The Gambia SE4ALL

Action Agenda

.

"DEVELOPMENT OF INVESTMENT PROSPECTUS FOR SUSTAINABLE ENERGY FOR ALL IN AFRICA – SUPPORT TO GAMBIA TO DEVELOP ITS SE4ALL ACTION PLAN AND INVESTMENT PROSPECTUS"

Contract No: 10 ACP RPR 15 - TD 12032-063
Project No: WP2.13.1-3.029

Region: West Africa (The Gambia)

Prepared by

Mr Demba Diop (Team Leader)
Mr Martin Zwanenburg (RE Expert)
Ms Marie-Vincente Pasdeloup (Communication Expert)

Submitted by

Particip GmbH

BizClim is a programme of the ACP Secretariat funded by the European Union. This document has been produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union nor the ACP Secretariat.

REPORT COVER PAGE

Project Title:	"DEVELOPMENT OF INVESTMENT PROSPECTUS FOR SUSTAINABLE ENERGY FOR ALL IN AFRICA – SUPPORT TO GAMBIA TO DEVELOP ITS SE4ALL ACTION PLAN AND INVESTMENT PROSPECTUS"		
Project No.	WP2.13.1-3.029		
Country:	The Gambia		
	Contracting Authority	Project Partner	Contractor
Name:	BizClim - Programme Management Unit	NEPAD	Particip GmbH
Address:	Rue Belliard, 205 1040 Brussels Belgium	Block B, Gateway Park, Corner Challenger & Columbia Avenues, Midridge office Park, Midrand	Merzhauserstr. 183 79100 Freiburg i.Br. Germany
Tel. number:	+32 2 669 9825	+27 11 256 3674	+49 761 79074 0
Fax number:	+32 2 669 9786	+27 71 8621559	+49 761 79074 90
Email address:	dominique@acpbusinessclimate.org	MosadE@nepad.org	johannes.ohnmacht@particip.de
Contact persons:	Ms. Dominique Bourgault	Prof. Mosad Elmissiry	Mr. Johannes Ohnmacht

Date of report: 25 November 2014

Authors of report: Mr Demba Diop (Team Leader)
Mr Martin Zwanenburg (RE Expert)
Ms Marie-Vincente Pasdeloup (Communication Expert)

Date of contract signature: 07 February 2014

Project completion: 31 December 2014

Contents

List of Tables

List of Figures

Abbreviations & Acronyms

AA	Action Agenda
AU	African Union
BANDES	Venezuelan Economic and Social Development Bank
CFL	Compact Fluorescent Lamp
CSP	Concentrated Solar Power
DCD	Department of Community Development
EC	European Commission
ECOWAS	Economic Community of West African States
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
FIT	Feed-in-Tariff
EE	Energy Efficiency
FIT	Feed-in-Tariff
GCCI	Chamber of Commerce and Industry
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEG	Global Electrical Group
GIEPA	Gambia Investment and Export Promotion Agency
GIZ/GTZ	German International Cooperation Agency
GMD	Gambian Dalasi
GREC	Gambia Renewable Energy Centre
GTTI	Gambia Technical Training Institute
GWh	Gigawatt hour
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt hour
LPG	Liquefied Petroleum Gas
LV	Low Voltage
MOE	Ministry of Energy
MOFEA	Ministry of Finance and Economic Affairs
MOFEN	Ministry of Forestry and Environment
MW	Megawatt
MWh	Megawatt hour
NARI	National Agricultural Research Institute
NAWEC	National Water and Energy Company
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NPCA	NEPAD's Planning and Coordinating Agency

O&M	Operation & Maintenance
OMVG	Gambia River Basin Development Organisation
PAGE	Programme for Accelerated Growth and Employment 2012-15
PMS	Project Management System
PMU	Project Management Unit
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PURA	Public Utility Regulatory Authority
PV	Photovoltaic
R&D	Research & Development
RE	Renewable Energy
REAGAM	Renewable Energy Association of The Gambia
REC	Regional Economic Community
REMP	Renewable Energy Master Plan
REN21	Renewable Energy Policy Network
REP	Renewable Energy Plan
RRA	Renewables Readiness Assessment
SE4ALL	Sustainable Energy for All
SHS	Solar Home System
SME	Small & Medium Enterprise
SWH	Solar Water Heating
T&D	Transmission & Distribution
ToR	Terms of Reference
TES	Total Energy Supply
TJ	Terajoules
TOE	Tonnes of Oil Equivalent
TWh	Terawatt hours
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WAPP	West African Power Pool
WB	World Bank
Wp	Watt Peak

Executive Summary

General

Renewable Energy: The Gambia has potential to accelerate the use of its renewable resources to power its growing economy. The Government of The Gambia recognizes that development of local, renewable energy resources is critical to ensure that it is able to meet both its economic and social objectives. It is promoting this development by creating the policy environment and developing appropriate regulatory and legal frameworks. Renewable energy systems are well positioned to play a critical role in addressing this growing energy demand for the following reasons:

The Gambia has an energy resources base adequate for meeting the needs of its population and transforming its economy. The Gambia has abundant solar energy resources across the country, good biomass resource in most areas, and modest wind regime along the coastal areas. These resources can be developed to bring higher quality energy services to populations across the country.

Renewable energy as a safeguard against energy access and security concerns. The Gambia's use of locally available renewable resources will reduce its dependence on imported and expensive fossil fuels that it can ill afford. Already there is high suppressed demand for energy, especially electricity, and as the country's demand for electricity increases, it would need to look into options that are affordable, reliable and have predictable cost attributes.

Renewable energy costs have dropped significantly and are likely to continue on the downward trend. Increased dash for fossil resources is likely to push prices up, while increased deployment of renewable technologies pushes prices down in line with progress in technology and economies of scale. This offers an opportunity for The Gambia to re-think its energy strategy.

Energy efficiency measure as a tool to reduce the cost of energy consumption both at individual and national level and thereby increasing energy access to the population for the save kilowatts and significantly reduce the demand for imported fuels for power generation and additional investment in power plants

Off-grid renewable power can meet demand in un-served rural areas in The Gambia and can substitute existing diesel-driven systems. The Gambia is yet to build its energy infrastructure in a planned and systematic manner. At the moment, much of its rural electrification programme relies on international donors and the country's utility, which is struggling to maintain service to existing customers. As a distributed and scalable resource, renewable energy technologies are well suited to meet the need for power in remote areas.

Renewable energy supply to the grid in The Gambia. Power produced through renewable systems can be fed into the grid in The Gambia, providing clean and reliable power supply. Already, the country has some experience in this area. The government is working to set a feed-in-tariff and finalize a Power Purchase Agreement (PPA) that would facilitate the entry of the private sector in The Gambia's power sector.

The Gambia needs to build technical and regulatory capacity. The level of skills in The Gambia is not sufficient for the magnitude of the energy challenge in the country. The Government will need to revitalise its technical arm (Gambia Renewable Energy Centre) to provide scaled-up support in technology development, finance, regulation and management. Further capacity will need to be built in research institutions and community actors.

On setting and achieving the targets

Limitations in the database on energy in The Gambia: Limitations in the database on energy in The Gambia do not allow to estimate the increase in the rate of improvement of energy efficiency or the shares renewable energy in generation on-grid or off-grid. And information on the implementation of some energy projects and programmes is also limited.

Targets on AE, RE and EE adjusted and broken down into components: Target setting on Access to Energy follows breakdown of AE into 7 components, as done in UNDP National Investment Program for Access to Energy for The Gambia. (NIP for AES). All 7 targets have been set at 100% achievement ; 3 by 2020 by the NIP and the remaining 4 by 2030 in the AA.

Renewable Energy targets focus on electricity and have been specified separately for on-grid and off-grid and for domestic production and imports from large-scale hydro projects in neighbouring countries.

Targets on Energy Efficiency for The Gambia will initially be on specific components such as '% of incandescent lamps replaced by EE lamps'.

Probability of achieving the set targets: The NIP for AES is confident that the 7 targets as set for AE can be achieved, but it is not evident that the required funding is available and that progress is on schedule.

The targeted increase in generation capacity and the contribution by RE depends strongly the realization of the OMVG project and progress in the WAPP, both not under the control of The Gambia.

The increase in the contribution of RE by domestic generation – both on and off-grid – depends strongly on the regulatory and incentive framework in place.

The availability of biomass for generation is at present under investigation. The technical capacity of the grid for major injections of power from PV plants also to be ascertained. Capacity enhancing measures may be required.

Given the fast development in cheaper PV generation costs and advances in mini-grids, the target for off-grid generation by RE of 25% by 2030 may have to be revised upwards.

Policies, strategies, incentives and risks: The policy environment for energy is making strong progress.

Major policy assessment and development activities are on-going and not all these activities and investment programs are fully in line or coordinated.

There is a strong sense that the policy framework and strategy for rural electrification needs to be further developed and amended and different suggestions are made.

In recent public consultations the concerns about rising prices for fuel-wood were prominent along with suggestions for more and cheaper improved stoves and for briquettes as an alternative fuel. A review of existing policies is required, including levels of subsidy and the sources of funding.

To attract private investors to deliver energy services at reasonable prices the major considerations are appropriate incentives and reduced risks. The AA suggest to focus on 'non 0-sum' measures which will benefit all investors in an equal way. And it may have to be accepted that not all objectives are compatible, especially in terms of price and availability of energy services. Other suggestions from different organizations have been included and will be presented for discussion at the workshop.

Preamble

The Action Agenda as proposed is coherent with most of the key principles:

1. It builds strongly on earlier plans, programmes, policies and strategies of the Government
2. The President is actively involved in the energy sector and regularly addresses meetings discussing especially Renewable Energy.
3. The approach is balanced and integrated, as it includes both conventional and RE&EE sources of energy, deals both with centralized and de-centralized approaches, covering both urban and rural areas and considers not only electricity, but also biomass.
4. The Ministry of Energy meets regularly with all (17) departments and agencies dealing with energy in the TWG (Technical Working Group) and is in the process of defining jointly with departments and agencies the qualifying and selection criteria for the inclusion and prioritization of projects proposed for the Action Agenda.
5. There is a clear preference for RE and EE sources of energy – also to reduce the dependency on imported fuels with on average increasing price levels – but least-cost generation options including coal-based generation have not been excluded from the scenarios reviewed in the end of 2012 (in the EU financed Strategy Study by Mercados).
6. Efforts are made to engage all relevant stakeholders, as is best shown in the process to develop the RRA (Renewable Readiness Assessment) for the Gambia in 2013.
7. Gender is specifically addressed as in the MFP (Multi-Functional Platforms) in which women play a dominant role.
8. Transparency & accountability are shown in the Feed-in-Tariff determination, but can be improved for the selection of generation projects above the 1.5 MW limit applicable to the Feed-in-Tariffs.

0 INTRODUCTION

0.1 The Gambian energy situation and context

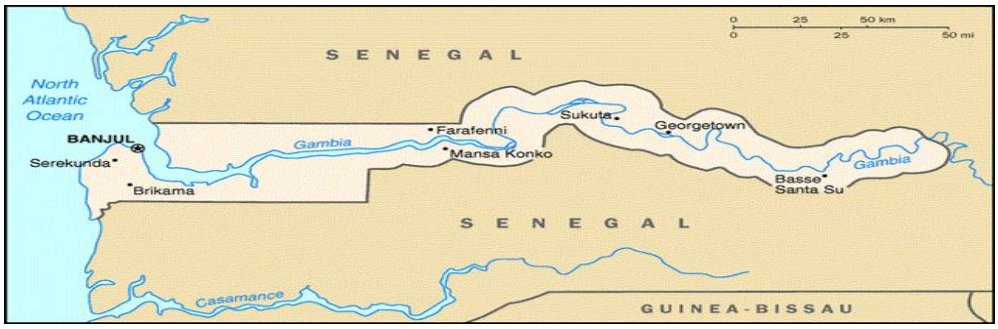
Political context

The Gambia is one of the most stable countries in the West Africa region. Politics of the Gambia takes place in a framework of a presidential republic, whereby the President of the Gambia is both head of state and head of government, and of a multi-party system. It holds regular presidential and parliamentary elections. Legislative power is vested in both the government and parliament.

Location and demography

It has an area of 11,570 sq. km and extends about 400 km inland along the banks of the Gambia River and bordered by Senegal on three sides. The Gambia has an estimated population of 1.8 million as of 2012, with an annual growth rate of 2.7% per annum and a population density of 120 persons per sq. km. The country is currently undergoing a rapid rate of urbanization with the share of the urban population increasing from 37% in 1993 to about 55% today (World Bank, 2013).

Figure 1: Mop of the Gambia



Macroeconomic context

The Gambian economy is a highly open type as measured by export and import ratios to GDP, however, as much as 80 percent of exports consist of re-exports. The main domestically-originating exports are groundnuts and tourism. The agricultural sector provides employment to 75 percent of the country's population and meets about 50 percent of the national food with the following main crops: groundnuts, rice, millet, sorghum, corn, sesame, cassava, palm kernels, cattle, sheep, and goats. Gambian is currently developing an ambitious program lead by the Office of the President to become self-sufficient in rice by 2017 which will result in lessening food import.

The GDP Per Capita or (PPP) Purchasing Power Parity is estimated at $1,200 in 2013.

Financial sector

The Central Bank of Gambia reported in January 2014 that overall budget deficit (including grants) was D2.7 billion (8.0 per cent of GDP) in 2013, higher than the deficit of D1.3 billion (5.9 per cent of GDP) in 2012. The deficit was financed mainly from domestic sources in the amount of D2.2 billion (6.0 percent of GDP). External financing amounted to D578.8 million and repayments (D172.7 million). The domestic debt, mainly short-term debt, totalled D13.5 billion (39 percent of GDP), an increase of 25.1 percent from 2012. Treasury bills and Sukuk Al-Salaam (Islamic finance), accounting for 81.0 percent and

2.9 percent of the debt, increased by 34.5 percent and 13.6 percent respectively.

Social Context & Human Development

According to the 2010 Millennium Development Goal (MDG) Report Card (September 2010), The Gambia is amongst the top four African countries having accomplished progress relative to the MDGs. The 2011 UN Human Development Report has ranked The Gambia 168th out of 187 countries based on the Human Development Index (HDI). Although the ranking represents some deterioration since 2005, it is still higher than the rankings for many countries in the region including Côte d'Ivoire (post war), Mali, Guinea, Guinea-Bissau, Sierra Leone and Liberia.

Energy Sector context

Legal, regulatory and institutional setting

The legal, regulatory and institutional setting of the energy sector is as follow:

Governance: The Office of the President (OP) ultimately has the final authority on the regulations, tariffs, and on contracting of any IPPs. The OP manages the governance of the sector.

Policies: Among the policies makers, there is the Ministry of Energy (MOE) in charge of the energy policy, the Ministry of Petroleum, and the MOFEN (Ministry of Forestry & Natural Resources).

Regulators: PURA (the Public Utility Regulatory Authority) and MOFEA (Ministry of Finance and Economic Affairs) acts as regulator together with the department of Forestry.

Regulators: Operators include both the public as private sector. The public's utility being the National Water and Electric Company (NAWEC) and the GP petroleum in charge of fuel procurement. There are several private companies active in fuel distribution (TOTAL, ELTON), renewable energy production companies in the biomass, solar and wind sector.

Energy demand and suppy

In 2010, Total Energy Supply (TES) of the Gambia was 407.926 TOE (Tons of Oil Equivalent). The Energy consumption per capita (kilogram oil equivalent, (koe) of The Gambia in 2007 was 81 koe (GEF/UNIDO, 2011). Biomass, including fuelwood, accounts for about 80% of the country's energy supply, and for more than 90% of household energy consumption - reaching up to 97% in some rural areas. Petroleum products consisting of liquefied petroleum gas (LPG) for cooking and diesel and HFO for generating electricity account for 20.6%; and electricity for about 1.6%. The share of renewable energy, mainly solar, is negligible at 0.03%. In 2006 The Gambia imported 128,000 metric tons of petroleum products, which had been on an increasing trend since 1995. The two biggest energy consumers are households and the transport sector. LPG use has been increasing in urban areas, but only marginally. Its use has been largely constrained by the high cost associated with LPG.

Challenges

The Gambia needs to address its dual challenges of energy access and security of supply, which traverse all sectors and impact all citizens. Current biomass use has major implications for land degradation,

deforestation and health risk, and with a growing population the pressure will continue to increase. It is difficult to find precise data on total fuelwood resources in The Gambia as most of the data in the literature are estimates or projections from previous studies. However, there is evidence that the country has lost more than 50% of the forest cover between 1946 and 2005[1]. The standing stock of fuelwood resources in 2004 was less than 50% of that in 1983, whilst the population of The Gambia has doubled in the same period.

Electricity—both in terms of quality and access—is a key challenge. Existing power infrastructure has undergone some modernization and system rehabilitation but a lot more action is required. In short, the energy system in The Gambia has become a burden on the economy and social systems, and therefore part of the problem of development – rather than the solution. The status quo is simply unsustainable.

[1] UNDP, AES- Gambian National Investment Program August 2012

0.2 Introduction to AA, IP and players involved

Sustainable energy for all (SE4ALL)

Ban Ki-moon (United Nations Secretary-General) vision statement on sustainable energy for all:

Energy enables. The historic energy transitions – first from human power to animal power, and then from animal power to mechanical power – were major shifts in the human journey toward greater productivity, prosperity, and comfort. It is unimaginable that today's economies could function without electricity and other modern energy services. From job creation to economic development, from security concerns to the status of women, energy lies at the heart of all countries' core interests.

To defeat poverty and save the planet, we can, and must achieve sustainable energy for all by the year 2030. Reaching this goal will require action by all countries and all sectors to shape the policy and investment decisions needed for a brighter energy future. Industrialized countries must accelerate the transition to low-emission technologies. Developing countries, many of them growing rapidly and at large scale, have the opportunity to leapfrog conventional energy options in favour of cleaner energy alternatives that will drive growth and enhance economic and social development.

In my view, three linked objectives underpin the goal of achieving sustainable energy for all by 2030:

- Ensuring universal access to modern energy services.
- Doubling the rate of improvement in energy efficiency.
- Doubling the share of renewable energy in the global energy mix.

African/ NEPAD initiatives

The New Partnership for Africa's Development (NEPAD), an African Union strategic framework for pan-African socio-economic development, is both a vision and a policy framework for Africa in the twenty-first century. NEPAD is a radically new intervention, spearheaded by African leaders, to address critical challenges facing the continent: poverty, development and Africa's marginalisation internationally.

NEPAD has programmes in six theme areas, which include 'Climate Change and Natural Resource Management'. Under this theme energy is one of NEPADs major programmes.

Driven by its mandate to increase energy accessibility of the African Population to affordable and sustainable modern energy resources, NEPAD Agency joined hands with UNDP and the African Development Bank last year and in collaboration with African Union Commission to facilitate the implementation of the Secretary General of the United Nation Initiative for Sustainable Energy for All by 2030. NEPAD/UNDP produced two documents in this regards: the first is "Africa Action Plan Guidelines for SE4ALL" and the second is "Africa Strategy for Decentralized Energy Systems".

The next step for NEPAD was to choose one country in each of the five regions in Africa where energy accessibility is very low, to use the action

plan guidelines and to assist chosen countries to develop a project driven action plan and investment prospectus for increasing energy accessibility using renewable energy sources.[2] The emphasis is on establishing the national renewable energy priority projects in each of the chosen countries, carry out gap analysis and establish the gaps that needs to be filled (policies, regulations, legal frame, capacity, project status) and to come up with an action plan to fill such gaps in order to create a conducive environment for investment and to raise resources for implementation of country-chosen priority renewable energy projects. NEPAD action is in line with the UN time frame of implementation of SE4ALL by 2030.

The present assignment is for the Western Africa Region, and the country chosen is the Gambia. Gambia is chosen because it opted to join SE4ALL Initiative, its energy access in rural areas is very low and it introduced some policy changes to promote investment in renewable energy. This intervention aims at assisting Gambia to develop its SE4ALL action plan and the required investment prospective to develop and implement its high-priority renewable energy projects.

More specifically, the project aims at supporting NEPAD in implementing the SE4ALL programme by helping the Gambia to develop its SE4ALL action plan as well as the required investment prospectus to develop and implement its high priority renewable energy projects.

Support to NEPAD by EU's BizClim Unit

The ACP Business Climate (BizClim) unit promotes the Private Sector Enabling Environment Facility (PSEEF), which is an EU funded initiative under the Cotonou Agreement.

The BizClim Facility seeks to enhance the business environment of African Caribbean Pacific (ACP) countries and regions by providing technical assistance to: a) improve legislation and institutional arrangements relating to the enabling environment; b) improve the financial sector enabling framework; c) reform state owned enterprises; d) enhance macroeconomic stability.

EU's BizClim Facility has supported several energy projects, with an emphasis on Renewable Energy. It supports technical studies and dissemination activities of the results, but under this Facility no financial support to projects or their promoters is available.

The format and procedure of the AA

The Action Agenda (AA) has a specific format and procedure, described in the format for the AA at the beginning of the ACTION AGENDA TEMPLATE:

"An SE4ALL Action Agenda process has to be strategy driven and holistic – a novel factor of SE4ALL being that the three targets are discussed together. To avoid SE4ALL being considered like another program, SE4All has to intervene at the higher level as an umbrella framework for the energy sector that also includes the nexus angles (food security, gender, health, water etc.). In this sense, the Action Agenda provides the long-term vision which ensures the overall sector-

[2] So far, the only other African country, where a similar process is under implementation is Kenya.

wide coherence and synergy of the accumulated efforts towards the three goals of SE4All in the country. This is also important in view of a potential energy goal that might emerge out of the post-2015/SDG processes. The Action Agenda will have to be endorsed by Government and national stakeholders. It should naturally serve as the basis for donor co-ordination and assistance on energy and as a reference document for the private sector and civil society.

The process of developing the SE4ALL Action Agenda is itself of critical importance as it will define the ultimate quality and relevance of the product. It is therefore crucial that there is clear national ownership of the Action Agenda and that its development process is an inclusive exercise of stakeholder engagement led by national authorities. This exercise should bring together stakeholders from all the relevant sectors into one conversation and be endorsed and coordinated at the highest political level in order to optimize its cross-sectoral impact. An indicative outline of the AA development process is therefore included at the end of the template.

The Action Agenda (AA) is envisaged to be generally of a length of 30 up to 50 pages and should be elaborated in a 4-10 month timeframe. There might naturally be variations depending on the specific country context. The time horizon of the Action Agenda should be 2030 in line with the SE4ALL objectives. While it is useful to have long-term planning targets in line with the SE4ALL timeframe, it makes sense to complement the long-term targets with intermediate targets. In any case the Action Agenda should retain flexibility to be adapted to significant changes in the national context. The methodologies and definitions used in the SE4ALL Global Tracking Framework (GTF)[3]should be used to the extent possible.

The Action Agenda should be concise, pragmatic and action oriented building to the extent possible on existing plans (e.g. a country's Integrated Energy Plan) and strategies."

IP (Investment Prospectus) in brief

An IP (Investment Prospectus) provides an approach to operationalizing the Country Action Agenda towards achieving SE4ALL goals by identifying and developing a set of implementable programs and projects, including their investment requirements, that can be presented to potential private and public investors. It's not a research paper, nor a policy document or a feasibility study.

It is a time-bound short-to-medium term document, which presents an integrated set of prioritized and sequenced investment opportunities.

The IP is a separate document also to be presented in the validation workshop in December.

Power-point presentations on both AA and IP were provided in the training workshop in June and were both included in the reader then provided.

[3] http://www.worldbank.org/en/topic/energy/publication/Global-Tracking-Framework-Report

The actual AA process in The Gambia

The actual AA process in The Gambia started with the training workshop in June and was followed by regular meetings at the Ministry of Energy between the project team and the TWG (Technical Working Group) in the first half of July. The TWG – consisting of key government Ministries and Departments, civil society, private sector and donor community – revised the template for the CN (Concept Note) and agreed on criteria for qualification and selection and intended to take over processing and selection of CNs to be received for the second and final deadline for CNs of August 15. CNs were prepared to facilitate a common format for proponents of project proposals. Unfortunately, prior to this deadline the TWG informed the project team, that the time and resources to process the CNs and make a selection and ranking would not be available with them.

The project team continued with the preparation of a first draft of the AA in line with the initial schedule of a validation workshop at the end of September. When this workshop had to be rescheduled and delayed by at least two months, the urgency to provide comments on the AA was diminished and during this delay a change of staff dedicated to the AA process took place, which in turn had to become familiar with the process and the issues at stake. Prior to the final draft of both the AA and the IP – given the deadline for printing - not all issues and text could be discussed and finalized as intended.

