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Portrait of Renewable Energy sector In Guinea Bissau

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ABSTRACT

SNV is starting a new area of focus in Guinea Bissau: Renewable Energies. The main objective of this paper is to provide SNV Guinea Bissau a portrait of the current status of Renewable Energies (RE) sector in Guinea Bissau, main actors and opportunities of intervention that can lead to a positioning of SNV in this sector.

A questionnaire was applied to each actor implied in the RE sector and interviews were made with different individuals from the government agencies responsible for the sector of Energy. The main findings were that there are four Renewable Energies sources available in GB: Solar photovoltaic, biomass, wind and water energy. Wind and water energy sources have not yet been exploited so far. Solar photovoltaic is by far the most exploited Renewable Energies source (RES) used in GB because it is the preferred source of the main actors and donors. The main actors which are the Government of Guinea Bissau, the European Union, The United Nations Agencies and NGOs believe that it is the most sustainable RES for the rural areas. These actors mainly finance standalone photovoltaic systems to power schools, health centers, houses and offices and photovoltaic water pumping systems for potable water in rural areas. It is only recently that biomass projects (Improved cook oven and biodigesters) financed by ECOWAS have appeared.

A review in the literature of other SNV's countries showed that SNV in the rest of the world has been focusing in Renewable Energies since the 2007. Their main area of focus has been biomass with biodigesters and improved cook oven. They have been very successful in implementing them in rural areas.

In this paper, we recommend that the chosen sectors of action of SNV GB in RE have to be in line with what SNV in other countries is doing, it has to involve areas of expertise of SNV GB such as vocational training and agriculture in rural areas, it has to have a fast impact on the rural communities, be sustainable and it has to help remove the obstacles that are blocking the access of RE to the rural population.

Five main areas of action in RE are recommended in this paper: Help the government of GB define their RE policy, implement the use of improved cook ovens and biodigesters in targeted regions, install photovoltaic systems in schools and train local people for the routine and curative maintenance of these systems in order to make them even more sustainable, install solar water pumping systems for irrigation and potable water and finally deploy solar lanterns in rural areas.

SUMÁRIO

A SNV inicia uma nova área de intervenção na Guiné-Bissau (GB): As Energias Renováveis. O objetivo principal deste trabalho é fornecer à SNV Guiné-Bissau um retrato do estado atual do sector das energias renováveis (ER) na GB, dos atores principais e das oportunidades de intervenção que podem levar a um posicionamento da SNV neste sector.

Um questionário foi preenchido por alguns atores implicados no setor das ER e algumas entrevistas foram feitas a diferentes membros do governo responsáveis pelo sector da Energia. Constatou-se a existência de quatro fontes de Energias Renováveis disponíveis na GB: a energia fotovoltaica, eólica, biomassa e hidraulica. As Fontes de energia do vento e da água ainda não foram, até agora exploradas. A energia solar fotovoltaica é de longe, a fonte das ER mais explorada na GB, isto porque tem sido a fonte preferida dos principais atores e doadores. Os principais atores que são o Governo da GB, a União Europeia, as agências das Nações Unidas e as ONGs acreditam que é a fonte de ER mais sustentável para as zonas rurais. Estes atores financiam principalmente sistemas autônomos fotovoltaicos para a alimentação eléctrica de escolas, centros de saúde, casas e escritórios e sistemas fotovoltaicos de bombeamento de água potável nas zonas rurais. Os projetos de biomassa (fogões melhorados e biodigestores) são recentes e foram financiados pela UEMOA.

Uma revisão da literatura da SNV em outros países da SNV mostrou que a SNV no resto do mundo tem vindo a apostar nas Energias Renováveis desde 2007. A sua principal área de acção tem sido a biomassa com biodigestores e fogões melhorados. Teve um grande sucesso na sua implementação em zonas rurais.

Neste trabalho, recomenda-se que os setores de ação da SNV GB na área das ER estejam em linha com o que a SNV em outros países tem feito, envolva áreas de especialização da SNV GB como a formação profissional e a agricultura em zonas rurais, tenha um impacto rápido nas comunidades rurais, seja sustentável e contribua para a remoção dos obstáculos que estão a bloquear o acesso da população às ER.

Cinco principais áreas de acção no sector das ER são recomendadas neste documento: Assistência ao governo da GB na definiçaõ da sua política de ER, implementação do uso de fogões melhorados e biodigestores em regiões-alvo, instalação de sistemas fotovoltaicos nas escolas e formação à população local para a manutenção destes sistemas, a fim de torná-los ainda mais sustentáveis, instalação de sistemas de bombeamento solar de água para irrigação e água potável e, finalmente, implantação de lanternas solares nas áreas rurais.

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List of Acronyms

AECID:	Spanish agency for international cooperation for development
ECOWAS:	*Economic Community of West African States*
EU:	European Union
GB:	Guinea Bissau
NGO:	Non-governmental Organization
RE:	Renewable Energies
RES:	Renewable Energies Sources
REFH:	Rural Energy foundation of Holland
SEIA:	Solar Energy Industries Association
UN:	United Nations

1 OBJECTIF

The purpose of this consultancy is to provide SNV Guinea-Bissau a portrait of Renewable Energy in Guinea-Bissau, the actors involved and the opportunities for intervention that may lead to a positioning of SNV in the field of Renewable Energies.

1.1 SPECIFIC OBJECTIVES

- To elaborate a "Portrait of the renewable energy sector in Guinea-Bissau", based on critical analysis of the "state of the art" of the renewable energy sector, focusing on areas of intervention of SNV.

- To prepare a well-founded proposal of guidelines to enable SNV Guinea-Bissau to define its position in the renewable energy sector.

2 METHODOLOGY

- Data collection from key actors in the renewable energy sector in Guinea Bissau
    - Type of renewable energies available in Guinea Bissau
    - Details on past, on-going and future projects in RE area through a form
    - Interviews
- Analyses of the collected data: type of renewable energy sources available in GB, sector of action of the main actors.
- Analyses of works done by SNV in the rest of the world in the renewable energy sector using SNV literature and their link with Guinea Bissau
- List of recommended top five sectors of actions for SNV Bissau

3 RENEWABLE ENERGIES IN GUINEA BISSAU

Before talking about RE in Guinea Bissau, it is important to have a common understanding on the concept of Renewable Energies sources (RES). In this paper we consider RES as sources of energy that can be renewed so fast that it can be considered as endless in a scale of Human lifetime. These sources have been issued of regular or constant natural phenomena caused by stars mainly the sun (irradiations), but also the moon (tide) and the earth (geothermal energy).

It is important to highlight that for an energy source to be considered renewable, it should be able to regenerate faster or at the same speed at which it is consumed. For example, wood is considered a RE as long as the number of hacked trees is equal or less than the number of grown trees. Thus, the behavior of the consumer plays an important role in this definition.

Most Renewable Energies papers or documents or university courses, such us the European Master in Renewable Energies [2] classifies RES in 4 categories: Solar, Wind, Biomass and water energies.

The four categories of RES are presented below as well as their potentialities in Guinea Bissau. We will analyze the productivity and availability of each type of RES in GB, referring to the opinions and constants provided by the focal persons of each organization interviewed.

Solar Energy

Solar energy is the most abundant RE source [3]. It is the production of energy directly from solar irradiation. This irradiation can either be directly transformed into heat or into electricity.

Solar energy application can be separated in two categories: electricity production and heat production

- Production of electricity: using photovoltaic panels (Individual photovoltaic systems, water pumping, power plants) and using thermal engines (power plants)
- Production of heat: Using solar heat collector water (or liquid) heater and for production of Electricity (power plants with heat engines)

GB being located in Africa, it has one of the best solar irradiation in the world as you can see from the map below.

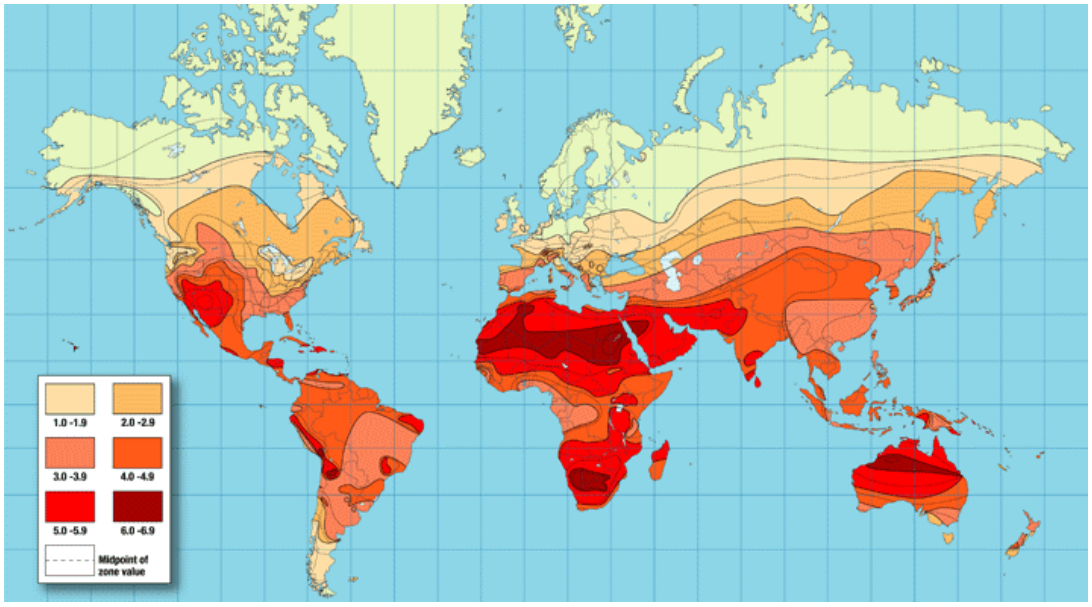

Image 1: World map of solar irradiation [20]

Below is the yearly irradiation available on the horizontal plane in Bissau (table 1).

