



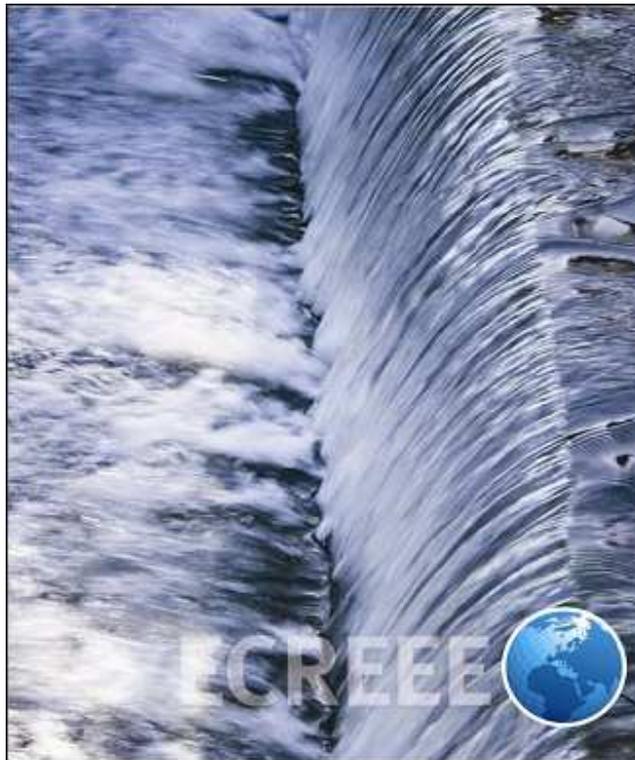
Concept Note / Aid Mémoire

Praia, 22 March 2012

Regional ECREEE Workshop on the ECOWAS Scale-Up Programme for Small-Scale Hydro Power

16th to 20th of April 2012 , Golden Gate Hotel, Monrovia, Liberia

Website: <http://small-hydro.ecreee.org>



Jointly organized by the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE), the Energy Sector Management Assistance Programme (ESMAP), the United Nations Industrial Development Organization (UNIDO) and the Government of Liberia



2012 INTERNATIONAL YEAR OF
SUSTAINABLE ENERGY
FOR ALL

I. Introduction and Context

A. Brief Description

The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) in cooperation with the United Nations Industrial Development Organization (UNIDO), the Energy Sector Management Assistance Programme (ESMAP) and the Government of Liberia are jointly organizing a five-day workshop on small-scale hydropower (SHP)¹ from 16th to 20th of April 2012, in Monrovia, Liberia. The event features a three day capacity building seminar on SHP project development and a two day technical meeting to validate the project document of the ECOWAS Scale-Up Programme for Small-Scale Hydro Power. It is expected that around sixty participants from ECOWAS and international level will attend the workshop, including policy makers, utilities, rural electrification agencies, regional river basin authorities, practitioners, equipment manufacturers, as well as financiers and banks. The workshop is a contribution of ECOWAS to the 2012 International Year of Sustainable Energy for All and the UN Goal on Universal Access to Sustainable Energy Services by 2030.

B. Background

1. Energy Challenges in the ECOWAS region

A severe energy crisis hampers the social and economic development of the fifteen ECOWAS countries. The countries are facing the interrelated challenges of energy access, energy security and climate change mitigation simultaneously. The lack of access to modern, affordable and reliable energy services is interrelated with a variety of economic, social, environmental and political problems in West Africa.

- a. In “business as usual” scenarios – without considerable additional investments – energy poverty and its consequences for economy and society will continue to be a predominant challenge in the ECOWAS region in 2030. West Africa, with around 300 million inhabitants equivalent to roughly one third of Africa’s total population, has one of the lowest modern energy consumption rates in the world. Household access to electricity across the region is about 20% but wide gaps exist between the access rates in urban areas that average at 40% and in rural areas at 6% to 8%.The electricity networks serve mainly urban centres and suburbs.The urban and rural poor in West Africa spend more of their income for poor quality energy services than the better-off for better quality services.
- b. The electricity systems in West Africa are facing challenges due to the growing gap between predicted demand, existing supply capacities and limited capital to invest. Despite the growing gap and lack of investment capital the energy intensity in the countries remain high and energy is used in an inefficient way throughout all sectors. The estimated technical and commercial electricity losses in the electricity systems lie between 20% and 40% throughout the West African region. Increasing fossil fuel import dependency, shortages and fluctuating fossil fuel prices are major concerns of West African countries and require a diversification of sources. Over 60% of the community’s electricity generation capacity is running on oil. In some countries even more than 90% of the electricity generation is satisfied by diesel and heavy oil generation plants. As a result, the steadily increasing and fluctuating oil prices have had a devastating effect on the economies in the region.
- c. With climate change another concern was added to the heavy energy agenda of the ECOWAS region. West Africa is so far only responsible for a fraction of global energy related GHG emissions. However, the energy sector will be highly impacted by mitigation and adaptation costs of climate change in the forthcoming decades. Climate change risks and the need for reliable and affordable energy supply to ensure energy security and energy access create a dilemma. On the one hand urgent investments are required. On the other hand, the expansion of energy supply based on inefficient low-cost fossil fuel combustion technologies will increase GHG emissions and interrelated negative climate change impacts

