ECOWAS BIOENERGY POLICY

and Implementation Plan

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ECOWAS CENTRE FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY
CENTRO PARA AS ENERGIAS RENOVÁVEIS E EFICIÊNCIA ENERGÉTICA DA CEDEAO
CENTRE POUR LES ENERGIES RENOUVELABLES ET L'EFFICACITÉ ENERGÉTIQUE DE LA CEDEAO

Acknowledgements

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Notes

The purpose of this ECOWAS Bioenergy Policy framework is to promote partnership and ownership and to provide guidance to ECOWAS Member States in developing national policies and regulations for sustainable and socially friendly bioenergy policies and implementation plans. It was initiated with a view of providing guidelines to enhance energy security and access without compromising food security or rural development in West Africa, as part of the contribution of the ECOWAS Commission to the SE4ALL initiative.

FOREWORD

The ECOWAS Commission has placed significant emphasis on the development of diverse modern sources of energy ever since it's recognition that access to sustainable energy services for the populations in the region are necessary pre-requisites for economic and social development. The region has endured low socio-economic development for decades as a result of low access rates to modern and sustainable energy services, coupled with high dependence on fossil fuels and unsustainable use of biomass energy, which often comes with negative consequences on health, environment, forest resources, and climate change. It is against this backdrop that the ECOWAS Heads of States adopted the ECOWAS Energy Protocol in 2003, which was envisaged to improve energy efficiency and increased use of renewable resources. This was followed in 2006 with the adoption of the ECOWAS/UEMOA White Paper on access to energy services for populations in rural and peri-urban areas, and all these culminated to the establishment of ECREEE in 2008.

Since its inception, ECREEE identified barriers to the promotion and development of renewable energy and energy efficiency services in the region. One of the main barriers identified was the absence of, or weak policy frameworks both at the national and regional levels. Consequently, the regional RE&EE policies were developed and adopted by the ECOWAS Heads of States and Governments in July 2013 following their adoption by the Ministers of Energy at the ECOWAS High Level Conference on SE4ALL in October 2012 in Accra.

Prior to that, the ECOWAS Bioenergy Forum held in Bamako, Mali in of March 2012 led to the validation of a Regional Bioenergy Strategy that aimed to facilitate the transition from the use of unsustainable and inefficient production, transformation and utilization of bioenergy resources to modern, efficient and sustainable ones.

The ECOWAS Bioenergy Strategy, which mapped out the way forward to accelerating access to sustainable energy services in West Africa through the use of biomass resources and technologies was also adopted by the ECOWAS Ministers of Energy in October 2012. One of the principal components of the bioenergy strategy is the formulation of a Regional Bioenergy Policy. The ECOWAS Bioenergy Policy was elaborated by the ECOWAS Ministers for Energy in December 2016, through the support of UNDP. The Policy was finally adopted at the ECOWAS Summit of Heads of States and Governments held in Monrovia, Liberia in June of 2017. The ECOWAS Bioenergy Policy is envisaged to strengthen the Renewable Energy and Energy Efficiency policies already adopted which aims to increase access to sustainable energy services.
According to statistics, about 80 percent of the region's total energy demand comes from biomass (basically firewood and inefficiently produced charcoal). The traditional methods of production and utilization of inefficient stoves often results in health complications, especially for women and children. Moreover, environmental degradation, GHG emissions, loss of ecosystems and desertification are all contributing

factors to food insecurity. In the cooking energy sector, more than 90 percent of the population of the region rely on firewood and charcoal for cooking and heating purposes, despite the introduction of alternative fuels and efficient cooking equipment. Based on this, ECREEE and its partners launched an initiative to introduce clean cooking energy solutions in the region. The initiative, the West Africa Clean Cooking-energy Alliance (WACCA), aims to address the existing inefficient cooking energy problems.

This Policy has the vision of transitioning to sustainable production, transformation and use of biomass in order to ensure universal access to modern energy services with a view to creating added value, jobs, increasing food security, mitigating environmental impacts and contributing to the achievement of the overall sustainable development goals. It further promotes the sustainable use of the biomass resources of the region, which include agro-industrial, municipal liquid and solid bio-wastes, which can be utilized for power generation, heating, food preservation and cooking. On a final note, there is no doubt that the ECOWAS Bioenergy Policy is a powerful instrument that could contribute to the revitalization of the rural and peri-urban areas by increasing access to sustainable energy, increased agricultural productivity, job creation and wealth generation through the sustained use of woody resources and other bio-waste for productive purposes

ABBREVIATIONS

AU	African Union
AUC	African Union Commission
BEFs	Bioenergy and Food Security (of FAO)
CBOs	Community Based Organisations
CDM	Clean Development Mechanism
CHP	combined heat and power
CSR	Corporate Social Responsibility
EC	European Commission
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
EEEP	ECOWAS Energy Efficiency Policy
EIA	Environment Impact Assessment
EIS	Energy Information System
EJ	exajoules
EREP	ECOWAS Renewable Energy Policy
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FIT	Feed-in Tariff
GHG	greenhouse gases
GBEP	Global Bioenergy Partnership
GCF	Global Climate Fund
ICS	Improved cookstoves
IGCC	Integrated gasification combined cycle
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill Gas
LPG	Liquefied Petroleum Gas
MDGs	Millennium Development Goals
MFP	Multifunctional platform
MSW	Municipal solid waste
NEPAD	New Partnership for Africa's Development
PPO	Pure Plant Oil
PPPs	Public Private Partnerships
R&D	Research and Development
SE4All	Sustainable Energy for All
UEMOA	Union Économique et Monétaire Ouest Africaine
UN	United Nations
UNDP	United Nations Development Programme
WACCA	West Africa Clean Cooking Alliance
WHO	World Health Organisation

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1 CONTEXT

Over three-quarters of the estimated 350 million ECOWAS inhabitants rely on traditional biomass as their main source of energy (ECREEE, 2012). Over the decades, the heavy dependence on wood and traditional charcoal has resulted in a massive depletion of the forest resources, exacerbated by an increasing population, with devastating economic, social and health consequences for the rural populations and the poor. UNEP (2010) estimates that about 3.4 million hectares are deforested annually in Africa. According to FAOSTAT (2013), deforestation in ECOWAS is almost 1 million hectares per year, with severe negative impacts on biodiversity and the ecosystems, as well as GHGs emissions, thus contributing to climate change.

Energy poverty in ECOWAS is increasing; especially in rural areas. Rural population is increasingly facing difficulties to meet their energy needs through gathering or buying woodfuel (wood and charcoal) and are obliged to cover much longer distances to collect it, while the penetration of modern energy services (electricity, biogas, LPG, ethanol and improved stoves) is still low.

In an effort to respond to the low access rates to sustainable energy services, particularly in providing modern bioenergy, ECREEE with its partners organized the ECOWAS Bioenergy Forum in Bamako, Mali on the 19 – 21 March 2012 to map out an ECOWAS Bioenergy Strategy. The overall objective of the Bioenergy Strategy is to improve food and energy security through the deployment of sustainability criteria in the production and utilization of resources.

