and in the trunks of trees. The abundance of lignocellulosic materials – roughly 60 to 90 percent of terrestrial biomass by weight – **along with the fact that they are not used for food (agri residue waste)** and feed (unlike corn and sugarcane), are key reasons why lignocellulosic ethanol and other lignocellulose based biofuels have attracted scientific and political interest. Lignocellulose and hemicellulose, which are referred to collectively as lignocellulosic materials, can be broken down into sugars, which can then be fermented into ethanol. Lignocellulosic materials being examined for the production of biofuels include those derived from switchgrass, prairie grasses, short rotation woody crops, agricultural residues, and forestry materials and residues.

Ethanol is chemically the same whether it is produced from corn, sugarcane or cellulose. However, the production processes are different and the necessary production technologies are in different stages of development. Corn and sugar based ethanol production technologies have been used at a commercial scale for decades. In contrast, some of the technologies needed to produce cellulosic ethanol, an “advanced biofuel” (broadly defined as a biofuel derived from organic materials other than simple sugars, starches, or oils) are quite new.

The advantage of the use of ethanol as fuel especially in the transportation sector is that ethanol/gasoline mix is an "oxygenate" fuel. It adds oxygen to the fuel mixture so that it burns more completely and reduces polluting emissions such as carbon monoxide.

Any amount of ethanol can be combined with gasoline, but the most common blends are:

- E10 - 10% ethanol and 90% unleaded gasoline.
- Ethanol is a clean-burning, high-octane fuel. Ethanol can be produced domestically in most countries. When ethanol is blended with gasoline, the octane rating of the petrol goes up by three full points, without using harmful additives. The higher the octane rating, the slower the fuel burns and the less likely the engine will knock.

Comparing with corn, cellulosic feedstocks have better energy conversion ratios, reduce CO₂ emissions, and create less damaging land and water impact as shown in table below.

Table 1: Comparison of various ethanol types and gasoline:

	Corn ethanol	Cane ethanol	Cellulose ethanol	Gasoline
Energy output	8	1.3	236	1
CO ₂ emission	1.94 kg/litre	1.07 kg/litre	0.22 kg/litre	2.49 kg/litre
Ignition temperature	High	High	High	Low

Water use in production	Growth of corn, refining diesel for tractors	Growth of cane	Varies greatly	Refining of crude
Production per acre	1512 liter	2305 liter	2780 liter	N/A

(Source: Source: Worldwatch Institute, US DOE–EIA, US EPA)

3.4. Modern Cooking Solution Penetration in ECOWAS Countries

Table 2: Modern cooking solutions in ECOWAS

Country	LPG	Electricity	Kerosene	Census year
Benin	5.0%	0.3%	2.8%	2013
Burkina Faso	1.3%	0.7%	0.1%	2014
Cape Verde	76.5%	0.3%		2017
Côte d'Ivoire	22%			2014
Gambia	3.4%		0.6%	2013
Ghana	22.8%	0.5%	0.5%	2013
Guinea	0.8%	0.6%	0.5%	2014
Guinea-Bissau		5%		2011
Liberia	0.95%	0.9%	0.4%	2008
Mali	28.9%			2017
Niger	0.5%			2012
Nigeria	0.9%	0.2%	25%	2008
Senegal	43.5%			2014
Sierra Leone	0.8%	0.5%	0.7%	2015
Togo	2.76%	0.08%	0.37%	2010

(Source: Regional Progress Report, 2017): Share (%) of Households Using Modern Cooking Solutions in ECOWAS Countries

- Over 90% of the population uses traditional biomass for domestic cooking.

- The penetration of modern energy services (electricity, biogas, LPG, ethanol, biodiesel and improved stoves) in the ECOWAS region is still very low and energy poverty is increasing. (Energy access is not keeping up with population growth.)
- Heavy reliance on wood and charcoal is causing pervasive depletion of forest resources, exacerbated by an increasing population, with devastating economic, social, environmental and health consequences.
- The lack of access to modern, affordable and reliable energy services is linked to a variety of economic, social, environmental and political problems. The challenges are also related to energy access, energy security and climate change resiliency and mitigation.