¹ “Small-scale hydro” (SHP) in the present context is defined as systems **up to 30 MW, thus also including micro (< 100 kW) and mini (100-1000 kW) hydropower**

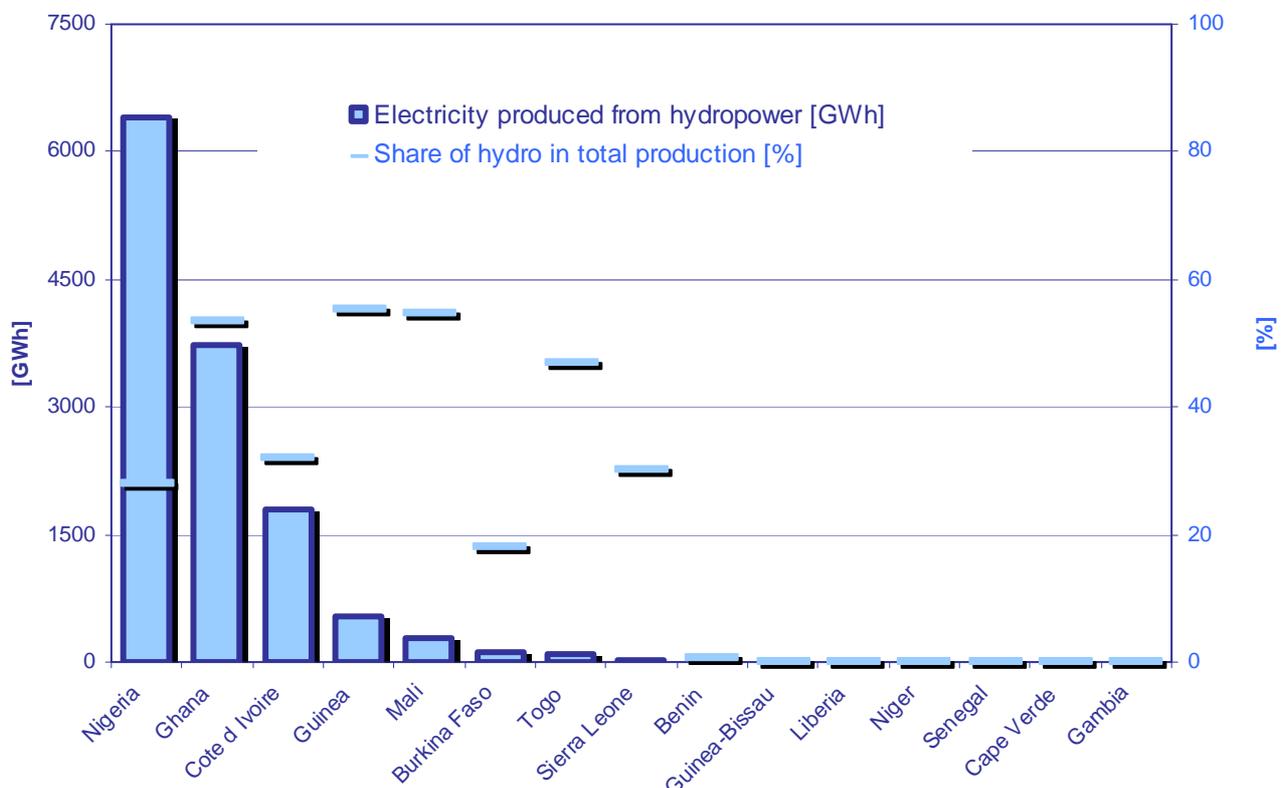
which harm Sub Sahara Africa at most. New energy infrastructure investments have a long life-time and determine the GHG emissions for the next 20 to 30 years. Climate change impacts (temperature rise, extreme weather events, droughts) will challenge the energy security of ECOWAS countries and have to be mainstreamed into energy policy planning (e.g. change of water flows).