The AA as prepared follows the template, but information is not available for all the subheadings in the template.

The roles of UNDP and ECREEE

Both UNDP and ECREEE have played significant roles and are expected to provide significant further inputs. UNPD has produced two reports on The Gambia 'SE4ALL; Rapid Assessment and Gap Analysis' of June 2012 (2nd draft) and 'National Investment Program on Access to Energy Services in The Gambia', August 2012. ECREEE has been important in the production of 'The Gambia; Renewable Readiness Assessment 2013' and has made developed a 'Template for the National Renewable Energy Action Plan (NREAP)' and a 'Template for the National Energy Efficiency Action Plan (NEEAP)'. The reports mentioned have been used in the AA, especially the UNDP report on Access to Energy Services. ECREEE has provided specific additions to the first draft, which have been incorporated in this second draft

Both UNDP and ECREEE are expected to deliver further outputs before 2015, which can be helpful for both the AA and the IP.

0.3 The first draft of the Report on Stakeholder Consultation

1st draft of Stakeholder Consultation report

At the request from NEPAD under its support by the EU BizClim UNDP has organized an extensive consultation of stakeholders in The Gambia. This section provides the structure of the consultations and a summary of the key finding and recommendations in the first draft of this report. Annex 10 provides the complete chapter on key findings and recommendations.

Structure of the Consultations

The energy sector is characterized by a wide variety of stakeholders which fall into two broad categories:

(i) State actors- Government ministries, departments and agencies; and

(ii) non- State actors which include local communities and their institutions, civil society organizations (NGOs and CBOs) and the private sector.

To capture the input from these two categories the consultations took the form of interviews and meetings.

The consultations were interactive and participatory and the participants included representatives of women groups, councillors, youth groups, as well as members of the Multidisciplinary Facilitation Teams and Technical Advisory Committees.

Key Findings and Recommendation

The consultations brought up concerns and issues, which, in many respects are common to all the communities. The concerns and issues include:

- Stakeholders request for a continuous and uninterrupted access to energy whether to provide lighting in their homes or their public institutions or to support their economic activities, as in tourism, agriculture (irrigation and food processing);
- Clean cooking energy is desirable but does not demand the same level of priority among the different stakeholders. For the urban centres, the argument for improved cookstoves is easier to appreciate and act upon, whilst for the rural communities (who use fuelwood they collect themselves from their farms or the forest) some aggressive sensitization will be necessary for attitudinal change;
- The stakeholders also recognized the key constraints that hamper energy access as:
  - i) capacity limitations of NAWEC (generation and distribution);
  - ii) lack of sufficient quantities of improved cookstoves in the market; and affordability of LPG or household solar systems.

The recommendations to address these challenges in order to meet the objectives of the SE4ALL Initiative include:

- Opening up the energy sector to the private sector with attractive incentives;
- Capacity building of technicians and artisans in solar installation and maintenance and the manufacture of improved cookstoves;
- Sensitization of the communities to the new technologies.

1 PART 1: VISION AND TARGETS UNTIL 2030

1.1 Background

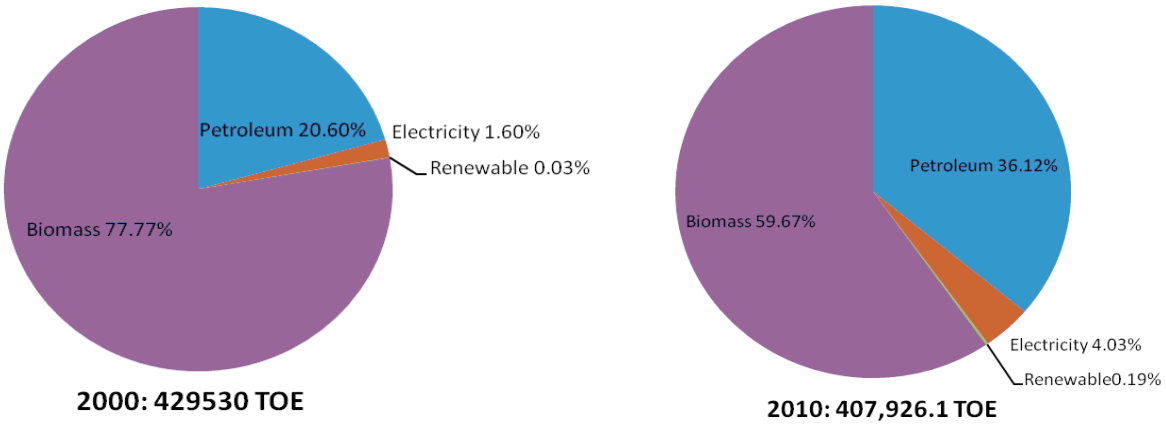
1.1.1 Energy Sector trajectory

Current situation

The Gambia has a dual energy system where traditional and modern energy systems and practices co-exist. On one side is the traditional energy system where biomass fuels and use of inefficient technologies dominate the household sector's energy needs. The other side of The Gambia's energy spectrum embodies a modern energy system where electricity and modern fuels as well as modern appliances are used. This picture is characterized further by an urban/rural split in terms of distributions of energy systems and practices. This fragmented nature of the energy system places enormous challenges for policy makers in The Gambia, and makes it difficult to address the energy challenge in an integrated manner.

Fuel imports cause major problems for the Gambian policy makers as it uses up the little foreign exchange the country generates. In 2009, the country spent in the order of USD 47 million in petroleum imports, which amounts to about 15.5% share of total imports. Furthermore, the energy intensity of The Gambia is about 0.51, which is around the ECOWAS average but significantly higher than that obtained in developed and emerging economies. As an example, China's energy intensity amounted to 0.46, and the European Union and Japan had values of 0.11 and 0.09, respectively (ECREEE, 2012). The high energy intensity points to the fact that ample opportunities exist for The Gambia to engage in efficiency improvements of its energy system (from production to end-use).

Figure 2: Total Energy Supply in 2000 and 2010 (MoE, 2012)



4 Important features in The Gambia's energy sector

Four important features characterize the energy sector in The Gambia. These include:

i) high dependence on imported fossil fuels;

ii) the dominance of traditional biomass sources in the country's energy mix,

iii) low access to modern energy services;

iv) limited investment in new assets and inadequate maintenance of old and ageing electricity power facilities; and very limited investment in renewable energy and energy efficiency potentials.

Policies

In 2005, the Gambia adopted an Energy Policy that sets out the objectives for the Government for the energy sector and also the aims for the renewable energy sub-sector. Within that policy, an Electricity Act was enacted in 2005 to (i) promote the development of the electricity sub-sector, (ii) encourage private investment in the sector, (iii) promote competition and (iv) set out the responsibilities for policy and regulation and to regulate electricity service providers. The Act sets out, inter alia, the objectives, licences and licensing procedures, tariff principles and accounting standards for the electricity sub-sector.

This Act established the Gambia Public Utilities Regulatory Authority (PURA) as the body responsible for the regulation of public utilities including energy services (electricity, petroleum and gas). The Act provides for the licensing arrangements to be administered by PURA. However the power to issue licenses (for generation, distribution and transmission of electricity) is vested with the Minister for Energy.

The licensing arrangement allows PURA the power to protect the interests of the public utility and of the consumer. The intention is that PURA will become self-funding and be seen as completely independent. More recently, the Ministry of Energy has published an Energy Action Plan for the period 2010-2014.

The Energy Action Plan had nine key objectives, in line with the objectives of the Energy Policy:

- Increase electricity generation, transmission and distribution capacities;
- Improve access to electricity and safe drinking water;
- Provide affordable electricity and water;
- Improve national security through street lighting projects;
- Promote the use of renewable energy and energy efficiency;
- To regulate the downstream petroleum sub sector;
- To encourage the re-exportation of petroleum products to neighbouring countries;
- Strengthen the institutional framework; and
- To popularize the use of LPG by making the price affordable.

After the completion of the Gap document mid-2012 new strategy documents have been developed, such as the document prepared by Mercados under EU assistance: Electricity Strategy and Action Plan. This strategy for electricity was validated in a workshop in December 2012

and is accepted by the Ministry of Energy as an important guide for the further development of the electricity sector.

The same support from the EU also contributed to the most recent legislation on renewable energy. In December 2013 the Renewable Energy Act has been approved by the parliament and has hence become an Act early in 2014. The Act stipulates that with given deadlines a number of activities have to be completed, most of them in the first half of 2014.

Hence, legislation is quite extensive and still under extension and elaboration, but adherence to and enforcement of the legislation and regulations remain weak. It is widely acknowledged that the ban on charcoal is not enforced. Even though most of the supply comes from Senegal, charcoal is still produced in The Gambia and with inefficient methods of production. Other regulations are occasionally disregarded, e.g. tariff increases for electricity regulatory justified by increases in fuel costs have twice been reduced to lighten the burden on the consumers. NAWEC has not been compensated for the reduced tariffs.

High dependence on imported fossil fuels for power generation

The Gambia relies entirely on imported fossil fuel for electricity generation, mainly HFO for the main power plants and diesel for the provincial power stations. These are both operated by National Water and Energy Company (NAWEC) as Global Electric Gambia (GEG) - an Independent Power Producer (IPP) has handed over the plant in Brikama at the end of the contracted 5-year period. GEG's staff remains involved in its O&M.

Effective installed capacity in The Gambia is around 65 MW, which are divided into two generation and transmission categories. The first comprises of the Greater Banjul area which is supplied by two Heavy Fuel Oil (HFO) power stations in Kotu (25 MW at peak load), Brikama (26 MW) and the Batakunku wind power plant (120 kW/150 kVA). The Batakunku is an independent power producer (IPP) plant. Electricity is transmitted from these stations for distribution via five radial 11 kV feeders and three 33 kV feeders. The second category of power supply comprises of seven NAWEC owned small-scale power plants that operate on diesel generator sets, served by stand-alone electricity subsystems in the provincial centres. Together, these small-scale plants have an installed capacity of about 13.75 MW (PURA, 2013). Approximately 250 km of 30 kV transmission lines are installed in the provincial grids plus 135 km of MV/LV lines and 94 km of LV overhead lines.

Table 1: Installed Electricity Generation Capacity and Production per Station in 2011

Power Station	Installed Capacity, MW	Production kWh
Kotu	25.300	99,824,000
Brikama	26.000	119,834,000
Essau	0.400	507,660
Barra	0.480	982,710
Kerewan	1.920	507,660
Kaur	0.480	132,548
Mansankonko	1.400	-
Farafenni	5.500	4,269,000
Bansang	0.600	1,482,300
Basse	2.800	4,349,292
Batokunku	0.150	119,000
Total	**57.40**	**232,008,170**

Source: PURA (2013) and NAWEC (2011)

4 Important features in The Gambia's energy sector

Four important features characterize the energy sector in The Gambia. These include:

i. high dependence on imported fossil fuels;
ii. the dominance of traditional biomass sources in the country's energy mix,
iii. low access to modern energy services;
iv. limited investment in new assets and inadequate maintenance of old and ageing electricity power facilities; and very limited investment in renewable energy and energy efficiency potentials.

Demand and supply of electricity

Approximately 44% of the electricity produced is consumed by residential consumers; small-scale industries with hotels and larger industries using approximately 39%; commercial entities using about 8%. The remaining 9% is consumed by Government and NAWEC (NAWEC, 2011). Demand for power continues to rise. In 2012, generation amounted to 232 GWh against an estimated electricity demand of 621 GWH, and is expected to exceed 800 GWh by 2020. This gap between demand and supply is further exacerbated by system losses of about 30%, hence reducing the power reaching consumers significantly (recent investments have reduced the systems losses to 22%).

Table 2 summarizes the evolution of the structure of the electricity market in the period 2007/2011 in terms of consumer population, power sales, system losses, power demand and energy demand.

Table 2: The Status of the Electricity Market

ITEMS	2007	2008	2009	2010	2011
Customer population	75,034	86,349	103,883	113,845	98,116
System Losses P/House Consumption	39%	33.34%	32.7%	31.2%	31.2%
Power Demand MW	88	90	108	126	132
Energy Demand MWh	416,280	473,040	501,420	596,030	621,680
Customer Growth p/a %	7.5	15.1	20	10	-14
Energy Demand Growth Rate	12.8	13.6	6	18.9	4.3
Power Demand Growth Rate	12.8	2.2	20.0	16.7	5
Revenue Growth Rate	51	19	-3.0	-7.3	12

Source: PURA (2012)

Table 3: Electrification Rate (2011)

Regions	Electrification Rate
Banjul	93%
Western	22%
Upper River	14%
Lower River	12%
Central River	7%
North Bank Region	6%

Source: Ministry of Energy

Load-shedding and ST expansion

Load shedding is frequent, and it is common practice for many businesses, hotels and health facilities to rely on on-site diesel generation units and occasionally solar PV units when load shedding or outages occur. Data on these back-up off-grid systems are not available. The resulting effect of this system underperformance is high tariffs for consumers and a rise in the number of back-up systems. It also weakens the financial position of NAWEC, thereby reducing its capability to raise sufficient revenue to expand the electricity system beyond the greater Banjul area. This has wider economic implications. The lack of reliable, affordable power and the high cost of energy are seriously limiting investment in The Gambia and are limiting growth in productive sectors such as the agro-processing and manufacturing sectors (GEF/UNIDO, 2011).

As given in Table 3, national electricity access in The Gambia is about

35%, often concentrated in the Greater Banjul area where access is about 50% (NAWEC, 2009). Recognizing the high suppressed demand and a weakness in the transmission and distribution network, NAWEC has projected the need for 75MW of additional capacity in the next three years and an additional capacity from 2014 to 2020 of 135MW (Government of The Gambia, 2012). The financial requirement between 2013 and 2016 will amount to USD112.5 million and USD182 million for the period 2014 to 2020. New transmission lines consisting of a 132kV power line between the two main power stations (Kotu and Brikama) are also planned in the Greater Banjul.

Costs and Tariffs

Costs and Tariffs

Following an extensive review, tariffs in The Gambia were increased by 17% in 2011. At present, consumers in The Gambia pay one of the highest electricity tariffs in the West Africa region at USD 0.28 /kWh. This situation can be explained partly by the country's reliance on imported fossil fuels for electricity generation, and the poor state of the transmission and distribution infrastructure in The Gambia. Electricity generation and transmission costs are passed on to the consumers resulting in high tariffs. Still, with tariffs not being cost reflective, the utility has been experiencing major financial difficulties and inadequate resources are allocated to cover operation and maintenance costs.

Table 4: Comparison of Tariff Affordability in Select West African Countries

Country	Effective Residential Tariff (US Cents) @ 100kWh/Month	2009 Monthly Per Capita GDP (USD)	% of Monthly Per Capita GDP spent on 100kWh of Electricity
The Gambia	21.2	98	21.7
Senegal	23.8	139	17.2
Burkina Faso	20.0	103	19.5
Cote d'Ivoire	11.9	134	8.9
Ghana	8.2	128	6.4

Source: World Bank (2012)

Strategies for off grid

Regarding those who remain unserved by the grid, typical distance of villages to the grid in The Gambia ranges between 5 to 25 km. The cost of transmission lines to connect these communities with low electricity demand to the grid could amount to USD 50-100,000 per km, which is beyond the financial capability of NAWEC. Furthermore, grid connection fees can range between US 230 and US 1800 (with a median cost of US 600), which is prohibitive to low-income households (Sanneh and Hu, 2009).

Substantial investments are needed for system modernization and to build new generation, transmission and distribution facilities, combined with the high operating cost of electricity supply. A parallel strategy is also important to meet the energy needs of low energy consuming communities that are located far from the grid. Gambia has the

opportunity to create a more cost-effective off-grid renewable energy supply system that can play a major role here in reducing the country dependency on imported fossil fuel, diversify the electricity mix and increase access to energy services in the country. The challenge is to develop a policy framework and functioning business models that attract investment into a mix of on and off- grid electricity generation. To meet these requirements, the Government has formulated strategies whose objectives are to rapidly expand installed electricity capacity, expand and upgrade the transmission and distribution networks, and develop renewable sources of energy, mainly solar, wind, and biomass.

1.1.2 Renewable Energy

RE as tremendous opportunity for The Gambia

Renewable energy represents an area of tremendous opportunity for The Gambia. Renewable energy is a self-sustaining resource that is infinite and undeletable. Depending on the location or environment, the resources vary by region in the Gambia. This makes renewable location and site specific. The following types of renewable energy resources are proven and are commercially operational world-wide: solar energy, wind energy, biomass, hydro, and geothermal. In some cases, wave and tidal energy have reached advanced research stages.

In the Gambia, the following renewable energy have been found to be available, according to the "Potential Assessment Study of Renewable Energy resources in the Gambia, 2006' funded by the African Development Bank and implemented by Lahmeyer International: Solar, wind and biomass. The hydro potentials are non-existing in the Gambian territory.

- Investment opportunities that exist for these renewable energy resources include
- large-scale power generation in urban and peri-urban set-ups;
- mini-grid or off-grid solutions in remote and rural areas; and
- non-electric applications such as solar drying and efficient and clean cooking.

For each resource, the various services that can be derived are described in the following sections.

Solar Energy

Solar Energy

The average annual solar insolation for The Gambia is 4.5-5.3 kWh/m2-day, which represents a high generating potential for the country and making it interesting for PV Power Plants, Solar Home Systems (SHS), solar heater for the domestic and hotel industry and Hybrid Diesel-PV Systems. It has been used since the early 1980s for water pumping, telecommunication facilities. The country has already implemented several PV based project including the European Union-sponsored solar PV pumping, SHS projects and PV-Diesel hybrid system in Darsilami) supports this consideration.

Solar Thermal technology involves the application of the heat of solar rays for heat energy; mostly used for solar water heaters and electricity generation using concentrated mirrors to heat a medium to power a generator; solar distillation and solar dyers for fruits and vegetables.

Biomass energy resources

Biomass energy resources

Biomass energy resources can be described as all biological materials that can be used to produce energy. It is by far the largest energy form used in the Gambia. The biomass resources can be in the form of solid, liquid and gaseous forms and is applicable for producing many forms of services such as electricity, heat through burning for cooking and heating, lighting and transportation (biofuels). Unsustainable and inefficient production and use of biomass will lead to its rapid depletion.

Sustainable Bioenergy is a process of producing energy from biomass resources that considers the social, economic and environmental aspects with high regards to food security in the production and utilization of biomass resources. Sustainable bioenergy include harvesting waste resources from municipalities, industry, agriculture and livestock, fuel wood (firewood and charcoal), energy crops produced sustainably, etc.

Table 5 below is a summary of the matrix showing the various technologies, biomass resources, services and applications.

Table 5: Biomass technologies and applications

Technology	Biomass	Product	Application
Direct combustion	Ligno-cellulosic biomass; Solid agro-industrial wastes, MSW	Heat	Heating; Grid connected electricity production; Off-grid electrification; Cooling; cooking
Anaerobic digestion	Animal / human wastes; Agro-industrial wastes; Municipal solid / liquid waste; Energy plants	Biogas	Heating; Grid connected electricity production; Off-grid electrification; Mechanical power; Cooking; Cooling; Lighting
Gasification	Ligno-cellulosic biomass; Solid agro-industrial wastes	Producer gas	Heating; Grid connected electricity production; Off-grid electrification; Mechanical power
Carbonisation	Ligno-cellulosic biomass; Solid agro-industrial wastes	Char	Cooking fuel

Technology	Biomass	Product	Application
Densification	Ligno-cellulosic biomass; Solid agro-industrial wastes	Briquettes, pellets	Cooking fuel, industrial boilers
Fermentation / distillation	Sugars; Starches	Ethanol	Gasoline substitute Cooking fuel
Extraction / Transesterification	Oil seeds; Waste vegetable oils Animal fats	Biodiesel	Diesel fuel substitute
Extraction / upgrading	Oil seeds	PPO	Off-grid electrification

Source: Demba Diop/Inception Report – ECOWAS Bioenergy Policy Study

Wind energy

Wind energy

Wind energy resources, unlike solar, are not as widespread and evenly distributed. It is more characteristic to specific locations and areas. Wind energy can be used for both electricity generation and mechanical power.

The wind conditions in the Gambia are moderate (below 4.0 m/s at 30 m height) all over the country, above all in the hinterland (Flores, 2010). Near the coast (e.g. at Kanuma and Jambanjelly) the wind condition are slightly higher (at 3.4 m/s to 4.2 m/s at 30 m measurement height) than in the interior due to the free wind flow coming from the sea in the West. There are several small scale projects along the coastal zone of the Gambia both from private investors and NGOs.

In the mechanical energy application, wind energy has been used for water pumping for many decades in the Gambia. This technology has provided water to populations for over decades, especially in the absence of electricity services and thereby providing the much-needed vital essentials of life.

Hydro-electricity

Hydro electricity

In the Gambia, due to the near-flatness of the country, despite a large river that cuts through the entire length of the country, the gradient does not exist for producing hydro-electricity within its territories. However, there exists potentials for this form of energy in the upper reaches of River Gambia in Senegal/Guinea. Hence the participation of the Gambia in the OMVG (Organization for the Development of the Gambia River Basin), based in Dakar, Senegal.

1.1.3 Energy Efficiency

EE in The Gambia

The Gambia Rapid Assessment and Gap Analyses (2012) identified the following challenges related to the promotion of energy efficiency:

- Weak public education and awareness of significance and measures for energy efficiency and conservation;
- Lack of fiscal and financial incentives to encourage the use of energy efficient appliances and technology;
- Inadequate financing for energy efficiency and conservation programs;
- Limited outreach of relevant institutions to extend services to districts and rural communities;
- Weak institutional capacity for monitoring and enforcement of relevant regulations; and
- Weak coordination of monitoring and enforcement of relevant regulations

In addition, there is urgent need to reduce waste and increase energy conservation or saving measures in the Gambia as the little that is produced or available is partially wasted both in the electricity and biomass sector. Energy Efficiency, if combined with Renewable Energy can achieve very desirable results in improving energy access in the Gambia because of the size of the country and relatively high population density. Therefore, Energy Efficiency can be one of the most important tools to be deployed in the Gambia for the following purpose:

1. Reducing energy demand and thereby providing the kilowatts / biomass resources to other consumers and therefore increasing access;
2. Facilitating the 'Energy Access Agenda' in the SE4ALL Goal
3. Saving the energy bills of consumers and therefore saving income of consumers
4. Reducing or delaying new investments in energy infrastructure and therefore the cost of operation and maintenance of the 'would-be energy infrastructure' and cost of capital;
5. Reducing the country's balance of payment that would have been used to pay for importing energy/fuels/infrastructure equipment
6. Enhancing the environment for delaying or reducing the power plants that would have come on line without the Energy Efficiency measures
7. Increase efficiency of the biomass sector, making use of wastes and protect the natural forest, etc.

EE in the traditional household energy sector of The Gambia

According to the GAP report, the country has lost more than 50% of the forest cover between 1946 and 2005. However, the projections to 2015 show a lower rate of degradation and this could be attributed to interventions through more aggressive forestry policies.

Besides the official ban for charcoal production, it is largely and easily produced at several villages in the West Coast Region. However, it must be emphasized that the bulk of the charcoal is imported from the Casamance region in southern Senegal. The bulk of the fuel-wood imported for consumption in the Greater Gambia Area is also mainly imported by truck from Guinea and southern Senegal. The RRA (p 20) mention an annual gap of over 500.000 tons of fuel-wood, based upon a study by Jarju in 2008 for the NARI (National Agricultural Research Institute).

Many of the programmes to promote improved cookstoves under-performed mainly due to the (i) lack of standards and quality control of the cookstoves; (ii) high cost of the improved cookstoves compared to the traditional cookstoves; and (iii) supply-driven projects that paid very little attention to consumer research, stove design, market development, long-term financing and business growth."

The major improved cooking systems recommended for The Gambia are:

- Expansion of access to LPG for cooking in the urban and peri-urban areas;
- Promotion of improved charcoal stoves in the urban and peri-urban areas, and improved fuel wood stoves in rural areas; and
- Promotion of the production and use of briquettes from groundnut residue.
- The use of kerosene for cooking was never popular in The Gambia, and it does not appear to have a potential for promotion as an alternative fuel.