Months	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Insolation, kWh/m²/day	5.28	5.94	6.54	6.96	6.74	5.83	5.05	4.79	4.92	5.21	5.3	5.03
Clearness, 0 - 1	0.62	0.64	0.65	0.66	0.64	0.56	0.49	0.46	0.48	0.55	0.61	0.61
Temperature, °C	27.22	28.72	29.95	30.67	29.95	27.56	25.77	25.57	25.79	26.06	28.04	27.68
Wind speed, m/s	4.59	4.38	4.36	4.4	4.63	4.45	4.37	3.92	3.59	3.21	3.58	4.04
Precipitation, mm	0	1	0	0	21	148	409	544	389	150	16	1
Wet days, d	0.2	0.4	0.3	0.8	3	9.9	18	21.7	18.9	10.1	1.8	0.6

These data were obtained from the NASA Langley Research Center Atmospheric Science Data Center; New et al. 2002

Table 1: Solar insulation in a horizontal plan in Guinea Bissau [21]

With a yearly average of over 5.8 Kwh/m2/day (table 1), GB should be able to take advantage of all solar energy applications.

As of today, the most popular solar application is the rural individual photovoltaic system that has been exploited in Guinea Bissau for the producing electricity to power houses, schools, offices and hospitals or health centers.

Solar water pumping is the second most installed solar application in GB (Ex. PRS I and II in Table 2).

These systems are composed of solar photovoltaic panels, a charge controller, a battery park (replaced with a water tank in most pumping systems) and an inverter (only for systems that use AC current). There are also a number of telecommunication solar systems installations mainly done by the telecommunication operator OrangeTM.

Solar photovoltaic system has been the most privileged sector of the RES in GB mainly because it is preferred solution for electricity production for the main actors in rural areas.

The number of project financed by these entities has been constantly increasing in the past few years. However, solar is still underexploited and there are still many schools, health center and administrative offices in rural and semi urban areas without electricity.

There are other solar applications such as solar water heater (mainly used in urban areas in countries with cold weather), solar power plants and grid connected PV systems that have not yet been exploited in GB.

Wind Energy

Wind energy is extracted from wind speeds by wind turbines. It was first used to produce mechanical power (windmills). Nowadays, it is mainly used for the production of electrical power [4]. Unfortunately, none were counted in Guinea Bissau. According to the current General Director of Energy in GB Eng. Fernando Benício no electrical wind turbines have been installed in GB and there are no projects in this area for the near future.

Some few windmills have been spotted in some remote areas in GB but they are no longer working.

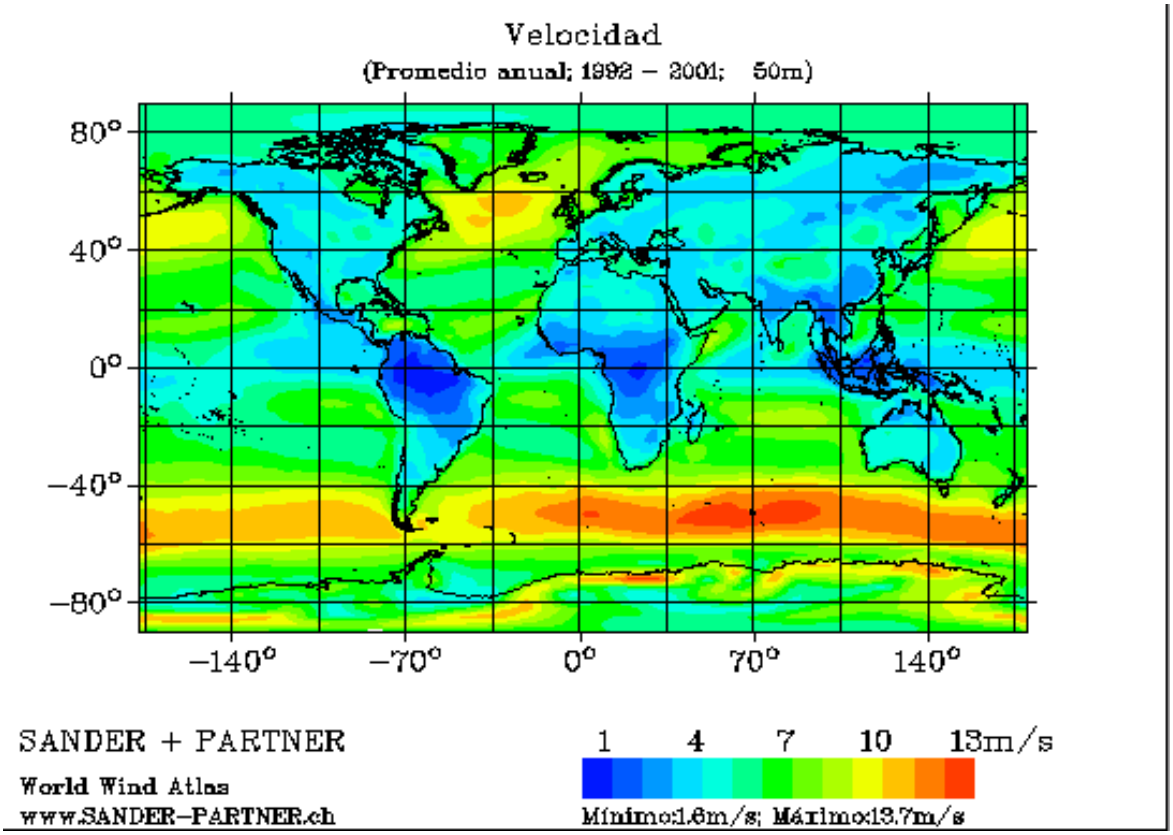

Figure 1: World wind speed map

The map above (figure 1) shows that GB does not have the best wind speed average of the world. However, it does not mean that wind power cannot be exploited in GB. To know whether wind power can be exploited in GB, it is necessary to have detailed information on wind speed and direction in GB. According to the general director of meteorology, Mr João Lona Tchedna, there are some small weather stations in every sector of the country but they can only provide readings on precipitation. Only four complete weather stations located in Bissau, Bolama, Bafata and the Airport could provide complete information which included: wind speed, wind direction, temperature, solar irradiation, humidity, etc… Unfortunately, since the civil war of June 7th, 1998,

these stations got damaged. Today, the only one still functional out of the 4 stations is the airport weather station. The meteorology of GB can provide all the data they have if a letter addressed to director is provided.

The director of the meteorology is also willing to work in partnership with SNV and he also said that they will be willing to collaborate with SNV in case there is a need to install complete weather station in areas that could be considered has potential areas to install solar wind turbines.

The information that can be provided to meteorology of GB will be useful to stipulate the energy that could be extracted from wind turbines in some parts of the countries. However, with more than 10 years of missing data and with only 4 complete weather stations in the whole country that stipulation will not be sufficient. More concrete information is essential to determine the site potential [7].

The climate has been changing drastically in the past few years and the 4 weather stations are not located in the most appropriate place to install wind turbine. For sitting large power wind project, collection for the site specific wind speed and direction is needed.

The best locations for onshore wind turbine installations are elevated places away from big building because the wind blows faster at higher altitudes [7]. Offshore installations near the land are also are a good place to install wind turbine because the average wind speed is usually higher than inland because its surface has less roughness than in land.

In GB, it may be possible to exploit wind speeds throughout the year on the coast of the main land or between the islands and in the region of Boe where there are altitudes of over 200m.

Hydraulic Energy

It is the energy that can be produced from the movement of water. Just like the wind power, it was first used for the production of mechanical power (Waterwheels and mills). Nowadays, it is mainly used for the production of electricity. The main techniques used for the production of electricity are dams but there are also other techniques such us: Run-of-the-river hydroelectric, pumped-storage hydroelectricity, Tidal power and wave power1.

Guinea Bissau has an important site for the construction of a dam with a good potential for power generation. The site is located in Saltinho and in 1983 a study done by "Consultores para Obras, Barragens e Planeamento, SA (COBA)" and financed by UNDP estimated that the dam could generate 18MW of electricity [8]. The construction of the dam was estimated at that time to 79 milion USD.