2. Renewable Energy and Energy Efficiency Potentials in the ECOWAS region

Apart from other low-carbon solutions renewable energy technologies are appropriate tools to address the described challenges simultaneously and in a sustainable manner. Apart from significant fossil fuel resources the ECOWAS countries can rely on a wide range of untapped renewable energy and energy efficiency potentials in various sectors:

- West Africa accounts for one quarter of Africa's total exploited hydropower potential (E.A.K. Kalitsi 2003). The ECOWAS region is endowed with rich perennial and non-perennial rivers. A total of 23,000 MW of hydroelectric potential is concentrated in five of the fifteen ECOWAS countries, of which only 16% has been exploited. According to first estimations the SHP potential in the region amounts to more than 6.000 MW.
- There is also a good potential for all forms of bioenergy in the ECOWAS region. Traditional biomass is already the main source of energy for the poor majority and accounts for 80% of total energy consumed for domestic purposes.
- There are also considerable wind, tidal, ocean thermal and wave energy resources available in some ECOWAS countries. The region has vast solar energy potential with very high radiation averages of 5 to 6 kWh/m² throughout the year.
- There is significant potential to improve demand side and supply side energy efficiency in various sectors (e.g. appliances, buildings, industry and power generation and transmission). In the power sector the technical and commercial energy losses (e.g. theft, illegal operators) lie in the range of 20 to 40% (in comparison to 7% to 10% in Northern America and Western Europe). It is estimated that in West Africa around 30% of the total electricity supply is consumed in the building sector.

Figure 1 – Hydropower production in ECOWAS countries as of 2007



3. Status of small-scale hydro power development in the ECOWAS region

Hydropower can contribute significantly to meet the electricity needs of urban areas as well as isolated rural areas. Hydropower is one of the most advanced and flexible sources of renewable energy. It is considered as reliable, low cost and is independent of the energy price volatility associated with plants using fossil fuels. Hydropower plants have usually a life time more than fifty years without major replacements. Traditionally, hydro-based electricity generation was the basis for the expansion of electricity networks in many Africa countries. Grid-connected large hydropower can improve energy security through the reduction of fossil fuel import dependency, diversification of the energy mix and reduction of electricity shortages. It can help to meet the rapid growth of electricity demand in urban centers and industry.

Small-scale hydro (SHP) can be connected to a central grid, to a rural isolated grid or can be connected to a dedicated power load (e.g. cement factory, lodges, mines). It can range from pico (1KW – 10KW), micro (10KW – 100KW), mini (100KW – 1 MW) to small (1MW – 30MW²): SHP can serve the priority needs of the rural poor and boost local development, productive uses (e.g. processing and conservation of agricultural products, water pumping and desalination) and basic social services (e.g. health care, education). SHP projects can be quickly implemented with reasonable financial requirements. They also have minimum environmental impacts as they are mostly harnessed through run-of-the-river (ROR) schemes with low impacts on the natural river flow.

However, so far the ECOWAS countries do not take full advantage of their technical and economic feasible hydro potential. This is particularly true in the case of small-scale hydropower. Only eight ECOWAS countries produce a significant part of their electricity from hydro sources (mainly large scale). Table-1 shows the gap between the technically feasible hydro potential and the status of exploitation. The challenges that SHP developers are facing are many and most of them are part of the larger picture of general barriers for the uptake of renewable energy. The main constraints for SHP development in the ECOWAS region can be summarized as follows:

- **Policy and institutional barriers:** There is a lack of coherent clear-cut energy policies, regulations and associated budgetary allocations to create an enabling environment for SHP investments and business. Most ECOWAS countries do not put a special focus on SHP in their energy policies and rural electrification strategies. The monopolistic role of national power utilities and the uncertainties for IPPs are other known constraints. There are no particular support policies and incentives for SHP in place and low quality equipment enters the market due to the absence of defined quality standards and certification.
- **Financial barriers:** There is a lack of long-term financing mechanisms tailored for SHP projects which usually have high initial investment costs and low operation and maintenance costs. Another constraint for SHP investments is the low willingness and ability to pay of the population in rural areas. Even the smallest of the SHP schemes possibly costing only few thousand Euros becomes a major project for the poor. Due to the complex nature of SHP, there are very often time and cost over-run in the construction phase. Associated technical, market and political risks impact the financial viability of SHP projects. Local lending agencies and development banks are usually focused on large hydropower rather than more expensive small projects with higher risks. Carbon mechanisms (e.g. CDM) are difficult to apply and risk capital for feasibility studies is scarce.
- **Technical barriers:** As most good sites are located in remote areas, infrastructure constraints such as access to roads and transmission lines make these good sites difficult to develop. Technical risks are also the hydrological and geological uncertainties and unpredictable long-term climate change impacts. A technical challenge for SHP schemes is also the low electricity demand in rural areas (load factor). Finally, the ECOWAS countries have difficulties to access appropriate quality technologies particularly in the mini, micro and pico hydro categories. There is a need for technology transfer.