3.5. Biofuels Market

Transport fuels and household fuels are the two major potential markets for biofuels especially ethanol and biodiesel. Below is a list of countries in Africa, Asia and Latin America having a biofuel mandate. However, most of these countries have not met their targets over the years due to myriad of reasons. Therefore, this is an area where can support West African countries through our “**Webinar Dialogue Series**” towards Policy dialogues and interventions, Capacity building, Design, Manage and Implement with result bases approach by linking their agriculture, industry and clusters, energy and household cooking to create markets within the countries itself and possibly expand to regional markets and rural market.

Africa	Asia	Latin America
Angola	China	Argentina
Ethiopia	Fiji	Brazil
Ivory Coast	India	Venezuela
Kenya	Indonesia	Columbia
Malawi	Malaysia	Costa Rica
Mauritius	Philippines	Ecuador
Mozambique	South Korea	Jamaica
Nigeria	Thailand	Mexico
South Africa	Vietnam	Panama
Sudan		Paraguay
Zambia		Peru
Zimbabwe		Uruguay
		Bolivia

Table 3: List of countries with biofuel policy and law.

About 3 billion people in the world still using traditional and dirty fuels such as charcoal, firewood, animal dung and kerosene for cooking. Majority of them live in 20 High Impact Countries (HICs) mentioned in the below table. As a result, indoor air pollution and related health effects are affecting a million people every year. There is an urgent need to support these countries in developing cleaner fuel options to tackle this problem and furthermore reduce widespread deforestation.

Africa	Asia
Nigeria	India
Ethiopia	China
DRC	Bangladesh

Tanzania	Indonesia
Kenya	Pakistan
Uganda	Philippines
Sudan	Myanmar
Mozambique	Vietnam
Madagascar	Afghanistan
Ghana	People's Republic of Korea

Table 4: List of High Impact Countries in Africa and Asia.

On the global demand, S&P Global report provides surge in ethanol demand due to growing population, growing wealth and more people consuming more. Brazil ethanol exports are at 5 year high and imports from India jumps to 97% with the recent road map for ethanol blending in the transportation sector. The demand is growing fast due to use of biofuel in the aviation industry driven renewable diesel and sustainable aviation strategies and policies.

4. ECOWAS Policy and Standards for Bioethanol as prelude to the development of the Markets

Bioenergy production, trade, use and policy implications transcend national borders. Biomass policies become ineffective when they are not supported and integrated at both national and regional levels (ECOWAS Bioenergy Policy, 2017). Policy coherence and long-term benefits are best realized under a regional context. Therefore, the ECOWAS region can achieve harmonization of biofuels production and use when a uniform policy and regulations for the region are developed and applied uniformly. Such integration can promote bioenergy production and use in the region to achieve various goals towards universal clean energy access, promoting economic development.

In 2006, ECOWAS adopted a White Paper on access to modern energy services for populations in rural and peri-urban areas and in 2008 ECREEE was established. A Bioenergy Strategy Framework was adopted in 2012 by the energy ministers of the ECOWAS region to tackle energy challenges (ECOWAS Bioenergy Policy, 2017). Renewable energy is included in the national policies of member states (ECOWAS Renewable Energy Policy, 2012). These initiatives reflect an increasing drive for integrated energy markets in the region and a regional approach in developing the renewable energy sector (ECOWAS Renewable Energy Policy, 2012). Furthermore, to develop the biofuel sector, the region had set a 5 percent target of ethanol blending into gasoline by 2020. **However, this has not yet been implemented and only Burkina Faso, Mali, Nigeria, Ghana and Senegal have developed specific strategies for biofuel.**

Member states' biofuel policies are at widely varying stages of conception and progress. Some of the countries are at an advanced stage and have developed specific biofuel policies and enacted sector regulations to produce and use bioethanol. Others are just beginning.

A **West African Clean Cooking Alliance (WACCA)** has been established to build upon existing interventions with the various fuels and technologies, accumulate and share knowledge about the available technologies and the technical approaches. The WACCA is expected to facilitate the adoption of standards for cooking technologies in accordance with international agreements as developed under ISO and the Clean Cooking Alliance (CCA). **Ethanol is included as one of the major clean fuels to benefit from a regional standard (ECREEE,**

2013). Thus, WACCA is expected to contribute to introducing a regional ethanol standard for cooking.