Unfortunately, until today, the construction of the dam has not started. No official reason was given as for why it has not been constructed yet. However, according to some employees of the ministry of energy there are three main reasons: delay of the government to implement the project, the important distance from Saltinho to the main cities of the country and the lack of infrastructure to transport the produced electricity to the consumers.

[1] For detailed information about the existing techniques for electricity production derived from hydraulic wind, consult the web site " Wind Energy - The FACTS" at http://www.wind-energy-the-facts.org/en/part-i-technology/chapter-6-small-wind-turbines/markets-and-applications-for-small-wind-turbines.html

Biomass:

Biomass is the renewable source of energy made of biological material from living or recently living organisms. Biomass is mainly used to produce electricity or heat form plants. There are nowadays huge fields of plants grown just to be used for this purpose.

There are several techniques to transform biomass into energy: Thermal conversion (some are direct: heat and fuel, some are indirect such as liquid fuel or combustible biogas) and Chemical conversion (anaerobic digestion, fermentation and composting)2. Production of energy from waste, worldwide is a very popular source of biomass. Nowadays, with the appropriate techniques and infrastructures, the waste of an entire city may be treated and used for energy production.

It is possible to identify 5 different sub categories of biomass energy source: Wood, waste, alcohol, fuel and landfill gases. The most ancient and still the most used today in African countries, is the wood coal and patches for cooking. In Guinea Bissau, it is the main source of biomass energy but not the only one.

GB has recently started trying knew application of biomass energy. According to the General Director of Energy there is an ongoing project for the construction of a small power plant of 45kW (±60KVA) in Safim which will be powered from biofuel obtained from waste of cashew nuts. The small power plant will be used to power hospitals and schools in Safim. The Energy Director also talked about an ongoing project for the installation of 18 biodigesters. More detail on this project was given to us by the coordinator of National Institute of Research and Applied Technology (INITA) (Table 2). These two projects are financed by ECOWAS.

GB has important agricultural resources [5] for which their potential for the production of biomass has already been proven in many countries. GB produces cashews nuts (fifth largest exporter of the world [11]), rice [15], peanuts (Biomass production in florida [13]), cotton [16], palm oil (Biomass production in Malasia [12]) and also sugar cane (Biomass production in Brasil [14]).

However it remains an underexplored sector, thus no studies has being conducted to assess the feasibility of biomass production from agriculture cultures, considering climate and land availability in Guinea Bissau for cultivation of crops destined to fuel production.

[2] For detailed information about the existing techniques for electricity production derived from biomass, consult the World Energy Council web site at http://www.worldenergy.org/publications/survey_of_energy_resources_2007/bioenergy/713.asp

4 MAIN ACTORS IN GUINEA BISSAU

In this study the main actors in the Renewable Energies field are separated in 5 groups: Government agencies, United Nation agencies, European Union, NGO's and the private sector.

The government of Guinea Bissau

Although the government of GB has no specific ''regulatory or legislative framework Renewable Energies" [6], it has included RE in its "Poverty Reduction Strategy Paper (PRSP)". The government of GB sees the promotion and development of Renewable Energies has an important factor for the development of the country [6]. RE is also mentioned in the official gazette (Boletim Oficial da república da Guiné-Bissau número 26 [17]) has an area that the government and more specifically the directorate of energy needs to promote. However, no detailed information on the strategy to be used to achieve their objectives is given.

The government agency responsible for RE is the ministry of energy and natural resources, more specifically, its directorate general currently headed by Mr. Fernando José Benicio.

The General Director of Energy said that the government has been involved in solar, biomass and hydro energy with the exception of wind energy. He gave us a few examples of projects that involved RES that are described in the table below (table 2).

According to Director Benicio the main strategy of government of GB regarding RE is through decentralized rural electrification. Director Benicio believes that the main restriction in the development on RE is the accessibility to the population. The Chef of the department of the ministry of energy and the plan, Mr. Francisco Quimontche (annex 1 for full reaction) finds the initiative very lovable and recommends SNV to get involved in the education and training in order to increase the number of qualified professionals in this area. He believes that the lack of right skills is the main obstacle of the evolution of Renewable Energies in GB. Director Benicio thinks that an increase of professionals in RE will be an added value however there are already a few national specialists in this sector working for the government and the private sector.

Project	Main entities	Type of RE	Cost of action	Comments	Regions	Dates
Government agency						
Regional solar program: phases I and II	Ministry of energy and natural resources and the European Union	Solar photovoltaic (water pumping)	N/A	Several villages have now access to potable water. Systems supplied and installed by Impar Lda	Oio, Bafata, Gabú	Ended in2009
45KW Biofuel generator	Ministry of energy and natural resources	Biomass	195.000.000,00 francs CFAs	biofuel generator from cashew nuts shells to power hospitals and schools	Safim	9 months
Improved cook over	INITA and Ministry of energy and natural resources	Biomass	Funded by UEMOA	They were successfully manufactured locally however it is more expensive then the conventional cook. Thus they are hard to sell. INITA is looking for finance to start a 2nd phase project for which the objective will to reduce the cost of the improved coo	Bissau	
Vulgarization of the production technics of biogas and its long-term use	INITA, Ministry of energy and natural resources and ETN/PREDAS	Biomass (Biogas)	Financed by UEMOA	On going: choosing villages where 20 biodigestors will be installed.	Oio, Bafata, Gabu	12months
IBAS - Rural Electrification using solar systems	UNDP, Ministry of agriculture and rural development and IBAS	Solar photovoltaic (individual systems and water pumping)	596.305,00USD form IBAS	Installation of solar systems in 20 villages for street lights, schools, community centers (and, when there is health centers and water pumping)		2011-2012
Construction of hydraulic dam	Study financed by PNUD [8] funds for the implementation not yet found	Water (hydro dam)	79.000.000,00 USD	Total expected power output 18MW. Project still not implemented due to lack of funds. Technology as evolved since 1983. A new study is probably needed to update the document. The power output has probably increased and the cost reduced.	Saltinho	1983 - present

Table 2: Some government projects that involved RES

The listed programs were not the only ones realized but they are among the most important. Director Benicio also stated that they have other projects which include RES for which they are looking for funds (eg. Electrification of 60 villages with more than 1000 habitants). They will be willing to work with SNV to in the execution of some of this projects or any projects related to RE.

The United Nations (UN)

United nation agencies have been one of the main contributors for the deployment of RE sources in GB. For the past few years, they have enforced the use for solar photovoltaic in all projects that had an electrical energy component (to power electrical equipment or for water pumping in rural and semi-urban areas).

They are very much aware of the importance on RE for the reduction of poverty. As stated by United Nations Development Program (UNDP) Associate Administrator and Under Secretary General Rebecca Grynspan, "*None of the Millennium Development Goals (MDGs) can be met without major improvement in the quality and quantity of energy services in developing countries*". She also said that the role of the UN and UNDP is to "*help countries to develop the national capacities needed to attract and manage investments and new sources of financing. We help them remove barriers to investment and establish policy frameworks that increase predictability and reduce risk*"[9].

The other UN agencies in GB do not exactly have RE projects, but they try as much as possible to include RE sources in their projects.

Project	Main entities	Type of RE	Cost of action	Comments	Regions	Dates
UNITED NATION						
Multifunctional regional center for the youth	UNFPA	Solar photovoltaic	16.000.000,00 F CFA	Individual photovoltaic system of 4800Wc Supply and installation of the PV system by DuraEnergy	Gabu	ended 2009
60 adult alfabitazation centers	UNICEF, Ministry of education,	Solar photovoltaic	~100.000.000,00 FCFA	ongoing - 60 kits of 150Wc	Gabu, bafata e oio	On going
Iluminação publica	UNGBIS,	Solar photovoltaic	N/A	solar streets and traffic light	Bissau	Ongoing
Water pumping	UNHCR	solar photoboltaic	N/A	Solar water pumping for a health center. Supply and installation of the PV system by Impar		2011

Table 3: Examples of UN projects in GB involving RES

The European Union (EU)

The EU can be considered, out of all the groups, as the one with the clearest strategy to accelerate the use of Renewable Energies in Guinea Bissau and in the world. Through the ACP/EU energy established in 2005, the EU co-finance projects on increasing access to sustainable and affordable energy services [18]. In the ACP-EU energy facility call for proposal 2009-2010 three projects in GB were approved in the RE sector (see table 4).
EU commission in GB is also using photovoltaic systems for the production of electricity in all their local projects that include electricity production. Some examples are illustrated on table 4 below.