The Ministry of Energy of the Gambia and the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) with the support of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Austrian Ministry of Agriculture, Forestry, Environment and Water Management (BLMFUW), and the governments of Austria and Spain organized a Regional Stakeholder Workshop on the Development of National Cooking Energy Action Plans, in line with the initiative of the West African Clean Cooking Alliance, from 11-12 August 2014, Banjul, The Gambia. The goals of this workshop were, among others, to share best practices on clean cooking activities, to discuss the proper implementation of clean cooking into national energy policies, and to share ways to design plans that promote clean cooking for economic growth and for improving environmental and social conditions.

Additionally, a National Cooking Energy Action Plan Framework is being developed to undertake a comprehensive country-level study to assess possible actions in the cooking energy sector, establish standards and labels, promote financing mechanisms, and establish a coordinating body, while promoting research and development in this field.

Energy efficiency in the electricity and heat sector

EE in the electricity and heat sector

Successful examples of reductions in the demand for electricity in The Gambia are the replacement of the regular incandescent lamps by CFLs (Compact Fluorescent Lamps) under various initiatives and in different locations. In an urban pilot area incandescent lamps could be replaced for free by CFLs and the residents – using pre-paid meters – noted a significant reduction in their consumption of electricity. However, the impact of this initiative remained limited because of its limited funding and the inability to create carbon credits due to the very complex procedure required. A concrete example: PURA (the utility regulator) replaced all its regular lamps by fluorescents and hence realizes annual savings of over 60.000 GMD.

On the supply side, the insufficient quality and availability of transmission and distribution lines is a major reason for the high losses of NAWEC. The first phase of the BANDES support project has enabled NAWEC to reduce these losses from 30% to 22%. (RRA p 35)

A well-known energy saver is SHW (Solar Water Heating). Despite good economics – calculated Pay-Back-Periods (PBP) range from less than 1 to 4 years – only a few hotels have adopted SHW. Conventional water-heating is either by fuel or by electricity. Especially in the last case, SWH will free electricity for better use.

Accompanying measures for solar thermal systems can be undertaken in several areas, for instance:

- Conducting awareness campaigns on solar thermal systems to inform all relevant stakeholders and the interested population about the different applications of solar thermal energy and the related benefits.
- Installing demonstration solar thermal systems for water heating in social institutions (hospitals, orphanages, homes for elderly people, etc.) in order to increase the hygienic standard of the social institutions and to reduce costs for water heating.
- Establishing a national centre of competence on solar thermal technologies.
- Establishing and implementing a national solar thermal technology platform (STTP), with links to similar platforms in other African countries in order to facilitate information exchange and international cooperation.
- Setting up technical assistance programmes to local producers of solar thermal collectors

Recommendations for increasing EE gains in the Gambia

Recommendations for increasing EE gains in The Gambia

Energy Efficient systems are a bit more expensive but the payback periods for most systems are in months (short) and for some systems and measures the benefits will exceed the costs almost immediately. For the rest of the life of the appliances, the consumer will be enjoying reduced energy bills and therefore savings on income. Some of the Energy Efficiency measures in the Gambia can include:

- Efficient lighting: introduction of efficient light bulbs such as CFL (Compact Fluorescent Lamps) or LED bulbs can significantly reduce the energy consumption for lighting as much as 75 – 80% in some bulbs. The use of efficient bulbs is one of the cheapest and quickest means of reducing the electricity demand, especially for the peak hours.
- Efficient appliances such as televisions, refrigerators and air conditioners. In today's world of economics, it makes a lot of sense to use efficient appliances that will be a little bit more expensive and save energy and income for the rest of the life of the appliance. In energy efficiency in appliances, it is always important to look for Standards and Labels on the equipment. All equipment should indicate the energy characteristics of the appliance, including the wattage. An appliance without a label and indication of the number of watts for consumption should not be encouraged to be imported/ manufactured. In addition, consumers should NOT be encouraged to buy such products.
- Energy Efficiency in Industry: Encourages the use of efficient machinery, equipment and natural light in large spaces. The use of Combined Heat and Power (CHP) in the power sector to re-use the heat, that would have been wasted, can increase the efficiency of such power plants.
- Energy Efficiency in Buildings: Incorporates techniques in building design and construction to make the building conserve energy by reducing demand for lighting, heating and cooling. This approach does not compromise the quality and characteristics of the structure.

1.2 Energy access target until 2030

1.2.1 Overall targets

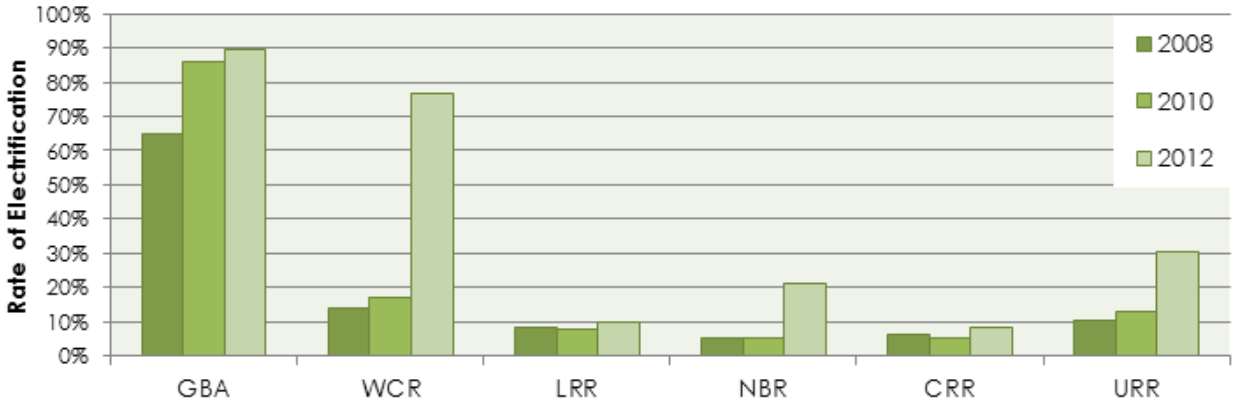
Overall targets of EA

The UNDP supported National Investment Program (NIP) for Access to Energy Services (AES)_ – Gambia (2012) - reports that as an active Member States of the ECOWAS, the Gambia has agreed and signed up for the following set of targets (The ECOWAS/UEMOA WHITE PAPER) for increasing access to energy services for rural, urban and peri-urban populations by 2015:

1. 100% of the total populations have access to a modern cooking fuel;
2. At least 60% of people living in rural areas have access to productive energy services in villages, in particular motive power to boost the productivity of economic activities;
3. 66% of the population have access to an individual electricity supply, or:
    a) 100% of urban and peri-urban areas;
    b) 36% of rural populations;
4. 60% of the rural population live in localities with
    a) modernized basic social services– healthcare, drinking water, communication, lighting, etc.;
    b) access to lighting, audio-visual and telecommunications service, etc.;
    c) isolated populations covered by decentralized energy systems.

Since the adoption of the White Paper, several government and donor led program have been formulated and some of them implemented but with limited results. By 2012, the achievements in term of access to electricity in the Gambia has been quite poor as illustrated by the rate of electrification rate.

Figure 3: Evolution of the rural electrification rate by region between 2008 and 2012 – Electrification Rate by Region 2008- 2012



Sources: Ministry of Energy, 2013

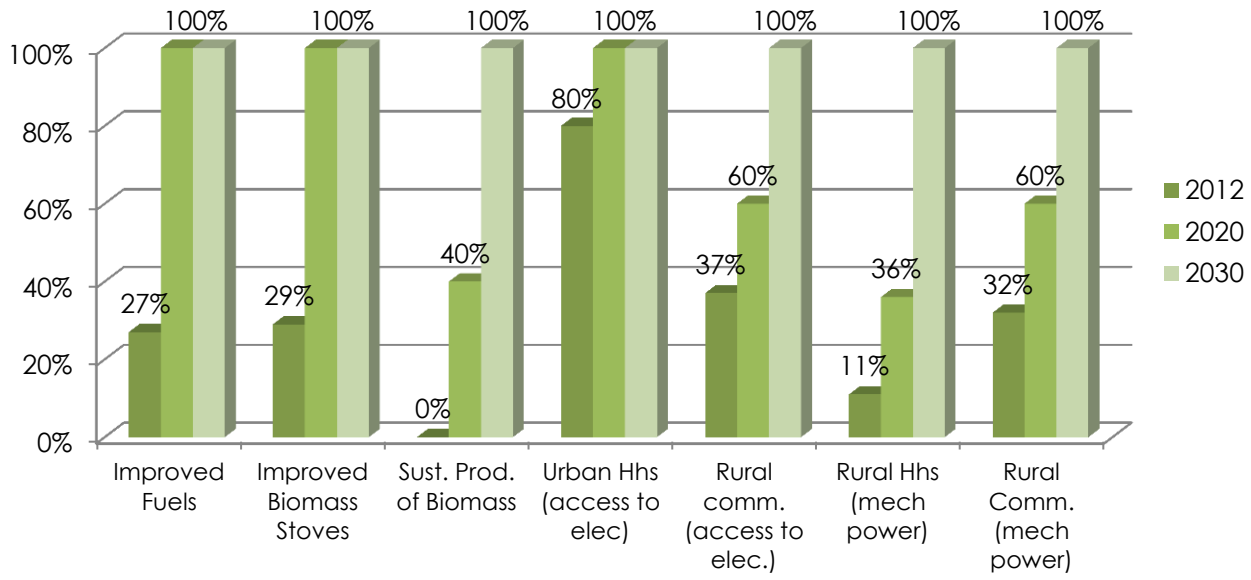
EA programmes in The Gambia

This led the Government of Gambia with the support of ECOWAS, the UNDP and the EU to undertake a review and elaborate measurable goals and targets by 2020. For the purpose of the present exercise, the goals and targets for 2020 have been extended to 2030 to align it to the overall aims of the SE4ALL.

The key prescribed energy access programs in The Gambia to meet the SE4ALL targets are:

1. Promotion of Multi- Functional Platforms
2. Promotion of Improved Cooking Stoves
3. Promotion of LPG Use
4. Grid Extensions
5. Solar PV for Off-grid Electricity

Figure 4: Energy access targets of the Gambia



1.2.2 Access to electricity services targets

Access to electricity services targets

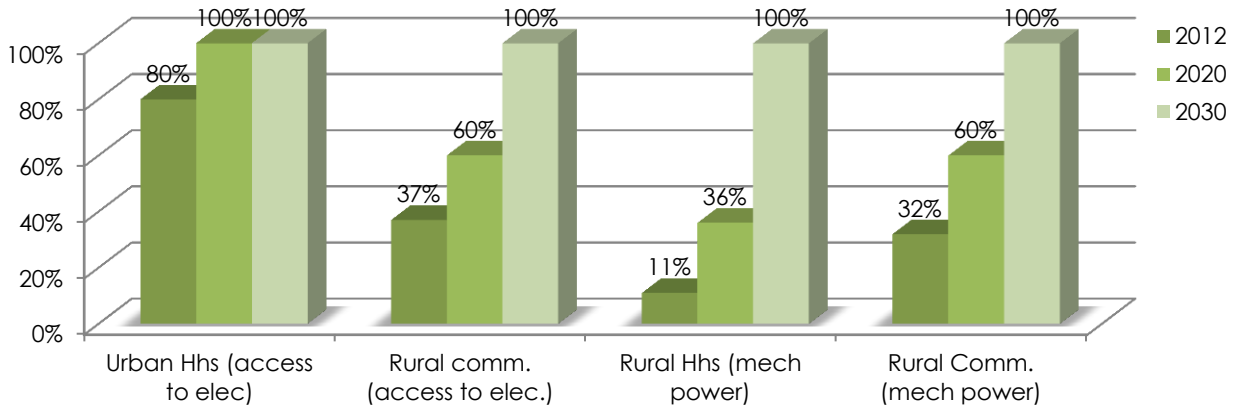
In addition to the ECOWAS/UEMOA WHITE PAPER, the Government of The Gambia considers the provision of electricity to all citizens as critical to inclusive and economic transformation. It recognizes off-grid renewable energy as a practical, potentially cost-effective alternative to expanding the grid to all corners of the country. The government strategy on electrification has embraced both grid-based and off-grid options.

According the Gambia Rapid Assessment and Gap Analyses, access to electricity by the general population has increased significantly especially for the urban population over the last ten years. In 2000, the number of residential customers connected to the public utility company's networks was about 36,000 customers, but this has

increased to just under 100,000 in 2011. In 2000, only 111 GWh of electricity was generated, as compared to 234 GWh by 2010. Since 1994, more than 50MW of new generation capacity has been added, which has improved the power supply significantly and enabled some action for rural electrification. However, this must be reviewed within the context of increasing demand. NAWEC estimates that the annual growth of electricity demand in The Gambia is 6 MW.

In 2001, the electrification rate of the City of Banjul was estimated to be about 70% and 20% for the entire country (National Energy Policy, 2005). By 2010, the national electrification rate was estimated be 40%. The residential sector has seen the highest growth in terms of electricity consumption. The overwhelming acceptance of prepayment meters has contributed to the strong demand for the electricity sector. Another factor for the increased demand is the government policy to reduce the cost of electricity meters by 50% for provincial consumers in 2009 from D6000 (US$200) to D3000 (US$100).

Figure 5: Project of the access to electricity and mechanical power to the population



1.3 Renewable Energy target until 2030

RE target until 2030

The Promotion of Renewable Energy in the Gambia started in the 1980s with the setup of the Gambia Renewable Energy Centre (GREC). Mandate of GREC was to promote renewable energy and undertake adaptive research in new and renewable energy. The involvement of the private sector started by the 1990s and early 2000; especially in the solar energy supplying home systems and solar water pumping.

There has been no comprehensive and coordinated program on RE until 2003 when the Government of the Gambia approached AfDB to finance a study on RE. By 2005, the Government of the Gambia took a decision to waive import duty and sales tax on Renewable Energy Equipment.

The Ministry of Energy has indicated that there are three strategies that need to be targeted in order to improve the implementation of renewable energy generation:

1. The development of legal and regulatory framework as it relates to renewable energy and energy efficiency;
2. Increasing the usage of Solar PV and Wind turbines for electrical generation; and
3. The inception of incentives for independent investors in renewable energy.

To date, the identified target for grid connected RE and biomass are discussed below.

1.3.1 Grid connected Renewable Energy Scenario by 2020 and 2030

EREP

The ECOWAS Renewable Energy Policy (EREP) represents the main policy sources in West Africa. The EREP was developed by ECREEE and validated by ECOWAS Experts Group Meeting, June 2012, Dakar. Following, it was adopted by

(i) the ECOWAS Energy Ministers during the High-Level Energy Forum, Oct 2012, Accra;

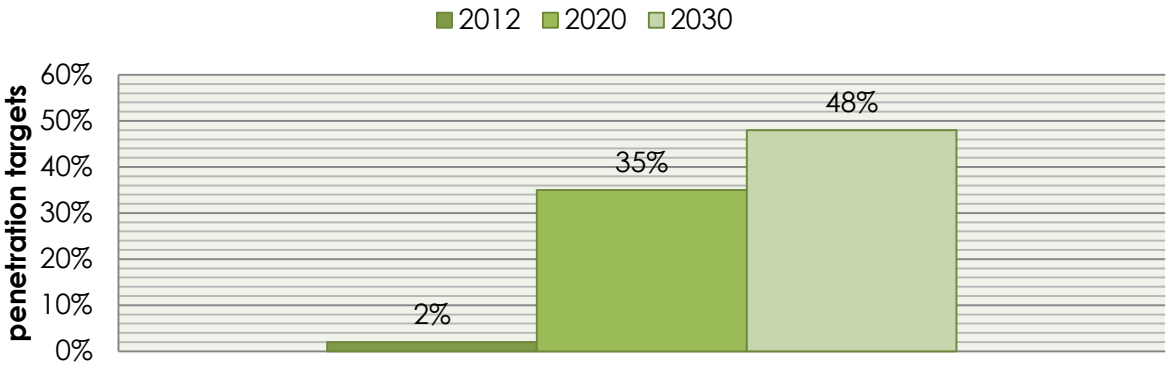
(ii) the ECOWAS Council of Ministers, June 2013, Abidjan;

(iii) the ECOWAS Authority of Heads of State and Government, July 2013, Abuja. The EREP represents a voluntary contribution of ECOWAS to the SE4ALL Initiative.

The renewable energy of the Gambia derives directly from the EREP. In the Gambia, this policy sets the target for penetration of RE including the expected hydro-power from the OMVG (shared with Senegal and Guinea) to respectively 35% by 2030 and 48% in 2030[4]. Currently (2014), the share of the RE is about 0.2% according the Renewable Energy Assessment carried out by IRENA.

[4] These targets have been taken from 'The ECOWAS Renewable Energy Policy and the NREAP Process', presented at the workshop co-organized by PURA on 18&19 June 2014 in the Kairaba Hotel.

Figure 6: Projected Grid –Connected RE in the Gambia



Grid limits and differentiation of RE targets

The limiting factor in the Gambia remains the weakness of the grid that can take a maximum of 6 MW RE at this moment according to PURA (the public utility authority). Without the hydro, the Gambia can still reach the given target by enabling solar IPP where many private investors seem to be interested. However, many uncertainties make putting a hard target at present too hazardous. In addition to a differentiation between 'with or without large hydro' other refinements need to be made, especially for The Gambia, which relies for hydro fully on neighbouring countries;

- targets for RE from domestic sources only and for inclusion of imported RE from large hydro
- targets for on-grid and off-grid
- targets with or without RE from biomass

A more elaborate discussion of the targets will be given in section 2.2.1.

1.3.2 Solar energy off grid targets

Solar energy off grid targets

Based on the assessment of the renewable energy resources potential, the Government of the Gambia prioritizes the resources for development for solar, wind and biomass resources. The Solar Home System Program was recommended to the Government as an energy supply option for remote communities or small villages where connection to the transmission and distribution network is not feasible. The SHS Program included the installation of approximately 10,200 SHS and PV systems for rural clinics (30 systems), schools (54 systems), and in community centres for telecommunications (18 systems) for an estimated cost of US$ 7,381,120 as shown in the table below.

Table 6: Government planned solar projects

Items	Value (US)	# of Units	Total
Solar Home System – 2.5W	70	4191	293370
Solar Home System – 40W	650	2611	1697150
Solar Home System – 70W	1000	2718	2718000
Solar Home System – 150W	2000	673	1346000
Solar Home System – Health Center	10000	30	300000
Solar Home System – School (UBS)	6300	51	3213000
Solar Home System – Schoool (SSS)	55100	3	165300
Solar Home System – ICT Center	30000	18	540000
Total			**7381120**

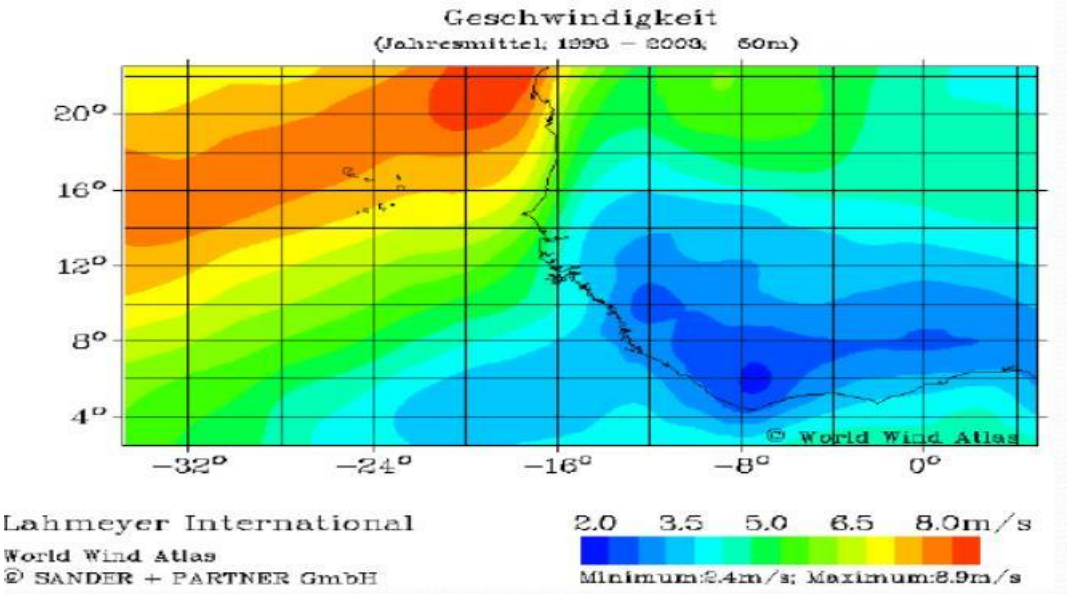
Sources: Kemo K. Ceesay, Ministry of Energy of the Gambia, Jan 2012 with reference to the 'Renewable Energy Master Plan for The Gambia 2006'[5]

1.3.3 Small Scale Wind Parks

Small Scale Wind Parks

Wind energy potential in Gambia can be considered rather moderate but provide some pocket along the coast that can be commercially viable given the energy context of the Gambia.

Figure 7: Map resources of West Africa



Source: World Wind Atlas

[5] 'Renewable Energy Master Plan for The Gambia 2006', by Enrique RODRIGUEZ-FLORES for Lahmeyer International GmbH at http://renknownet2.iwes.fraunhofer.de/pages/wind_energy/data/3_REMasterPlanforTheGambia_Rodriguez.pdf

Small scale windparks in The Gambia

A Small Scale Wind Park is promoted by the Government that would be the first wind park project in the country. The wind park was proposed as a two phase project with the installation of three turbine units during each phase. The feasibility study included the use of new and re-powered wind turbines to demonstrate the influence on project economics. The project will consist of 6 wind turbines of 600kw each for a total installed generation capacity of about 4MW at an estimated investment cost of € 8 million6.

It is not clear to what extent the SHS program has been implemented. The Small Scale Wind Park as initially proposed has not been implemented as such, but several wind turbines of slightly different sizes have been installed and all but one of them are at present in operation.

1.3.4 Other Renewable Energy Projects

Other renewable energy projects

GEF 4/UNIDO RE mini-grids for rural areas project:

- Estimated total project cost US$ 7.6 million
- Grant Funding of about US$ 1.7 million from GEF
- Financing gap of about US$ 5.9 million to be provided by mix of financing sources – bilateral, multilateral and private sector
- Implemented by UNIDO
- Implementation started in 2012 and due to be completed in 2015
- 5 Components:
  - Demonstration projects of about 1.5MW
  - Scaling up of the investment
  - Legal & Regulatory Framework for RE Sub-sector
  - Institutional Capacity Strengthening
  - Project Management & Coordination

[6] Kemo Ceesay, Ministry of Energy

1.4 Energy Efficiency target until 2030

1.4.1 Biomass

Biomass

Most efforts in the Gambia have targeted the traditional biomass sector with several projects and programs to increase its efficiency.

The Gambia has a rich variety of woodland ecosystems, including forests, closed and open woodland, tree and shrub savannah, mangrove, riparian and fringing savannah. IRENA reports that The Gambia's forest cover has declined from 60% in the 1960s to 43% of the land area today. Its forest and woodland ecosystems supply about 85% of domestic energy requirements. Fuelwood accounts for more than 90% of household energy consumption and is often used in inefficient stoves.

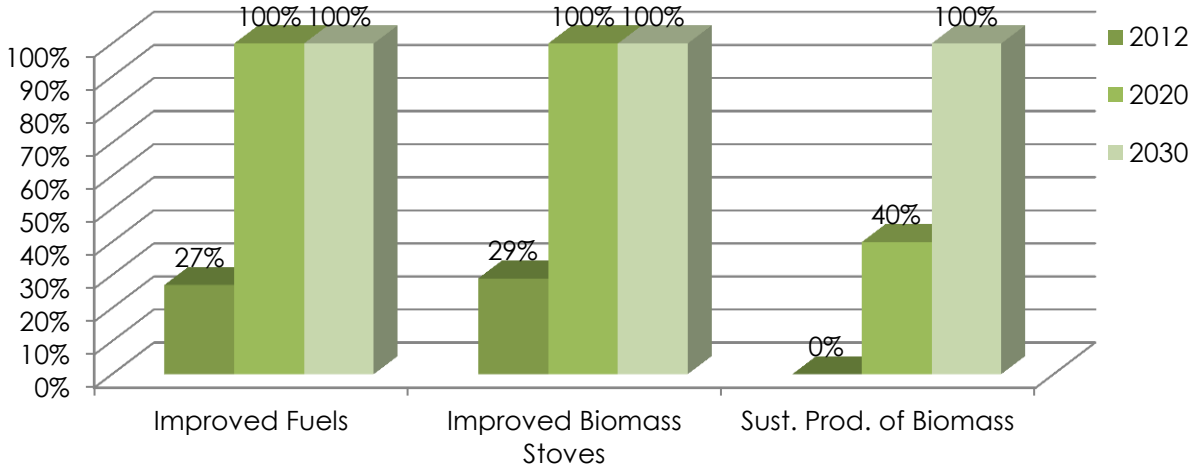
In 2005 the technical potential for sustainable fuelwood production was about 209,000 tonnes/year for an aggregated demand of 734 400 tonnes/year resulting in a huge gap of about 535,000 tonnes/year (Jarju, 2008). This has led to overexploitation and degradation of native forest, as well as fuel imports from Senegal largely in the form of charcoal.