² According to the official definition „small“ hydro includes systems of 1-10 MW, however in the present context the upper limit is fixed at 30 MW.

- **Capacity barriers:** Public institutions such as ministries, regulatory authorities and district administrations often possess only minimal capacity to design, implement and revise SHP supportive policies and regulations. At technical level the capacities to plan, build and run SHP projects are very low. Most of the countries lack specialization to undertake quality feasibility studies (e.g. detailed design and financial cost benefit analysis). Most ECOWAS countries do not have any facility to manufacture even the most rudimentary turbines or parts that might be critical in maintenance of the schemes. Local lending agencies and investors are reluctant as they do not know how to appraise SHP projects.
- **Knowledge and awareness barriers:** Another serious challenge is the missing knowledge and awareness on SHP costs, potentials and benefits for rural electrification. Utilities are focused on large hydropower rather than the more costly small-scale hydro schemes. Public data on SHP resources and projects sites is often not available. Such a lack of sound basic data (e.g. hydrological, geographic, geologic data, seasonal and long-term river flow data), poses a major barrier for private investors in the sector. Detailed GIS based SHP maps are in most cases not available and there is a lack of river flow measurement stations. Increasing climate variability and the destruction of rainfall catchment areas are making investment in hydropower systems risky.

C. Strategic rationale for proposed SHP workshop

In previous decades the utilities of the ECOWAS region were mainly focused on large hydropower rather than small-scale hydro development. Also international financiers (e.g. development banks, trust funds) targeted mainly large scale projects in the context of regional power trade and the West African Power Pool (WAPP). With the adoption of the ECOWAS White Paper on access to energy services for peri-urban and rural areas in 2005 the sector of small-scale hydro power got more attention. The white paper recommended that at least 20% of new energy investments in rural and peri-urban areas should originate from renewable energy sources.

As a direct response to the white paper several SHP projects and initiatives were launched co-funded by the GEF (e.g. UNEP, UNDP, UNIDO). Two regional institutions with a specific mandate for small-scale hydro power promotion were created. In 2006 the UNIDO Centre for Small Hydropower Development in Abuja, Nigeria, was launched. In 2010 the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) was created by the ECOWAS Commission with support of the Austrian and Spanish Governments and technical support of UNIDO. Both institutions and other partners will join forces for the implementation of a comprehensive SHP Up-Scaling Programme in the forthcoming years.

An expert group meeting on small hydropower development was organized by the ECOWAS Commission in cooperation with UNIDO in Abuja, Nigeria, from 6 to 8 August 2007. It brought together international experts and representatives from nine ECOWAS countries. The meeting concluded with the recommendations (...)

- to establish a regional ECOWAS network of national SHP focal points and experts
- to develop an ECOWAS programme for small-scale hydropower which addresses the existing technical, financial, economic, legal, institutional, policy and capacity barriers through a regional approach
- to develop a SHP project pipeline and to raise local and international funding
- to assess the technical and economic feasible SHP potentials and
- to provide capacity development support in different areas and for different target groups

Five years after the expert meeting, ECREEE and its partners decided to organize a follow-up SHP workshop to be held in Liberia. It will review the progress of implementation of the recommendations of the SHP expert meeting in 2007 and will discuss the suggested ECOWAS Scale-Up Programme for Small-Scale Hydropower.

Table 1 – Overview on SHP potentials and stage of development in ECOWAS countries