Project	Main entities	Type of RE	Cost of action	Comments	Regions	Dates
EUROPEAN UNION						
Project of support of the department of justice	Paosed (EU) and Ministry of justice	Solar photovoltaic	N/A	Three photvoltaic systems to provide ericity to the regional court house of Bafata, the regional court house of Gabu and the Civil registration office of Bafata	Bafata and Gabú	ongoing
Programa Comunitário para Acesso a Energias Renováveis	EU and TESE - ASSOCIACAO PARA O DESENVOLVIMENTO	N/A	N/A	ACP-EU Energy facility 2009-2013		ongoing
Renewable energy for local development	EU and FUNDACION PUEBLO PARA PUEBLO	N/A	N/A	ACP-EU Energy facility 2009-2013		ongoing
Providing Solar Home Systems to the rural and periurban population of the region of Gabú in east Guinea-Bissau on a fee-for-service basis	EU and FOUNDATION RURAL ENERGY SERVICES	Solar photovoltaic	N/A	ACP-EU Energy facility 2009-2013. The target is to conncet 3000 client within 4 years	Gabú	Ongoing
Solar Water pump for schools	EU and Medicos do Mundo	Solar photovoltaic	N/A	07 solar water pumps supplied and installed by IMPAR	Biombo and Bissau	2010

Table 4: Examples of European Union projects in GB that involved RES

Non-Governmental Organizations (NGOs)

Most NGOs working in rural areas in the war against poverty are contributing to the expansion of RE especially solar photovoltaic.
They are using photovoltaic panel to provide electricity in rural and peri-urban areas to power schools, health centers and hospitals and for water pumping. Action for Development (AD), is the only NGO that as started since last year a specific professional training for photovoltaic system technicians. Table 4 below shows some examples of projects realized in the past few years that included a RES.

On Annex 1, you can find the forms that some NGOs accepted to fill up in order to give us their view on renewable energies in Bissau and give us some information on some works that they have done in RE area.

The common point of all the NGOs is that they all see RE has an important asset for the fight against poverty and they are all willing to be future partners of SNV in this initiative. A project coordinator of the Spanish NGO ACPP (Assembly of Cooperation for Peace), Alicia Fernandes stated that although they are not working directly in the RE area, they have installed photovoltaic systems in about 14 schools, 7 health centers and to power 5 water pumps. She stated that they choose solar because it is the most sustainable solution to provide electricity in rural areas. However, she is concerned on how these systems could be made more sustainable because the installations are normally done on remote areas with no qualified personnel nearby. She suggested that SNV should consider working in this area for train people locally for the routine and simple curative maintenance of the systems.

The program coordinator of UICN, Frederic AIRAUD, stated that although they are not working on any particular RE projects they would be willing to work with SNV to help develop this area. They would be willing to share their international experience in this area with SNV.

Main entities	Type of RE	Cost of action	Comments	Regions	Dates
ACPP	Solar photovoltaic	N/A	Sypply and installation of a 800Wc Water pumping photovoltaic systems by Impar	Fulacunda	2011
Alternag and ACPP	Solar photovoltaic	~30.000.000,00 F FCA	Sypply and installation of a 7350Wc stand alone photovoltaic systems by DuraEnergy	Bissau	2010
ONG RA and Portuguese cooperation	Solar photovoltaic	N/A	Sypply and installation of a 1600Wc stand alone photovoltaic systems by Impar	Buba	2010
ONG AIDA and Prodepa	Solar photovoltaic	N/A	Sypply and installation of a 4250Wc Water pumping photovoltaic systems by Impar	Bolama	2009

Table 5: Examples of NGO projects in GB that involved RES

Private Sector:

Giving that almost projects that involve RE are solar photovoltaic, all the companies working in the RE field are working in solar energy field and more specifically the photovoltaic field.

These companies survive mainly through Government, UN, EU and NGOs projects. Since these projects have considerable increased in the past few years, GB has experience an exponential increase in the number of solar energy companies. However, most of them are just business men selling materials without having the right for photovoltaic system installation. GB has also experience the arrival of European companies mainly from Portugal and Spain (prosolia, Cidade Solar) in the past 2 years due to the financial difficulties that these countries have been facing which were caused by a reduction of the subsidies given to the photovoltaic and RE sector in general by their governments.

The main restrictions for the development of RES in GB are the duties cost or import taxes on RE products that are very high. The Technical director of Impar, Mr. Patricio Ribeiro said: the port of Bissau is the main restriction. Having to pay 30% - 70% of duty taxes on top of the original cost of purchase to clear the equipment, the private sector has to sell its products at almost 100% of the cost of purchase. This not only makes it almost impossible for individual or entities that are not exempt from taxes to acquire these products but it makes it difficult for the private sector to keep stocks in the country.

The project advisor of DuraEnergy, Mr Adelino Handem believes that by reducing or eliminating taxes, RE would be more accessible to the general public. This could create a new market for the private sector in this area. Mr Handem believes that SNV could help the private sector by making RES, more particularly solar photovoltaic systems, more accessible to the general population and also by making the population understand the importance of the RE for environment and as a solution for the reduction of poverty. Another problem that the private sector, according to Mr Handem, is facing is the important percentages of bank interest. In fact, in order to execute the large projects from agencies such as UN agencies and other investors in this area, they will only give 20% to 40% of advance payment which is normally not enough to purchase the equipment. Therefore, the private sector has to get advance payment from the banks (14% of interests to pay) to realize the requested task.

It is very difficult to survive by working exclusively in this area. Fortunately, it has been improving much in the past few years. For example, Impar went from 22860Wc

photovoltaic capacity system installations in 2006 to an 81825Wc in 2010. Most of them would have extra activities in order to survive. This improvement is also seen by the number of new companies that have appeared in the past few years. Some examples of Solar PV systems installations done by the private sector are shown in tables, 3,4 and 5.

Main Donors/investors

The main donors and investors in this area in GB are the International NGOs, the European Union, the Government of GB, Foreign governments, the United Nations and ECOWAS.

It is necessary to keep a close relationship with these entities as they may often have calls for proposal to finance projects in RE. The ACP-EU Energy facility proposal is a good example.

ECOWAS has also issued a few call for proposal. In June 2011, they launched their first call for proposal in the RE area [10].

The UNEP, the UN agency for the environment as also received 3.13 billion US dollars to invest in projects related to the environment within the next 4 years.

The government of Spain and the government Netherlands (ex. Rural Energy foundation of Holland) have also financed several projects in this area through their NGOs (Agência Española de Cooperación Internacional para el Desarrollo (AECID), Xunta de Galicia) based in GB.

The African Bank for Development (BAD) has also financed some project of other SNV countries in this area.

Carbon financing could also be a source to finance RE projects.

The number of donor or financing entities in this area has been increasing through the years due to their concern on climate changes. It is therefore important to stay alert on the immersion of new donors.

5 RENEWABLE ENERGIES STRATEGY USED BY SNV IN OTHER COUNTRIES

With its headquarters in the Netherlands, SNV has been working with national, regional and local governments, civil association and entrepreneurs to reduce poverty for more than 40 years. SNV is now present in over 35 countries.

Although, RE only became one of the positioning choices for SNV in 2007, SNV was already involved in the RE sector in some countries. The table below gives a few details of some of the works done in ASIA, Africa and Latin America where SNV has been involved in works related to the RE sector (see table 7).

From the given table 7, it is possible to see that SNV in general has an extensive experience in Biomass and more particularly in Biogas. SNV has always focused their work in rural areas, their experience with the rural population contributed considerably to their success in the implementation of the domestic biogas and biofuel. It may also be this rural experience that influenced their choice for the Biomass RE sub-sector.

Although most of their experience is in domestic biodigesters, SNV are also doing some work on biofuels, watermills and solar. This experience could be shared with SNV GB to help them reach their objectives.

In some of these countries, SNV's main focus is not on changing the habits of the people in the rural areas but more in improving the quality of the equipment already used making them form efficient and less pollutant.