Given the favourable soil and climate as well as underground water conditions in The Gambia, there is ample opportunity to establish highly productive and intensively managed wood lots. These could replace wood imports and ease the pressure on natural forests.

The Government with the assistance of ECOWAS and UNDP has conducted in 2012 a review of the bioenergy sector and elaborated strategies and targets for increased efficiency of the subsector. The graph below give the target on improved fuels (briquetting, improved charcoal, etc.), improved biomass stove and sustainable production of biomass fuels.

The initial targets were set for 2020 and targets for 2030 have been added.

Figure 8: Energy Efficiency Targets in the biomass sector



Source: Compilation from NIP for AES

1.4.2 National Energy Efficiency Program

NEEP

This program was developed with the assistance from ECOWAS.

- Mainly to substitute incandescent bulbs with Compact Fluorescent Lamps (CFLs)
- Estimated 305,000 incandescent bulbs of different watts in residential sector
- Assuming 7 hrs. of daily illumination, if all the residential incandescent bulbs are replaced, 9MW generation capacity is reserved.
- US$ 450,000 was estimated to do the program
- The Government of the Gambia is seriously looking for funding to implement this program that will be carried out by the Ministry of Energy in collaboration with NAWEC, PURA & NEA

1.4.3 Sensitization on Energy Efficiency & Conservation

Sensitization of EE & Conservation

Supported by UNDP under its Environment & Energy sectors support program

- Printed leaflets, posters and T-shirt for sensitization
- Conducted nationwide sensitization campaign in late 2009, including TV panel discussion
- Prepared drama tapes in 4 main local languages and being shown on GRTS
- Bill boards at strategic locations for more sensitization

Indicators for EE

As argued at the end of the later section 2.3.1, decomposed indices of EE may be used. Targets for these decomposed indices can be defined on the basis of specific information for Gambia or from information in other ECOWAS countries, which can also be used as examples for policies and measures.

1.4.4 Relevant nexus targets until 2030

Relevant nexus targets until 2030

Increased access to modern energy services will enhance the capacity and output of productive sectors in the Gambia: Agriculture, Fisheries, Industry, Trade, Tourism and Infrastructure, with emphasis on productive capacities of the poor and vulnerable populations. It will also improve the coverage of the basic social services and social protection needs of the poor and vulnerable: health education, gender activities.

Agriculture & rural development

Agriculture & rural development

The government of The Gambia is initiating an ambitious program designed to make the country self-sufficient in rice and reduce dramatically food import by 2016. The specific objectives of the sector among others are to improve food and nutritional security level of the population, ensure commercial and market orientation of agricultural activity, and to ensure the sustainable and effective management of the natural resource base of the country.

The Renewable Readiness Assessment (RRA) specified that agricultural policy identified several key interventions designed to achieve the policy objectives. Two such interventions that are of strategic relevance to energy access are the drive to increase food production through irrigation, mechanisation and diversification to meet the increasing food need of the population; and the need to advance the process of modernising and commercialising the activities of the agricultural sector through agro processing and marketing (Agriculture and Natural Resource Policy 2009 – 2015).

The role of energy, especially renewable energy will be crucial to enable the mobilization of water for irrigation and other purpose and also to the mechanization of the sector and the development of post-harvest activities. Solar and Wind power are particular suitable under the small and medium scale farming system of the Gambia for diverse applications; water, irrigation, drying , storage, post-harvest activities.

Beside the productive use to boost agricultural production, transformation policies are also under development for other sectors, as elaborated most clearly in the Program for Accelerated Growth and Employment (PAGE program) for 2012-2015.

Additional measures addressing the water-energy nexus could be as follows:

- Investigation of energy potential in waste disposal sites (municipal waste, waste water treatment)
- Introduction of efficient technologies (e.g. water pumping) in agriculture and households
- Energy audits in water utilities
- Capacity building to increase energy efficiency within municipal water supply systems
- Educational programmes to save water in schools/public institutions
- Promote the use of photovoltaic water pumps, including irrigation systems
- Promote the use of animal waste and manure for biogas production
- Promote rainwater harvesting, micro-irrigation and groundwater re-charge schemes in order to make irrigation of crops more energy and water efficient
- Support the development of energy recovery from wastewater, which can reduce the energy demand in the water treatment plant or even allow an export of excess energy to the power grid
- Reduce the use of non-renewable energy in agro-food systems, by

using agricultural wastes and solar energy to produce the energy needed for the food processing

In addition, renewable energy and energy efficiency can support the adequate functioning of health care facilities among others through the following measures:

- Vaccine refrigeration and ice pack freezing using solar and wind energy generated on site (temperature control is more accurate than with kerosene-fuelled absorption refrigeration)
- Lighting from renewable energy sources (substitute for kerosene lighting which contributes to poor indoor air quality)
- Solar-based radio and radiotelephone communications (facilitate emergency medical treatment and provide reliable communications to other health clinics and facilities in the region)
- Enable medical appliances to operate with RES (incorporate inverters that are powered by RE into the system)
- Sterilization (sterilize with thermal energy rather than electricity due to lower costs)
- Water treatment (endorse alternatives to chemical disinfection like UV or ozone treatment using RE sources)
- Water supply (RE-powered manual and large-motor generator driven pumps)
- Solar thermal technologies (e.g. solar water heating, distillation and pasteurization)
- Energy storage technologies in combination with RES electricity generation for medical facilities
- Equip hospitals with solar energy technologies (e.g. solar photovoltaic power plant, solar water heating installations, a solar-powered vaccine refrigerator) and efficient light bulbs (replacement of regular light bulbs with compact fluorescent lights (CFLs)) and ceiling fans
- Make the hospital or health clinic the centrepiece of a village mini-grid

The range of actions and measures above, may not all be applicable, but can serve as a checklist for additional opportunities for which priorities are to be set in further consultations.

2 PART 2: PRIORITY ACTION AREAS

2.1 Energy Access

2.1.1 What is the current status and trajectory?

Current status and trajectory

Table 2 in section 1.2.3 showed the status in the electricity market in 2011 and the year-to-year developments since 2007 in terms of number of customers, system losses, capacity, electricity produced and growth rates for demand and revenues. Table 3 in section 1.2.3 showed the rate of electrification in the 6 regions. NAWEC projects the need for additional generation capacity between 2014 and 2020 at 135 MW at a cost of 182 million $ and in combination with the need for additional transmission lines.

No recent estimates are available for the number of improved stoves in actual use, or for the number of LPG stoves.[7] Data on the additional numbers of both required up to 2020 are available in the National Investment Program on Access to Energy Services in The Gambia of August 2012 (NIP for AES).

2.1.2 What are the existing plans/strategies and what are the gaps?

Existing plans and strategies

According to the Program on Access to Energy Services in The Gambia, the number of stoves required by type of stove – improved or LPG - and type of user – urban or rural – during the period 2013-2020, as well as the number of households using sustainable biomass, is summarized in the next table.

Institutional costs include:

- public education and sensitization
- development and use of sustainable biomass

Table 7: HH with improved stoves and the costs (to be supplied between 2013 and 2020)

HH = households		(in 000)	unit costs	
			in mill. $	in $
A	improved stove			
1	urban HH	106,240		
2	rural HH	102,230		
3	HH total	208,470		
4	total costs		$ 3,070	

[7] The concerned database for The Gambia turns out to be incomplete. The recent 'The ECOWAS Renewable Energy and Energy Efficiency Status Report' (November 2014) by REN21 in cooperation ECREEE shows the percentage of use of improved stoves in The Gambia at 20% and much higher than surrounding counties, but the source of the data is not clear.

HH = households		(in 000)	unit costs	
			in mill. $	in $
5	unit costs			$ 14,73
B	LPG stove			
6	urban HH	93,490		
7	rural HH	113,210		
8	HH total	206,700		
9	total costs		$ 9,660	
10	unit costs			$ 46,73
11	total stoves	415,170		
C	using sustainable biomass			
12	urban HH	33,030		
13	rural HH	70,900		
14	HH total	103,930		
16	capital costs		$ 12,730	$ 30,66
17	institutional costs		$ 17,680	$ 42, 58
	grand total costs		$ 30,410	$ 73,25

Source: Calculated on basis of info in Table 7.3 of NIP for AES

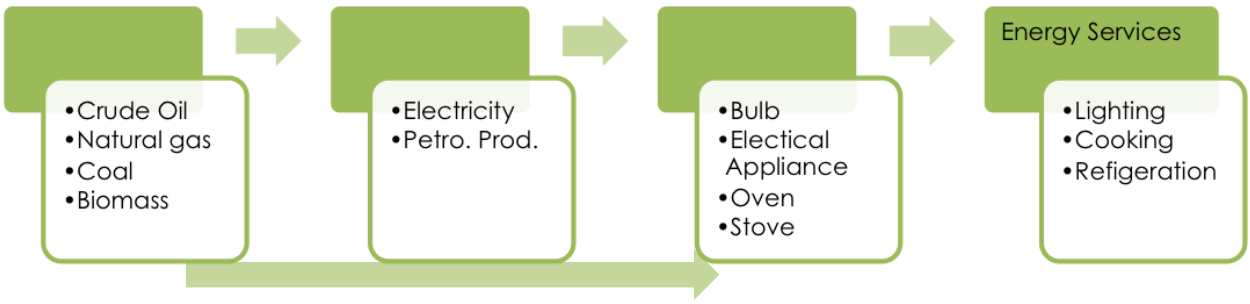
Summary of elements of the NIP on EA

The above table shows a summary of one of the elements of the National Investment Program on Access to Energy Services. The other elements have been summarized in the next table, after a short description of the AES approach.

In the AES approach, the attention shifts from the source of energy, technology or equipment to the service delivered, as shown in the following figure.

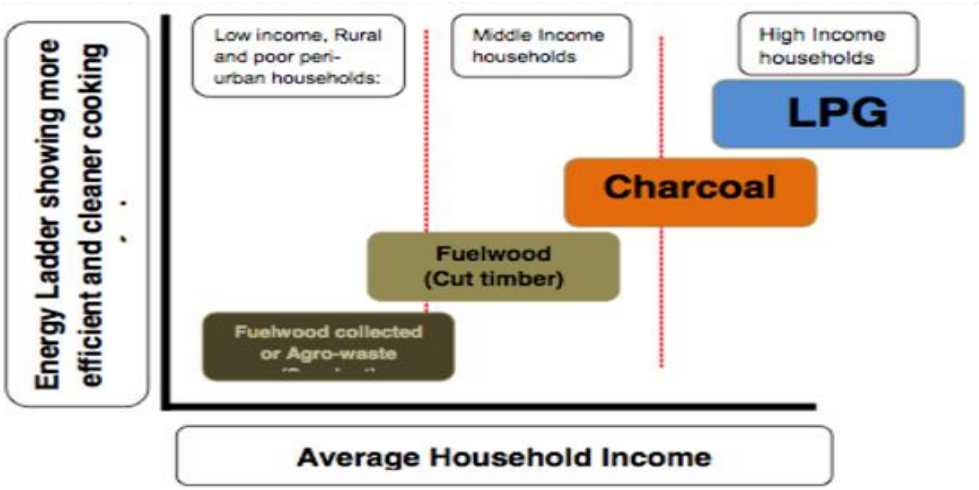
The type of fuel used, depends strongly on the income level, as shown in the following 'ladder' of Figure 10.

Figure 9: From Primary Energy to Energy Services



Source: White Paper for a regional policy- ECOWAS-Oct 2005/ adapted from the World Energy Assessment (WEC 2004)

Figure 10: The Energy Ladder in The Gambia



Source: National Investment Program on Access to Energy Services in The Gambia 2012

NIP strategy on stoves

The NIP for AES has developed a strategy for dissemination of both improved stoves and LPG stoves in which these are delivered by the private sector, where different companies are to compete for clients and in which their products have to adhere to strict standards of durability, reliability, safety plus energy efficiency for improved stoves. Both are to be delivered at a subsidy on the purchase price of 30%. This subsidy is to be funded by the government, which in turn may find other donors for this purpose. It can also be considered to generate carbon credits, under UNFCCC and/or on the voluntary markets.

Previous efforts to introduce LPG for stoves did not lead to the desired results, partly because the supply depended upon delivery by truck from Senegal. New port facilities now facilitate import over sea and sufficient storage. A new approach will be followed based upon the successful system operating in Senegal, where 60% of the households in Dakar now use LPG stoves.

The new approach now proposed for improved stoves also builds upon many earlier projects, which failed for a wide range of reasons. It expects that the availability of modern biomass fuels will increase, such as briquettes from groundnut shells. In The Gambia a significant part of the groundnut shells is available at centralized locations and still mainly wasted, despite the availability of modern briquetting facilities.

Even though biomass provides the biggest share of all energy in The Gambia – 60% in 2010 – the major share of the costs of NIP for AES are for electricity, as shown in the next table.

Table 8: Major costs in the NIP for AES for the period up to 2020

in million $	Capital cost	Institutional costs	Maintenance + Institutional costs	Costs of fuel	Costs of fuel + electricity	TOTAL COSTS	shares in TOTAL COSTS
Improved cooking systems	12,73	17,68				30,41	**12,8%**
Electricity	79,14		25,99	75,08		180,21	**75,7%**
Mechanical Power	18,62		3,9		4,77	27,29	**11,5%**
TOTAL COSTS	110,49	17,68	29,89	75,08	4,77	237,91	**100%**
shares in TOTAL COSTS	**46,4%**	7,4%	12,6%	31,6%	2,0%	100%	
Total of institutional, maintenance, fuel and electricity costs				127,42			
			as a share	**53,6%**			

Source: Calculated on basis of info in Table 7.2 of NIP for AES

Costs up to 2020

The costs of electricity do not yet include the capital costs of the additional generation capacity required as a result of this program. And the costs are to achieve the targets set for 2020. Of the seven separate targets, four are set to 100% in 2020. The remaining three have been set at 100% in 2030, as shown in the last graph of section 1.4.1. The additional costs for the period 2020 to 2030 are still to be estimated.

Mechanical power is delivered by electricity and the Multi-Functional-Platforms (MFPs). MFPs will run partly on fuel pressed by the MFP – e.g. from jatropha nuts – and partly on diesel. The electricity is delivered by grid, mini-grid or SHS.

The expected results are shown in the next table:

Table 9: Summary of Potential Developmental Benefits of Proposed Energy Access

	Immediate Impact	Potential Benefits	Long Term Impact
Improved Cooking System	Reduced amount of wood collected for cooking	Less fuel collection and cooking time	Improved school enrolment
	Less Pressure on the environment	Better health for women	Improved maternal and infant mortality
	Less smoke from cooking	Girls have time for school	Improved quality of life
Mechanic power	Less hands, energy and time on grain processing	Better health for women	Improved quality of life
		Girls have more time for school	
	Less energy and time on drawing water	More farm output and incomes	
	More reliable water supply for crops	Improved incomes from value addition to produce	
Rural	Reliable electricity supply	Functional labs	Skill education enhanced

	Immediate Impact	Potential Benefits	Long Term Impact
Electricity	to schools and health centres		
	Access to ICT and household appliances for rural communities	Increased awareness of national development issues	Enhanced chances of success of development plans
	Opportunities for cottage industry growing	Food and income security	Reduced poverty and hunger

Source: Table 6.2 in NIP for AES

The three main elements of EA

The three main elements of Energy Access are specified in the next table and targets have been set for their achievement in two phases; 2013-2015 and 2016-2020. Targets for Modern Fuels, Modern Biomass Stoves and electricity connections to Urban/Peri-Urban Households have all been set at 100% by 2020. The extension to 2030 is made for those targets still below 100% at the completion of this NIP.

Data on the actual accomplishments since the start of the NIP are not yet available, not the baseline data, as the database to be produced could not be completed.

Table 10: Access of households & communities to Energy Services by 2015, 2020, 2030

		Phase 1		Phase 2		Phase 3
		2013	2015	2016	2020	2030
1	**Modern cooking systems, % households**					
a	Modern Fuels	35%	51%	59%	100%	same
b	Modern Biomass Stoves	38%	55%	63%	100%	same
c	Sustainable Production of Biomass	5%	15%	19%	40%	100%
2	**Electricity, % households/communities**					
a	Urban / Peri-Urban Households	83%	88%	90%	100%	same
b	Rural Communities	40%	45%	48%	60%	100%
c	Rural Households	14%	20%	23%	36%	100%
3	**Mechanical Power, % communities**					
a	Rural Communities	35%	42%	45%	60%	100%

Source: Summary of Table 1 in NIP for AES + extension to 2030

Importance of electricity and its scenarios

The previous table has shown that as a share of the total program costs, those for electricity consume about 75% whereas the other two share the remaining 25% about equally. The importance of electricity is also evident from the studies and actions either completed or on-going , as summarized in Annex 3.

Many studies have been made on the electricity sector. In 2012 AF-Mercados EMI developed an Electricity Strategy with funding from the EU. The Mercados study used a model to optimise investments in generation and T&D at the least possible costs for a range of potential

scenarios. The central recommendation is to seek international connections as soon as possible, both to get access to cheaper electricity from hydro projects to be developed under the OMVG and WAPP and to be able to produce and export power from a sizable 70 MW coal-fired plant. In several scenarios, not all grids will be interconnected, not even by 2030, partly because various connections with Senegal provide a more cost-effective solution.

As is well recognized, connections with and dependence on Senegal include considerations beyond cost-effectiveness. Similarly, the OMVG projects have been under consideration for three decades and their implementation is not under the control of The Gambia. Both Mercados and PAGE do count upon the eventual realization of the OMVG and PAGE has included OMVG related investments in its set of priority energy projects. (See Annex 6).

This preference for early international connections has been included in the preferred strategy by Mercados as presented and validated in the concerned workshop in December 2012. But it is not clear, whether the validation excludes e.g. the scenarios including a coal-based plant, unfortunately still often the 'cheapest' solution, because external effects such as pollution and emission of Green-House-Gasses are still largely excluded from the costs.8

In the case of electricity, it is well recognized – also by Mercados - that the increasing cost reductions in solar PV require up-dates of the 'least cost generation plan' regularly and some even suggested at least twice a year. From this perspective an update of the Electricity Strategy – as to be prepared by Fichner, see Annex 3, line 22 – is welcome, especially if it will include an integrated analysis of generation and transmission, as also done by Mercados.

In addition to the Electricity Strategy and work on the RE Law and FIT, Mercados also made an analysis of the institutional, financial and the technical & operational aspects of NAWEC and of the present condition of the generation facilities and the national grid and made recommendations for actions and a time-schedule for improvements. Annex 7 shows the summary, as made by Mercados.

In its analysis and recommendations, Mercados built upon the earlier work by NOVI (in 2010 for the WB) and included as line 1 in Annex 3. (Earlier studies and policies can be considered as out-dated). It can be expected that Fichner in turn will review and build upon the work by Mercados.

Several proposals for major utility scale on-grid PV plants have been made directly to NAWEC or through GIEPA and are under consideration also by the Ministry of Energy. They range in size from 5 MW to 35 MW. Because their size is above the upper limit for the FIT, their tariff will not be set by the FIT, but is open to direct negotiation. As these are Renewable Energy Projects, they will be further discussed in the concerned section 2.2. Because of their intermittent nature, RE sources

[8] See 'Coal The fuel of the future unfortunately' in The Economist of Apr 19th 2014

like PV and wind pose specific problems in their priority access to the grid. It is commonly agreed that there is a limit to intermittent electricity that the grid and its operator can handle. It has been argued in the Strategy Study by Mercados that 10% is the upper limit for the Gambian grid at present and PURA's approach is in conformity with this suggestion, but some developers claim a much higher capacity of the grid, even in its present conditions and present generation capacity and technology.

2.1.3 What are the actions needed to achieve the overarching objective in the field of energy access?

Risks assessed in the NIP

The NIP for AES has included an assessment of risk in sections 8.4.1 to 8.4.4 with the following results (Financial and sustainability risks not yet elaborated):

Table 11: Risk factors

Type of risk	Potential impact	Probability
Institutional Risk (low government commitment)	High	Very low
Technical Risk	High	Very low
Market risk (no active involvement by stakeholders)	High	Very low
Implementation Risk	Medium	Very low

Source: Based on information in the NIP for AES

NIP policies and funding

The NIP for AES reports the need for more coordination in the planning and implementation of energy projects and makes a number of policy recommendations which need further discussion. Also, the sources of funding for the NIP have not been specified.

Grid infrastructure and supply efficiency

Grid infrastructure and supply efficiency

This action area includes the expansion of grid infrastructure to areas or people without access to electricity; reinforcing transmission and distribution infrastructure so as to reduce losses and improve reliability, measures to reduce commercial losses, measures that increase the efficiencies of energy generation and supply infrastructure (e.g. improving the thermal efficiency of power plants), and smart grid solutions and grid-scale storage that would improve the efficiency of advanced grids. It should also consider non-technical solutions such as revenue management, safety, marketing and customer service outcomes.

Some points on the grid infrastructure and supply efficiency.

- The T&D system needs to be evaluated in a model integrated with generation as done by Mercados and likely to be redone by Fichner
- GEF 5 includes a proposal for RE generation with storage and smart grid elements
- T&D work under BANDES contributed to a reduction of system losses from 30 to 22 % and more similar work can be done, but others claim that technical losses are low (9%) and that the balance of 13% is the result of other losses (mainly theft)
- NOVI emphasizes the need for a feasibility and cost-effectiveness study on options to increase efficiencies from present fossil fuel plants
- Many propose a complete elimination of inefficient and expensive fossil fuel plants, especially in the separate grids (but RE from intermittent sources like solar and wind only no solution)
- Sensitizing local communities at district and village levels on the benefits of mini-grids projects based on renewable energy sources
- Strengthening capacity of private service providers to maintain mini-grids equipment

Distributed electricity solutions

Distributed electricity solutions

Decentralized systems are already included in the NIP for AES of 2012 and in the RE Masterplan developed in 2006. The implementation has been limited, especially with respect to the SHS proposed for communities with less than 50 inhabitants and far away from the grid.

Possible further measures regarding mini-grids based on renewable energy sources could be as follows:

- Develop national policies to encourage mini-grid installation
- Strengthening capacity of state agencies for planning and implementation of mini-grids based on renewable energy sources
- Develop business models that address the concerns of the relevant stakeholders, while establishing a project-conducive environment
- Provide sustainable finance models (mix of subsidies and revenues)
- Strengthen policy planning mechanisms and national infrastructures to promote public private partnerships (PPP) in the renewable energy sector
- Encourage cooperation between local/regional partners to bundle projects in order to increase effectiveness, to allow for additional funding possibilities and to overcome fixed lending costs
- Establish and follow international standards for mini-grids
- Training of local agencies to ensure operation and maintenance of mini-grids based on renewable energy sources

Issues on regulatory frameworks discussed in section 2.4.

Modern cooking appliances and fuels

Modern cooking appliances and fuels

This action area includes all options that enable households to shift to cleaner fuels and stoves, including cookstoves fuelled by cleaner fuels such as biogas, solar, ethanol, propane, LPG, and advanced biomass cookstoves.

Information on improved stoves and LPG stoves has been described in earlier sections on the NIP for AES, which also covers the enhanced production of briquettes. For improved stoves and LPG stoves it proposes a 30% subsidy and a competitive approach, but on the basis of specified standards of performance. It also emphasises the need for a realistic business model for which it considers the Gambian company Greentech as an example in its production and distribution of briquettes of groundnut shells and in its marketing of improved stoves.

Experiences with biogas plants at household and institutional scale are not encouraging.

Animals are not kept in farms and dung is used for manure already.

A biogas plant on basis of liquid municipal waste has been proposed under GEF 5.