Towards harmonization of the ECOWAS biofuels' policy, a draft ethanol (for cooking and gasoline blending) and biodiesel standards are developed. The draft standards are approved by my member states and it is undergoing through ratification for publication.

ANNEXURE

Webinar Objectives and Outcomes

West Africa Dialogue on Ethanol Clean Cooking Solutions: Social, Health, Economic, Environmental and Climate Impacts

The objectives of this dialogue are;

1. Introduce ethanol clean cooking solutions leading to better social fabric, health, economy and environment outcomes.
2. Promote innovative delivery opportunities for stakeholder and actors in the value chain and eco-system.

This initiative provides a platform for policy and decision makers representing majority of stakeholders and actors and developing the local eco-system for ethanol industry, cooking stoves industry and promoting clean cooking solutions to address the SDGs and NDC commitments of the countries.

Expected Outcomes from webinar

- Awareness on clean cooking solutions, use of ethanol in clean cooking and the value chain eco-system
- Promotion of West Africa's regional policy on biofuels and interventions for ethanol from policy and regulatory perspectives
- Use of Ethanol as a democratic fuel in Clean cooking
- Local production of supply of Ethanol from micro-distilleries. Supply chain and capacity building.
- Manufacturing and distribution of Ethanol use stove
- Social enterprise development
- Pragmatic solution into Clean cooking with Ethanol and its sustainability

Expected Outcomes post webinar

- Joint program and interventions on Ethanol Clean cooking with ECREEE.
- Design, manage and implement Impact Program on Ethanol Clean cooking in member countries.
- Technical assistance, Result-based finance, Carbon finance, other market instrument based finance fund raising for program.

Language

Interpretation will be available in English, French and Portuguese

Webinar Program Agenda

WEBINAR

Ethanol Clean Cooking Solutions in ECOWAS states
Social, Health, Economic, Environmental and Climate Impacts

Thursday 29 November 2022, Time: 2:00 PM GMT

Interpretation available in English, French and Portuguese

Time (GMT)	Activity	Duration	Speaker
2:00-2:10 PM	SESSION OPENING AND MODERATED - TENN & ICDI - Welcome Address, Context, Objectives - Introduction of participants - Presentation of agenda	10 min	Kandeh K. Yumkella Founder and CEO, TENN Alejandro V. Casso, Founder Director, ICDI
2:10-2:15 PM	ECREEE and UNIDO Cooking with Ethanol videos	5min	
2:15-2:20 PM	OPENING REMARKS - ECREEE	5 min	Jean Francis Sempore Executive Director, ECREEE
2:20-2:27 PM	THE SOCIAL TOLL OF DIRTY COOKING - ICDI - Poverty and health issues: Equality and livelihoods - Environment and climate; the ethanol solution	7 min	Leticia Browne, Country Advisor & Associate, ICDI
2:27-2:42 PM	THE ETHANOL SOLUTION - PGI - Feedstocks - Ethanol production in small and micro distilleries - Distribution and Sales - Case studies in SSA - Carbon Finance opportunity - Social audit	15 min	Harry Stokes, Executive Director, PGI Wubshet T. Tsehayu, Energy and Carbon Finance, PGI
2:42-2:57 PM	UNIDO - UNIDO Global Program on Clean Cooking. Market Enabling Framework for ethanol. Program Case Study: Tanzania - UNIDO plan for replication in SSA	15 min	Josy Thomas, Industrial Development Officer, UNIDO
2:57-3:07 PM	ECREEE - ECREEE initiatives on Clean Cooking and Renewable Energy	10 min	Guéi Guillaume Fulbert Kouhie, Program Officer - Renewable Energy Technologies, ECREEE

Time (GMT)	Activity	Duration	Speaker
3:07-3:17 PM	AfDB (African Development Bank) - Sustainable Energy Fund for Africa (SEFA) - Finance mechanisms for ethanol fuel production	10 min	Monojeet Pal, Division Manager, Energy Efficiency and Clean Cooking Division (PERN2) João Duarte Cunha Manager of the Renewable Energy Funds Division & SEFA
3:17-3:32 PM	Q&A – Moderated by ICDI and TENN	15 min	Paul T. Yillia, Director Operations, TENN
3:32-3:35 PM	Closing remarks and vote of thanks ECREEE	3 min	Jean Francis Sempore Executive Director, ECREEE
	Program duration	95 min	