ECOWAS Bioenergy Policy and implementation plan

Prepared With the financial and technical support of UNDP,

Regional Energy Project for Poverty Reduction

Prepared by Demba Diop (ddiop@antenna.nl - EPM Consulting) for ECREEE

Dakar -30 September -01 October 2015

Table of Contents

Current Bioenergy Situation:

Energy access

By 2020, West Africa, home to appr. 350 million peoples, a 1/3 of the African.

Considerable challenges; 11 of its 15 nations are Least Developed Countries (LDCs).

30 % of access to electricity; wide gaps between urban and rural areas and between countries.

The rural poor spend more of their income on (poor quality) energy services than the better-off spend on (better quality) services.

Traditional biomass accounts for 80% of the energy for cooking (ECREEE, 2012).

Current Bioenergy Situation

Energy access

Energy access

- Growing gap between predicted electricity demand, existing supply capacities and limited capital to invest.
- The little energy that is generated is used inefficiently: an estimated 40% technical and commercial electricity losses.
- In some countries even more than 90% of the electricity generation is satisfied by expensive imported diesel or heavy fuel
- Rural electrification rate very low with less than 10% in Guinee Conakry, Niger, Liberia, Guinea-Bissau, Sierra Leone.
- Lack of access to modern energy services is a critical barrier for education, health, income generation and gender.

Current Bioenergy Situation:
Energy access

ACCESS TO MODERN ENERGY SERVICES

- People's revenues are often insufficient to cover the costs of running (diesel) generators. This situation requires heavy support (in the form of subsidies) from central governments.

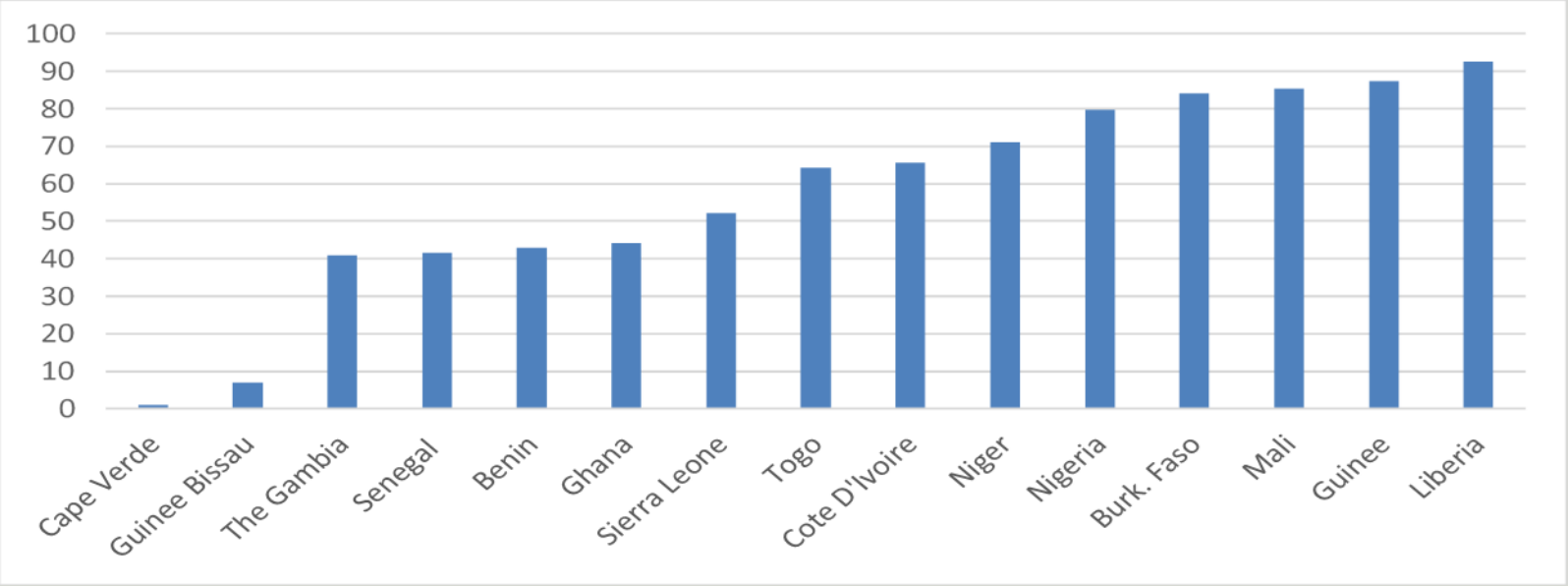


Figure 1: Share of traditional biomass in the final energy consumption per country, 2010. Source: Elaborated from REN21 data for West Africa - 2014