The Ministers of Energy adopted the ECOWAS Bioenergy Strategy framework in October 2012 as a contribution of the Region to the Sustainable Energy for All (SE4ALL) Initiative especially the promotion of modern bioenergy.

Globally, the SE4ALL calls for an urgent need to increase significantly (i) the rate of access to modern energy services, (ii) the improvement of energy efficiency and (iii) the use of renewable energy sources. On a continental level, the African Union and UNECA[1] are actively pursuing the SE4ALL agenda by promoting the development of a well-articulated bioenergy policy that can have high multiplier and cross-sectorial impacts on the development of agriculture, transport, industries and trade. Consequently, a Pan African Bioenergy Policy Framework and Guidelines was elaborated and adopted by the CEMA[2] in 2012. The Policy framework recognises the critical role that bioenergy can play in promoting Africa's energy security, its agricultural transformation and fostering broad-based economic growth. It advocates the coordinated development of sustainable bioenergy in Africa as part of the energy mix, and the use of locally available resources and indigenous technologies. The ECOWAS Bioenergy strategy is consistent with the Africa Bioenergy Policy Framework and Guidelines.

In the last decade, ECOWAS has been playing a leading role continentally in terms of policy development for promoting renewable energy and energy efficiency, and overall integration and harmonization. The ECOWAS/UEMOA White Paper adopted in 2006 sets clear goals and objectives that have been consequently adopted by the member states and acknowledged by the international community. The establishment of the ECOWAS Centre for Renewable and Energy and Energy Efficiency (ECREEE) and the results so far achieved are a good testimony and showcase the good level of integration and harmonization of the West African nations in the

[1] United Nation Economical Commission for Africa
[2] Conference of Energy Minister of Africa

energy field. Therefore, there is a compelling case in ECOWAS to support an economic transition that significantly increases access to modern energy services through improved energy efficiency and a greater use of renewable energy sources - specifically bioenergy.

The development of this policy framework is further justified by:

- The need to anticipate and reverse unwanted negative impacts. Well-designed bioenergy policies support the attainment of Sustainable Development Goals. Inappropriately designed bioenergy policies and investments can easily frustrate these goals[3]. There are growing negative tendencies emerging in some parts of the region with respect to bioenergy development in general and biofuels in particular that call for strong policies (e.g. food versus energy crop).
- The low rate of adoption of modern bioenergy technologies in the ECOWAS Region. There are major developments in the field of modern bioenergy, leading to sharp increases in bioenergy production globally. ECOWAS has considerable potential for bioenergy production, both to satisfy local energy needs and for export markets, but this is not properly harnessed.
- At the institutional level, while regulatory frameworks have been developed to manage negative impacts of bioenergy in several parts of the world, this has not been sufficiently done in Africa. It is expected that ECOWAS will play a leading role in the continent. ECOWAS has been credited as the most integrated Regional Economic Community (REC) in Africa in term of policy harmonisation, especially in the energy sector.
- ECOWAS has already set targets for renewable energy and energy efficiency, including modern bioenergy.

[3] Pan African Bioenergy Policy Framework (2012)

2 CURRENT BIOENERGY SITUATION

2.1 Energy access in ECOWAS

2.1.1 Background: energy poverty but real potential for improvement

By 2020, the ECOWAS[4] Region, will be home to approximately 400 million people (FAOSTAT, 2014), and the challenges facing it will be still considerable given that 11 of its 15 nations are currently categorized as Least Developed Countries (LDCs). Currently, these nations also belong to the Heavily Indebted Poor Countries (HIPCs), and 12 of them have low human development indicator (HDI) levels and high Poverty rate (UNDP, 2011).

With regards to the energy sector, the challenges are simultaneously related to energy access, energy security and climate change mitigation. Furthermore, the last few years, the ECOWAS Region has gone through a deep energy crisis (increasing oil price for importing countries, reduced access to biomass coverage) that hampered social and economic progress and affected particularly the low-income population groups. The lack of access to modern, affordable and reliable energy services is linked to a variety of economic, social, environmental and political problems.

In "business as usual" scenarios – without considerable additional investments – energy poverty and its consequences for the economy and society will continue to be a predominant challenge in the ECOWAS region by 2030 (ECREEE RE policy document). ECOWAS, equivalent to roughly one third of Africa's total population, has one of the lowest modern energy consumption rates in the world. Household access to electricity across the region is below 30% and wide gaps exist between the access rates in urban areas and in rural areas and between countries. The electricity networks serve mainly urban centres and suburbs. The rural poor in ECOWAS spend more of their income on (poor quality) energy services than their richer counterparts spend on (better quality) services.

Traditional biomass is the dominant energy in the ECOWAS region with a share of almost 80% in the final energy consumption, varying from 60% (Senegal) to over 90% (Niger, Guinea Bissau). Over 90% of the population use traditional biomass for domestic cooking (ECREEE, 2012).

The electricity systems in ECOWAS are all facing a growing gap between predicted demand, existing supply capacities and limited capital to invest. Despite the growing chronic capacity and production deficit and lack of investment capital, energy is used in an inefficient way throughout all sectors. The estimated technical and commercial electricity losses in the electricity systems vary between 15 to 40% throughout the ECOWAS region (EEEP, 2013). Increasing fossil fuel import dependency, shortages and fluctuating fossil fuel prices are major concerns of West African countries and require a diversification of sources. In some countries even more than 90% of the electricity generation is satisfied by expensive diesel or heavy fuel. As a result, the steadily increasing and fluctuating oil prices have had a devastating effect on the economies of ECOWAS oil importing countries

[4] stretches from Nigeria west ward to Cabo Verde and including Benin, Burkina Faso, Cote d'Ivoire, Gambia, Ghana, Guinea-Bissau, Guinea, Liberia, Mali, Niger, Senegal, Sierra Leone and Togo

The ECOWAS region is so far only responsible for a small fraction of global energy related GHG emissions but in many countries the use of unsustainable woodfuel also contributes to GHG emissions. Emissions from non-renewable wood removal are likely to be even higher than what is recorded in national GHG inventories (GACC, 2014), thus, underestimating its contributions to climate change. Transitioning to sustainable woodfuel production is arguably one of the low-hanging fruits to cost-effectively mitigate climate change. However, it is important to note that neglecting to harness its potential to address climate change may come at a very high social cost in the long-run as a no action/minimum action could invariably lead to an adverse scenario where cost for urgent climate changes adaptations competes heavily for the already scarce financial resources for energy access expansion. Therefore, for the ECOWAS region to move towards a sustainable economic trajectory the importance of sustainable bioenergy production and use in addressing climate change cannot be overemphasized.

In addition, access to modern energy services in rural areas is extremely low and varies from country to country. Rural electrification rate is less than 10% in countries such as Guinea, Niger, Liberia, Guinea-Bissau, and Sierra Leone. Such situation seriously hindered the achievement of the MDGs and development targets. The absence of modern energy services is a critical barrier to meeting education, health, poverty reduction, food security and gender goals.