Project Title	Geographical Coverage	Cost of action	Main Responsible	Results	Dates/ duration
BIOGAS					
AFRICA BIOGAS PARTNERSHIP PROGRAMME (ABPP)	Burkina Faso Ethiopia Kenya Senegal Tanzania Uganda	€ 93,000,000	Hivos and SNV	- 3592 digesters constructed by the end of 2010; - Direct employment generation for masons and appliance manufacturers involved in the market chain - GHG emission reduction - workload reduction and reduced exposure to indoor air pollution	2009-2013
NATIONAL BIODIGESTER PROGRAM	Kenya	€ 310,994	Sustainable community Development Services (SCODE), SNV	- 105 local entrepreneurs in the improved cook stove chain have been trained on improving their business, earning between 100,000 to 150,000 KSh additional income per year; - these local entrepreneurs have been able to install more than 15 000 households with an improved cook stove.	2009 – 2010
PROGRAMME	Rwanda	$14,943,630	GIZ (GTZ)	- 1006 digesters constructed by the end of 2010; - reaching 7042 persons (workload reduction and reduced exposure to indoor air pollution, mainly benefitting women and children); - direct employment generation - GHG emission reduction: 2148 t CO2 eq; - 2958 ton of biomass (equaling 265 ha of forest) and 40 ton of fossil fuel (kerosene for lighting) substituted.	2007-2011

Project Title	Geographical Coverage	Cost of action	Main Responsible	Results	Dates/ duration
BIOGAS					
MUNGWI ENERGY PLATFORM	Mungwi district of Northern province, Zambia	€ 230,000	Centre for Environment Energy and Engineering Zambia Ltd. (CEEZ)	- application for land title done in 2010 and still in progress; - CEEZ and farmers supported in development of business plan (early 2010); - 500 Jatropha small-scale farmers supported in the formation and registration of a company known as Mungwi Small-Scale Energy company - supported MSSEC in negotiations with CEEZ leading to the formation of Mungwi Energy company with shareholding of 75% for CEEZ and 25% for MSSEC.	2008 to 2012
SNV's VIETNAM BIOGAS PROGRAMME	VIETNAM		Netherlands Ministry of Foreign Affairs	- install biogas plants for over 100,000 households in 44 provinces	2010
NATIONAL BIODIGESTER PROGRAM	CAMBODIA			- 15 local companies are now providing biogas services to rural households.	
Asian Development Bank's Energy			SNV	1,000,000 biogas plants is planned by 2016	
Domestic production of Biogaz	BENIN	€ 230,000		- access of renewable energies/ domestic biogas to rural populations - Secured and increased employment - Deforestation reduction - increase in house hold revenue	

Project Title	Geographical Coverage	Cost of action	Main Responsible	Results	Dates/ duration
BIOGAS					
VALORISATION ÉNERGÉTIQUE DE LA COQUE D'ARACHIDE POUR LES PETITES ENETERPRISES RURALES DE PRODUCTION D'HUILE AU SÉNÉGAL	Senegal	500 000 Euros		Recyclage des ordures issues de la production de l'arachide pour en faire une source énergétique, Mise en place de 50 entreprises rurales de production d'huile, autonomes en énergie, Valorisation de la production agricole par sa transformation (huile), Réduction de l'exode rurale par la création d'emplois fixes et temporaires, Amélioration des conditions de vie des populations avec une huile de qualité	
Global Alliance for Clean Cook stoves		$250 million public-private initiative	UN Foundation	aims to enable 100 million households to adopt clean and efficient cook stoves by 2020	Sep-10
The Congo Basin Forests Fund	Congo	€ 118,000,000	The Congo Basin Forests Fund	poverty reduction and the fight against climate change by reducing and, if possible, reversing the deforestation rate in the Congo Basin	created in June 2008

Project Title	Geographical Coverage	Cost of action	Main Responsible	Results	Dates/ duration
BIOFUEL					
Public-private platforms	Latin America		SNV	- increases employment and income opportunities for local entrepreneurs, and their access to energy in remote areas.	
Foundation on off-grid electricity generation	Peru (Amazon)			- electricity generation in isolated communities	
Production biodiesel and electricity for the local markets	Zambia		14 Jatropha farmer associations		

Project Title	Geographical Coverage	Cost of action	Main Responsible	Results	Dates/ duration
Solar					
Innovative distribution model for portable solar lanterns to the base of the pyramid (BoP)	Kenya	€ 440,000		• reduce user's expenditures for lighting, cell phone charging and other small electric devices; • time saving, improved health (respiratory infections) and safety (fire), especially for women and children; • improved lighting conditions for ambient lighting, studying and income generating activities; • reduced levels of kerosene consumption and disposing less batteries in the environment; • GHG emission reductions.	
PILOT PROJECT TO ESTABLISH A DURABLE AND SUSTAINABLE BUSINESS MODEL FOR "PORTABLE SOLAR UNITS" IN BURKINA FASO	Burkina Faso	€ 150,000		• 5000 PSUs sold in 1 year, • clean and reliable energy access to approximately 30,000 people • The generation of wealth and employment for those involved in the various stages of the value chain.	2009-2010

Table 6: Works related to RE done by SNV in the world [19]

6 POSSIBLE SECTORS OF ACTION FOR SNV GUINEA BISSAU

The different types of RE sources available in GB along with the activities that the main actors of this area have been doing and the experiences that SNV in other countries have shown, makes it possible to identify possible areas or sectors of actions that SNV Bissau should focus on.

The main criteria used for the selection of these actions are:

- Have a certain connection with the areas of expertise of SNV GB
- Fast impact
- Strategy regarding RE used by SNV in other countries
- Main donors aspirations
- Minimum impact in the environment
- Complementarities with other actors' interventions

Below you have the main recommended sectors of actions for SNV GB.

- **Renewable Energies policy in Guinea Bissau.**

  Main partner: Ministry of Energy and Natural Resources of Guinea Bissau and UNDP
  Other possible partners: Private sector, NGOs and EU

  Duration: Long-term.

  Objective: Support the government in defining its strategies in the RE sector and implement the policies needed to accelerate and facilitate the access of RE sources to the population.

  Example: taxes exemptions, Reimbursement in yearly income taxes, CO2 tax policies, Etc...

  Main results expected:

  - Reduction of the cost of RE products and increase the number of satisfied end users.
  - Create a fair and secured environment which will encourage international institutions to invest in this area.
  - Reduction of poverty

  Urban and rural impact

Justification: because without a well-defined strategy in this area by the government, it is difficult to create a safe environment to attract investor. GB more than most countries needs to really work on this aspect because it is still considered by many as a post conflict country and very unstable.
The government has shown his interest in developing this area and just needs to officially define its strategy and the different steps to reach their objectives.

- **Improved cook stove and Biodigesters:**

Main partner: Other SNV countries and INITA
Other possible partners: The government of Guinea Bissau, NGOs, UN and EU

Duration: Short-Term

Objective: Implement the use of Biodigester cook stoves in rural areas

Examples: Benin and Cameroon (Vision paper on SNV's involvement in RE), Rwanda (NATIONAL DOMESTIC BIOGAS PROGRAM (NDBP), Kenya (Clean Household Dissemination and Enterprise Development).

Results Expected: Less indoor pollution, less health problems, reduction of poverty, reduction of deforestation

Rural Impact

Justification: because the wood coal been the main source of energy for cooking in rural areas, it is one of the main reasons for deforestation. SNV GB by taking this action will have everything to succeed because they have the experience of dealing with the rural population in Guinea Bissau, they have a good experience in the agricultural sector, they will be able to use the experience of the SNV of other countries and they will be able to follow the strategy used by other SNV offices. Additionally, SNV will also be able to benefit from the experience of INITA which has successfully implemented improved cook oven in Bissau. INITA is also at the moment investigating for the most appropriate locations to install 20 biodigesters.
Solar concentration cook: Could be introduced as an alternative solution in areas where biodigester cannot be used.
The ECOWAS has been the main donor in this area in GB.

- **PV systems:**

  Main partner: The government of Guinea Bissau, NGOs (AD in particular), ECOWAS, UN and EU, UICN

  Duration: Short-Term:

  Objective: Install solar photovoltaic systems in schools and provide training for the rural population on RE

  Examples: Zambia (Mungwi Energy Platform), UICN and IBAP in the natural parks

  Results Expected: Increase education level in rural areas by allowing them to have access to certain technologies and increase awareness on the importance of RE sources.

  Rural Impact

  Justification: Because SNV GB has an extensive experience in the education sector in GB with a team that knows how to communicate with the rural population. There is also a need to train people to work in RE sector especially solar photovoltaic systems which is the most popular RE source and for which the need for specialized technicians persists.

- **Solar water pumping:**

  Main partner: The government of Guinea Bissau, NGOs, ECOWAS, UN and EU

  Duration: short-term: few months

  Objective: Production of potable water, irrigation for agricultures

  Examples: PRS (Regional Solar Project) – Local Government and European Union, "Hydraulique villageoise'' – ECOWAS, etc…

  Results Expected: allowing longer if not all year around of agricultural production, save the women and children several hour per day that is normally used for water drawing, reduction of health problems…

Rural Impact

Justification: Since SNV GB has an extensive experience in the agriculture sector and understands that one of the limiting factors for the development of the agricultural sector is the lack of access to water during the dry season.

- **Solar Lantern**

Main partner: The government of Guinea Bissau, ONGs, UMOA, UN and EU

Duration: Short-term.

Objective: dissemination of domestic solar streetlights

Examples: Innovative distribution model for portable solar lanterns to the base of the pyramid (BoP) in Kenya

Results Expected: Increase security at night in villages, time saving, improve health (especially for women and children). Improve lighting condition for ambient light, studying and income generation activities. Reduction of CO2 emissions.

Rural Impact

Justification: Because it is an area that many institutions are already involved in and for which its impacts on the rural may be more difficult to access. However, SNV could easily work in this area because it could easy find local partners and can make use of the experience of SNV in other countries.

There are other applications of RE sources that are very popular in the world such us RE power plants of wind, solar thermal and photovoltaic, hydraulic and geothermal power plants. Unfortunately, these are not sectors of SNV expertise and may not even be in line with the objectives of SNV. Other applications such as solar water heater are also not discussed here because they are mainly used in urban areas and in countries with cold weathers.