Country	Hydropower Potential and Exploitation	Small-Scale Hydropower	Large Hydropower	RE Market Barriers (relevant to ECREEE)
Benin	-	Some 80 sites equipped with SHP installations	Potential of Oueme River: 20 sites with 760 MW and over 280 GWh/a in total	- difficulties in registering PPAs - lack of technical knowledge - inadequate finance - no incentives for investments
Burkina Faso	Study on HP identified potential for decentralized production. Costs at some sites between € 0,15-0,27/kWh, others above	9 plants with 36 MW in total as of 1999		- lack of local expertise - inadequate finance
Côte d'Ivoire	12 TWh (economic potential)	Several identified sites with potential between 0.5 - 5.0 MW	4 sites identified ranging from 5-290 MW. Potential of (other) selected sites: 1,300 MW	-
Ghana	HP generation (2006 - 2008): 5,600 GWh; Planned: +240 GWh	13 sites earmarked	2 main plants, third one to be commissioned soon	- limited local expertise
Guinea	6,000 MW or almost 20,000 GWh Only 2% exploited	13 sites with total capacity of 24 MW earmarked; 37 potential sites identified	81 potential sites identified, 17 of which above 100 MW	- lack of institutional framework - inadequate finance - no fiscal incentives
Guinea-Biussau	over 180 MW Currently no significant exploitation			- lack of consistent RE policies - weak industrial & private sector - lack of accurate data - no incentives for investments
Liberia	Over 1,000 MW potential, but only a 4 MW plant (privately owned) in operation.	23 plants before war, now only 1 in operation, over 24 additional potential sites identified prior to the war.	no plant in operation, 3 potential sites identified before war, one 64 MW plant operated before war	- Energy policy adopted in 2009 - monopoly of power utility
Mali	1,050 GW or 5,000 GWh Only 15% exploited	2 plants in operation, 8 sites identified	2 plants in operation	- lack of enforcement of energy policy - no dedicated body for quality control
Niger	270 MW (economic potential)	-	1 plant in operation (125 MW), 2 sites identified (149 MW in total)	-

Nigeria	technical feasible potential: 20.000 MW (gross potential), 3,500 MW for SHP	8 plants with 30 MW in operation, 277 potential sites with 734 MW in total according to obsolete study, 2023 target: 3,400 MW	1,930 MW in operation, 30 sites identified, 4 of which above 1000 MW, 2015 target: 5,230	<ul style="list-style-type: none"> - lack of accurate data - poor regulatory environment - poor institutional framework - poorly implemented incentives - lack of standardization - high transaction costs at ports - need for incentives for investments
Sierra Leone	1,500 MW from 27 sites, 2 of which economically attractive	1 plant in operation, 1 plant out of service, 1 plant to be implemented	one 50 MW plant under construction since 1990	<ul style="list-style-type: none"> - lack of energy policy - lack of regulatory framework - lack of legal framework - tariffs below production costs
Togo	220 MW from 40 sites Only a few existing plants	26 sites identified with 120 MW in total	6 sites identified, but inconsistency in data	<ul style="list-style-type: none"> - lack of appropriate policy - lack of regulatory instruments - no incentives for investments
Senegal	4,250 GWh/a 234 GWh of which exploited (concordation to AfDB et al. 2010)	one 200 MW plant, 2 plants planned, one of which is large, the other one not specified		<ul style="list-style-type: none"> - unclear legal framework - no direct financial support scheme

II. Activity objectives and key results of the workshop

D. Primary objectives and participants

The overall objective of the workshop is to create a strategic framework for small-scale hydro power development in the ECOWAS region and to formulate a realistic plan of action to address the existing barriers through a regional approach. The workshop responds directly to the recommendations of the expert SHP meeting held in Abuja, Nigeria, in 2007. It is expected that around one hundred participants from ECOWAS and international levels will attend the workshop, including policy makers, utilities, rural electrification agencies, regional river basin authorities, practitioners, equipment manufacturers, as well as financiers and banks. For the training seminar on SHP project development ECREEE will invite experienced resource persons from the ECOWAS region, Eastern and Southern Africa, Asia and Europe.

A. Key outcomes being sought

The workshop aims at achieving the following specific objectives (outcomes):

- to take stock of the progress of SHP development and to assess the individual support needs of the participating ECOWAS countries
- to validate the proposal for the ECOWAS Up-Scale Programme for Small-Scale Hydropower and raise funding
- to gather country information on resources, institutional set-ups and policies for the planned regional SHP resource assessment/atlas of ECOWAS
- to compile an inventory of SHP investment projects to be presented to financiers and investors
- to initiate a regional information network of national SHP focal points and experts
- to provide training on key aspects of SHP project development for ECOWAS experts and facilitate cross-border exchange of experiences and lessons learned

- to create awareness among invited policy makers that SHP is a tool for poverty reduction and sustainable development in peri-urban and rural areas

III. Activity Description (Tasks and outputs)

A. Key components

Training workshop on SHP project development (three days):

- to provide training on key aspects of SHP project development (e.g. project management, planning, design, financing, implementation, maintenance, policy frameworks, sustainability assessment) and facilitate cross-border exchange of experiences and lessons learned
- to assess the individual training needs of the different countries as input for the design of capacity development programmes (e.g. through a questionnaire)
- to agree on a time schedule for follow-up trainings

Technical meeting on the ECOWAS Up-Scale SHP Programme (two days):