At the same time, the ECOWAS Region is endowed with considerable biomass resources that should be tapped to improve the standards of living of its population. Currently access to modern energy services still relies on heavy subsidies from central governments. In addition, in rural and peri-urban areas where electricity is not available, people's revenues are often insufficient to cover the capital and running costs of accessing modern energy services.

2.1.2 Lessons learned in the ECOWAS region

Based on a review of existing policies and experiences in the ECOWAS region, the following guidelines should be taken into consideration:

- Energy transition to a new and more sustainable model that will address the concerns of an integrated, fair and inclusive development, restore social equity (rural/urban), gender equality and sustainable land management equilibrium. Bioenergy is at the core of this transition because of its crosscutting nature.
- Develop sustainable approaches for both the supply and demand side of bioenergy in order to satisfy, in the long-run, the need for cleaner fuels. Experiences show the relevance of an approach combining both the efficient supply of biomass, through reforestation and sustainable management of forest, and efficient utilization of the available resources, by making available of a wide range of alternative modern fuels (biogas, bioethanol and LPG) to reduce the dependence on wood products. This can be an effective strategy for achieving a supply-demand equilibrium in the bioenergy sector.
- The implementation of innovative financing mechanisms and incentives, such as tax exemptions, Feed-in-Tariffs (FITs), and mandates, could promote the production of electricity from agricultural, industrial and municipal wastes from anaerobic digestion, gasification, cogeneration as well as liquid biofuel to run internal combustion engines.

- The development of markets for modern bioenergy products requires the establishment of a mechanism that facilitates access to equipment and fuels in order to reach a larger number of end-users, especially at the 'base of the pyramid' in rural and urban areas.
- Ensure reliable supply of large quantities of wastes and residues for the production of fuels (e.g. briquettes, pellets, etc.), biogas or electricity to feed off-grid systems and co-generation systems as the technologies for converting wastes to energy.
- Promote measures that prevent open burning of residue and other agro-forestry, industrial and municipal waste. The utilization of these waste resources into energy provides sustainable energy access, reduces dependency on imported fuels, lessens emission of GHGs, and leads to better health and sanitation, especially in the urban areas.

2.1.3 Challenges

In the implementation of ECOWAS energy policies, the following challenges have been identified:

- Lack of institutional and regulatory framework that encourages and empowers private operators in investing in the production of modern bioenergy (both fuels and electricity)
- Lack of capacity to monitor sustainable land use and help mitigate the risks of competition between energy security and food security, or land evictions.
- Lack of mechanisms for systematic collection and management of data and statistics (Instruments and tools), on biomass/bioenergy at local, national and regional level.
- Inadequate knowledge management systems in the field of bioenergy to disseminate the gained experience and knowledge in terms of technologies, business models, best practices, policy frameworks and innovative and tested financing mechanisms to foster investments to meet the needs of the household, communities and private sector.
- Poor involvement of relevant stakeholders in the bioenergy value chain. In the planning and implementation of bioenergy programmes and projects, it is necessary to involve relevant institutions and actors (public, private, universities and research institutions, civil society, women groups, end-users, etc) in the entire process.
- Inadequate capacities within the bioenergy value chain in order to foster the dynamics of the sector.
- Lack of awareness and low involvement of financial institutions including microfinance institutions.

2.1.4 Key opportunities

The ECOWAS Region has readily available bioenergy resources in abundance with a large potential for converting effluents and residues of agricultural and agro processing activities into modern bioenergy. The Region accounts for (i) 60% of the world cocoa production , (ii) large quantities of palm oil and coconut residues , (iii) other untapped residues from cassava peeling, groundnuts shell, cotton and sorghum stalks, risks husks, shea nuts wastes , cashew nuts, invasive plants, etc.

- The utilization of agro-industrial and municipal wastes would resolve most of the waste disposal and environmental constraints, increase hygiene, reduce health risks, avoid the destruction of soils nutrient by burning the fields after harvest, promote gender activities

and provide modern energy services to the population. The potential for electricity production from agricultural residues exceeds by far the needs of the ECOWAS Region according the UEMOA / ITLIS study (2008).

- Grid connected renewable electricity from biomass resources could be among the cheapest options in the region and could also provide benefits in terms of potential for job creation and agricultural development.

3 RATIONALE, VISION AND OBJECTIVES

Bioenergy production, trade, use and policy implications transcend national borders. Biomass policies become ineffective when they are not supported and integrated at both regional and national levels. The modernisation and rationalisation of biomass energy sector cannot be successfully implemented in a single country, as the lack of similar measures in neighbouring countries tend to annihilate any efforts taken in a given country (an example could be the ban in a country of charcoal production). Therefore, policy coherence and long-term effects are best realised under a regional context. The Region is poised to play the role of harmonising approaches leading to a viable modern bioenergy sector.

Figure 1: The generic process of developing effective policies

The African Union Conference of Energy Ministers (CEMA) resolution adopted on 16th November 2012 on the African Bioenergy Policy Framework recommending that the process of sustainable bioenergy policy development begins with a deep understanding of the bioenergy sub-sector. The process of developing a sustainable bioenergy policy and its implementation may take the following format, as articulated in the Pan African Bioenergy Policy Framework.

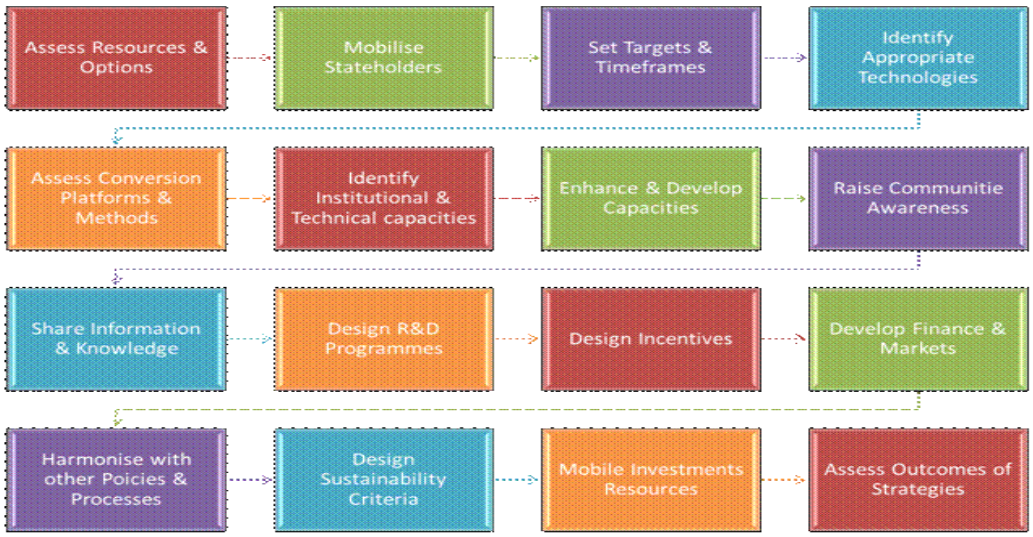


Figure 2: Steps for implementing bioenergy policy (adapted from the Pan African Bioenergy Policy Framework, 2012)

3.1 Rationale

Bioenergy through different mature and proven technologies, have the potential to meet the following objectives and targets.