Among others, the following general measures can be undertaken:

- Improve the efficiency and sustainability of the energy value chain through participatory and sustainable forest management (PSFM) and support the development of activities in the context of REDD+ initiatives
- Develop and implement gender-responsive national policies and programmes on clean and efficient cooking
- Support the development of micro-enterprise clusters to foster collective energy efficiency and establish vertical linkages between the cluster and the distribution/supply chains for improved cook stoves
- Disseminate information about all relevant elements of successful implementation of improved cook stoves including hard- and software aspects of the technology, its availability and financing schemes
- Conduct training of trainers' sessions: register/appoint trainers having acquired a certain qualification (diploma or similar) to implement capacity building trainings and have them trained on a regular basis by national/international experts (try to target women – gender issue)
- Mobilise private investment and encourage involvement of the private sector and banks in funding sustainable cooking energy investment projects
- Identify and support access to finance for entrepreneurs and cook stove producers to set up national production centres and/or upscale their businesses
- Increase the use of carbon financing opportunities for sustainable cooking energy projects through capacity building, awareness raising and project development

- Conduct demonstration/pilot projects on innovative and clean fuels & devices for upscaling
- Establish an independent national coordinating and monitoring body dedicated to promoting clean cooking solutions
- Develop national programmes for the adoption of technological standards for cooking fuels and appliances in terms of efficiency, (safety and health impacts) in accordance with international bodies such as the Global Alliance for Clean Cook Stoves (GACC)

Other priorities

Other priorities

Demand side management initiatives are possible, but not yet of the 'automatic/smart grid' variety.

2.1.4 Which (global) High-Impact Opportunities are relevant?

HIOs

High-Impact Opportunities (HIOs) are sectors or categories of action that have been identified as having significant potential to advance the 3 SE4ALL objectives globally. They serve as a collective forum for stakeholders working on various High Impact Initiatives (i.e. targeted on the ground programs or projects in support of SE4ALL) within the same general sub-sector (such as on mini-grids, or biofuels). Approximately 50 HIOs have been identified to date. Annex 1 contains the current list of formalized HIOs. It is recommended to identify relevant HIOs and involve the HIO co-leaders in the development of priority actions in the concerned field, enabling maximum potential for targeted follow-up support and investment.

HIOs 1, 5 and 6 are relevant, but mostly in the RE context.

2.2 Renewable Energy

2.2.1 What is the current status and trajectory?

Current status and trajectory of RE in The Gambia

As indicated in section 1, the target for renewable energy in the Gambia has to be specified in several ways;

- a target for RE from domestic sources only and a target including imported RE from large hydro projects[9]
- a target for on-grid and a target for off-grid
- a target with and a target without RE from biomass

Currently (2014), the share of RE excluding biomass is about 0.2% according to the Renewable Readiness Assessment carried out recently

[9] In its 'Template for National Renewable Energy Action Plans (NREAPs) of the ECOWAS Renewable Energy Policy (EREP), Period [2015-2020/2030], Final Version, dated 28.02.2014' it is suggested to specify these targets both in terms of capacity (MW) and generation (GWh), as capacity factors (which link them) may be different.

by ECREEE for IRENA. Targets set in accordance with the EREP for the Gambia for penetration of RE including the expected hydro-power from large scale hydro projects in the OMVG (shared with Senegal and Guinea) and the WAPP have been set as respectively 35% by 2020 and 48% in 2030[10] The Gambia itself does not have potential for large-scale hydro and very limited potential for small-scale hydro projects[11] In many countries targets for RE without large-scale hydro are about a third of the targets including large-scale hydro.

The figures 35% by 2020 and 48% in 2030 are in line with those in Table 4 of the Energy Strategy and Action Plan by Mercados, December 2012. This table gives the results of Scenario Three, which is the scenario with high RE ambitions

Table 12: Key cost indicators for scenario three (renewable ambitions)

	Units	2011-2015	2016-2020	2021-2025	2026-2030
Demand (expressed)	GWh/year	284	592	851	1,087
Renewable generation	% demand	1%	20%	58%	53%
Unsupplied energy (of expressed)	%	4%	3%	3%	2%
Fixed operational costs (ex. Interest)	US$m (2011 real)/yr	2	5	9	12
Variable operational costs (inc. Fuel)	US$m (2011 real)/yr	40	68	23	36
Capital recovery (capital and interest)	US$m (2011 real)/yr	6	34	93	124
Emissions	ktCO2	166	319	373	493

Projected imports of electricity and high growth rate for domestic RE

This table warrants a close look, as it shows many interesting results, some of which go beyond the present discussion and purpose, which is to arrive at growth rates for electricity from RE sources, excluding from large-scale hydro. Large-scale hydro has been estimated to produce 33% of the electricity in the period 2026-2030. Hence, the contribution to the generation of on-grid electricity by other RE sources in that period is 53% - 33% = 20% of 1,087 GWh = 217.4 GWh on average per year.[12] A rough estimate for off-grid generation during that period by RE sources is 135.9 GWh on average per year.[13] Combining on-grid and off-grid generation amounts to 353.3 GWh on average per year in the period 2026-2030, as detailed in the next table. This is 55 times the 6,4 GWh on average per year in the period 2011-15 or an annual increase of over 22% during 20 years.[14] This high annual rate also reflects the low level of RE capacity at present; 0.2% of all energy supplied in which electricity has a share of only 4%.

[10] These targets have been taken from 'The ECOWAS Renewable Energy Policy and the NREAP Process', presented at the workshop co-organized by PURA on 18&19 June 2014 in the Kairaba Hotel.

[11] 'Tidal river power' has been mentioned as a potential option for The Gambia.

[12] The technical limit in additions to the grid for intermittent RE sources such as solar or wind does not apply for large-scale reservoir based hydro plants, which is 'dispatchable'. i.e. can be switched on or off as desired, just as most conventional power sources and especially gas-turbines.

[13] The average for off-grid electricity generation in ECOWAS countries expected to be 50% of the on-grid generation of which 25% will be supplied by RE sources. For more details, see the next table.

[14] This 21% annual increase is only for the contribution from RE sources to the generation of electricity.

Table 13: Growth rates of RE electricity over 20 years

line nr.			2011-15 average in GWh /year	2011-15 average in %	2026-30 average in GWh /year	2026-30 aver age in %	average annual growth in %
		electricity					
1	**all on-grid**	**electricity**	284		1087		7,0%
	of which	renewable					
2		incl. large hydro	2,8	1,0%	576,1	53,0%	3,5%
3		large hydro	0,0	0,0%	358,7	33,0%	not applicable
4		excl. large hydro	2,8	1,0%	217,4	20,0%	24,3%
	all off-grid	**electricity**					
5		as % of on-grid	14,2	5,0%	543,5	50,0%	20,0%
	of which	renewable					
6		excl. large hydro	3,6	25,0%	135,9	25,0%	20,0%
	renewable	**electricity**					
		excl. large hydro					
7		on-grid	2,8	44,4%	217,4	61,5%	
8		off-grid	3,6	55,6%	135,9	38,5%	
9		**total**	6,4	100,0%	353,3	100,0%	22,2%

Source; the two averages of GWh/year in line 1 are from the previous table.

Share of off-grid electricity and its target for RE

The share of 33% for large-scale hydro in 2026-2030 is from the same study by Mercados. The share of off-grid electricity as about half of the on-grid generation as found in many countries with large-hydro is based upon the EREP document for ECOWAS and the ratio of 2.8 RE GWh on-grid and 3.6 GWh off-grid is a rough estimate for the period 2011-15. 25% of off-grid electricity from RE sources is indicated as a relevant target in the present section.

Range of targets for RE

The use of PV for generation allows for small and gradual increases to capacity, even by the PV panel. But increases can also be by utility scale PV plants with sizes of over 5 MW. Large-scale grid connected generation by solar PV has become cost-competitive in The Gambia with its excellent irradiation and the decreasing costs of the technology. Many proposals for utility-scale PV projects for grid-connection are under development, but face 3 constraints at present; i) uncertainly about the technical capacity of the grid to absorb significant quantities of electricity from intermittent sources (such as solar and wind), ii) regulatory issues on tariffs for PV and on the standardization of PPAs and iii) the poor financial condition of NAWEC, which may ultimately block negotiations with IPPs. Wind resources are more moderate, except for coastal areas, but can also play a role in hybrid systems and in water pumping.

Similarly, issues with rural electrification strategies and appropriate business models and conditions may hold back RE technologies off-grid, even when their economic performance is better than the alternative of generation by diesel. Both on-grid and off-grid the economic potential of RE cannot yet be fully developed because of financial constraints, which will require mitigation actions and policies.

Actions will reduce the constraints and uncertainties mentioned over time, but the range of potential targets is still broad. The domestic on-grid generation from solar PV can increase quickly to over 5 MW at a minimum and a 10% share in 2020 is similarly to be considered a minimum. For off-grid areas, the economic advantages of RE or hybrid systems as compared to diesel-based generation are becoming stronger and an off-grid RE share of generation of over 25% in 2020 should be considered achievable.

The enactment of the RE Law early in 2014 included the obligation for an assessment of biomass resources in order to develop a Biomass Strategy. Without certainty on the availability of biomass resources and their most appropriate use, generation of electricity with biomass has been restricted to plants up to 1 MW. Hence, in the targets as indicated, the role of biomass has not yet been included.

2.2.2 What are the existing plans/strategies and what are the gaps?

RRA NIP, PAGE and Strategic Plans

A Renewable Readiness Assessment (RRA) has been prepared for The Gambia at the end of 2013 and is a precious source of information on the historic developments of RE in The Gambia, the present opportunities and obstacles, the role of development partners and NGOs and recommendations to facilitate the development of RE. It has been developed in an interactive manner with frequent consultations and the use of technical groups and experts.

As an example of the degree of details and the consultative decision procedures applied, Annex 5 presents the ranking and scores for 15 'resource-service-pairs', such as e.g. 'solar for drying'. The 5 pairs with the highest scores have been selected for further development in the RRA and marked in bold in Annex 5.

Apart from recommendations to speed up the RE Law, which has been enacted indeed, the recommended actions in the RRA are;

- the establishment of standards and labels for RE equipment
- the revival of GREC
- assess, update and validate solar, biomass and wind resource mapping
- establish Renewable Energy Fund and identify sources of funding
- build stakeholder capacity (policy makers, regulator and private sector)
- and allocate land for renewable energy use

The land issue is crucial indeed as an issue arose over the permit for a windmill in one location, which had to discontinue its operations until

the issue will be resolved. In the effort to support GREC very many tasks have been allocated to it, where selection of some priorities may be more appropriate.

The National Investment Program for Access to Energy Services (NIP for AES) described in section 2.1 contains a mixture of conventional, EE and RE sources to advance access to energy to the targets set for 2020 and extended in the present document for 2030 for targets set below 100% for 2020.

Plans such as the Draft Energy Strategy and Action Plan for the period 2010-2014 and PAGE (Programme for Accelerated Growth and Employment) and its prioritized actions on energy exists, but are not well coordinated and implementation of projects is dependent upon the availability of funding, such as for the Rural Electrification Project (REP).

The Ministry of Energy is in the process of developing its new Strategic Plan for 2014-2018.

2.2.3 What are the actions needed to achieve the overarching objective in the field of RE?

Support access to hydro power and to finance

At present, there are several grids in The Gambia, which are not yet connected. Similarly, there are no connections to grids outside of The Gambia. As shown in the study by Mercados on the Electricity Strategy and Action Plan of 2012, connection of all grids within the country is not the least cost option in all of the scenarios considered. But international connections to provide access to the scheduled OMVG hydro projects and/or to Senegal for separate grids were considered as economically advantageous. Some preparatory investments in relation to the OMVG have been included in PAGE (See Annex 6) and the Annex 3; the Action Plan of the Draft Strategic Plan 2010-2014, reproduced in Annex 9.

The RRA did present several calculations, which showed on the basis of the LCOE (Levelized Costs of Electricity) and Life-cycle costs – which both include OPEX and CAPEX – that PV systems for off-grid electrification are significantly cheaper already than diesel generation in The Gambia. The major bottleneck is the availability of finance. As in RE projects the capital costs are relatively high, access to long-term finance is a necessity. With diesel generation, the investment costs are lower, but the running costs much higher.

Issues related to finance will be discussed under the 'enabling environment' in section 2.4.

Renewable power generation

Developments in technology and in policy frameworks

It may not be advisable to pursue all renewable technologies. Conditions in The Gambia e.g. are not suitable for regular hydro projects, while conditions for wind are moderate and conditions for solar are excellent. With the decrease in costs for PV, the competition for CSP becomes more difficult. Another advantage for PV is its scalability.

Additions can be made relatively easy and 'lumpy investments' as for CSP or a coal-based plant are not required. The disadvantage of solar and wind for generation of electricity is that they are intermittent and that their output cannot be controlled, unless storage facilities are added. Without storage, their connection to the grid imposes additional costs to the grid operator, such as the need for reserve generation capacity and control systems.[15] [16]

While solar PV is the most competitive RE technology at present in The Gambia, some diversity of RE resources can also be advisable, both for possible complementarity – e.g. of solar PV and wind – and to develop a broader base of skills and experience in case of new technological developments. One expected development is a significant decrease in costs and increase in quality of battery storage systems, which will reinforce the trend towards devolvement or distributed generation, despite of the resistance of established utilities.[17] [18]

Even though the RE Law has been enacted, its proper implementation still requires a range of actions and improvements, such as the development of standard PPAs, the review of the tariff for PV and the streamlining of procedures for applications under the FIT, as e.g. in Annex 8. Activities already scheduled on the development of standard PPAs for projects > 20 kW[19] and on the review of the tariff for PV are shown in Annex 3, lines 8-10.

The need for the review of the tariff for PV under the FIT is related to the decreased costs of PV. Previously, the tariffs set in the FIT in The Gambia were based on the 'avoided costs' related to the costs of generation by the existing fossil fuel plants. But now that the generation costs of PV have become lower than these 'avoided costs', the tariff for PV will be set on the basis of the actual generation costs of PV in The Gambia, which need to be assessed. The tariff for PV will be applied only to plants qualifying for the FIT, i.e. with a capacity between 20 kW and 1.5 MW. Proposers of plants above 1.5 MW do not come under the FIT, but can engage in direct negotiations with NAWEC. Several proposals for plants above 1.5 MW – even up to 30 MW – have been made and the review of these proposals is not delayed by the present review of the tariff for PV under the FIT.

It can also be considered to ask for RE proposals under a tender, as is done in many countries. In Senegal a system of 'concessions' is used for the electrification of rural areas. The concession is then allocated on the

15 See e.g. 'AFUR Guidelines Renewable Energy and Regulation', Dec 2013 by Martin Zwanenburg at http://www.afurnet.org/index.php/en/downloads/cat_view/4-publications/8-afur-guidelines (AFUR; African Forum of Utility Regulators)

16 For a recent estimate of costs involved see 'Renewables: The Only Path to a Secure, Affordable and Climate-friendly Energy System by 2030', April 2014, by Uwe Nestle and Silvia Brugger, Commissioned and published by the Heinrich-Böll-Stiftung, European Union

17 See e.g. 'Clean energy Let the sun shine The future is bright for solar power, even as subsidies are withdrawn', The Economist, March 8th 2014

18 See e.g. 'Distributed generation Devolving power Big batteries threaten big power stations—and utilities' profits', The Economist, March 8th 2014

19 Standard PPAs for projects < 20 kW are already available and PURA and NAWEC have significant experience with Net Metering (NM) up to this scale.

basis of a tendering system. The 'winner' then gets the sole right for the concerned area and the obligation to deliver the specified electricity services under the specified conditions for a given period. It has been suggested both in the RRA and in the NIP for AES to use a similar system in The Gambia. This is one option for a Rural Electrification Strategy, the need for which has been argued strongly in the RRA.

In Annex 4 the issue is raised under C whether such a Strategy is a necessity a priori or whether a 'trial-and-error' approach can be used?

Grid infrastructure and supply efficiency

Locations and supporting measures

Whether a given location on the grid is suitable for the delivery of a certain amount of RE from intermittent sources – such as solar or wind - needs to be determined by a specific study and for which specific models and software is available. If system extensions and modification are required, the sharing of costs needs to be negotiated, if not covered by a standard PPA. Some RE resources – such as coastal wind (with higher speeds) - are tied to a specific location or area. Others - such as PV plants - have more flexibility, but require large areas, which may compete for other uses. It is assumed that a grid code is available and will be referred to in the PPA.

In the case of a mini-grid, the RE or hybrid generation facility and the grid will be designed in combination.

Complementary measures in electricity distribution systems may include:

- Management practices related to billing and maintenance, such as optimised billing and regular inspection of lines
- Shortened billing cycle, including thorough tools that produce a bill immediately upon meter reading
- Regular inspection of lines to identify and remove illegal, unsafe connections, and to encourage all users to become paying customers
- Regular preventive maintenance of all components of the distribution system in order to assure reliable power supply.
- This includes, notably, upgrading of lines and transformers that are operating near capacity that show signs of weakness or that are out-dated and inefficient
- Installation of pre-paid meters to improve bill collection and relations with clients
- Installation of high voltage distribution systems that improve power quality and reduce theft
- Power factor correction to reduce losses through the installation of capacitor banks on client premises where they are needed
- Demand side management initiatives are possible, but not yet of the 'automatic/smart grid' variety. Measures could be time-of-use tariffs, real time tariffs or peak pricing; load control strategies or use of power factor charges.
- Promotion of efficient electricity generation technologies, e.g. support to Combined Heat and Power (CHP) or co-generation

Industrial and agricultural processes

SWH and use biomass

Options to use waste-heat in the main generating plants will need to be reviewed on their feasibility and cost-effectiveness.

Some specific options to shift to RE sources have been identified in the NIP for AES. It indicates that both the Banjul Brewery and the Gambia Groundnut Company use electricity for water heating, whereas Solar Water Heating (SWH) options are available and are cost-effective, with short Pay-Back-Periods (PBPs)[20]. Similarly, SWH options for hotels are proven, but applied in a few only. SHW is a prime and lucrative option to free electricity for better use. Agencies like PURA are actively promoting the use of SWH in hotels.

The case of SWH will be further discussed under the 'enabling environment' sector in section 2.4.

In the NIP for AES the actual change of a boiler from heavy fuel oil to biomass in a soap factory of SS Sillah & Sons was also given as a positive example. As long as the biomass would otherwise be wasted, this is very appropriate. As indicated elsewhere, the availability of biomass is to be assessed and to feed into the development of a Biomass Strategy late in 2014 or early in 2015.

Buildings and Appliances

SWH and links with EE

This action area includes design and retrofit of buildings incorporating renewable self-generation options (e.g. rooftop solar and solar hot water).

SHW (solar hot water) has been discussed under different headings. The ECOWAS Strategies and Directives on Buildings and Appliances as developed by ECREEE have been included under the EE section on 'Buildings and Appliances'

Transportation

Transportation

This sector should in particular contain actions focusing on increasing the share of renewables in the fuel supply. Biofuels has been included in 2 of the 15 Resource-Service Pairs investigated in the RRA, but not in combination with transportation. (See Annex 5)

Other possible measures in the transport sector include:

- Awareness raising for municipal authorities and building planners on the advantages of sound spatial planning
- Encourage eco-driving through awareness raising campaigns
- National information campaign could be launched to encourage walking and bicycle use
- Procurement strategy or procurement standards focusing on energy efficiency criteria for new government vehicles

[20] A development proposed for both companies under GEF 6 will be the generation of biogas and its (partial) use for water heating for industrial purposes.

2.2.4 Which High-Impact Opportunities are relevant?

Relevant HIO

HIOs 5. Water-Energy-Food Nexus & 6. Clean Energy Mini Grid can both be relevant.

Of the Concept Notes (CNs) submitted – and all fully included in the IP – CN 3 proposes to install solar power systems for the 10 processing centres of the GALDEP (The Gambia Lowland Development Project).

CN nr. 8 is for the development of a 'model village solar enterprise' to develop a community enterprise running a 60 kWp hybrid system to serve other enterprises and the villagers with electricity under a PAYG (Pay-as-You-Go) cell phone based system.

CN nr. 6 has the broadest scope and intends to deliver 100 kW Hybrid Mini Grids to 50 remote villages selected and identified all over The Gambia. Each system will combine a 10 kW wind system with up to 90 kW over solar PV – depending upon the requirements of the community and its opportunities – and to be operated under the SMA Sunny Island concept.

Especially the evaluation of this last CN will require access to independent expert advice and opinions; is the proposed technology a proven one and are the sun and wind resources at the 50 selected locations sufficiently available and complementary in hours of availability?

The need for the availability of such advice has been generalized into issue for discussion C in Annex 4.

2.3 Energy Efficiency

2.3.1 What is the current status and trajectory?

Current status and trajectory

Energy Efficiency (EE) is often a subject given less or later attention than Renewable Energy (RE).

As an example of GEF in a presentation[21] at the GEF 5 Inception Workshop for The Gambia in the Kairaba Hotel on July 7-th 2014; attention to RE is given in GEF 4 and 5 and EE will be introduced in GEF 6.

Many reports – such as the RRA for The Gambia - stress the importance of EE, but defer attention until later.

Similarly, the 'GAP Analysis' devoted just 1 paragraph to EE.

Several reasons have been given for this benign neglect. One is the initial emphasis on access and the options there for RE. Another is the lower visibility for EE and the fact that much of it is accomplished by the thousands of private enterprise as it makes good business: "Experience demonstrates that EE costs on average 1/2 of supply based options (Coal or Gas or Renewables): USD $0.02 - $0.04/kWh". [22] [23]

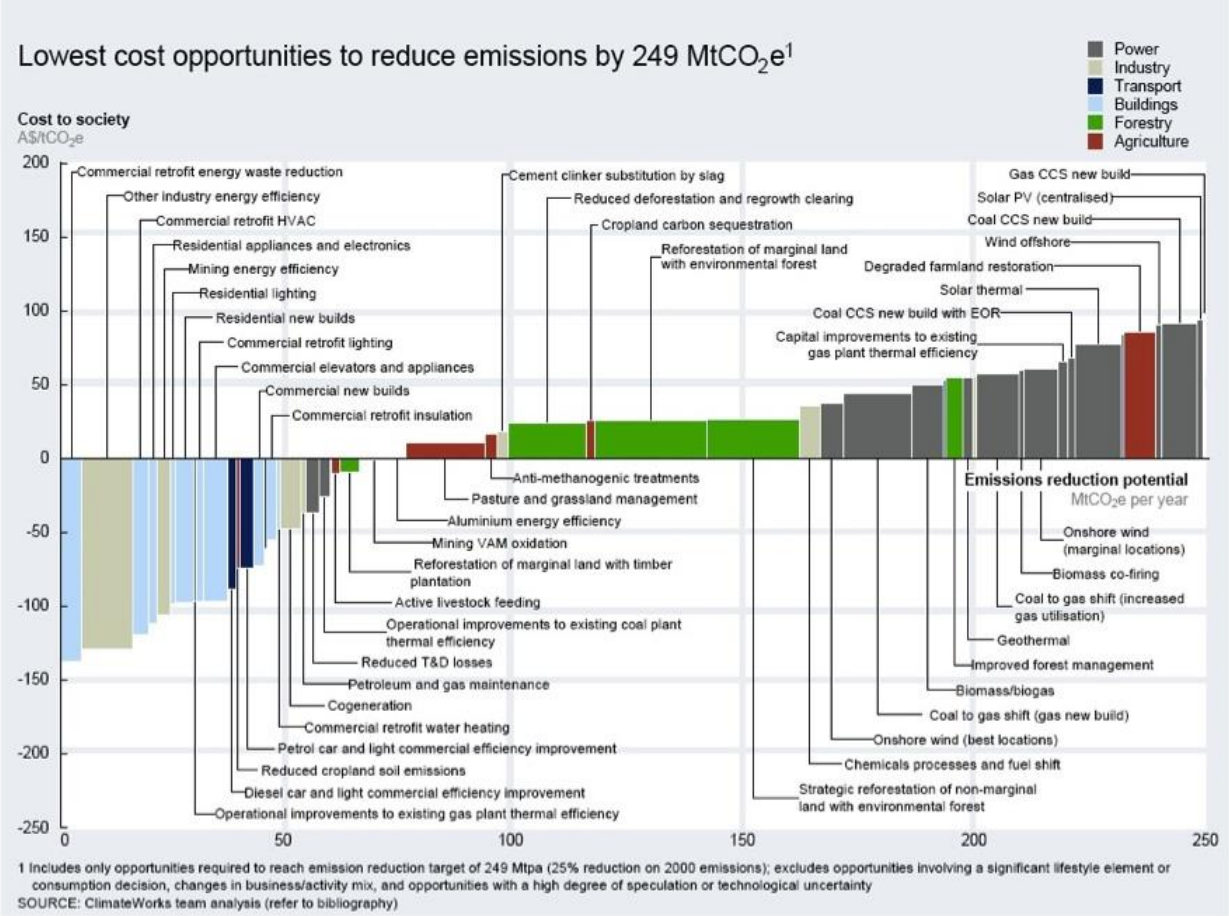
As the following figure shows, EE often results in savings or 'negative costs' in the reduction of Green-House Gasses (GHG), as one example of what is known as the Marginal Abatement Cost (MAC) curve.