Current Bioenergy Situation

Regional Goals and Targets

ECOWAS/UEMOA White Paper,

- a regional policy that seeks to considerably increase the rate access to energy services for populations and an acceleration of development process towards achievement of the MDGs

White Paper goals and achievement by 2011

Type of White Paper Goals	Goals of the White Paper by 2015	Energy access achievements by 2011
Access to modern cooking fuel	100% of the population	17% of the populations (30% urban, 7% rural)
Individual electricity access	66% of the population	42%
In urban and peri-urban areas	100%	70%
Rural populations	36%	11%

Current Bioenergy Situation

ECREEE Renewable Energy Policy (EREP)

The EREP vision is to secure an increasing and comprehensive share of the Member States' energy supplies and services from timely, reliable, sufficient, cost-effective uses of renewable energy sources enabling:

- Universal access to electricity by 2030
- A more sustainable and safe provision of domestic energy services for cooking thus achieving the objectives of the White Paper for access to modern energy services by 2020.

Three groups of targets are set by the EREP:

- grid-connected renewable energy applications;
- off-grid and stand-alone applications; and
- domestic renewable energy applications.

Current Bioenergy Situation

ECREEE Energy Efficiency Policy Targets

The specific target of the regional policy is to implement efficiency measures that free-up 2000 MW of power generation capacity by 2020, through the following actions:

- lighting: phase out inefficient incandescent bulbs by 2020;
- electricity distribution: reduce losses in electricity distribution, from the current range of 15% to 40%, to under 10% by 2020;
- cooking: achieve universal access to safe, clean, affordable, efficient and sustainable cooking for the entire population of ECOWAS, by 2030;
- standards and labels: establish an ECOWAS Technical Committee for Energy Efficiency Standards and Labelling, and adopt initial region-wide standards and labels for major energy equipment;
- Building Code: develop and adopt region-wide efficiency standards for buildings;
- finance: create instruments for financing sustainable energy, establish a regional fund for the development and implementation of sustainable energy projects.

Current Bioenergy Situation

Unmapped Biomass Resources

- The region holds more than 60% of the world production of cocoa (Ivory Coast, Ghana, Nigeria).
- World leader of cassava research and production (Nigeria)
- Good share of the world production of coffee, groundnuts, sheanuts, rice, millet, sorghum, cashew nuts, palm oil, coconuts, etc.
- Highest yield of sugar cane (135 ton per hectare in North Senegal as compared to a an average of 100 ton in Brazil
- Straw, husks, stalks, shells and other resources are rather burned or abandoned on the fields after harvest while these resources could improve farmer's revenues