3.1.1 Provision of energy services to the poor

Sustainable energy services from biomass resources could be among the cheapest options in the region, especially when sourced locally. Resources such as residues and wastes (straw, stalk,

shells, etc.) can be used from the agricultural production fields and the primary processing centres and converted locally into biogas, electricity and heat using different technologies. Biomass residues are particularly suited to meet household energy needs, including cooking.

3.1.2 Promotion of agro-industrial development and job creation

Bioenergy has the potential to improve livelihoods through involving small-scale farmers as direct producers or out-growers enabling them to generate new income, opening up employment opportunities, and thereby alleviating poverty and boosting rural incomes. Properly designed, socially inclusive and environmentally responsible waste-based bioenergy that involve small-scale producers can contribute to poverty alleviation.

3.1.3 Minimising health risks and addressing gender imbalance

Yearly, thousands of people from the Region, particularly women and children, die from respiratory diseases due to indoor-air pollution from cooking and heating with traditional biomass in inefficient devices while children and women spend a great amount of time collecting fire wood for daily subsistence at the detriment of their safety, education, or other rewarding activities. Modern bioenergy could greatly improve health and gender issues in the rural areas. The underlined policy and recommended actions will greatly improve the condition of women and children, especially in rural areas by fostering the availability of improved household energy technologies, appliances and fuels.

3.1.4 Attracting investment in sustainable agriculture and land use

Bioenergy can bring more investments and modernise the agricultural sector by increasing mechanisation, but taking measures to minimise the impact on land use, biodiversity, soils, and water resources. A deliberated move towards the establishment of small-scale processing (refining) units will enable low income groups to generate additional income and help transform the rural sector from subsistence production to agro-processing. Indeed, all the economic, social and environmental benefits of bioenergy can be realised at the smallholder level with social inclusiveness, sustainable forest management and agricultural practices while preserving the ecosystem.

3.1.5 Improving food security

The use of slurry (residue of biogas production) and nutritive ash (residue of controlled combustion processes or biochar) can greatly improve the soil and increase agriculture yields. Modern bioenergy strengthens farming activities as it provides extra revenues for the farmers and enhances soil quality (i.e. residues from biogas process provide a lot nutrients to the soil). On the other hand, land-use change can negatively affect the availability and price of food.

3.1.6 Improving government budgets, balance of payment and energy security

Utilisation of domestic and agro-industrial wastes for energy applications could result in savings for government budgets, from reduced import of fossil fuels and subsidies. Reduction of imported fossil fuels through improved supply of modern bioenergy goes a long way in improving energy security.

3.1.7 Impacts on biodiversity, natural resource management and climate change

Policies could reduce poor practices of “slash and burn” as a way to clear land, as such practices negatively impact on biodiversity (insects, plants, etc) and contribute to soil erosion. Bioenergy policies are appropriate in stimulating farmers to collect or use agricultural waste, rather than burning it, as an additional source of income and/or increase energy access.

In principle, without considering land use change, bioenergy is neutral in term of CO_2 emissions, as opposed to fossil fuels. When burned, biomass does release carbon dioxide, a greenhouse gas, but in equal amounts as what is absorbed during the growth of the plant.

3.2 Vision and Objectives

3.2.1 Vision

Vision: Transition to sustainable production, transformation, trade and utilization of biomass in order to ensure universal access to modern energy services with a view of creating added value, jobs, increasing food security, mitigating environmental impacts and overall sustainable development in ECOWAS .

3.2.2 Objective

This policy seeks to promote a modern, sustainable and vibrant bioenergy sector in ECOWAS region by creating an enabling environment that can unlock the potential by removing the institutional, legal, financial, social, environmental and capacity gaps and barriers. It is aimed at addressing the needs and constraints of the governments, the private sector and the local communities in using existing resources including household, agricultural and industrial processing wastes and residues.

The objective of the Bioenergy Policy therefore is to encourage the utilization of the Bioenergy resources to provide sustainable energy access to its population prior to any attempt to export the resources.

3.2.3 Proposed Bioenergy Policy targets for 2020 and 2030

Based on the EREP (ECOWAS Renewable Energy Policy) and EEEP (ECOWAS Energy Efficiency Policy) targets and the West Africa Clean Cooking Alliance (WACCA) initiative adopted by ECOWAS ministers, the following targets are proposed for the modern bioenergy sector:

Table 1: ECOWAS BIOENERGY POLICY TARGETS

Main Bioenergy target by 2020 / 2030	baseline: 2012	2020	2030
Share of efficient charcoal production	17%	60 %	100 %
Share of population using alternative modern fuels for cooking	27%	36 %	41 %
Biodiesel and bioethanol as share of fossil fuels consumption	<1%	5%	10%
Bioelectricity	+/- 100 MW	634 MW	2008 MW
Fuelwood saved from 2012[5]	NA	700 million tons	3 billion tons

[5] Saving 700 million of fuels wood correspond to roughly 18 billion USD based on current price of wood in Burkina Faso

Table 2: ECOWAS BIOENERGY POLICY TARGET (With LPG and ICS as Alternative to reduce Traditional Wood energy consumption)

Main Bioenergy target by 2020 / 2030 (for LPG & ICS)	baseline: 2012	2020	2030
Share of population using improved cook stoves[6]	29%	60%	100%
Share of efficient charcoal production	17%	60 %	100 %
LPG penetration household level[7]	8%	20 %	26 %

Bioenergy Policy targets by 2020:

1) Universal access to clean, safe and affordable cooking energy, including 20% of LPG users. Such a scenario represents:
   a. over 10 million of additional household users of LPG as primary fuel in comparison with the 2012 situation,
   b. about 15 million additional households using ICS as main cooking device and/or sustainable biomass fuel as primary fuel,
   c. 700 million tons of wood saved between 2012 and 2020 e.g. 18 billion USD