7 CONCLUSION AND RECOMENDATIONS

RE will be a new sector of action for SNV GB for which the population of Guinea Bissau will be the first to profit from. All actors in this sector (NGOs, UN agencies, European Union, private sector) found this initiative lovable and have shown their interest in becoming partners of SNV. These partners can be keys to financial donor or can assist in the execution of projects.

New donors and call for proposal in RE appear every year. It is important to stay attentive to these new opportunities. It is also important to be familiar with the procedures to submit proposal to some entities that regularly issue calls for proposal (ex. ACP-EU Energy facility from the EU).

The five areas of action recommended for SNV GB (support to Government strategy and policy, improved cook oven and biodigesters, solar photovoltaic system installation and training in rural schools, solar water pumping for irrigation and potable solar Lanterns) can be implemented by SNV GB with guarantied success. They can be implemented simultaneously or separately depending on funds availability and partnerships.

Biomass is the RES that produces the most CO_2 emissions. This is why, Biomass applications are not very much developed in this document. Applications such as biofuel in big scale are not recommended because it would mean that enormous fields of land would have to be used for biofuel productions instead of food production. We recommend that production of biofuel be based on already existing wastes such as cashew nuts wastes.

The application and technologies of RE for these sectors have proven themselves very efficient and their impact on the reduction to poverty very positive. Furthermore, SNV GB has an extensive experience in working with the rural population in GB. This experience is already an important step towards the success of the development of RE in GB.

Certain applications of RES available in GB were not considered in this study either because they are more suited for developed countries (Example: City anaerobic digesters) or because they are more suited for urban or cold weathers (Example: Solar water heaters).

8 REFERENCES

[1] **Reeegle**
http://www.reegle.info/countries/GW

[2] **European master in Renewable Energies**
http://www.master.eurec.be/en/About-the-Master/The-three-semesters/

[3] **SEIA**
http://www.seia.org/cs/about_solar_energy

[4] "World Wind Energy Report 2010" from the World Wind Energy Association in 2010, 197 gigawatts (GW) of wind-powered generators were counted

[5] **US Department of state**
http://www.state.gov/r/pa/ei/bgn/5454.htm

[6] **REEEP**
http://www.reeep.org/index.php?id=9353&special=viewitem&cid=137

[7] **US Department of Energy**
http://www1.eere.energy.gov/windandhydro/wind_potential.html

[8] Consultores para obras, barragens e planeamento, SA and Ministere des Resources Naturelles et de l'Industrie. **Amenagement Hydroelectrique de Saltinho,**

[9] **Bloomberg New Energy Summit 2011, Introductory remarks by Rebeca Grynspan,**
UNDP Associate Administrator and Under Secretary General
Bloomberg New Energy Summit
Roundtable Day on Energy Access and Climate Finance in Association with UN-Energy
April 7, 2011 at 9:00am

[10] **REEEP**
www.reeep.org/57.20242/ecowas-launches-first-call-for-proposals-for-renewable-energy-facility-eref.htm

[11] http://organiccashewnuts.com/cashewbissau.htm

[12] **Biomass production from palm oil in Malasia**
http://www.researchsea.com/html/article.php/aid/1020/cid/2?PHPSESSID=c00596b9qallfdd5ifjptmuls2

[13] **Biomass from peanuts in florida**
http://www.flpeanuts.com/news.htm

[14] **Biomass from sugar cane in Brasil**
http://www.scielo.br/scielo.php?pid=S0103-90162000000400013&script=sci_arttext

[15] **Biomass production from rice in China**
http://www.ncbi.nlm.nih.gov/pubmed/15978690

[16] **Biomass production from Cotton in North Carolina**
http://www.jstor.org/pss/4046582

[17] **Boletim Oficial da República da Guiné-Bissau de junho 2007**

[18] **EU Commission Development and cooperation – EuropeAid**
http://ec.europa.eu/europeaid/where/acp/regional-cooperation/energy/index_en.htm

[19] **SNV Africa RE references and Financing sustainability:**
Carbon revenue for the poor

[20] **Oksolar**
www.oksolar.com/abctech/solar-radiation.htm

[21] **Gaisma**
www.gaisma.com/en/location/bissau.html

9 APPENDICES

9.1 APPENDIX A: MAIN ACTORS OPINIONS ON RE IN GB

Ficha de Informação N 1

Nome da Agencia: Ministerio da Energia

Endereço : Palacio do Governo **Tel. :** .....

Actividade principal: .....

O responsável:

Nome : Fernando José BENÍCIO **Função :** Director geral da energia

Tel.: *+245 663 72 21/ 547 91 54*

Email : *fjbenicio@yahoo.com.br*

Tipo de Energia renovável :

[x] **Solar Fotovoltaico** [ ] **Solar Térmico** [ ] **Eólica**

[x] **Hidráulica** [x] **Biomassa**

Projectos realizados e em curso:

Nome do projecto, tipo de energia renovável, período realizado, parceiros envolvidos, local/região do projecto, financiamento, objectivos iniciais e resultados obtidos, obstáculos encontrados, sucesso (continuar a sua implementação em outros locais? se não porque)

Pompagem solar

PRS – Recursos hidricos

Biomass:

Biodigesters: Instalação de 18 biodigesters nas regiões de Oio, Bafata e gabu

Em progresso: actualmente na phse the sensibilisação e estudo sociologo para a escolha dos sitios de instalação

Estratégia governamental: Electrificação descentralizada (creaçao de empresas longe da rede electrica classica

Plano d'aprovisionamento de lenhas de carvao noLeste, Bissau, Bafata e nas zonas fronteirisas.

Central Elctrica de Biogas: Projecto em curso. Para instalacoes de uma central de 45kW (~60KVA) que sera alimentada com biofuel que bem da casca de coco de cajú. Financiamento de cerca de 196milhoes de francos CFA da UMOA. 9 meses. Atrasos previstos.

Projectos em vista :

Nome, tipo de energia, parceiros (e possibilidade de SNV ser parceiro), Financiamento, data do inicio e duração prevista para o projecto.

Electrificação de 60 tabancas de mais de 1000 Habitantes (a procura de financiamento)

Acha que os actores económicos principais na Guine Bissau deveriam investir mais nas energias renováveis? Porque ?

Lesgislação:

- Carta politica energetica
- Lei do sector da energia 2 ou 3 de 27 de junho de 2007

Quais as restrições para o desenvolvimento das ER na GB?

O accesso a energias renovaveis.

Qual devera ser o futuro das ER na Guine Bissau?

O futro das energies renovaveis na GB bissau esta nas Zonas Rurais

Estaria interessado ter a SNV como parceiro? Claro

Ficha de Informação N 2

Nome da Agencia: Ministério da Economia e plano

Endereço : Palacio do Governo ***Tel. : (***+245) 6608680

Actividade principal: Elaboração de programa de investimento publico

O responsável:

Nome : Francisco Quinmontche **Função :** Chef Departamento

Tel.: *+245 6608680*

Email : *quimontche@hotmail.com*

Tipo de Energia renovável :

[x] **Solar Fotovoltaico** [ ] **Solar Térmico** [ ] **Eólica**

[ ] **Hidráulica** [x] **Biomassa**

Projectos realizados e em curso:

Nome do projecto, tipo de energia renovável, período realizado, parceiros envolvidos, local/região do projecto, financiamento, objectivos iniciais e resultados obtidos, obstáculos encontrados, sucesso (continuar a sua implementação em outros locais? se não porque)

Programa regional solar fases I & II, em curso electrosolar em Gabu, Hidraulica solar em Bafatá

Projectos em vista :

Nome, tipo de energia, parceiros (e possibilidade de SNV ser parceiro), Financiamento, data do inicio e duração prevista para o projecto.

Pretende-se realizar a electrificação rural ao nivel nacional através de fundação energia rural de Holanda

Acha que os actores económicos principais na Guine Bissau deveriam investir mais nas energias renováveis? Porque ?

Sim, para minimizar os custos de investimentos e redução dos custos da energia, produsida através do siesel, energia barata

Quais as restrições para o desenvolvimento das ER na GB?

Falta de quadros no dominio da energia renovavel, e falta de meios financeiros para a implementação dos projectos.

Qual devera ser o futuro das ER na Guine Bissau?

Promover o seu desenvolvimento, tendo en conta a abundancia do poder da energia solar/renovavel

Estaria interessado ter a SNV como parceiro?

Claro que sim, enquanto parceiro para o desenvolvimento do sector

Informação Extra:

As energias renovaveis tem vindo a experiementar um crescimento continuo des de há varios anoos, por isso é importante +re+arar os professionais qualificados. A formação do pessoal neste dominio deve ser uma prioridade profissional para o futuro do sector.