Knowing the resources

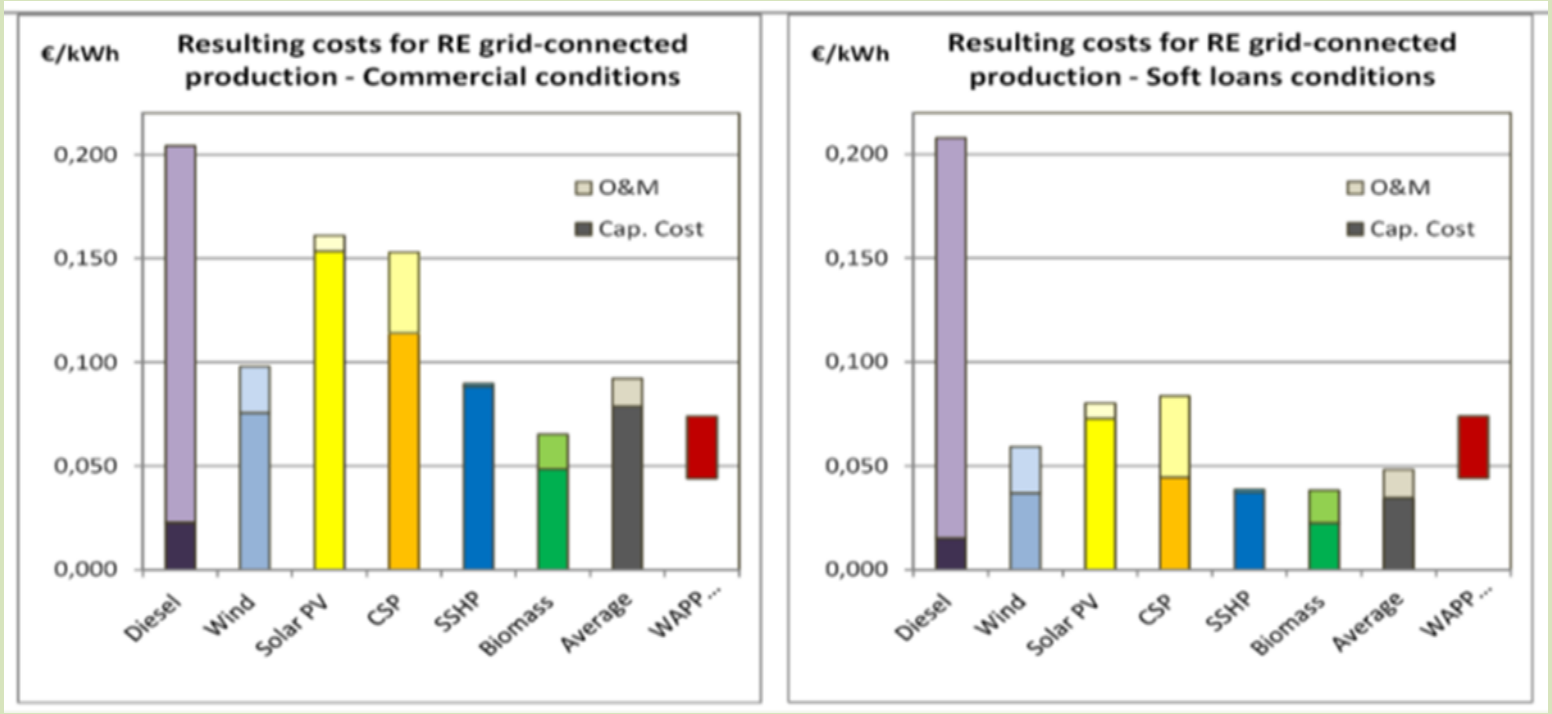
- Most of the food and export crops in the region are source of wastes and residues (cocoa, coffee, palm oil, ground nuts, rice, sheanuts, etc) that require marginal investments to be collected for energy production.
- Most of the infrastructure for export exists already as in the case of coffee, cacao, groundnuts, cotton, sheanut, cashew, etc.
- These individual and collective infrastructures (drying, grading, pressing, etc) can serve as the backbone of the bioenergy supply chain in the Region and create more jobs.




Current Bioenergy Situation

Biomass as the cheapest sources of bioelectricity in ECOWAS countries

bioenergy is one of the cheapest sources of bioelectricity in the Region as reported in the baseline study of ECREEE in 2011.



Current Bioenergy Situation

Large potential for bioelectricity from biomass residues

UEMOA /ITLIS study: the potential from agricultural residues of 55 billion kWh per year, equivalent to 20.7 billion litres of diesel or 148 million barrels of oil

The region could readily turn into a net energy exporter if solely 15% of its biomass residues potential energy is exploited.

At ECOWAS level, with the addition of humid and resource-rich countries such as Guinee Conackry, Liberia, Sierra Leone, Ghana and Nigeria, the potential for bioenergy could make the region an energy power house.