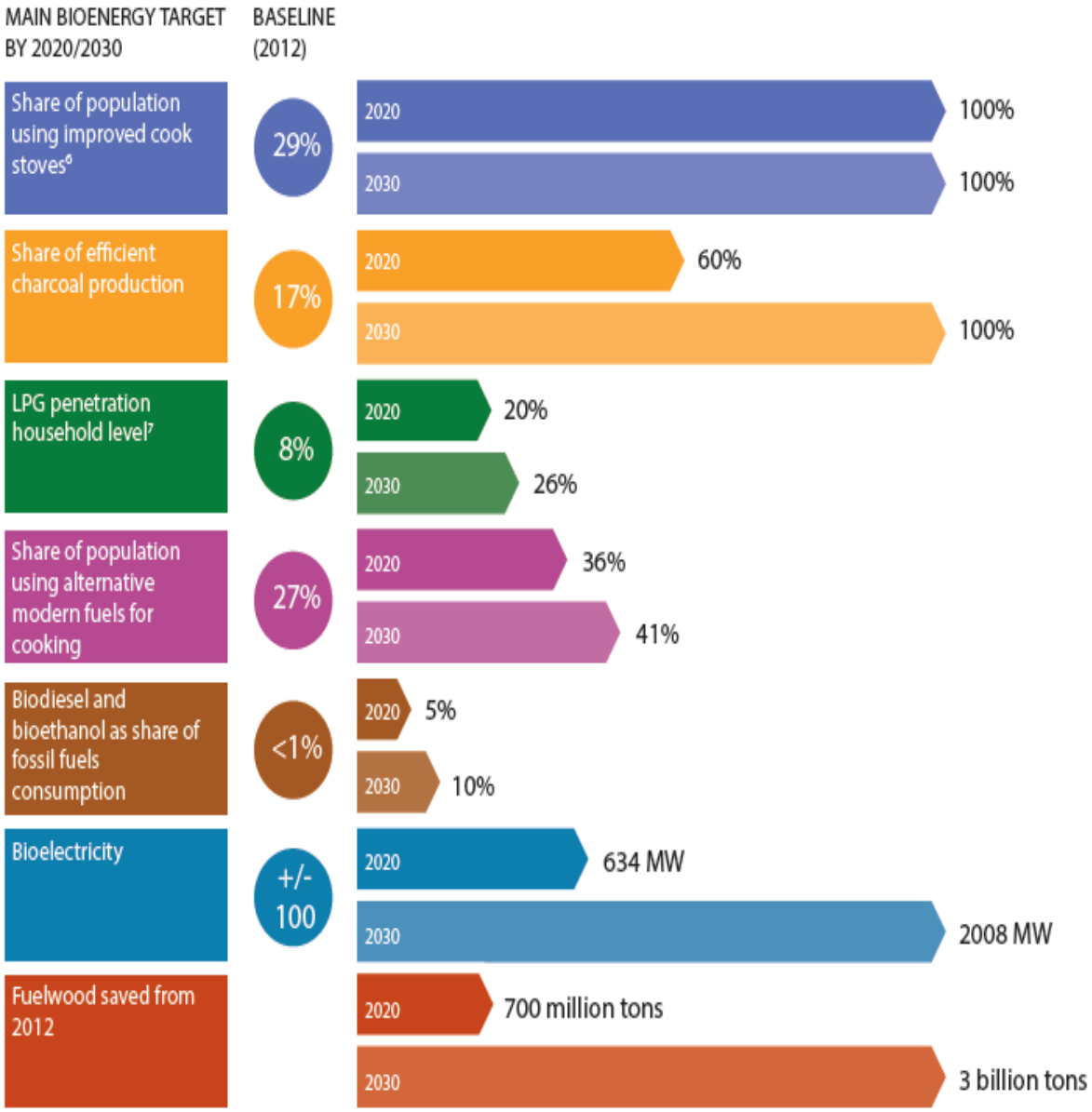
2) 26 % of electricity from Renewable Energy source (2,425 MW) in the region; of which 634 MW is generated from biomass residues or dedicated plantations with the deployment of sustainable and efficient technologies and application including:
   a. Biomass heat and power: systematic approach to sugar processing companies and other large-scale producer of biomass to valorise their waste stream to electricity.
   b. Waste-to-energy: connecting with cities/municipalities, agro-industries, slaughterhouses, and waste water treatment plant to convert waste into electricity, biogas, pellets/briquettes, etc.
   c. Electricity from wood plantation in countries such as Liberia, Guinea and Sierra Leon
   d. Biogas production, gasification of agricultural residues for energy (electricity, heating and cooking) in association with NGOs and local communities, including women in the rural areas.

Bioenergy Policy target by 2030:

1) Universal access to clean, safe and affordable cooking energy, including 26% of LPG users and 100% of improved cookstoves (ICS) and/or sustainable biomass fuels users. Such a scenario represents almost 3 billion tons of wood saved between 2012 and 2030. The graph below represents the expected situation by 2020 and 2030 with regards to improved solid biomass fuels, the dissemination of improved stoves and the sustainable production of biomass.
2) Electricity from biomass will account for 5 % of the total installed capacity in the region, which corresponds respectively to 686 MW by 2020 (28% of RE capacity) and 2008 MW (13% of RE Capacity) by 2030.

[6] Improved cook stoves refer here to wood and charcoal burning stoves
[7] LPG is taken here in the table because of its capacity to replace traditional biomass use

Figure 3: Summary of the ECOWAS Policy Bioenergy targets



4 POLICY IMPLEMENTATION STRATEGY

4.1 Key areas

The identified technologies for meeting the demand for biomass-based power and fuels for rural electrification, grid connection and household energy are:

- Combined Heat and Power (CHP);
- Small-scale Biomass Gasification
- Biomass for Rural Electrification
- Clean Cooking Fuels and stoves
- Domestic, community and industrial biogas
- PPO, biodiesel and bioethanol for diesel oil and gasoline substitution and/or blending

4.2 Guiding Principles

4.2.1 Alignment with existing policies

This policy document is in line with the ECOWAS "White Paper for a regional policy geared towards increasing access to energy services to the rural and peri urban populations", the EREP and EEEP, ECOWAS Bioenergy Strategy Framework, the Pan African Bioenergy Policy Framework and Guidelines that was adopted by the African Minister in November 2012 in Addis Ababa (Ethiopia). It is designed to strengthen the EREP and EEEP of ECOWAS and deliver effective steps to advance the SE4All agenda and all the previous international initiatives in this field.

4.2.2 Good governance

At the national and regional levels, governance and regulatory frameworks are crucial for ensuring a level playing field that encourages key stakeholders to participate in the development of the bioenergy sub sector in an equitable, responsive and accountable fashion. Good governance is a central component of the Policy and will imply: 1) strengthening forest related laws to improve the eco-systems, 2) harmonizing forest and fiscal policies; 3) decentralization and devolution of authority to rural communities; 4) establishing mechanisms for broad stakeholder consultation and engagement; and 5) defining clear responsibilities for the stakeholders and transparent mechanisms to design, implement and monitor the bioenergy policy 6) Ensuring transparent mechanisms to attract and to protect private sector investments and (7) Inclusive Participation.

The following need to be considered:

- Take into consideration the needs and constrains of the large numbers of small farmers, cooperatives and associations involved in activities of primary processing of bioenergy crops and residues.
- Ensure the active involvement of civil society organisations, private sector, local communities and municipalities from the outset.
- Ensure women play an important role in the bioenergy value chain therefore particular attention should be given to gender issues especially women participation in the decision making process.