É de relembrar que os serviços energeticos de uma maneira significativa para o desenvolvimento economico, social, isso faz com que utilização das energias renovaveis de que o pais dispoe de uma potencialidade enorme permitira o acesso das populações aos serviços energeticos no meio rural e peri-urbana

Ficha de Informação N3

Nome da Agencia:…*Direcção Geral de Meteorologia Nacional (DGMN)*
Endereço :…*Av. do Brasil; Cx.P. 75 1038 Cedex – Bissau*
Tel. : *00245 5748490*
Actividade principal: *Meteorologia, Tempo e Clima*

O responsável:
Nome : *JOÂO LONA TCHEDNA*……. **Função :** *Director Geral*…….
Tel.:…*00245 574 84 90*…… **Email :**…*dgmeteobissau@yahoo.fr ou J_Lona@yahoo.fr*

Tipo de Energia renovável :

☐ **Solar Fotovoltaico** ☐ **Solar Térmico** ☐ **Eólica**
☐ **Hidráulica** ☐ **Biomassa**

Projectos realizados e em curso:

Nome do projecto, tipo de energia renovável, período realizado, parceiros envolvidos, local/região do projecto, financiamento, objectivos iniciais e resultados obtidos, obstáculos encontrados, sucesso (continuar a sua implementação em outros locais? se não porque)

Projectos em vista :

Nome, tipo de energia, parceiros (e possibilidade de SNV ser parceiro), Financiamento, data do inicio e duração prevista para o projecto.
No quadro do "Projecto em carteira" de Reabilitação de Sistemas de Base de Meteorologia Nacional, prevê-se a utilização da energia solar fotovoltaíco para fazer face a carência de energia. O Projecto inscreve-se no quadro do Projecto de Protecção Civil a ser financiado pelo PNUD. No entanto, a possibilidade de SNV ser parceiro é uma iniciativa louvável.

Acha que os actor económicos principais na Guine Bissau deveriam investir mais nas energias renováveis? Porque ?
Sim. Porque é uma aposta indicada para contribuir na mitigação dos efeitos nefastos das alterações climáticas e no desenvolvimento durável.

Quais as restrições para o desenvolvimento das ER na GB? *Falta da política nacional de apoio ao desenvolvimento das energias renováveis.*

Qual devera ser o futuro das ER na Guine Bissau? *Devera ser aposta do Governo para o sector energético.*

Estaria interessado ter a SNV como parceiro?
Obviamente que sim

Observações Gerais:

A Direcção-Geral de Meteorologia Nacional apoia a iniciativa de SNV em promover estudos de viabilidade e de desenvolvimento de utilização de Energia Renováveis na Guiné-Bissau. A DGMN manifesta a sua disponibilidade em colaborar com SNV e fornecer todas as informações e dados necessários para levar a cabo este importante projecto de desenvolvimento para a Guiné-Bissau

EXTRA:

A Meteriologis tem estacoes para mediadas de precipitacoes em todos os sectores daGuinea Bissau.
Tambem tem quatro estacoes mais completas: Aeroporto Osvald Vieira, Meteorologias de Bissau, gabu, bafata e bolama. Estas estacoes podem fornecer dados mais completos tais como a temperatura, irradiacao solar, direcçao e velocidade de vento. Infelisment, com exepçao da estaçaõ do aeroporto todas as outras etacoes deixaram de funcionar na guerra de 7 de junho. Ate agora não estao a funcionar. No entanto é possivel obter dados com informacoes detalhadas antes da gerra. E tambem existe possibilidades des installar estacoes de medida en zona que podem ser zonas com bom vento.
Meteorologia esta disposta numa parcearia com a SNV.

A meteriologia recebei uma vesite de empresa europeia que queria dados sobre entos an GB para uma eventual instalacoa de turbinas aeolicas. Uma vez que receberam os dados nunca mais deram noticias.

Fazem parte de IPCC.

Ficha de Informação N 3

Nome da Agencia:…*UICN – Uniao Internacional para Conservaçao da Natureza….*

Endereço :…*Rua Angola Bissau…* ***Tel. :***…*320 12 30 …*

Actividade principal: Organizaçao international de conservaçao do ambiente

O responsável:

Nome :…*Frederic AIRAUD* **Função :** *Coordenador de Programa*

Tel.:…*530 21 54* **Email :** frederic.airaud@iucn.org

Tipo de Energia renovável :

☐ **Solar Fotovoltaico** ☐ **Solar Térmico** ☐ **Eólica**

☐ **Hidráulica** ☐ **Biomassa**

Projectos realizados e em curso:

Nome do projecto, tipo de energia renovável, período realizado, parceiros envolvidos, local/região do projecto, financiamento, objectivos iniciais e resultados obtidos, obstáculos encontrados, sucesso (continuar a sua implementação em outros locais? se não porque)

Nao temos agora projecto em curso em relaçao com a energia renovavel.

Projectos em vista :

Nome, tipo de energia, parceiros (e possibilidade de SNV ser parceiro), Financiamento, data do inicio e duração prevista para o projecto.

Nao temos previsto projecto em relaçao com a energia renovavel.

Acha que os actor económicos principais na Guine Bissau deveriam investir mais nas energias renováveis? Porque ?

A energia solar é um dos sistemas mas adaptado pelo pais. Deveria haver mais investimentos nesse sector para permitir de baixar o preço medio duma instalaçao solar. Seria muito pertinente estudar a viabilidade tecnica e economica duma central electrica solar para abastecer a cidade de Bissau ou outras localidades em vez de continuar a depender nos geradores actuais.

Quais as restrições para o desenvolvimento das ER na GB?

O preço da instalaçao inicial é muito elevado. Poderia ser pertinente estudar a possibilidade de propor creditos aos particulares ou empresarios para ajudar a instalaçao dum sistema de energia renovavel. Tambem o Estado poderia dar

incentivos ou reduzir as taxas de importaçao sobre esses productos que deveriam ser mais divulgados e accessiveis na Guiné-Bissau.

Qual devera ser o futuro das ER na Guine Bissau?

Facilitar o accesso a sistemas adaptados para pequenas empresas, casas, tabancas ou bairros com uma instalaçao mais barata ou a criaçao dum sistema de credito para permitir a mais pessoas de adquirir-o.

Desenvolver com o Governo da Guiné-Bissau um projecto mais ambicioso de construcçao duma central electrica solar (como estao a ser construidas no Marocco por exemplo) para garantir o abastecimento duravel em energia da Capital e acabar com a dependencia aos combustiveis fosseis permitindo assim reduzir o preço medio da energia electrica, a poluiçao e as suas consequencias sobre o clima global.

Estaria interessado ter a SNV como parceiro?

A UICN esta muito interessada em collaborar com qualquer organizaçao que gostaria de desenvolver as energias renovaveis no pais. A UICN podera participar na preparaçao dum projecto de central electrica solar e nessa base ajudar para convencer os decidores politicos do interesse e da pertinencia dessa alternativa para o desenvolvimento do pais. Atraves a sua rede de peritos ao nivel mundial, a UICN podera valorizar experiencias ja realizadas em outras partes do mundo e ajudar para escolha das melhores tecnicas.

Ficha de Informação N 4

Nome da Agencia: Instituto da Biodiversidade e das Áreas Protegidas

Endereço : Rua São Tomé, Casa no 6ª C.P. 70-Bissau

Tel. : *320 71 06/07……*

Actividade principal: Propor, coordenar e executar a politica e as acções concernentes a biodiversidade e as áreas protegidas em toda a extensão do território nacional·

O responsável:

Nome : João Sousa Cordeiro. **Função :** Coordenador da Reserva da Biosfera Arquipélago Bolama Bijagós.

Tel.:66 7 66 00 / 580 38 54 **Email :** João.cordeiro@iucn.org

Tipo de Energia renovável :

[X] **Solar Fotovoltaico** [ ] **Solar Térmico** [ ] **Eólica**

[ ] **Hidráulica** [ ] **Biomassa**

Projectos realizados e em curso:

Nome do projecto, tipo de energia renovável, período realizado, parceiros envolvidos, local/região do projecto, financiamento, objectivos iniciais e resultados obtidos, obstáculos encontrados, sucesso (continuar a sua implementação em outros locais? se não porque)

Em todos as nossas sedes das áreas protegidas temos ***o sistema solar fotovoltaico***. É caso da nossa sede do Parque em Orango em Eticoga, João Vieira Poilão, Área Marinha Comunitária de Urok em Formosa, Cacheu, Lagoa de Cufada, Casa de Ambeinte em Bubaque, Casa multifuncional de Canogo, Canhabaque. Escola de Menegue, Ambuduco. E nos pequenos posto de controle e de vigilância das áreas protegidas.