- to take stock of the progress of SHP development since 2007
- to discuss the key pillars of the ECOWAS Up-Scale Programme for Small-Scale Hydro Power related to policy support, capacity development, awareness raising and investment and business promotion.
- Compile and discuss an inventory list of SHP investment projects with invited financiers
- Present the structure of the planned SHP inventory to be “replenished” by the ECOWAS countries
- to Initiate a regional information network of national SHP focal points and experts

B. Risks and issues

Main risk factors	Classification	Mitigating measures
Timely organization of key components and inputs for the workshop	Low	<i>ECREEE has already experience in organizing workshops of similar size and scope; The draft of the SHP Programme is already elaborated and will be updated; A consultant will be recruited for the preparation of the main documents of the workshop; The UNIDO Small Hydro Power Centre will be also involved in the preparations of the workshop;</i>
Low organizational capacities to ensure the workshop logistics in Liberia	Middle	<i>ECREEE has already experience in organizing events of similar scale and complexity in other ECOWAS countries (e.g. Ghana, Benin, Senegal); the UNIDO-SHP Centre will assist in the practical organization if needed; A SHP program funded by Norway is situated in Liberia; The World Bank is also funding the construction of a Micro-hydro in Liberia.</i>

C. Expected Outputs/Deliverables

It is expected that the workshop will produce the following **practical results and deliverables**:

- A **validated project document** for the ECOWAS Scale-Up Programme for Small-Scale Hydropower
- An **inventory on SHP resource data and other information** from the countries to be used for the GIS based regional SHP Resource Assessment/Atlas

- An **inventory of potential beneficiary investment projects** was compiled and discussed with local and international financiers
- An **inventory list of key SHP experts and businesses in the ECOWAS region**
- An **inventory for capacity building needs and relevant institutions** in the ECOWAS
- **Contact list of national SHP focal points and web based information network** established

IV. Implementation Arrangements

A. The Partners

The workshop will be jointly organized by the (...)

- ECOWAS Regional Centre for Renewable Energy and Energy Efficiency, based in Praia, Cape Verde
- UNIDO and the UNIDO Small Hydro Power Centre, based in Abuja, Nigeria
- the Energy Sector Management Assistance Program, based in Washington DC, USA
- the Rural and Renewable Energy Agency of Liberia

The **Energy Sector Management Assistance Program**: is a global knowledge and technical assistance partnership administered by the World Bank and sponsored by bilateral official donors since 1983. ESMAP's mission is to assist clients from low-income, emerging, and transition economies to secure energy requirements for equitable economic growth and poverty reduction in an environmentally sustainable way. ESMAP follows a three-pronged approach to achieve its mission: think tank/horizon-scanning, operational leveraging, and knowledge clearinghouse (knowledge generation and dissemination, training and learning events, workshops and seminars, conferences and roundtables, website, newsletter, and publications) functions.

The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE): As a policy response to the rising energy security concerns, continued lack of access to energy services in rural areas and the need for climate change mitigation the ECOWAS Energy Ministers established the first regional renewable energy promotion agency in Sub Sahara Africa. The Secretariat of the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) was inaugurated on 6th July 2010 with support of the ECOWAS Commission, the Governments of Austria, Spain and technical assistance of the United Nations Industrial Development Organization (UNIDO). The ECREEE Secretariat is based in Praia, Cape Verde, and operates with a small multi-national team of full time staff. ECREEE works through a network of National Focal Institutions (NFIs) which interlinks the Secretariat with all ECOWAS Member States. ECREEE aims at the creation of favorable framework conditions for renewable energy and energy efficiency markets. The Centre supports activities, programs and projects directed to mitigate existing technical, legal, institutional, economic, financial, policy and capacity related barriers. The ECREEE activities include fund mobilization, policy support, knowledge management and awareness raising, capacity development and business and investment promotion.

The **United Nations Industrial Development Organization (UNIDO)** is the United Nations' specialized agency with the mandate to promote industrial development in the world's developing and least developed nations. UNIDO is one of the lead United Nations agencies in the field of renewable energy for productive uses and industrial energy efficiency. UNIDO's services include the implementation of renewable energy demonstration projects, policy support to create a favorable environment for renewable energy technologies, and capacity-building in the form of local training, workshops and targeted publications. UNIDO has provided technical assistance for the establishment and operation of the **Regional Centre for Small Hydropower**, based in Abuja, Nigeria, and the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE), based in Praia, Cape Verde. The UNIDO Regional Centre for SHP is mandated to provide technical assistance to African countries in developing and implementing their SHP projects. This objective is expected to be achieved through training, awareness creation, assistance for planning and design, utilization of local materials and equipment manufacturing.