4.3 Pillars for policy implementation

4.3.1 Pillar 1: Policy support to enhance local governance

Government support, in the form of policy, regulations, and/or incentives, has been instrumental in driving bioenergy markets worldwide. Therefore policy support to enhance local governance is crucial to reaching the ECOWAS bioenergy policy targets. Key policy areas to address include:

- Identifying and developing pragmatic policy instruments that promote rural development, gender equality, and sustainable agriculture at national level.
- Establishing national/regional targets and timetables for bioenergy development, to include issues of small-scale farmers.
- Establishing legal and regulatory frameworks, including standards and labels for bioenergy service components (fuels, equipment and devices) at the national level to accelerate bioenergy development.
- Linking policy-makers from the energy and agricultural, forestry, health and environment sectors at the institutional level. This includes working together with international organizations addressing the energy-water-food nexus implications.
- Establishing or strengthening existing inter-ministerial bodies or institutionalized mechanisms in national governments to coordinate bioenergy activities across the interested ministries (e.g. agriculture, forestry, energy, health, rural development, finance, commerce/trade, and environment).
- Establishing clear guiding principles for land use and land tenure.
- Fostering a regional market for sustainable bioenergy, to include cross-border trade.
- Discouraging illegal biomass trade, linking it to strong forest conservation actions, and empowering rural communities.
- Engaging the private sector in policy/regulatory development, including producer organizations, SMEs, cooperatives, Women groups, etc.
- Establishing a proper monitoring and evaluation system to assess the impact and performance of bioenergy activities at the national and regional levels.

4.3.2 Pillar 2: Capacity Building and technology transfer

Capacity-building is a long-term, continuous and complex process that requires clear policies and the active cooperation of all involved stakeholders. For bioenergy markets to develop and deepen, capacity building is required in all areas of project and program design, development, installation, operation and maintenance. This entails a long-term commitment, with activities focusing on individuals, institutions, and systems, aimed at public, private, and non-government organizations. Opportunities for training and capacity-building in the use of sustainable bioenergy technologies and applications could be made available through pilot or demonstration projects.

Support to Member States is required for all aspects of technology research, development, demonstration, deployment, marketing, financing, operation, and maintenance. Further, continued emphasis on accelerating renewable energy R&D is critical to reduce costs, improve performance, and enhance competitiveness with fossil energy sources.

ECOWAS Members States need basic capacity to assess, analyse and prioritize sustainable bioenergy technologies based on their own needs and development priorities and then adapt these technologies to specific local conditions.

Capacity building activities in ECOWAS will include:

- Enhancing capacity of policy-makers in integrating bioenergy into national development strategies, which are cross-cutting.
- Strengthening enterprises to source, integrate, install, operate, maintain, and service bioenergy systems; provide business training and incubation support.
- Training policy-makers on policies and programs for accelerating the adoption of bioenergy by smallholders.
- Supporting the finance and banking sectors to understand the risks/rewards of financing bioenergy projects and structuring appropriate financial products.
- Providing training and technical assistance on project assessment tools and standards for bioenergy development, drawing on international efforts in this area (e.g., the European Union, including its SE4All Technical Assistance Facility, REEEP, the Global Bioenergy Partnership, and the Roundtable on Sustainable Biomaterials, among others).
- Providing capacity support to governments and the private sector in accessing carbon finance opportunities (e.g. Global Carbon Fund (GCF), CDM, voluntary carbon markets and NAMAs) and on innovative financing mechanisms. This implies the development of appropriate capacity for GHG emission reduction calculation and the compilation of GHG inventories.
- Supporting communication and outreach campaigns on bioenergy benefits and challenges, including consumer awareness campaigns.
- Supporting research institutions and academia in R&D in the bioenergy sector.
- Conducting joint research efforts between local research institutions and industry, aimed at bioenergy applications and collaborative efforts to carry out bioenergy resource assessments.
- Combining efforts with industrialized countries to promote knowledge transfer and the development of appropriate bioenergy technologies and services, particularly in the rural communities.
- Facilitating South-South collaboration and cooperation on sustainable bioenergy development.

4.3.3 Pillar 3: Knowledge management, communication and awareness raising

In the implementation of the bioenergy policy, it is necessary to increase communication, knowledge and awareness on potential risks and opportunities associated with bioenergy development. As information and data are an essential part of appropriate policy development and implementation, information and data on bioenergy should be collected and shared through various knowledge sharing platforms[8]. To this end, proposed activities include:

- Strengthening processes for data collection, analysis and availability.
- Gathering case studies that highlight good and bad practices.
- Establishing a platform to share experiences on policies, markets, technologies, costs, business models, applications, finance sources, standards and certification, etc.
- Encouraging the use of bioenergy and biomass sustainability assessment tools such as FAO's Bioenergy and Food Security (BEFS) tools, Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM) and the Global Bioenergy Partnership (GBEP) sustainability indicators.
- Conducting sensitization and awareness creation campaigns for wider dissemination of sustainable bioenergy practices to achieve the transitioning to its sustainable production and utilization; and
- Conducting research on current/potential biomass supply and demand value chains.

[8] This includes the ECREEE website (www.ecreee.org) and the ECOWREX (www.ecowrex.org)

- Including gender issues on all aspects of knowledge management, communication and and sensitization campaign.

4.3.4 Pillar 4: Environment, land tenure and social equity

A long-term successful bioenergy strategy needs to take into account sustainability issues. Therefore a number of initiatives, policies and standards related to biomass sustainability are currently under development.

- In ECOWAS countries there is a need to assess and to identify suitable areas for agricultural expansion for bioenergy feedstock production as well as for forest concessions, in order to manage land transaction deals and the sustainability of biomass crops or fuels production.
- At the national (or local) level, the investment policy should be coherent with other sector policies, such as food security or rural development policies. Furthermore, inclusive business models should be promoted.
- The FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security[9] can be used as guidance on tenure right, and the FAO BEFS project worked on adapting these guidelines to the specific bioenergy context[10].
- Due to the complexity of the sustainability issue, future policy-making and development of standards need to focus on integrated approaches, in which the complex interactions between the three pillars (economic, environmental and social) of sustainable development are duly taken into account. The GBEP sustainability Indicators can be promoted and adapted to the local conditions.
- Gender sensitivity, especially with regards land tenure and social equity.

4.3.5 Pillar 5: Financial instruments

Finance and investments are key to the growth and development of bioenergy. As the industry expands and develops, financing sources and instruments, both locally and internationally, must be increased. More creative leveraging of public and private sector resources will be needed to meet the financing requirements of the bioenergy industry, including from a variety of public and private sector sources. Activities to be conducted include:

- Engaging local/national, regional and international financial institutions and micro-credit agencies to finance bioenergy services.
- Establishing risk mitigation facilities to spur local financing for bioenergy projects, particularly at the small-scale level.
- Fostering development of “bankable” project portfolios in bioenergy; offer assistance to entrepreneurs in areas such as R&D, seed capital funding, pre-feasibility and feasibility assistance, reimbursable grants, etc.
- Exploring opportunities for carbon (including Global Climate Fund, REDD+ and NAMAs development) and innovative finance instruments at the national/regional levels.
- Establishing an ECOWAS Sustainable Bioenergy Regional Facility to provide grants and loans for bioenergy projects.