O período da realização do projecto, foi no inicio dos anos de 1997, que iniciou-se a colocação dos painéis solares fotovoltaicos nas nossas zona de intervenção. ***Os parceiros evolvidos*** na sua implementação são: IBAP, UICN, FIBA, Tiniguena, GEF /Banco Mundial,

Os parceiros envolvidos, são FIBA, PRCM, GEF/BM, UICN, . ***Local do projecto****: Parque Nacional de Orango, Parque Nacional Marinho João Vieira Poilão, Área Marinha Protegida Comunitária de Urok, da* ***Região de Bolama Bijagós****, Parque Natural dos Tarafes de Rio de Cacheu, da* ***Regiao de Cacheu,*** *Parque Natural das*

Lagoas de Cufada da **Região de Quinara,** Parque Nacional de Cantanhez, **da Região de Tombali** . ***O financiamento*** para a colocação dos painéis solares no inicio dos anos de 1997, foi o ***financiamento*** pelo Governo Suíço. E mais tarde o ***financiamento*** foi de GEF/BM que acabou por terminar em 31 de Março de 2011. ***Os objectivos iniciais do projecto*** era de equipar todas as sedes das áreas protegidas com o sistema de fotovoltaico, porque é muito mais durável, embora a sua instalação é ainda caro. Como ***resultados obtidos*** a maioria da nossa sede das áreas protegidas foram equipadas com sistema de painel solar. ***Obstáculos encontrados,*** *os recursos financeiros para a manutenção de todo o nosso sistema fotovoltaico não são suficientes.* ***Sucesso.*** Deve-se continuar a sua implementação noutras áreas protegidas, por exemplo iremos criar área protegida terrestre de Dulombi e Boé, pretende-se instalar o sistema fotovoltaico nas sedes de Dulombi e Boé futuramente.

Projectos em vista :

Nome, tipo de energia, parceiros (e possibilidade de SNV ser parceiro), Financiamento, data do inicio e duração prevista para o projecto.

Projecto em vista e a criação de Áreas Protegidas Terrestre em Dulombi e Boé, com os seus 3 respectivos corredores de fauna. O ***tipo de energia*** fotovoltaico, parceiros***,*** GEF/PNUD assistência a implementação de áreas protegidas terrestres. Não descartamos a hipótese de *SNV vier a ser* o nosso parceiro. ***Título do Projecto:*** Apoio à Consolidação do Sistema de Áreas Protegidas na Faixa Florestal da Guiné-Bissau*.* ***Período do Programa:*** *2009 – 2012, mas até então o projecto não arrancou ainda.* ***Título do Projecto:*** Apoio à Consolidação do Sistema de Áreas Protegidas. **Contribuições em espécie:** 3.160.000 USD. ***Duração do Projecto*****:** 3 anos

Acha que os actores económicos principais na Guine Bissau deveriam investir mais nas energias renováveis? Porque ? *Sim, porque é a energia limpa, não tem nenhum impacto negativo no meio ambiente, e garante boa saúde para as populações.*

Quais as restrições para o desenvolvimento das ER na GB? *As únicas restrições é que a ER , por enquanto como não existe muitas empresas nessa área os custos são elevadíssimos a as populações não têm o poder de compra que lhes permita adquiri-la*

Qual devera ser o futuro das ER na Guine Bissau? *O futuro da ER, na Guiné-Bissau, para mim é uma alternativa. A crónica problema de energia eléctrica que a Guiné-Bissau vem sofrido aos longos dos anos. Simplesmente ela e cara ainda.*

Estaria interessado ter a SNV como parceiro?

Sim sempre que for pertinente

Observações Gerais:

Por exemplo nas ilhas, concretamente na Reserva da Biosfera Arquipélago Bolama Bijagós, seria interessantes fazer um estudo de prospecção para ver a viabilidade da implementação de energia eólica em certas ilhas. Também o ideal seria que todos os acampamentos turísticos conseguissem ter painel solar, tendo em conta o turismo ecológico que se pretende implementa nas ilhas.

Ficha de Informação N 5

Nome da Agencia : *ONGD Paz y Desarrollo.*

Endereço : *Av. Dom Settimio Arturo Ferrazzetta (Luanda -Prédio A. Lopes).*

Tel. : *00245-6109438 / 00245-683 4242*

Actividade principal: Cooperação para Desenvolvimento, atráves de apoios aos projectos nas areias (Saúde, Saneamento Básico, Agricultura, Género e Segurança Alimentar).

O responsável:

Nome : *Esther Castro Cidre.*

Função : *Técnica Expatriada y Responsável de Convénio Guiné-Bissau.*

Tel.: *00245-6109438* **Email :** cbissau@pazydesarrollo.org
bissau@pazydesarrollo.org

Tipo de Energia renovável :

[ ] **Solar Fotovoltaico** [X] **Solar Térmico** [ ] **Eólica**

[ ] **Hidráulica** [ ] **Biomassa**

Projectos realizados e em curso:

Projectos realizados:

"**Melhorada a atenção sanitária do Hospital de Mansoa e da região de Oio**", 15/11/2007 à 15/12/2009; PyD-Paz y Desarrollo e Minsap-Ministerio da Saúde Publica, Sector de Mansoa região de Oio, financiado pela Agência Española de Cooperación Internacional para el Desarrollo (AECID); Melhorar a condição de vida da população da região de Oio, aumenetando a capacidade operativa do hospital de mansoa e da direcção regional de saúde de Oio (DRSO); Construir a infraestruturas operativas do hospital de Mansoa.

"**Melhorar a condição das mulheres rurais e a gestão sustentavel em torno rural e florestal das regiões de Oio, Cachéu e Bafatá**", 01/10/2008 à 31/12/2010 PyD-Paz y Desarrollo e Federação Camponesa de Djalicunda-Kafó, Regões de Oio, Cacheu e Bafatá, Guiné-Bissau; financiado pela Xunta de Galicia; Deminuir a pobreza rural nas regiões de Oio, Cachéu e Bafatá; Melhorar a situação socio-economico das mulheres nas regiões de Oio, Cachéu e Bafatá.

"**Reduzir o indíce de transmição do VIH/SIDA no Sector de Farim, Região de Oio**". 1/5/2008 à 30/4/2009, PyD-Paz y Desarrollo e NADEL-Associação Nacional Para o Desenvolvimento Local Urbano, financiado pela Xunta de Galicia,

Fortalecidos os serviços de saúde no sector de Farim, Região de Oio ou Reducir o índice de transmição do Sida no sector de Farim, Região de Oio, construir e equipar "Centro de consulta, seguimento e de sensibilização sobre Sida" com posibilidade de teste voluntario.

"**Melhorar a condição das mulheres rurais e a gestão sustentavel em torno rural e florestal das regiões de Oio, Cachéu e Bafatá**", 15/10/2009 à 31/12/2010; PyD-Paz y Desarrollo e Federação Camponesa de Djalicunda-Kafó, Nas Regiões de Oio, Cacheu e Bafatá; financiado por Ayuntamiento de Málaga; Diminuir a Pobreza Rural nas Regiões de Oio, Cachéu e Bafatá, Guinea Bissau; Fortalecer autosuficiência e a segurança alimentar a favor de 2.870 familias campenesas nas comunidades rurais das três regiões beneficiarias de Oio, Cacheu e Bafatá.

Projectos em curso:

"Melhorar as oportinidades das mulheres nos ambitos de educação e saúde, e fortalecimento de organizações das mulheres e seus intervenções na defesa da equidade de género", 14/05/2008 à 31/12/2011; PyD-Paz y Desarrollo e Federação Camponesa de Djalicunda-Kafó ; Sector de Mansaba, Regiões de Oio; financiado pela Agência Española de Cooperación Internacional para el Desarrollo (AECID); Aumentar as capacidades e autonómia das mulheres; promoção das mulheres em todos os espaços sociais e políticos e Melhorar oportunidades das mulheres no ambito económico.

"**Aumento de acesso das mulheres e jovens nas actividades generadoras de ingressos e melhorar as condições de segurança alimentar nas regiões de Oio, Cachéu e Bafatá**, **Guiné-Bissau**"; 12/10/2009 à 15/9/2011; Ayuntamiento de Málaga; Diminuir a Pobreza Rural nas Regiões de Oio, Cachéu e Bafatá; Melhorar as condições socio-económica de 1.891 mulheres e de 385 jovens e fortalecer o autosuficiência e promoção da segurança alimentar em 9 Sectores das Regiões de Oio, Cacheu e Bafatá.

Projectos em vista :

Nome, tipo de energia, parceiros (e possibilidade de SNV ser parceiro), Financiamento, data do inicio e duração prevista para o projecto.

Só vamos formular novos projectos em finais de Outubro proximo.

Acha que os actor económicos principais na Guine Bissau deveriam investir mais nas energias renováveis? Porque ?

Sim,

Porque é muito mais económico e tem menos riscos em termos de poluição do ambiênte, e pode ajudar na colmatação das deficuldades energestico existentes no pais.

Quais as restrições para o desenvolvimento das ER na GB? N/A

Qual devera ser o futuro das ER na Guine Bissau?

Prespectiva-se que no futuro a ER seja amplamente utilizado como fonte de ernergia no pais.

Estaria interessado ter a SNV como parceiro?

Num futuro proximo, sim.

10 ANNEXE

10.1 ANNEXE A: CONSTELLATION OF RENEWABLE ENERGY ACTORS IN GUINEA BISSAU