[21] See e.g. 'UNIDO's Climate Change Strategy for GEF 6' by Alois P. Mhlanga, which also includes suggestions for biogas systems in houses, institutions and industries, such as GGC and the Banjul Breweries, also for heating of water at both.

[22] See e.g. 'Energy efficiency Negawatt hour The energy-conservation business is booming', The Economist, March 1st 2014

[23] From 'Renewable Energy and Energy Efficiency Policies- Lessons Learned', by Toby D. Couture (for ECREEE 17 March 2014 Abidjan)

Table 14: The 'costs' for a broad range of options for the reduction of Green-House Gasses (GHG)



Source: ClimateWorks

Decomposing increases in EE

The opportunities on the left sticking out below all are 'free of costs' as the benefits exceed the costs.

As can be read in the descriptions, many of the concerned opportunities relate to improvements in efficiencies – often in residential applications and retrofits – and in some cases just proper maintenance is sufficient. But not all is bright. One obstacle is the uncertainty of some of the benefits. Another one is that the benefits of improvements may accrue to someone else, e.g. if the improved house is sold and the value of the improvements is not properly included in the sales price.[24]

A final reason for the apparent neglect is the treatment of improvements in the EE of biomass under RE, as is also the case in the RRA.[25] To the extent that the biomass used is from a sustainable resource, the resulting energy service of cooking can be labelled as RE. But as what is involved is an increase in the EE of the stoves, the classification under EE can also be defended. It matters in quantitative terms as biomass provides still over 50% of the primary energy in The

[24] See e.g. ; 'Financing energy efficiency', The Economist, April 26 2014

[25] And in the NIP for AES stoves are discussed under energy access and include both EE biomass stoves and stoves for LPG.

Gambia. Unfortunately, in The Gambia no accurate data on biomass consumption for recent years are available, nor data on the number of improved stoves sold or in use, nor on their actual energy performance. Given the dominant role of biomass in total energy use, the absence of the concerned information it is not possible to define a present 'rate of improvement in EE'.

Given the neglect of EE and its partial 'hiding' under RE, it is not surprising that no proper national yardstick for the 'rate of improvement of EE' exists as yet. Changes in the general indicator of 'energy intensity' do not necessarily reflect an improvement in EE, but are often a result of changes in the composition of the GNP; most affluent countries have a low 'energy intensity' (EI) because of a higher share of 'services', which have a lower EI than 'manufacturing' or 'mining'. In fact, some of the energy intensive manufacturing may have been outsourced to other countries, such as China.

Instead of a composite index - such as a national energy intensity' (EI) – it is suggested to use partial but well measurable indices, such as 'the share of energy efficient lamps in lighting'. Such an index may have to be further refined in terms of concerned wattages, types of lamps – e.g. LEDs, CFLs, incandescents - or hours of use. Various indicators – e.g. for lighting, cooling - may be combined to arrive at some sort of 'composite index', but this is not necessarily helpful.

A very important indicator – if not the most important one at present for The Gambia – can be the 'use of EE stoves' and annual in/decreases in their use. The 'use of EE stoves' is by itself a composite index and may have to be decomposed into types of stoves, their EE and their actual use. This method is proposed indeed in the 'Template for National Energy Efficiency Action Plans under the ECOWAS Energy Efficiency Policy (EEEP) for the Period [2015-2030]'.[26]

Targets for the decomposed indices can be defined on the basis of specific information for Gambia or from information in other ECOWAS countries, which can also be used as examples for policies and measures.

2.3.2 What are the existing plans/strategies and what are the gaps?

2 components of EE program in The Gambia

Section 1.3 summarized the EE program in The Gambia as consisting of two components:

1 National Energy Efficiency Program

2 Sensitization on Energy Efficiency & Conservation

[26] Template for National Energy Efficiency Action Plans (NEEAP) under the ECOWAS Energy Efficiency Policy (EEEP), Period [2015-2020/2030], Draft Version 9, Dated 31.03.2014

1 National Energy Efficiency Program

National Energy Efficiency Program

This program was developed with the assistance from ECOWAS.

- Mainly to substitute incandescent bulbs with Compact Fluorescent Lamps (CFLs)
- Estimated 305,000 incandescent bulbs of different watts in residential sector
- Assuming 7 hrs. of daily illumination, if all the residential incandescent bulbs are replaced, 9MW generation capacity is reserved.
- US$ 450,000 was estimated to do the program
- The Government of the Gambia is seriously looking for funding to implement this program that will be carried out by the Ministry of Energy in collaboration with NAWEC, PURA & NEA

2 Sensitization on Energy Efficiency & Conservation

Sensitization on Energy Efficiency & Conservation

Supported by UNDP under its Environment & Energy sectors support program

- Printed leaflets, posters and T-shirt for sensitization
- Conducted nationwide sensitization campaign in late 2009, including TV panel discussion
- Prepared drama tapes in 4 main local languages and being shown on GRTS
- Bill boards at strategic locations for more sensitization

The second component describes the activities of SEE-WA, under implementation by GREC (activity 17 in Annex 3) wth co-financing by the EU. The program for substitution of regular lamps (incandescents) by CFLs (Compact Fluorescent Lamps) under the first component has been described by both NAWEC and PURA as highly successful, as it demonstrated very clearly to the recipients of free CFLs in this pilot – in exchange for 1 incandescent – the significant savings in electricity made through this replacement. This realization was reinforced by the use of prepaid meters, which provide a strong feedback on the quantity of kWh's utilized. The realization of these savings was spread by word of mouth and reinforced by the sensitization activities under the second component.

The CFL substitution pilot project was limited in scope and numbers – just 4000 CFLs -because of the limited funding and no efforts were made to generate carbon credits. This was a pity, especially because an earlier CFL project in The Gambia demonstrated that CFLs simply paid for themselves, not only through the savings by the consumers, but also by the value of the carbon credits which could be created.[27] This study

[27] This pilot project was financed by the Dutch Ministry of Development Affairs from the end of 2003 till early 2007 and implemented by Martin Zwanenburg for the Dutch company ETC, BV in association with Gambian partners.

already showed that the poor conditions on the Gambian grid – with regular spikes in voltage – made a realization of the promised hours of use per CFL impossible.[28] Reductions of over 50% were common and confirmed the complaints by the users of CFLs in the later pilot about the limited durability. The study mentioned included durability tests, which showed that frequent on-off switching had a strong negative impact on the durability of the CFLs. But at the present prices of CFLs, even then significant savings by the users can be realized. Savings are not only realized by the customers, but also by the utility, especially if the CFLs are used during peak hours. Reduced peak loads reduce the peak capacity required and hence the capital expenditure for the utility concerned. In several countries utilities provided customers around 1990 with one CFL per household for free, when the CFL price was around 20 $ and only the magnetic type was available. The utilities earned back their expenditure for the CFLs provided for free, even if the households did not buy extra CFLs themselves.[29] But the free CFLs turned out to be a very successful marketing campaign.

The following text is taken from ECREEE's EEEP Template introduced in the preceding section as well as the table (without title in the original):

"The NEEAP template considers national actions both at the level of the ECOWAS energy efficiency initiatives as well as at the level of energy consumption sectors. As guidance, the following matrix presents in an indicative manner the relationships between the EE initiatives and the different sectors considered here. Measures within a given initiative can encompass several sectors (e.g. EE Lighting or EE buildings cutting across residential, commercial/services and public sector). In their turn, measures in a given sector (e.g. residential) could encompass several initiatives."

Table 15: Matrix of EE initiatives and sectors where they can be applicable

	EE Lighting Initiative	EE Standards and Labelling Initiative	EE Buildings Initiative	High performance electricity distribution initiative	Safe, affordable, clean+sustain. cooking initiative
Residential sector	X	X	X	X	X
Tertiary sector (commercial and services)	X	X	X	X	X
Industrial sector	X	X	X	X	
Transport sector					
Public sector	X	X	X	X	
Energy supply					
Other sectors					

Source: NEEAP

[28] During the 2-year testing period, some brands performed better than others, but this performance could vary with different batches of the CFL, especially if not produced in the same plant.

[29] The calculation of the actual savings for the concerned utilities were more complex, as CFLs have a 'reactive load', which decreases the 'power factor' and results in less kWh sold than generated. To restore the power factor would require investments in 'capacitor banks'. The later electronic CFLs have a lower impact on the 'power factor'.

2.3.3 What are the priorities to be addressed to achieve the overarching objective in the field of EE?

Priorities for achieving objectives in the EE field

This table is presented as it can help to guide and prioritize EE actions and focus in The Gambia, as beyond the activities mentioned at the start of this section, not many EE activities have been undertaken, other than those discussed under the section grid infrastructure below (in 2.3.3.4).

The cells of the table can be checked as options for focus. Also several of the measures and policies listed elsewhere in the EEEP template can be considered and used as a checklist for completeness and prioritization, e.g. bans on sales of incandescent and efficiency standards on refrigerators – both applied in Ghana - or restrictions on the import of vehicles beyond a specified age, as applied in many of the ECOWAS countries.

The relevance for and opportunities in The Gambia need also to be considered, as well as a rough estimate on an expected cost-effectiveness, e.g. on the basis of the MAC curve presented in section 2.3.1 above. The particular values indicated there should be taken as an initial guide only.[30]

Given the close to 100 of EE options detailed in the NEEAP template, it is clear that a small country like The Gambia should select only a small number of these options as priorities. In fact, the present 3 priorities of the Ministry of Energy under EE have recently been indicated as;

- replacement of incandescent lamps by CFLs
- reduction of the losses in the T&D system
- the further dissemination of EE stoves
-

Table 16: Example of EE actions, targets and approach on the basis of present priorities of MoE

Nr.	Title	Baseline	Actions taken	Target	Activities		
					1	2	3
1	Repla-cing incandes cent lamps by CFLs	end 2014; estimated nr. of incandescents 305,000	4000 incandescents replaced in pilot project	e.g. ; 50% replaced by end of 2018	investigate options for carbon credits under PoA	define & adopt quality standards of CFLs	

[30] There are many variations of the MAC curve and the costs and benefits are in relation to the reduction of GHG unit, mainly in order to provide a common basis.

Nr.	Title	Baseline	Actions taken	Target	Activities		
					1	2	3
2	Reduc-tion of losses in T&D						
3	Increase d EE in biomass stoves						

EE as source of EA

In the following sections very rough suggestions will be made for additional EE activities.

It is interesting to note that the Technical Working Group with the Ministry of Energy refused to accept the original CN template with the initial suggestion to allow only for one tick-mark in the multiple choice question on 'focus on AE, RE or EE?'. Many EE projects will have a direct impact on energy access, because less of scarce resources will be used, i.e. less electricity by the use of CFLs and less biomass by the use of improved stoves. And hence more electricity or biomass will become available for other users, i.e. more access.

Buildings and Appliances

ECOWAS strategies and directives

Appliance efficiency, including lighting, space cooling and heating and refrigeration may be a good starting point and also in line with the recommendation in the RRA for 'standards and labelling'.[31]

ECOWAS through ECREEE has developed the ECOWAS regional strategy on energy efficient lighting. The strategy covers both on-grid and off-grid lighting. The actions outlined in the ECOWAS strategy cover the four parts of the integrated policy approach:

i) Minimum Energy Performance Standards (MEPS);
ii) Supporting Policies and Mechanisms (SPM);
iii) Monitoring, Verification and Enforcement (MVE); and
iv) Environmentally Sound Management (ESM).

The SE4ALL country action agenda for the Gambia will align its actions on energy efficient lighting with the ECOWAS regional strategy, such that national actions complement those taken at the ECOWAS level.

In addition, ECOWAS through ECREEE, in cooperation with the Member States has developed the ECOWAS Directive on Energy Efficiency in Buildings (EDEEB). The main purpose of the ECOWAS Directive for Energy Efficiency in Buildings is to promote the improvement of energy efficiency

[31] These can apply both to generating equipment to be in line with the requirements under the grid code, as to the EE standards of electricity consuming appliances.

of buildings among ECOWAS Member States.

Energy efficiency requirements in building codes and thermal regulations of ECOWAS Member States shall ensure that energy efficiency is taken into account in the design and building phase and can help to implement the building energy efficiency potential. The respective building code shall define norms and standards for the energy performance of buildings based on the climate zone in which they are located.

Specifically, this ECOWAS Directive defines the ECOWAS framework on energy efficiency for buildings and specifically:

a. A common general framework to measure and calculate energy performance of buildings;
b. Minimum requirements for new buildings energy performance;
c. Minimum requirements for existing buildings energy performance subject to major renovation and requiring project approval;
d. Minimum requirements for renewable energy sources used in new and existing buildings subject to major renovation and requiring project approval;
e. Buildings energy certification.

Measures in the buildings sector include, among others:

- National building code tailored to local conditions and construction practices, which requires or encourages minimum energy efficiency standards in buildings, criteria of tropical architecture and a link to urban planning, in line with the requirements of the ECOWAS Directive on Energy Efficiency in Buildings (EDEEB).
- Measures aiming at reducing energy consumption in public buildings by addressing the building as such and the building operation (including user behaviour)
- Develop and implement a system to award energy performance certificates for public buildings
- Promotion of the use of local materials in construction
- Qualification, accreditation and certification schemes for installers of energy–related building elements.
- Develop and disseminate a compilation of model designs for sustainable construction of small buildings

Transportation

Transportation

Suggestions have been made for a railway, but with the low levels of traffic and congestion this may not be appropriate or increase efficiencies in transport (also considering the energy embodied in the infrastructure required).

Grid infrastructure and supply efficiency

Grid infrastructure and supply efficiency

The BANDES project is credited with reducing technical losses in T&D substantially. Calculations may show similar options in other T&D improvements.

2.3.4 Which High-Impact Opportunities are relevant?

Relevant HIO

HIO nr. 5 on vehicle fuel efficiency may be appropriate and addressed e.g. by stricter procedures for transport licenses on buses and trucks and/or limits on the importation of vehicles over 5 years old.

2.4 Enabling Action Areas

Enabling AAs

The information provided in section 2.4 will follow the suggestions for information per subsection quite closely, but not completely. The questions and related information as provided focus on deficiencies and may incorrectly suggest that the accomplishments are limited. This is certainly not the case. The development and enactment of e.g. the RE Law and work on the FIT tariffs and procedures represent major accomplishments as well as the experience gained with e.g. Net Metering and the combination of a centralized and a decentralized approach.

Energy planning and policies

3 issues concerning the finalisation of future targets

As argued in the section on RE, three issues make it difficult at the moment to set future targets for RE, either on-grid or off-grid. For both the regulatory and institutional situation lacks sufficient clarity. The regulation and the FIT are still under development, as shown by lines 8-10 in Annex 3. And for rural areas there are strong suggestions for a clear Rural Electrification Strategy and suggestions to move to a concessionary system as successfully applied in Senegal.

For the main grid, it needs to be assessed how much RE from intermittent sources such as solar and wind can be accommodated. And with respect to NAWEC as the intended off-taker, doubts persist about its financial position and acceptability to private sector IPPs.

Recommendations from earlier studies – line 1&2 in Annex 3 – have not been implemented and a new study on the financial situation and management at NAWEC will be implemented, along with the development of a new National Energy Strategy with Action Plan, as shown in line 22 of Annex 3.

In addition, a Review of the Energy Policy of 2005 is under implementation and a second draft has been delivered in April to be reviewed in a workshop – line 14 of Annex 3 – but no information on this is available to the project team as yet.

Similarly, information on the implementation of energy projects under PAGE, under the Energy Strategy 2010-14 or under the National Investment Program on Access to Energy Services (NIP for AES)[32] is not readily available, nor the database developed for NIP for AES. This partly reflects the recent change of staff positions at the Ministry of

32 Not included in the present version of Annex 3

Energy and the situation will be rectified, but the concerned information is not yet available for the present draft of the Action Agenda.

The studies by NOVI in 2010 and by Mercados in 2012 – line 1 & 2 of Annex 3 – also report limitations on data available – such as load curve data – and on the process and reasons for decisions e.g. on adjustments of the tariffs. In this situation the need for more detailed statistical data is not a priority.

In the reports by NOVI and Mercados strong suggestions were made to separate the accounts – if not the organization – of the electricity and water sections of NAWECs operations. A detailed plan of action and time-schedule has been proposed by Mercados and the summary has been included in Annex 7.

NOVI emphasized strongly that the separation and clarification of the accounting system and the improvement of NAWECs financial position should take precedence over utility reforms such as privatization. And any privatization will require more and appropriate regulation and so a balance must be struck.

Business model and technology innovation

Business model, technology innovation and regulation

The business model for on-grid IPPs and Net Metering is quite clear, but the model for rural areas needs clarification. As shown in the recent publication 'From the bottom up'[33] explicit but not necessarily heavy regulation is required for rural electrification and the role of the private sector, both for the permanent situation of a separate (mini-)grid and for the transitory situation that such a separate grid will become part of the main grid. Customers need to be protected against the monopoly position of the (mini-)grid operator – whether a private, a community enterprise or a cooperative – and the rights of the (mini-)grid operator need to be protected when it becomes part of a larger grid and may become a distributor only and will lose its generation business and investments. Without proper guarantees and proper regulation in advance it may be reluctant to invest, but as a monopolist it may itself in turn lack proper incentives for efficient and cost-effective operations, depending upon the contractual arrangements and its obligations.[34]

Whether the regulation is done by the national regulator or by a separate agency – e.g. a Rural Electrification Agency - is one of the choices to be made. In the case of The Gambia arguments are made for a separation and also to relieve NAWEC from its loss-making operations in the provincial grids. But the main issue here is the tariff; should one national tariff policy be applied or should tariffs be adjusted to reflect the different costs on the different grids. It may well be that

33 'From the bottom up. How Small Power Producers and Mini-Grids Can Deliver Electrification and Renewable Energy in Africa', by Bernard Tenenbaum, Chris Greacen, Tilak Siyambalapitiya, and James Knuckles, 2014 Worldbank report 9781464800931, at http://dx.doi.org/10.1596/978-1-4648-0093-1

34 Similar conclusions were reached in the more recent 'Hybrid mini-grids for rural electrification: lessons learned', published jointly by USAID and the Alliance for Rural Electrification

considerations of sustainability and affordability are difficult to combine in the present situation in The Gambia, characterized by high costs of generation and low levels of income, leading to the highest share of income spent on electricity of all neighbouring countries. This difficulty in balancing both concerns is reflected in the continuing financial difficulties in NAWEC and its insufficient resources both for O&M and for new investments.

The following summary of another report by the World Bank[35] of 2011 correctly describes the present position and condition also for The Gambia: "Using a variety of quantitative indicators, the paper evaluates the performance of electricity tariffs against four key policy objectives: recovery of historic power production costs, efficient signalling of future power production costs, affordability to low income households, and distributional equity. ...

The conclusion is that achieving all four of these policy objectives simultaneously is almost impossible in the context of the high-cost low-income environment that characterizes much of Sub Saharan Africa today. Hence most countries find themselves caught between cost recovery and affordability."

This means that there is no silver bullet to solve this dilemma. But it does not imply that nothing can be done either. One appropriate action is to continuously look for the lowest possible costs to achieve set objectives. This has been done in the NIP for AES, where on-grid and off-grid methods including the use of SHS were selected on the basis of population density and distance to the grid. Earlier a similar approach was followed in 'Renewable Energy Master Plan for The Gambia 2006'.[36]

A comparison shows that recommendations can change over time on the basis of changing cost structures, which suggest an increasing attractiveness of decentralized solutions with more RE and especially PV. As shown in the NIP for AES; other solutions can also be cost-effective in the provision of specific energy services for productive purposes as shown by the MFP and its careful introduction and up-scaling.

Another point relates to the electricity tariff structure, cross-subsidization and the resulting incentive structure for NAWEC and for its customers. As different tariffs apply to different customers, not only per kWh, but also for connection charges, for pre-paid meters and in the application of 'lifelines', i.e. monthly thresholds of 50 kWh per household without charge, cross-subsidization takes place between customers for electricity and in the case of NAWEC also between customers of water and electricity. For NAWEC customers with higher tariffs are 'more valuable' than customers on 'lifelines' and hence there

[35] 'Power Tariffs Caught between Cost Recovery and Affordability', The World Bank Africa Region, Sustainable Development Unit, December 2011, Cecilia Briceño-Garmendia and Maria Shkaratan at http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5904

[36] 'Renewable Energy Master Plan for The Gambia 2006', by Enrique RODRIGUEZ-FLORES for Lahmeyer International GmbH at http://renknownet2.iwes.fraunhofer.de/pages/wind_energy/data/3_REMasterPlanforTheGambia_Rodriguez.pdf

is little incentive for NAWEC to encourage e.g. high tariff customers like hotels to shift from water heating by electricity to solar water heating (SWH), as pointed out in the NIP for AES.

At present, there is a strong cross-subsidization of rural consumers by more urban consumers as a result of the 'one tariff policy' and the higher costs in rural areas. NAWEC reduces rural losses by reducing the hours of operation and logistical restrictions on fuel transportation and storage, but ultimately both the 'one tariff policy' and the logistical issues are a matter of choice. And even though the number of rural customers and the hours of operation are limited, those with a connection are in a better position than those without it, whether their lack of connection is the result of inability to afford the connection charges or the non-availability of the grid in their area.

It has also been claimed that the operations of NAWEC are inefficient e.g. as a result of over-staffing. This may be true and can possibly be checked by benchmarking, but it reflects both past decisions and inertia in the system as in any organization. This may be changed by privatization as a crude measure or even a 'shock therapy', but it is no panacea, creates its own problems and requirements for regulation and - as mentioned earlier – is not considered a priority e.g. by NOVI in its Diagnostic Energy Sector Review of 2010.

Finance and risk management

Finance and risk management

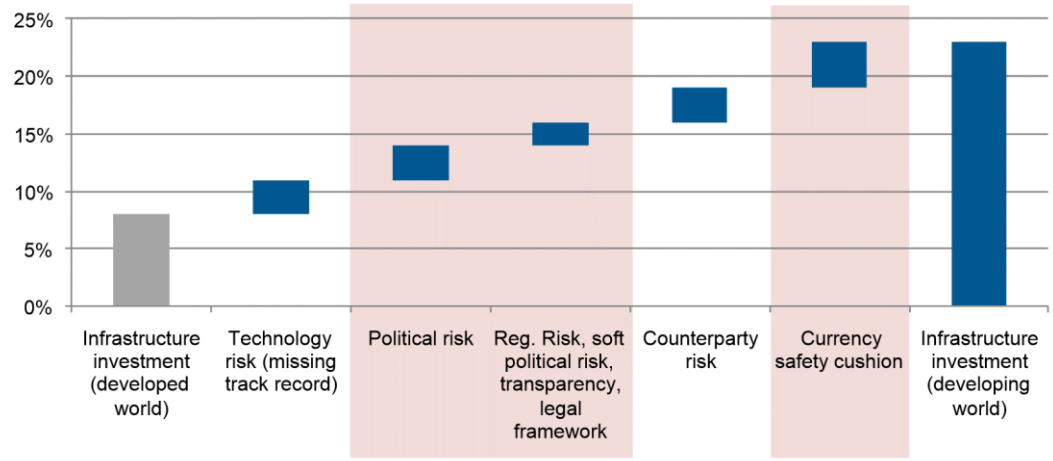
On the one hand, The Gambia is blessed with excellent irradiation, which creates excellent opportunities for access to solar PV at continuously reduced costs. On the other hand, the financing of the high up-front capital expenditure of solar PV required is so expensive – if available at all – that the economic benefits cannot be realized for lack of access to finance. This has recently been experienced again in 4 of the 6 GEF 4 pilot projects for rural mini-grids, which could not obtain co-finance, even where 30% of the capital costs were provided as a grant by the program.

The difference in the costs of capital[37] between developed and developing countries is mostly shown by means of the following figure (appearing with different names); As included in AFUR Guidelines Renewable Energy and Regulation[38]

[37] Simplified by not making a distinction between the costs of equity and the costs long term debt, resulting in combination in the WACC; the weighted average costs of capital.