The Rural and Renewable Energy Agency (RREA) is the Government of Liberia Agency that is under the policy oversight of the Ministry of Lands, Mines and Energy but with operational autonomy. The RREA's mandate to facilitate the economic transformation of Liberia by facilitating the commercial development and supply of modern energy services to rural areas with an emphasis on locally available renewable resources. This

also includes facilitating and promoting the development of SHP in Liberia. The RREA serves as ECREEE's National Focal Institution (NFI) in Liberia.

B. Team composition

Institution/Experts	Function/Tasks	Contacts
<p><u>ECOWAS Regional Centre for RE&EE (ECREEE)</u></p> <ul style="list-style-type: none"> • Mr. Mahama Kappiah, ECREEE, Executive Director • Mr. Martin Lugmayr, ECREEE, Renewable Energy Expert • Mr. Jansenio Delgado, ECREEE, Renewable Energy Expert • Mr. Joana Barbosa, ECREEE, Project Assistant 	<ul style="list-style-type: none"> - Overall Organization - SHP Programme Document - Workshop Documents - Coordination of training workshop 	<p>ECREEE Secretariat Achada Santo Antonio 2nd floor, Electra Building C.P. 288, Praia, Cape Verde workshop@ecreee.org Tel. +238 2604630 Web: www.ecreee.org Web: http://small-hydro.ecreee.org</p>
<p><u>ESMAP, Washington:</u></p> <ul style="list-style-type: none"> • Ms. Juliet Pumpuni, Africa Energy Group (AFTEG), The World Bank 	<ul style="list-style-type: none"> - Co-funding - Technical Inputs 	
<p><u>ECREEE NFI - Rural and Renewable Energy Agency (RREA)</u></p> <ul style="list-style-type: none"> • Mr. Augustus V. Goanue, Executive Director, RREA and Principal Focal Point, ECREE • Mr. Stephen V. Potter, Technical Services Director, RREA and Alternate Focal Point, ECREEE • Ms. Kim A. Harris, Director for Administration & Operations, RREA 	<ul style="list-style-type: none"> - Local logistical support (e.g. hotel list with prices, translation services, invitation of local press and technical inputs (high level opening by the minister, arranges high-level moderators and experts from Liberia) 	
<p><u>UNIDO</u></p> <ul style="list-style-type: none"> • Mr. Alois Mhlanga, UNIDO Headquarter • Mr. Afolabi Ayodele Esan, UNIDO Small Hydro Centre • Mr. Adgidzi Donald, UNIDO Small Hydro Centre 	<ul style="list-style-type: none"> - Technical Inputs - Implement some of the training modules 	

A. Indicative Budget Breakdown

The organizing Partner agreed on a common budget (see separate excel sheet):

B. Co-Funding Arrangement

The workshop will be co-funded by ECREEE, UNIDO, ESMAP and the Government of Liberia as agreed under this concept note (see separate excel sheet).

C. Timetable (2011-2012)

Indicative time schedule	D	J	F	M	A	M	J	J	A	S	O	N
Selection and contracting of consultant and final inception report (see budget item 2.1 and TORs in the annex)												
Finalization of the draft project document of the regional SHP Up-Scale Programme												
Preparation of the Workshop documents (e.g. agenda, training modules, questionnaires, inventory lists, resource assessment)												
Invitation of workshop participants and instructors for training modules												
Logistical organization (e.g. flight bookings, venue, equipment, catering, transport)												
Elaboration of Workshop report and follow-up activities												

V. Information for Participants

A. REGISTRATION PROCESS

Around 60 SHP experts from the ECOWAS region and the international level are expected to participate in the workshop. Representatives of the Ministries of Energy from fifteen ECOWAS countries, namely the ECREEE National Focal Institutions (NFIs), are invited to participate and validate the ECOWAS SHP Program. The online-registration is available at: <http://small-hydro.ecreee.org>. Invited participants which are funded by UNIDO/ECREEE/ESMAP have to provide the following information: the full name (first and second name/surname), their passport numbers, data or birth, and the airports of departure and arrival. Please note, that nominations cannot be changed after the registration (flight tickets are not changeable). Therefore, kindly provide reliable data. For funded participants the flight bookings will be done by ECREEE/UNIDO.

B. DATE AND VENUE

The regional workshop will be held from 16 to 20 March 2012 at the Golden Gate Hotel, Paynesville, Monrovia, Liberia.