[9] See “Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security”, FAO, 2012; as well as the e-learning curriculum on “The Responsible Governance of Tenure - E-learning to support the implementation of the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests, in the context of National Food Security”: www.fao.org/nr/tenure/e-learning/en/

[10] See www.fao.org/energy/befs/...

4.4 Implementation arrangements

4.4.1 Implementation plan at the regional level

ECREEE as the technical arm of ECOWAS is mandated to promote renewable energy markets. Therefore, in the implementation of the ECOWAS Bioenergy Policy, ECREEE should take the leading role in the process in collaboration with the Member states. The implementation shall be consultative with all the Member States to achieve a very successful outcome in providing bioenergy access to the population in the Region.

4.4.2 Implementation plan at country level

Role of National Governments

Governments, both at the national and local levels, play a leadership role in initiating and formulating policy and legislation, and in promoting investments. The key responsibilities of governments in the implementation of a sustainable bioenergy policy are:

1. Embedding the bioenergy policy into national development plans with adequate legal provisions.
2. Assessing and mapping the bioenergy potential.
3. Risk prevention and management through promotion of good environmental and socio-economic practices in bioenergy feedstock production and use, and thorough screening of investment proposals.
4. Improving land tenure, forestry and water resources governance to ensure the establishment of bioenergy development does not negatively affect food security and marginalize the poor.
5. Setting environmental standards, creating an attractive investment environment, and providing supportive monetary, fiscal, and pricing policies. This implies ensuring environmental, economic and social objectives are fully met during the bioenergy programme implementation.
6. Establishing corporate social responsibility (CSR) guidelines for companies to abide by while implementing a project as it is done in other sectors (Gold Standards or Kimberley Method) to ensure sustainability and to prevent conflicts.
7. Building capacities for policy planning and implementation, investment planning, negotiation, choice of feedstock and technology, and concluding economically, socially and environmentally acceptable arrangements.
8. Involving relevant government departments. The institutions' involvement in the promotion, production, and trade of bioenergy needs to be well coordinated and guided to strengthen synergies and avoid duplication of efforts.
9. Engaging local communities, including women, in the formulation and implementation processes, both as producers and ultimate beneficiaries.
10. Identify and foster bioenergy production chains which have the minimum impact on food security;

11. Establishing a national bioenergy research and innovation community that encompasses the whole value chain, linking especially research institutes and small and medium enterprises;
12. Operating transparent, information and education programmes about the pros and cons of different forms of bioenergy and establishing a national platform with unbiased and updated information;
13. Allowing independent producers to export bioelectricity to the grid; and introduce appropriate incentives such as feed-in-tariffs, fixed price guarantees, tradable green certificates for bioenergy;
14. Introducing time-limited bioenergy support policies linked to clear objectives with a view to an economically viable industry, including phasing out of subsidies for fossil fuels;
15. Promoting innovative financing for bioenergy projects;
16. Introducing proper impact monitoring, evaluation and response mechanisms.
17. Capacity building with priority to communities
18. Take advantage of Green Climate Funds, World Bank, and other innovative Climate financing
19. Overall, ensure gender sensitivity in the process

Role of the private sector

The private sector is ultimately the engine of bioenergy development. SMEs have a special role in the development of sustainable bioenergy given their great capacity to involve local communities. Industries such as sugar mills and other agro-processing industries could pave the way by expanding bioelectricity generation from their own resources to substitute expensive fossil fuels and electricity, thus contributing to the achievement of the policy targets. Likewise large industrial and agricultural processing companies should be encouraged to develop bioenergy production units from their own waste streams.

Role of Civil Society Organisations (CSOs)

CSOs play key roles as a watchdog for government and business actions and as an advocate for promoting bioenergy at the national and community levels. The active involvement of civil society actors in the promotion and capacity building of bioenergy is crucial to fostering sustainable development of bioenergy. CSOs can stimulate sustainable business models and good practices for bioenergy investments.

5 MONITORING THE DEVELOPMENT AND IMPLEMENTATION OF BIOENERGY POLICIES

5.1 Developing monitoring systems

The purpose of establishing a monitoring system is to detect, measure and register all relevant challenges and performances against benchmarks due to bioenergy policies implementation and provide feedback to policymakers and other stakeholders. The agricultural, forestry, environment and energy sectors should be called upon to provide updated information to monitor the process.

A monitoring system implies the following activities to be implemented at national level:

- Gathering and analysing statistics that are directly fed into the existing Energy Information Systems.
- Measuring and analysing the impacts of national bioenergy policies (achievement of targets, budget control and impact assessment).
- Analysing sustainability of land and water use, GHG emissions, biodiversity and other socioeconomic effects.
- Introducing and monitoring certification schemes to guarantee sustainability and traceability of bioenergy products.
- Tracking system for land tenure transactions and legal cases.

5.2 Relevant data to be monitored

The GBEP indicators can serve as basis for benchmark. The key efforts consist of systematically collecting the data needed for the measurement of the indicators.

Data to be collected include but not limited to:

- Access to modern energy and impact on livelihoods, including food prices,
- Land prices and tenure systems
- Availability of food,
- Relocation of food production and cattle breeding,
- Changes in land cover, including deforestation.

6 PLANNING FOR THE IMPLEMENTATION OF THE POLICY

6.1 Expected milestones of the policy development action plan

1. Dissemination and ownership of the regional policy by Members States by end 2018
2. Adoption of a National Bioenergy Action Plan by the ECOWAS Members States, derived from the Regional policy, by end 2019
3. Development of a set of investment guidelines and supporting documents addressing the resources availability and potential for a bioenergy market development in the Region made available by end 2019. These guidelines and supporting documents will be regularly updated;
4. Embark on robust sensitization activities to create awareness on the use and benefits of sustainable bioenergy
5. Support capacity building of Member States on bioenergy technical, policy and regulatory aspects
6. Business and investment models based on best social and environmental practices for various types of bioenergy projects (stand-alone and grid-connected power plants) are produced by ECREEE and disseminated in the Region to attract potential investors
7. Because of the results of the activities envisaged by this policy, the region will facilitate about 50 bankable projects (i.e. feasibility studies, engineering designs) by the end 2020 leveraging USD 500 million investment and the creation of job opportunities for at least 100,000 people