[38] 'AFUR Guidelines Renewable Energy and Regulation', Dec 2013 by Martin Zwanenburg at http://www.afurnet.org/index.php/en/downloads/cat_view/4-publications/8-afur-guidelines (AFUR; African Forum of Utility Regulators)

Figure 11 Impacts of risk components in developing countries on costs of capital



Derisking and 0-sum approaches

This figure shows how the cost of capital of about 8% in the developed world increases by almost 200% to about 23% for infrastructure development in developing countries.

The exact definition of and contribution by each component is not so important. The major point is that in order to reduce the costs of capital for a particular RE project two different approaches can be followed; one is the compensation of these costs for a particular project by subsidies directed at this particular project e.g. by subsidies on its investment and/or production/operational costs. This tends to amount to a 0-sum result ; what is spent on one project, cannot be spent on another one. The other approach is directed at reducing the different risks components as such, which will then benefit all individual RE projects, i.e. a non 0-sum. In practice, both approaches are combined, but the preferred approach is the second one of 'derisking'. In this way the impact or leverage per $, Euro or whatever currency is used becomes the highest, which is appreciated from the perspective of the donor country and its taxpayers or by any other semi-commercial or philanthropic organization and its supporters.[39] More details on 'de-risking strategies' and leverage are beyond the scope of the present report.[40]

A good example of the non 0-sum approach is the efforts made and/or intended by e.g. ECREEE and GEF/UNIDO to sensitize regional and national bankers and investors on both the opportunities and the particular characteristics of RE projects and especially their particular cash-flow structure with high initial expenses, compensated by major annual operational cost savings and profits and often sufficiently short Pay-Back-Periods (PBPs) against acceptable risks.

This should also include a sensitization on the most promising sectors,

[39] In 'Steps in The GEF project cycle.ppt' , presented at the Inception Workshop of GEF 5, on 7 July 2014 at the Kairaba Hotel it was mentioned that GEFs efforts have led to a reduction of over 2.5 billion tonnes of CO2 at costs for GEF of slightly over $1 per tonne.

[40] See e.g. 'Key Findings from UNDP's Derisking Renewable Energy Investment Report', by Marcel Alers , Head, Energy, Infrastructure, Technology and Transport United Nations Development Programme at IRENA/CPI WFES Side Event: Risk Coverage for Renewable Energy Investments, 20 January 2014

such as e.g. SWH (Solar Water Heating), which can provide strong benefits not only to those who install SWH, but also to those who can make use of the savings in electricity realized, which represents a national socio-economic benefit. For this reason this can also warrant a technology specific approach – such as SWH - with special promotion efforts and loans on concessional terms, which will facilitate the realization of its national socio-economic benefit and potential.[41]

Another example of a non-discriminatory approach and as applied in The Gambia is the allocation of a SIC or "special investment certificate" issued by GIEPA, containing tax breaks for five years depending on the size of the investment and the fulfilment of the required conditions, specified in advance.

Another example of a non-discriminatory approach that can be applied in The Gambia is to investigate the possibilities to obtain carbon credits under Programs of Activities (PoAs), in particular for CFLs and stoves. For both a PoA is under development and it may be possible for The Gambia to make use of these PoAs. This will require a limited effort at the national and if successful, all stove and CFL projects can benefit from it at relative low costs.

Capacity building and knowledge sharing

Capacity building and knowledge sharing

Capacity building and knowledge sharing also comes under the non 0-sum approaches. This can be initiated by the government, by general or specific trade associations/organizations such the Chamber of Commerce or REAGAM, by supporting organizations such as GREC or the PMO (Project Management Office) of GEF/UNIDO or by individual organizations seeking cooperation. An example of this is the cooperation between the Ministry of Health and Social Welfare (MoH&SW) and PUG (Power-up-Gambia) and in turn its cooperation with GTTI and GREC in the design of its PV facilities and the efforts towards standardization, which will allow for a better and more cost-effective O&M by the technicians.

Similarly informal or formal cooperation takes place in PPP approaches towards development of RE projects. Such a co-operation does not need to be government initiated or directed, but can and should be supported and facilitated where appropriate.

Many other on-going examples exist, such as the cooperation between the Ministry of Energy, the Ministry of Agriculture, the Gambian Groundnut Company and Greentech Ltd in the facilitation and promotion of biomass briquettes using groundnut shells, wasted otherwise.

[41] The need to support and promote SWH in The Gambia- e.g. in the hotel sector - has been recognized for decades, so far with limited success. At present, PURA is making special efforts, e.g. by specials fairs and exhibitions.

Other priorities

Other priorities

The importance of transparency in the award of contracts in the energy sector, such as to potential IPPs has been stressed regularly and it has also been suggested to organize tenders in the awards of contracts for rural electrification, following the example of Senegal. This will imply a major institutional change and will require the formalization of a Rural Electrification Strategy, as strongly advocated in the RRA.

The inclusion of some points for discussion in Annex 4 of this draft of the AA

Points of discussion

Whether such a formalisation is a necessity or whether a 'trial-and-error' approach is to be preferred has been included as point B in Annex 4, which present 5 issues for discussion. Several of these points make reference to on-going of scheduled activities on energy policies, strategies and projects summarized by line in Annex 3.

These issues as well as recommendations in this draft will be presented for discussion at the validation workshop on December 10&11 in Banjul.

3 PART 3: COORDINATION AND FOLLOW-UP

3.1 SE4ALL National Secretariat or Coordinating Group

SE4ALL National Secretariat / Coordinating Group

For an effective implementation of the SE4ALL Action Agenda, inclusive governance arrangements will be required, including cross-sectoral cooperation and inter-ministerial coordination. There is already a National Multi-sectoral Committee (NMC) in the Gambia dealing with the implementation of the goals of the White Paper by 2015 (100% of the population with access to modern cooking fuel - at least 60% of the population living in rural and peri-urban areas with access to productive energy service in villages; - 66% of the population with access to electricity supply). The setting up of the NMC was made possible with the assistance of the UNPD and ECOWAS.

The Gambia National Multi-sectoral Committee (GNMC) is composed of 3 committees: Steering Committee (SC), the Technical Working Group (TWG) or National Expert Group and the Validation Stakeholder Group.

3.1.1 Composition of the Steering Committee

The Steering Committee is composed of Ministers of the following Ministries, civil society and private sector.

Table 17: Gambian SE4ALL Steering Committee

No	Institution	No of Representative	Role
1	Ministry of Energy	1	Chair
2	Ministry of Finance and Economic Affairs	1	Co-Chair
3	Ministry of Forestry and Environment	1	Member
4	Ministry of Trade, Industry and Regional Integration	1	Member
5	Ministry of Agriculture	1	Member
6	Ministry of Women's Affairs	1	Member
7	Ministry of Basic and Secondary Education	1	Member
8	Ministry of Education	1	Member
8	Ministry of Health and Social Welfare	1	Member
9	Ministry of Information, Communication and Infrastructure	1	Member
10	Gambia Chamber of Commerce and Industry (GCCI)	1	Member
11	The Association of Non-Governmental Organizations (TANGO)	1	Member
12	Representative of the TWG	2	Secretary and Member
		Total: 11	

3.1.2 Duties and Responsibilities

Duties and responsibilities of the SC

The duties and responsibilities of the Steering Committee will include the following:

1. Review and approve Energy Access programs and work plans
2. Monitor and evaluate the implementation of Energy Access program and work plans
3. Conduct at least one quarterly meeting
4. Shall provide strategic policy guidance to the whole access to energy program.
5. Mobilize resources for AES program of the Gambia
6. Authorize/Establish ad hoc thematic commissions

3.1.3 Composition of the Technical Working Group or National Expert Group

Composition of TWG / National Expert Group

The TWG serves as the technical arm of the GNMC and provide expertise and guidance to the key stakeholders. It will consist of key government Ministries and Departments, civil society, private sector and donor community. The table below shows the composition of the TWG.

The TWG can invite any relevant institution or resource person to attend a work session.

Table 18: Composition of the TWG

No	Institution	No of representative	Role
1	Ministry of Energy	4	Chair
2	Ministry of Finance and Economic Affair	1	Co-Chair
3	Ministry of Agriculture	1	Member
4	Ministry of Basic and Secondary Education	1	Member
5	Ministry of Trade, Industry and Regional Integration	1	Member
6	Ministry of Forestry and Environment	1	Member
7	Ministry of Health and Social Welfare	1	Member
7	Ministry of Education	1	Member
8	Ministry of Information, Communication and Infrastructure	1	Member
9	National Environmental Agency	1	Member
10	National Agricultural Research Institute	1	Member
11	Department of Community Development	1	Member
12	Department of Water Resources	1	Member
13	National Women's Bureau	1	Member

No	Institution	No of representative	Role
14	National Women Finance Association	1	Member
15	National Water and Electricity Company	1	Member
16	National Office Support Unit of European Union	1	Member
17	Renewable Energy Association of the Gambia (REAGAM)	1	Member
18	United Nations Development Program	1	Member
19	Concern Universal	1	Member
		Total: 24	

Source: UNDP

3.1.4 Duties and Responsibilities of the Technical Working Group / National Expert Group

Duties and responsibilities of the TWG

The duties and responsibilities of the Technical Working Group will include the following:

1. Identify the energy needs of various sectors
2. Develop short, medium and long term energy access programs
3. Support mainstreaming of AES in national priorities and policy papers and Secure necessary funds to implement Energy Access Program and action plans
4. Explore the various energy resources
5. Increase awareness of the general public on issues of access to energy services through various means such as TV/radio panel discussion, informative leaflets, public sensitizations etc.
6. Serves as supervisory body of the Multifunctional Plate Form (MFP) Coordinating Unit
7. Serves as a technical arm of the GNMC.
8. Convene at least three meetings every quarter
9. The Ministry of Energy will serve as the secretariat.
10. Follow on the work of GNMC Secretariat
11. Update the Gambia's AES ATLAS chapter in the ECOWAS EAS website: www.energy accessafrica.org
12. Identify AES partnerships and engage key bilateral and multilateral donors,
13. Any other duties assigned by the Steering Committee

3.1.5 The Validation Stakeholder group

Composition of the Validation Stakeholder group

It comprises key Government Ministries and Departments, civil society, private sector and two representatives of the TWC.

1. Office of the President, The Republic of The Gambia
2. Ministry of Energy
3. Ministry of Finance
4. National Water and Electric Company (NAWEC)
5. GAMPetroleum (GAP)
6. Public Utilities Regulatory Authority (PURA)
7. Renewable Energy Association of The Gambia (REAGAM) – REAGAM is a non-profit cooperation of approximately 17 to 19 private and public companies and individuals active in the promotion of renewable energy projects such as small solar PV installations, solar thermal, micro hydro, cooking stove improvements, and the expansion of jathropa growth for oil production in The Gambia.
8. The Gambia Investment and Export Promotion Agency (GIEPA) – GIEPA, created by The Gambia Investment and Export Promotion Agency Act of 2010
9. The Department of Forestry
10. The Department of Community Development
11. The National Environment Agency (NEA) Follow-up analysis

3.2 Monitoring, evaluation and reporting

M&E and reporting

To continually build support for the SE4ALL Action Agenda and foster ownership and accountability, a mechanism should be put in place to track progress that should link to the Government's own monitoring and evaluation instruments and where relevant build on existing monitoring exercises by the different partners, facilitate the collaborative participation of stakeholders in monitoring, and make the monitoring information accessible to the public..

The overall objective of the monitoring and evaluation process is to care for successful implementation of the activities by:

- Reviewing annually the AA implementation, underlining the achievements and gaps;
- Point out required out changes as reflected by the reality on the ground;
- Enable corrective so as to adjust strategy and implementation plan to meet the need on the ground

A detailed monitoring plan for tracking and reporting on program time-bound milestones and accomplishments will be prepared by the SE4ALL Secretariat at the beginning of project implementation and then periodically updated.

3.3 Link to Investment Prospectus(es)

AA's link to the IP

The Action Agenda is closely linked to the IP. The role of the SE4ALL Secretariat is mainly of monitor the implementation of the IP by enabling the environment and facilitating the process of developing, financing and implementing and monitoring the individual project so as to achieve the target by 2020 and 2030.

4 SUMMARY AND CONCLUSION

Under the support of EU BizClim to the SE4ALL program, two African countries – The Gambia and Kenya - were selected for the pilot development of the Action Agenda (AA) and the Investment Prospectus (IP). The AA and the IP are the cornerstones in the SE4ALL approach; the AA is developed to see which energy targets can be achieved and which actions are required to obtain these targets. Targets are set for the long-term, i.e. for 2030 with sub-targets prior to 2030. The IP then serves to present energy projects required to achieve these targets to private and public investors.

The process of developing the AA and IP in The Gambia started late in March 2014 when Prof. Elmissiry of NEPAD and the project team made their first joint visit to The Gambia, where they met with the Minister of Energy, with the staff of the Ministry of Energy and with several other stakeholders.

During the second visit end of June a training workshop was held to make stakeholders of both the public and the private sector aware of the opportunities of the SE4ALL program for The Gambia and of its requirements in terms of project proposals that may be suitable for inclusion in the Investment Prospectus to be developed in parallel with the Action Agenda.

In July the project team supported the TWG (Technical Working Group) on energy in several meetings at the Ministry, where the TWG revised the template for the Concept Note (CN) and with a grid and procedure to evaluate the CNs to be received. Potential proposers of projects have been approached for the submission of CNs, with a first deadline in mid July and a second in mid August.

The first draft of the AA was developed in August on the basis of the information from The Gambia and relevant publications from The Gambia and international publications and experiences on energy and in particular renewable energy. Fortunately, especially renewable energy has seen a strong development in which investments in renewable energy globally started to exceed those in conventional energy technologies. A milestone not well appreciated as yet.

A major reason for this change was the steep decrease in the costs of generation of electricity with PV. Because of this reduction in costs, PV plants became competitive also at utility scale, especially in countries with good irradiation, such as The Gambia. This in turn made it necessary for PURA to revise its Feed-in-Tariff (FIT) for PV, as its unit costs per kWh became lower than those for the generation based on fossil fuels, which is at present still the dominant source of electricity in The Gambia. Another consequence of the lower costs of PV is their greater competiveness, especially in rural areas and for distribution over mini-grids. This in turn requires a further development of the strategy for rural electrification.

The major distinction between generation from fossil fuels versus the generation from renewable sources such as PV, wind or hydro is the pattern of cash-flow. Conventional generation requires relatively limited investments against relatively high running costs, mostly fuel. For renewables it is the other way around. The disadvantage of this pattern of cash-flow for renewables in developing countries like The Gambia is the much higher costs of capital, e.g. a higher rate of interest, if the capital (loan or equity) is available at all. This situation requires many actions to reduce the cost of capital and to increase its availability. This is one of the elements in the Action Agenda under the heading of 'Enabling Environment'. Other elements are e.g. the lack of technical skills for installation, operation and maintenance of RE equipment. Recommendations from different organizations and

reports have been included in the Action Agenda, not just for Renewable Energy (RE), but also for Energy Efficiency (EE) and Access to Energy (AE).

Targets are to be set for the rates of annual increases in RE and EE respectively the targets and years of their achievement for AE. For AE a set of 7 targets has been developed by the UNDP in its National Investment Program for Access to Energy Services for The Gambia (NIP for AES). This program will deliver improved stoves, more sustainable forestry, LPG stoves, access to mechanical power and limited access to electricity all over the country. For RE the focus was on electricity and a distinction has been made and targets set for i) supply from large hydro projects outside of the country ii) supply of electricity from RE to the grid and iii) supply of electricity from RE to the off-grid areas or through mini-grids. The emphasis in domestic electricity from RE is on PV and – to a lesser extent – on wind. The availability of biomass for generation of electricity is under assessment. Overall targets for EE have not yet been identified and will initially be set on specific options, such as on the replacement of incandescent lamps by EE lamps, such as CFLs or LEDs.

The achievement of these targets is not fully under the control of The Gambia. Especially, the availability of the anticipated access to electricity from the OMVG hydro projects in Senegal and Guinea is unpredictable as well as future access to the WAPP (West African Power Pool). On many projects which will rely on private finance, the result will be uncertain, but The Gambia can take actions to enhance its 'enabling environment', both for its energy sector and as a destination for investment in general. As for the achievement of the goals under AE, three of the 7 sub-targets of the NIP for AES are to reach a 100% achievement by 2020 and UNDP has expressed confidence that the targets can be achieved. But detailed information on funding and progress so far is as yet not available. For the remaining 4 sub-targets additional activities beyond 2020 are to be undertaken in order to achieve their targets of 100% by 2030.

In recent public consultations the concerns about rising prices for fuel-wood were prominent along with suggestions for more and cheaper improved stoves and for briquettes as an alternative fuel. A review of existing policies is required, including levels of subsidy and the sources of funding. The Action Agenda does devote attention to this sector and several of the CNs received deal with 'stoves and briquettes'. Improved stoves have a long history and extensive research has been done in terms ranging from 'lessons learnt' to 'why stove projects failed'. So, it is encouraging to read in a recent report[42] that The Gambia has a penetration rate of improved stoves of 20%, much higher than any other ECOWAS country.

[42] 'The ECOWAS Renewable Energy and Energy Efficiency Status Report', November 2014, by REN21 in cooperation with ECREEE.

5 ANNEXES

Annex 1. **Active High-Impact Opportunities**

An initial set of 50 potential HIOs have been identified. The most advanced ones are listed below.

List of advanced HIOs

Close to being formalized	**Discussions underway**
1. Energy and Women's Health 2. Phase out of Gas Flaring in Oil Production 3. Sustainable Bioenergy 4. Vehicle Fuel Efficiency 5. Water-Energy-Food Nexus 6. Clean Energy Mini-Grids 7. Universal Adoption of Clean Cooking Solutions	1. Advanced Lighting & Appliance Efficiency 2. Energy Efficiency in Buildings 3. Off-Grid Lighting & Charging 4. Sustainable Energy for Island Economies

Annex 2. **Overview of all CNs received**

CN file number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Proposer	**PUG**	**PRSP**	**Sunray Development**	**KEN**	**Greentech**	**REAGAM**	**PUG**	**Sunray Development**	**PCU MoB&SE**	**PURA**	**Women's Bureau**	**GTTI**	**MoE**	**Gambia Tourism Board**	**NEA**	**MoE**	**MoE**	**MoE**
Short title	PV to 3 rural hospitals	briquetting & stoves	GALDEP farmers enterprises	Rocket stoves for Kartong	Decent. & diversif. Biomass energy	Hybrid mini-grids in remote communities	Leveraging PV to fund health care needs	Model village solar enterprise	PV and Litre of Light for Public Schools	Provincial Energy Efficient Project (PEEL)	Empowerment by access to clean cooking	Facilitating RE access and affordability	Multifunctional Platforms (MFP)	Energy Efficiency In Hotels	Renewable Energy for the NEA	Efficient Lighting Project	Solar Home Systems Project	Wind Park at Tujereng
Technology	PV + battery + Net Metering (NM)	briquetting & stoves	PV	stoves & improved woodlots	up-scaling briquetting & stoves	50 sites with 10kW wind + 30-90 kW PV	test NM for 260 kW + up-scaling 1 MW	60 kWp hybrid with PAYG technology	PV and bottle lighting	1,000 LEDs as pilot for consumer in 2 areas	Emphasis on improved stoves & fuels	Provision of training relevant to RE	simple diesel machines	Energy management, solar lighting system	Solar energy, improved internal grid	Compact fluorescent lamp (CFL)	PV solar system	Wind turbines
Investment budget in 000 GMD	10,080	110,000	27,214	350	6,300	2,092,020	34,245	22,800	252,000	2,000		10,000	6,443	6,000		42,954	429,547	429,547
Annual budget in 000 GMD	426	9,000		< 50	4914		covered by revenue		84,000	0			42		46,443			
Own resources in 000 GMD	25% of annual budget		some	revolving funds			use of prospectus	with communities		200		1,000	402					
Regular/ annual budget of proponent in 000 GMD	3,528	120					3528		1,000,000			11,000	1,073				1,073	

CN file number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Focus	AE	✓	×	×		✓	×	×	✓	✓		×		✓		✓	✓	✓	✓
	RE	×	✓	✓		✓	✓	✓	×	×		✓	✓			✓			✓
	EE		×		×	×			✓	✓	×	✓			✓		✓	✓	
Community involvement	high	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
	mediu.														✓				
	low															✓			
Indicators		Gwh, cost reduction & patients served	Nr. of stoves & quantity of biomass briquettes	Nr. community businesses, nr. trained, ha developed	Nr. of ha improved & nr. of stoves	2 stoves/ HH, 40 kW for press, 15,000 tons saved/ annually	50 community with 100-1,000 families, consuming 40-100kW/ day	2,000 kW/day & 'proof-of-concept' for up-scaling by 1 MW	System installed, HH connected, community enterprises operational	Number of schools provided	Savings by households and improved voltage conditions	Nr. of campaigns & trainings improved stoves & MFPs	150 trainees each in PV, briquettes and improved stoves	Nr of households connected/ Nr of improved stoves/ Qt. of MW produced / Area under forest management	Hotels are awareness/ 70 % of hotels implement energy mgmt./ 1 hotel staff trained on energy mgmt	55 offices will be connected/ Nr capacity of solar panels installed / amount of Watts produced	Nr of households' awarenessm/ Nr incandescent replaced / Nr of kW/ Volts level/ Load level	Nr of households connected/ Improvement in quality educati and health conditions	10 000 households connected/ 50 Hotels connected/ Improvement in health conditions / Nr of enrolment and passes in schools
Beneficiaries		Better hospital services to 90,000 patients, esp. women & childr	70,000 stoves, 17,000 tons of briquettes & income for 3,000 workers	The women farmers, their families & communities and the consumers	70-90 stoves for the 200 compounds to benefit users & environment	Families using stoves, bulk consumers, employment in value chains	Communities with e.g. refrigeration & ITC services, RE & SME sector	40,000 patients and NAWEC & customers with more electricity	The communities, staff involved and new enterprises & employment	Student & teachers in all schools (from basic to secondary)	The households using the LEDs	Women, girls and children	The trained women & youth and all users of improved energy	Women, community	(All) Gambian Hotels	various units and offices of the Agency	200 000 households	Households, Schools, health centres, ICT centres	10 000 Households, 50 Hotels

CN file number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		en																	
Geographical location	national		✓			✓				✓		✓	✓		✓		✓		
	regional		✓	✓						✓	✓		✓						
	provin.	✓	✓		✓			✓		✓	✓		✓	✓				✓	
	town/ area		✓						✓	✓			✓			✓		✓	✓
	specified	yes	no	yes	yes	no	yes	yes	no	no	no	no	no	yes	no	no	no	yes	yes
Concen-trated in	urban					✓				✓		✓			✓	✓	✓		✓
	peri-urban		✓			✓				✓		✓	✓				✓	✓	
	rural	✓		✓	✓		✓	✓		✓	✓	✓		✓			✓	✓	
no earlier projects		✓			✓			✓	✓	✓		✓	✓			✓			
earlier projects with adjustments		✓	✓	✓		✓					✓				✓			✓	✓
earlier projects in same region											✓								

CN file number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
earlier projects in other region				✓													✓		
estimate of use	household		60%		100%	50%			60%			40%	30%			100%	100%	25%	60%
	productive		20%	100%		40%			20%		35%	35%	20%						40%
	social/ comm.	100%	20%			10%		100%	20%	100%		25%	50%	100%				75%	100%

The ✓ indicates the applicability as indicated by the project proponent, which often indicated more than one classification as appropriate.

The ✖ indicates the tentative classification proposed for these 18 CNs. This classification was also indicated by the proponent, but often not as the only one.