Potential for bioelectricity production from biomass residues in UEMOA Countries (ITLIS., 2008)

	Need (billions kWh)	Potential (billions kWh)	Eq. Diesel (Million litres)	Eq. Barrel of oil (Million)	Eq. million USD (year 2008)
Benin	0,60	6,20	2 336	17	1 168
Burkina Faso	0,50	10,00	3 746	27	1 874
Cote d'Ivoire	2,60	17,20	6 465	46	3 234
Guinée B	0,10	0,50	188	1	94
Mali	0,80	8,00	2 989	21	1495
Niger	0,50	6,30	2370	17	1186
Senegal	1,90	2,90	1094	8	547
Togo	0,60	4,00	1514	11	757
TOTAL	7,90	55,10	20 701	148	10 356

Current Bioenergy Situation

What are the Types of resources

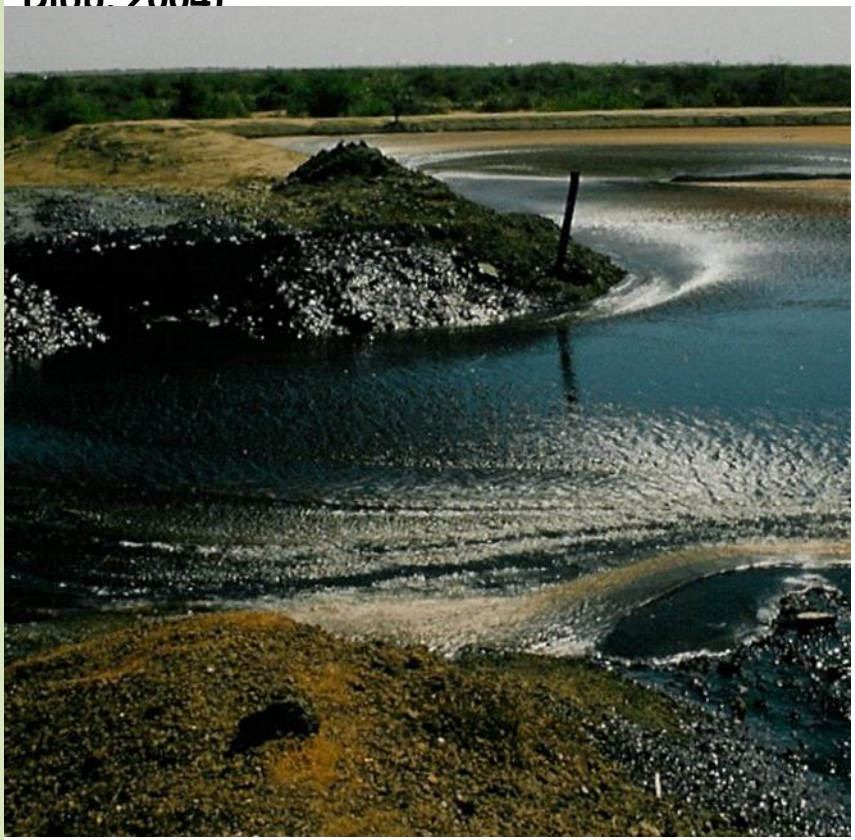
Agroresidues

- World largest producer of cocoa (7 to 9 tons of waste 1 ton of dry cocoa). Coffee, sheanuts, palm oil, rice husk, groundnuts, cotton, millet, sorghum, coconuts, etc.

Municipal by-products :

- Landfill gas for energy generation
- Avoid uncontrolled dumping

Dumped molasses in north Senegal (Demba Diop, 2004)



Current Bioenergy Situation

Types of resources

Woodfuels

- almost all woodfuels used are direct;
- Wood consumption is well above the annual increment (desertification);
- Residues (e.g. sawmills) are left unused;

Agrofuels

- Ethanol: sugar cane, sweet sorghum, cassava
- Biodiesel : palm oil , palm kernel oil, cottonseed oil, peanut oil, Jatropha oil, coconut oil and the Neem tree.

Groundnuts Senegal

Current Bioenergy Situation

Types of resources

- Larges amount of residues from shea in Burkina Faso, Mali, Ghana, Togo. Only in Togo, about 18 000 tones of shea butter residues can be captured for energy generation
- Wasted cashew apple in Guinea Bissau, Ghana, Ivory Coast could serve for ethanol production.
- The region enjoy large population of tree bearing oil (neem seeds, baobab, etc) that can meet up a consistent part of the imported diesel in the Sahel countries.

Residues of sheanut at shebou factory, North Ghana

Current Bioenergy Situation

Relevance of Bioenergy to the target and needs of the Region

Decrease health diseases and improve gender implications

- Yearly, thousands of West Africans die from respiratory diseases due to kitchen smoke while children and women spend a great amount of time collecting fire wood for daily subsistence at the detriment of education or other rewarding activities..