6.2 Proposed activities to be implemented by ECREEE

1. Organizing a series of consultations, workshops and events focused on specific proposed policies to share the policy document with the Members States and relevant partners
2. Identify minimum standards for the whole bioenergy value chain
3. Support Member States in their processes towards the development of a national bioenergy policy and action plan
4. Support capacity building of Member States on bioenergy technical, policy and regulatory aspects
5. Research and documentation, feasibility studies, gathering experiences, resource assessment and mapping, identification of suitable supply chain models and the definition of sustainable investment profiles and business models to promote the use of biomass resources to contribute to universal energy access
6. Organization of Public Private Partnership events for dialogue and business opportunities
7. Technical Assistance (awareness, training, capacity development) to all stakeholders, including private companies, cooperatives, associations, local experts/consultants on bioenergy technology, and business developers
8. Direct technical assistance to 50 sustainable bioenergy projects to reach bankability
9. Promote at least 200 community-based projects
10. Establish with development banks appropriate financial mechanisms (e.g. a guarantee fund) that will enable to leverage USD 1 billion investments
11. Continuous evaluation and monitoring of funded projects

GLOSSARY

1. Biomass

Biomass is organic matter derived from plants and animals. Biomass contains stored energy from the sun. Plants absorb the sun's energy in a process called photosynthesis. The chemical energy stored in plants gets passed on to animals and people that eat them. Biomass is a renewable energy source because the energy required for its formation - solar energy - is renewable, and its main chemical constituents (carbon, hydrogen, oxygen) are continuously consumed during plant growth and released during energy production, in the form of carbon dioxide and water. Maintenance of biomass resource, the natural resources it relies upon and recycling of nutrients are prerequisites for sustainable biomass use. Some examples of biomass fuels are wood, crops, manure and some garbage. Energy sources from biomass are often divided into two main categories: biomass wastes (or residues) and energy crops. The two categories differ significantly in the economics of their utilisation as well as in biophysical terms.

2. Agricultural and forestry waste and residues

Biomass wastes or residues refer to the remaining biomass after harvesting and/or after processing. Biomass wastes and residues include forest and agricultural residues (e.g. bagasse, cereal husks, straw); and animal wastes. Agrofuels are fuels obtained as a product of agriculture biomass and by-products at farming level, and/or industrial processing of raw material (agro-industries). The term covers on the one hand biomass materials derived directly from crops grown for their use as bioenergy source (sugar/starch crops, oil crops, etc.), and on the other hand agricultural, agro-industrial and animal by-products.

3. Energy crops

Dedicated energy crops refer to plantations of trees, grasses and/or other energy crops. Bioenergy plantations are optimised for energy production, through which the harvested biomass is used directly, or serves as feedstock for further production of more specialized fuels. The principal challenges centre on lowering biomass production and logistics costs and reducing risks for biomass growers (e.g. stable prices) and energy producers (e.g. guaranteed biomass supply).

4. Municipal Waste

Other sources of biomass are municipal solid waste (MSW), landfill gas, and biogas commonly called household garbage. Trash that comes from plant or animal products is biomass. Food scraps, lawn clippings, and leaves are all examples of biomass trash. MSW can be a source of energy by either burning it in waste-to-energy plants, or by capturing biogas. In waste-to-energy plants, trash is burned to produce steam that can be used either to heat buildings or to generate electricity. In landfills, biomass decomposes and releases methane-rich landfill gas.

Municipal by-products refer to biomass by-products produced by the urban population and comprise two types: solid municipal by-products and gas/liquid municipal by-products produced in cities and villages. Solid municipal biofuels comprises by-products produced by the residential, commercial, industrial, public and tertiary sectors that are collected by local authorities for disposal in a central location. Gas/liquid municipal biofuels comprise biogas, landfill gas and sewage sludge gas, derived from anaerobic fermentation.

5. Biomass conversion

Burning biomass is not the only way to release its energy. Biomass can be converted to other usable forms of energy like methane gas, syngas or transportation fuels like ethanol and biodiesel. Methane gas is the main ingredient of natural gas. Smelly stuff, like rotting garbage, and agricultural and human waste, release methane gas – also called landfill gas or biogas. Crops like corn and sugar cane can be fermented to produce the transportation fuel, ethanol. Agricultural and industrial waste such as corn cobs or palm kernel shells and nuts can be used in gasifier burners through a pyrolysis process to produce a clean gas for cooking, heating or power generation. The residue from gasification is biochar that can be used for soil amelioration for enhancing agricultural productivity. Biodiesel, another transportation fuel, can be produced from leftover food products like vegetable oils and animal fats.

6. Liquid Biofuels

Liquid biofuels are fuels like ethanol and biodiesel that are made from biomass materials. These fuels are usually blended with the petroleum fuels, but they can also be used on their own. Ethanol and biodiesel can be clean burning fuels with fewer air pollutants.

7. Woodfuel (solid biofuel)

Woodfuel include all types of biomass derived directly and indirectly from trees and shrubs grown on forest and non-forest lands. Woodfuels include biomass derived from silvicultural activities (thinning, pruning etc.) and harvesting and logging (tops, roots, branches, etc.), as well as industrial by-products derived from primary and secondary forest industries (charcoal and sawmills etc.) used as fuel. Woodfuels may also be grown for the purpose of energy generation (forest energy plantations).

8. Modern energy services[11]: Availability for the end user of:

- electricity for lighting, communication, healthcare, education and other uses;
- modern fuels or technologies for cooking, heating and cooling and transport;
- mechanical power for productive use (e.g. irrigation, agricultural processing), provided through electricity or modern fuels, or directly through renewable sources such as hydropower; and
- transport, provided through electricity or modern fuels.

This definition of modern energy services is based on two criteria: energy efficiency and safety to human health. Where modern energy services rely on the combustion of fuels, the fuels (whether solid, liquid or gaseous) must be burned in efficient and safe combustion chambers, improved cookstoves,94 or fuel cells. Efficiency is meant here as the energy output as a percentage of the heating value of the fuel. Safety refers to the absence of indoor air pollutants and low amount of air pollutants released in the open air by the energy system.

Modern energy services might also be defined by what they are not. They do not include: use of kerosene or other fuels for lighting; combustion of fuels on open stoves or fires without chimneys or hoods (or any other energy systems that release flue gases indoors or release high concentrations of air pollutants); or human and draught animal power.

Modern bioenergy services are defined as modern energy services relying on biomass as their primary energy source. Modern bioenergy services include electricity delivered to the final user through a grid from biomass power plants; district heating; district cooling; improved cookstoves (including such stoves used for heating) at the household and business level; stand-alone or grid-

[11] This and the following definitions of energy and bioenergy services are taken from GBEP 2011

connected generation systems for household or businesses; domestic and industrial biomass heating systems; domestic and industrial biomass cooling systems, biomass-powered machinery for agricultural activities or businesses; biofuel-powered tractors and other vehicles, grinding and milling machinery.

Modern bioenergy services do not include biomass used for cooking or heating purposes in open stoves or fires with no chimney or hood or any other energy systems that release flue gases indoors or release high concentrations of air pollutants, irrespective of the feedstock or biofuel employed.

Modern bioenergy is used to describe energy, for example when we need to quantify it or use the term in an abstract sense, which delivers modern bioenergy services.

Please refer to the UN Energy Bioenergy Decision Support Tool for further reference and definitions. www.bioenergydecisiontool.org