Abbreviations

CFL	Compact Fluorescent Lamp
GALDEP	The Gambia Lowland Development Project
GMD	Gambian Dalasi
GTB	Gambia Tourism Board
GTTI	Gambian Technical Training Institute
KEN	Kartong Eco Village Network
NEA	National Environmental Agency
NM	Net Metering
PAYG	Pay-As-You-Go
PCU MoB&SE	Projects Coordination Unit Ministry of Basic and Secondary Education
PRSP	Paper Recycling Skills Project (PRSP) Biomass Recycling Research and Training Centre
PUG	Power Up Gambia
PV	Photo-Voltaic (or Solar PV)
REAGAM	Renewable Energy Association of Gambia

Annex 3. **Recent, present and scheduled work on energy policies, strategies and RfP**

Based on information as available end of July

#	Subject	Component	By	For	Completed or status	discussed in draft AA?
1	Diagnostic Study Energy Sector		NOVI	WB	completed November 2010	yes
2	Strategy for Electricity		Mercados	EU	completed/validated? end 2012	yes
		with Action Plan & Time line			see Annex 7	yes
3	Projects under GEF 4	pilots for rural RE mini-grids		UNIDO	from 2012 - 2015	yes
4	Renewable Readiness Assessment		ECREEE	IRENA	completed end of 2013	yes
5	Renewable Energy Law				enacted early in 2014	yes
6	FIT (Feed-in-Tariff)	Procedure	PURA		proposed early in 2014 (see Annex 8)	yes
7		Tarification	PURA		completed	no
8		but revision on PV	consultant	PURA	under review	yes
9	further	Regulation	MoJ & MoE		?	yes
10	Development of legal docs for PPA for > 20 kW, T & D		Dentons US LLP	MoE & AfDB	draft generic templates by July	yes
					then training also on negotiations	no
11	REF (Renewable Energy Fund)				under implementation	no
12	Biomass	Assessment	?	MoE	due by end of 2014	yes
13		Strategy o.b.o. Assessment	?	MoE	to follow Assessment	no
14	Review of Energy Policy		Sahel Invest	?	2nd draft April 2014	no
					to be reviewed in workshop	no

#	Subject	Component	By	For	Completed or status	discussed in draft AA?
15	Comprehensive consultations at national & local level		2 consultants	UNDP	report for consultations Aug 19-21	yes
					both to feed into AA & IP (see '16')	
16	Final draft of AA & IPs (Investment Prospectus)		Particip	EU & NEPAD	for validation September 29&30	yes
17	Supporting EE for Access in West Africa (SEEA-WA)		GREC	ECREEE/EUEI	to be completed by Nov 2014	yes
18	Development of National RE Action Plan (NREAP)		support by ECREEE		due by end of 2014	yes
19	Development of National EE Action Plan (NEEAP)		support by ECREEE		due by end of 2014	yes
20	Projects under GEF 5	Greening the Prod. Sector	with ECREEE	UNIDO	selection finalized end of 2014	yes
21	LCDP (Low Carbon Development Pathway)		Dep. of W.R.	EU	MoE to call a task team meeting	yes
22	National Energy Strategy with Action Plan		Fichner	WB	negotiation on contract ongoing	yes
	+ analysis of finances and financial management of NAWEC					yes

LCDP (Low Carbon Development Development Pathway)

Annex 4. **Issues for discussion**

Ref.	Issue	Introduction
A	technical capacity of grid for RE from intermittent sources (e.g. solar & wind) is limited	For technical reasons, no grid can be fed only by intermittent resources, over which there is no control. This is especially true for The Gambia, where grid stability is extra limited, because of the small system & with low inertia without steam turbines. For this reason Mercados suggested an upper limit of 10% for solar & wind. PURA roughly adheres to this suggestion by putting a present limit of 6 MW. Some developers claim that tests with software by Siemens indicate that over 30 MW can be handled in the GBA without major modifications. UNIDO is recommending a study on this issue.
B	regulatory & institutional capacity of grid for RE from solar & wind is limited	Activities such as scheduled in lines 8-10 of Annex 3 support the claim that regulatory capacity is as yet insufficient. Both the RRA and the NIP for AES emphasize the need for a Rural Electrification Strategy - with clear boundaries for grids and appropriate off-grid business models - and propose the use of 'concessions' as in Senegal + the use of tenders. Hence, also the institutional capacity is limited. The recent WB study 'From the bottom up' also puts emphasis on the need and options for regulation, 'light or heavy' and by a separate agency? The issue is; should both capacities be improved first or can action be taken on a 'trial and error' basis?
C	conditions for demo/pilot or up scaling on basis of environment, technology or size?	GEF/UNIDO tends to regards projects as demo/pilot, whereas NIP for AES builds a program around e.g. a MFP because of its success in neighbouring countries. When is an approach ready for up-scaling? When can a particular technology be considered as proven & suitable, e.g. small hybrids of solar & wind, as suggested for up-scaling in a CN? Were the 2 related pilots under GEF4 successful and sufficient? Are the resource conditions known sufficiently all over the country? Is wind available at night? Is expert advice available? Can the size of e.g. PV plants feeding into the grid be increased only gradually?
D	the condition of NAWEC in relation to what investors require + the related chances of success for an IP	Despite recommendations as by NOVI and Mercados, the financial position of NAWEC nor its financial transparency has improved significantly. When the IPP with GEC was contracted, it was the only company willing to accept the conditions - and lack of guarantee - and the contract was only for 5 years. On the other hand, many proposals keep on coming, some with significant sources of funding. Does it make sense to develop an IP now if NAWEC is to be the off-taker?
E	should a 'final AA' by the end of October be pursued or should it be considered as a step in an on-going process?	For contractual reasons of the EU BizClim unit financing the present AA/IP assignment, it has to be finalized by the end of October. Given the ongoing actions on PV tariffs, further regulation and PPAs - lines 8-10 in Annex 3 - as well as scheduled activities on EE and RE - lines 17-19 - as well as new work on strategy and NAWEC - lines 22 - ; are these sufficient reasons to consider the present work as an important step, but no more? Or can it be made dependent upon important progress and steps, such as in the approval of a PPA application pending since April - in one of the CNs - before the validation session at the end of September?

Annex 5. Ratings and Rankings of the 15 Resource-Service Pairs

Resource-Service Pair	Aggregate Scores/Resource-Service Pair									Total	Rank
Bioenergy for Centralised Electricity	20	0	85	85	78	55	20	15	88	446	11
Biofuel for Cooking and Heating	55	20	83	60	85	20	20	30	97	470	10
Biofuel for Mechanical Power	30	0	70	75	76	30	20	20	100	421	13
Biogas for Cooking and Heating	45	15	70	80	70	30	20	55	94	479	9
Solar for Cooking and Heating	90	0	90	65	73	15	55	60	88	536	6
Solar for Cooling	35	15	0	70	75	20	70	35	91	411	15
Solar for Drying	95	30	0	35	55	75	80	40	82	492	7
Solar for Mechanical Power	35	40	0	15	50	85	80	90	87	482	8
Solar for Centralised Electricity	100	40	0	70	45	89	75	100	98	617	1
Solar for Decentralised Electricity	100	0	80	70	51	70	20	100	85	576	3
Solar Thermal for Centralised Electricity	70	0	70	65	44	35	20	40	76	420	14
Solar Thermal for Heating	100	25	80	65	50	65	75	80	71	611	2
Solid Biomass for Cooking & Heating	100	42	0	65	65	72	80	45	72	541	5
Wind for Centralised Electricity	75	15	70	80	45	50	85	80	75	575	4
Wind for Mechanical Power	30	4	60	70	40	18	55	50	97	424	12

(by 9 Expert Team Members (in the RRA exercise for The Gambia)

The 5 prioritized Resource-Service Pairs and their rank and score have been marked in bold

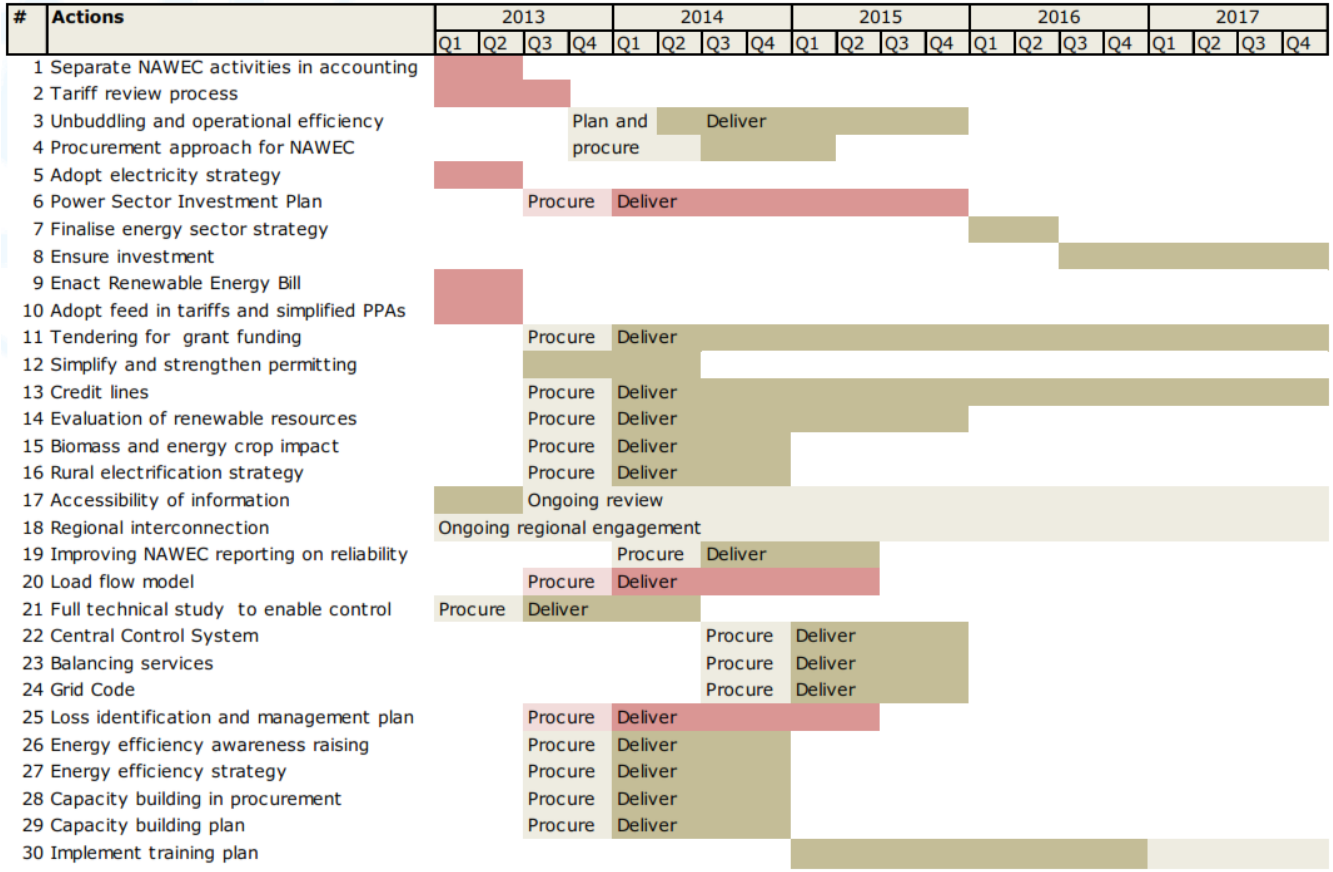
Annex 6. **Projects on energy in Priority Action Plan' of PAGE**

(PAGE; Programme for Accelerated Growth and Employment 2012-2015)

Pillar	Project/ programmes	Office responsible	Cost (Millions Dalasi)				Cost (Millions U.S. $)			
Improving and Modernizing Infrastructure			**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**
Energy	Increasing generation capacity by 75MW	MOE & NAWEC	135	180	180	180	4.62	6.17	6.17	6.17
	Upgrading and replacement of aging T & D network	MOE & NAWEC	15.00	15.00	15.00	15.00	0.15	0.15	0.15	0.15
	Extension of transmission network (KM)	MOE & NAWEC	226.46	226.46	226.46	226.46	7.76	7.76	7.76	7.76
	Extension of distribution network (KM)	MOE & NAWEC	21.00	21.00	21.00	21.00	0.72	0.72	0.72	0.72
	OMVG Energy Project	MOEW, NAWEC & OMVG	5.50	5.51	5.52	5.54	0.19	0.19	0.19	0.19
	Increase solar energy installation	MOEW, NAWEC & PURA	90.00	180.00	180.00	180.00	3.08	6.17	6.17	6.17
	Increase wind energy installation	MOE & NAWEC	45.00	45.00	45.00	45.00	1.54	1.54	1.54	1.54
	Renewable Energy for Productive uses	MOE	1.80	1.58	1.34	1.34	0.06	0.05	0.05	0.05
	Increase number of Multifunction Platforms (MFP)	MOE	3.60	3.15	3.15	3.15	0.12	0.11	0.11	0.11
	Design and construction of a lab, with necessary equipment	MOP	0.00	29.19	58.38	58.38	0.00	1.00	2.00	2.00
Subtotal (Energy)			**543.36**	**706.89**	**735.85**	**735.85**	**18.61**	**24.22**	**25.21**	**25.21**

Annex 7. **Action plan and timelines** (by AF-MERCADOS EMI)

(Accompanying The Electricity Strategy and Investment Plan of 18 Dec. 2012)



Annex 8. Licence Framework For The Gambia

(Projects 20kW to 1.5MW)

TSEP	DESCRIPTION	DURATION
1	**GIEPA receives unsolicited bid from prospective investor** 1.1 Contacts NAWEC 1.2 NAWEC reviews proposal and advises GIEPA (2 weeks) 1.3 GIEPA appraises proposal and considers for **SIC** (see below) 1.4 GIEPA facilitates to local Govt. 1.5 GIEPA facilitates NEA forms for Investors.	2 weeks Proposed
2	**NEA Assesses environmental impacts of the project**	21 days Proposed
3	**Investor negotiates and agrees PPA with NAWEC.** 3.1 Investor forwards application package to PURA (PPA, NEA, etc.)	2 weeks proposed
4	**PURA evaluates the complete package**	1 week proposed
5	**PURA recommends to the Minister** 5.1 Minister Gives his/her decision to PURA 5.2 PURA conveys decision to investor	18 days Proposed

*The **SIC** is the "special investment certificate" issued by GIEPA containing tax breaks for five years depending on the size of the investment.*

Annex 9. The Action Plan in the Draft Strategic Plan 2010-2014 of the Ministry of Energy

Objectives	Strategies	Program/ Related Activities	Current status	Target					Total Cost	Responsible Authority
				2010	2011	2012	2013	2014		
1. increase generation, transmission and distribution capacities	1.Create a platform for resource mobilization for the energy sector	Donor roundtable Private Sector	New On-going	x	x	X X	X	X	$20,000 NA	
	2. Encourage private sector investment in electricity sub-sector	liaise with GIPFZA and MOFA on promotional activities	On-going	X	X	X	X	X	NA	
	3. Reduce the electricity losses (technical and non technical)	Transmission and Distribution project- Venezuela and other project Strengthen loss Mgt Unit at NAWEC	To start soon On-going	X X	X X	X X	X	X	$22M $75,000	
	4. Participate in sub-regional programs	OMVG, WAPP, ECOWAS WHITE PAPER	On-going	X	X	X	X	X	$13.8 M	
	5. Expansion of T&D	Western Region Electrification Number of villages Rural Electrification (Phase II) number of villages Rural Electrification (Phase III) Number of villages	On-going New New			41 44		46	$25M $21M $25M	
	6. Increase in generating capacity(MW)	GBA and Rural areas	59MW	89	98	128	143	183	$124M	

Objectives	Strategies	Program/ Related Activities	Current status	Target					Total Cost	Responsible Authority
				2010	2011	2012	2013	2014		
2. Improve access to electricity and safe drinking water	1. Extend access to electricity and water to un-served areas	Extension of electricity to GBA	New sites	15	20	20	20	20	$12M	
		Extension of water to GBA	New sites	8	8	8	8	8	$2.4M	
		Replacement of Asbestos Pipes	On-going		50km				$8.75M	
	2. Expand access to electricity and water in the urban and rural areas	community taps,	On-going	8	8	8	8	8	$0.4M	
		Rural Water supply project(Barra, Kanuma, Farafenni, Kerewan, Kaur, Janjanbureh, Bansang, Basse, Bwiam, Kanilia)	New			10			$11M	
3. Provide affordable electricity and water	1. As a cross cutting strategy, expansion in T& D and access to safe drinking water and electricity will both have a direct bearing on tariff reductions	Tariff review	New			X			$5,000	
	2. Encourage efficient production and usage of electricity and water	Apply more efficient technologies	On-going	X	X	X	X	X	NA	
	3. Minimize operational and commercial losses	strengthening management and revenue collection,	On-going	X	X	X	X	X	$480,000	
4. Improve national security through street lightening projects	1. Expand the provision of street lights to new area	Westfield-Sukuta road, Africell-SK Mkt-Bundung, Western Region, Airport junction- Brikama, Kotu-Tippa Garage, Kololi Highway, etc	On-going	X	X	X	X	X	$20M	

Objectives	Strategies	Program/ Related Activities	Current status	Target				Total Cost		Responsible Authority
				2010	2011	2012	2013	2014		
		Replacement of existing street light bulbs to energy saving bulbs, and all future projects must utilize	New	X	X	X	X	X	$7M	
	2. Campaign/ sensitise compound owners within GBA to provide gate lights (councils/ NAWEC/ MOE)	collaboration with the Councils in sensitizing compound owners,	New	X	X	X	X	X	$25,000	
5.Promote the use of renewable energy and energy efficiency	1. Resource mobilization	Donor roundtable Private Sector	New New	X	X	X X	X	X	$20,000	
	2. Research and development	Make GREC as a Directorate and provide funding	New		X	X	X	X	$200,000	
	3. Develop legal and regulatory framework	legislate Renewable Energy and Energy Efficiency law	New		X				$10,000	
	4. Increase the usage of solar PV and wind turbine for electricity generation	implement renewable projects Village solar lightening system (5 Villages in 2010)	New	5	10	15	20	25	$2.2m	
		Wind turbine rural electrification(in MW)	New	0	0	1	1	1	$6M	
	5. Devise a classification/grading mechanism for renewable energy devices	conduct verification test on the devices	New		5				$4,000	
	6. Comprehensive sensitization program	continue sensitization	On-going	X	X	X	X	X	$30,000	
	7.Provide special incentives for would-be	liaise with GIPFZA on incentives/ prepare	New	X	X	X	X	X	NA	

Objectives	Strategies	Program/ Related Activities	Current status	Target					Total Cost	Responsible Authority
				2010	2011	2012	2013	2014		
	investors in renewable energy	Cabinet Paper on the special incentive								
6. To regulate the downstream petroleum sub sector	Expedite the finalization of the legal and regulatory framework for downstream segment of petroleum sub-sector	Finalize legislation on Petroleum Products Develop regulations	On-going	X	X				NA $10,000	
7. To encourage the re-exportation of petroleum products to neighboring counties	1.Regulate the re-exportation of petroleum products	prepare re-exportation guidelines, Building of fuel depot at Basse	New New		X				$5,000 NA	
	2. use of river transport	Encourage private sector/ GPA	New						NA	
	3. Promote bilateral trade agreements between Gambia and neighboring countries	Bilateral trade agreement	New	X	X	X	X	X	NA	
8. Strengthening institutional framework	1. Restructuring of the Ministry of Energy	Update Strategy	On-going	X					$5000	
	2. Capacity Building for MOE, NAWEC and other stakeholders	Relevant Training Program	On-going	X	X	X	X	X	$250,000	
9. To popularize the use of LPG by making the price affordable	1. Develop a pricing mechanism for LPG	setup Taskforce to develop a pricing mechanism	New	X					$10,000	
	2. Set up a price incentive scheme to reduce the unit cost and price of LPG	Determine the level of subsidy required for widespread use of LPG	New	X					$10,000	
	3. To raise awareness on the safe use of LGP	Sensitization campaign	New	X	X	X	X	X	$30,000	

Annex 10. Preliminary results on recent stakeholders consultations by the UNDP

Parts of the Executive Summary of this UNDP report have been included in section 0.3 of the main text. This annex contains the complete final chapter of the report.

KEYFINDINGS AND RECOMMENDATIONS

KEY FINDINGS

The consultations brought up concerns and issues which, in many respects are common to all the communities. The concerns and issues include:

i) Stakeholders request for a continuous and uninterrupted access to energy whether to provide lighting in their homes or their public institutions or to support their economic activities, as in tourism, agriculture (irrigation and food processing);
ii) Clean cooking energy is desirable but does not demand the same level of priority among the different stakeholders. For the urban centres, the argument for improved cookstoves is easier to appreciate and act upon, whilst for the rural communities (who use fuelwood they collect themselves from their farms or the forest) some aggressive sensitization will be necessary for attitudinal change;
iii) The stakeholders also recognized the key constraints that hamper energy access as: i) capacity limitations of NAWEC (generation and distribution);ii) lack of sufficient quantities of improved cookstoves in the market; and affordability of LPG or household solar systems.

The recommendations to address these challenges in order to meet the objectives of the SE4ALL Initiative include:

- Opening up the energy sector to the private sector with attractive incentives;
- Capacity building of technicians and artisans in solar installation and maintenance and the manufacture of improved cookstoves; and
- Sensitization of the communities to the new technologies.

It is encouraging to note that most of the recommendations, particularly the encouragement of the private sector in energy sector; promoting the use of renewable energy; and promoting the use of improved cookstoves have been already addressed in recent regulations and the draft Energy Policy. The Electricity Act provides opportunities for private sector participation in power generation. The Renewable Energy Act provides for private sector production and sale of electricity to NAWEC. It supports the establishment of off-grid renewable/hybrid facilities run by IPPs. Furthermore the Act provides for the establishment of a Renewable Energy Fund to which would provide financial incentives such as capital subsidies, production-based subsidies and equity participation. These would be available for mini-grid and off-grid renewable power systems for remote areas.

The draft Energy Policy, which may come to operation soon, clearly outline the measures to be put in place to: i) improve the energy supply system; ii) improve access and provide an affordable energy service; and (iii) enhance the renewable energy potential base. These new frameworks together with the strong commitment demonstrated by the Government with donor support should be able to substantially improve energy access.

RECOMMENDATIONS

In order for The Gambia to meet the targets set by the SE4ALL Initiative, future investment in the energy sector should provide support in the following areas, taking account of the gaps identified in the Rapid Assess/Gap Analysis study:

Access to Electricity

1) Support increased power generation, transmission and distribution. The options should be flexible to allow greater private sector participation;
2) Increase greatly the share of renewable energy in the energy mix;
3) Promote electrification of small cluster communities using solar PV or in combination with wind, where this is possible; and
4) Develop and implement a comprehensive strategy for rural electrification for rural communities.

Clean Energy for Cooking

Improved Cookstoves

1) Support technical skills training to local technicians and artisans in the manufacture of improved cooking stoves;
2) Promote aggressive sensitization campaigns in support of the use of the improved cookstoves;
3) Conduct stakeholder consultations to develop and implement domestic policy and legislation for promotion and development of improved cookstoves
4) Develop and implement incentives to promote the improved cookstoves subsector – e.g. reduce import duties and taxes reduction
5) Establish Improved Cookstove Test Laboratory with appropriate equipment and skilled personnel
6) Undertake consumer surveys and regional energy needs assessment on cookstoves to map socio-cultural variations and priorities (once every three years)

LPG

1) Conduct consultations with stakeholders in LPG market chain to develop and implement regulation structure and mechanism for LPG market chain;
2) Develop and implement incentives to encourage private LPG retail/service companies to build up distribution network and retail outlets e.g. import duties and taxes reduction; and
3) Conduct stakeholder consultations to develop and implement favourable and transparent product pricing regime for LPG.

Energy Efficiency

1) Conduct stakeholder consultations to develop, adopt and implement policy and regulatory framework for energy efficiency;
2) Conduct stakeholder consultations to design, adopt and implement mandatory labelling and certification for energy-efficient devices (e.g. efficient lamps and refrigerators);
3) Promote installation of efficient lighting in all new social housing projects of government; and
4) Facilitate development of financing schemes to cover the upfront cost of energy-efficient devices.

Renewable Energy

1) Increase greatly the share of renewable energy in the national energy mix by promoting investment; and
2) Support technical skills training and capacity building of local technicians and artisans in the installation and maintenance of solar and other renewable energy systems.

Crosscutting Issues

1) Fully engage with financial to provide medium to long-term finance for capital investments in production and business growth for entrepreneurs in the solar, wind and biomass systems as well as the LPG and cookstoves businesses, and soft loans to end-users
2) Conduct annual energy access and consumer research surveys;
3) Prepare and implement annual programmes for public education and awareness creation on energy access, renewable energy and energy efficiency;
4) Develop standards for energy end-use devices and strengthen regulations in energy sector;
5) Mainstream gender into policies and programmes and evaluate effectiveness;
6) Integrate climate change into programmes and projects and evaluate effectiveness; and
7) Organise regular inter-Ministerial and Inter-Agency Meetings to review SE4ALL policies, programmes and projects.

Rue Belliard, 205
1040 Brussels | Belgium
Telephone +32 2 669 98 25 | Fac +32 2 669 97 86
www.acpbusinessclimate.org
info@acpbusinessclimate.org

Agence de mise en œuvre

Implementing agency