Attract investments to agriculture and improve sustainable land use and productivity

Improve food security

- Use of slurry (residues of biogas production) and nutritive ash (residues of gasification process) can improve greatly agriculture yields for the smallholders. Modern bioenergy strengthens equally commercial farming as it provides extra revenues for the farmers and enhance the environment.

Current Bioenergy Situation

Relevance of Bioenergy to the target and needs of the Region

Improve government budgets, balance of payment and energy security

- Utilisation of domestic and agro processing wastes for energy applications might result in savings for national governments, reduced foreign expenditure, reduced subsidies for imported fuels and improved budget controls.

Impacts on biodiversity and natural resource management and contribution to climate change mitigation

- By adopting policies that ban the poor practices of slash and burn practices as a way to clear land.

Thank you! Merci! Muito obrigado!

ECOWAS Regional Centre for Renewable Energy and Energy Efficiency

Centre Régional pour les Energies Renouvelables et l'Efficacité Energétique de la CEDEAO

Centro Regional para Energias Renováveis e Eficiência Energética da CEDEAO

Achada Santo Antonio, 2nd Floor, Electra Building,
C.P. 288, Praia – Cape Verde
Tel: +2382624608, +2389225454
skype: info-ecreee
info@ecreee.org

Policy Implementation strategy
Key Areas for Bioenergy Policy

Main groups of biomass feedstock:

- Solid biomass (wood, crop residues, agro-processing residues)
- Digestible organic wastes (dung, nightsoil, waste water, etc.)
- Sugars and starches
- Vegetable oils and fats

Main conversion processes:

- Combustion, including stoves (heat / electricity)
- Gasification (electricity / heat)
- Densification (briquettes, pellets)
- Carbonisation (charcoal)
- Anaerobic digestion (electricity / heat / mechanical power)
- Fermentation / distillation (ethanol)
- Extraction / transesterification (PPO / biodiesel)

Policy Implementation strategy
Key Areas for Bioenergy Policy

1. Wood, crop residues, agro-processing residues

- ***Improved cooking stoves:*** in combination with solid biomass fuels. High fuel efficiency, reduced indoor pollution. Must be bought but typically highly economic investment
- ***Carbonisation:*** charcoal from wood or other lignocellulotic biomass. Improved production methods have higher efficiency and lower emissions but can have high investment costs

Charcoal briquettes produced from cotton stalk in Mali

Policy Implementation strategy
Key Areas for Bioenergy Policy

- ***Densification:*** biomass briquettes and pellets from solid biomass. Mainly for domestic energy; can replace fuelwood (reduce deforestation) but often more expensive
- ***Gasification:*** conversion of solid biomass into gas for electricity production and industrial heat. Relatively efficient and limited investment costs, but difficult to operate and maintain

Rice husk gasifier in Dano, Burkina Faso

Policy Implementation strategy
Key Areas for Bioenergy Policy

- ***Combustion for CHP / industrial heat:*** typically grid connected systems. Efficient at larger scale, but high investment costs and large biomass quantities required.

EFB fired steam boiler at 450 kWe CHP plant of Juaben oil mill, Ghana

60 kWe Steam engine run on cashew shell at SICAJU in Guinea Bissau

Policy Implementation strategy
Key Areas for Bioenergy Policy

3. Sugar, starch

- ***Bioethanol:*** from fermentation of sugars and starches and subsequent distillation / rectification. Use as automotive fuel (blending with gasoline). Large scale production is efficient but high investment costs.
- ***Liquid household fuels:*** in liquid or gellified form, used in dedicated household stoves. Clean but relatively expensive.

12 million l/a ethanol plant at CSS sugar factory in Richard Toll, Senegal

Policy Implementation strategy
Key Areas for Bioenergy Policy

4. Vegetable oils and fats

- ***Pure Plant Oil:*** for use in (adapted) diesel engines. PPO can be produced locally – attractive in remote areas. Issues are potential food market distortions and oil quality.
- ***Biodiesel:*** for use in diesel engines, neat or blended. Produced through transesterification of oils or fats. Industrial process, cost-efficient at larger scales.

2000 l/d biodiesel plant of Mali Biocarburant, Mali