C. PREPARATORY WORKS AND BACKGROUND INFORMATION

Updated information on background documents, the workshop proceedings and logistics are available at: <http://small-hydro.ecreee.org>. To make the workshop a success, the invited National Focal Institutions of ECREEE (NFIs) are asked to assist actively in the preparation of the workshop. The NFIs are asked to (...):

- send the attached notice on the "call for small-scale hydro experts" to qualified experts in the sector (ECREEE offers travel support for a limited number of experts).
- send general information on the SHP sector in your country before the workshop to hydro@ecreee.org (e.g. small hydro sites, studies).
- fill the attached questionnaire on small hydro stakeholders and send it to hydro@ecreee.org at latest by 12 March 2012.
- distribute the attached capacity building needs questionnaire to SHP stakeholders in your country and ask them to fill in and return the questionnaires to hydro@ecreee.org at latest by 12 March 2012.
- send comments on the attached draft ECOWAS Up-Scale Program for Small Scale Hydropower at latest by 12 March 2012.
- prepare and hold a presentation (max. 15 min.) on the status quo of the small-scale hydro sector in your country. The presentation guidelines can be found in the annex. We would be pleased to receive the power point presentation at latest by 26 March 2012.

D. VISA ARRANGEMENTS

Before leaving the home country, participants should complete all formalities regarding entry and transit visas, which they may require for the trip to Monrovia, Liberia. If needed ECREEE is able to provide an invitation letter.

E. HOTEL RESERVATION:

The list of recommended hotels is available at: <http://small-hydro.ecreee.org/>. It is recommended that participants stay at the Golden Gate Hotel where also the workshop takes place. For other participants a bus transport will be organized. Please inform if the organizer should help with the accommodation arrangements.

F. ENQUIRIES AND CORRESPONDENCE

All enquiries and correspondence prior to the Conference shall be addressed to:

ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE)

Achada Santo Antonio, Electra Building, 2nd Floor

C.P. 288 Praia – Cape Verde, Tel. +238/2604630

Email: workshop@ecreee.org

Website: <http://small-hydro.ecreee.org/>, <http://www.ecreee.org>

G. WORKSHOP LANGUAGES

English and French (Simultaneous interpretation between English and French will be provided.).

H. FINANCIAL ARRANGEMENTS

All training fees are covered by the organizers. The travel expenditures of invited participants will be covered by UNIDO/ECREEE. The participation of the fifteen ECREEE National Focal Institution (NFIs) and a number of international and local SHP experts will be sponsored by UNIDO (around 27 participants). Financial and administrative arrangements for the UNIDO sponsored participants will be made in accordance with UNIDO's rules and regulations. UNIDO will provide:

- a) A round-trip airfare (economy class and most direct route) between the airport of the departure in the sponsored participant's usual place of work and the site of the Workshop (Monrovia, Liberia). The bookings of flights will be done by ECREEE in cooperation with the UNIDO Travel Unit. Please note that no tickets shall be purchased by sponsored participants. Such tickets cannot be refunded. All sponsored participants shall arrive in Monrovia, Liberia, no later than the 15 April 2012. The sponsored participants will depart no later than on 21 April 2012 (workshop ends on 20 April evening).
- b) A Daily Subsistence Allowance (DSA) at the prevailing UN rate for Monrovia, Liberia, will be paid at the venue to each participants in accordance with the UNIDO regulations and rules and the period of the training (16 to 20 April 2012). One additional DSA night will be paid to cover expenses incidental to travel abroad, such as expenditure for passport, visa, medical examination, inoculations and other such miscellaneous items, as well as travel to and from the airports. UNIDO cannot assume financial responsibilities for earlier arrivals / later departures for personal reasons.

Exclusions:

UNIDO and ECREEE will not assume responsibility for the following expenditure in connection with the participants' attendance at the meetings:

- Costs incurred by participants with respect to any insurance, medical bills and hospitalization fees.
- Compensation in the event of death, disability or illness.
- Loss or damage to personal property.
- Purchase of personal belongings and compensation for damage caused to them by climatic or other conditions.

I. Workshop Agenda

Day One: 16 April 2012		
Capacity Building Workshop on SHP Project Development		
Location: Golden Gate Hotel, Monrovia / Liberia		
INTRODUCTION / WELCOME SESSION		
Time	Session	
08:30	1	Welcome (ECOWAS, ECREEE, UNIDO, ESMAP, GoL) 10 min per person
09:30	2	Short announcement on agenda, objectives of the workshop, logistics, etc.
GENERAL AND TECHNICAL ASPECTS		
09:45	3	What are we talking about? (30 min), Martin Bölli overview on “small-scale hydropower” SHP; Comparative analysis of micro, mini, small hydro (and large hydro for comparison)
10:15	4	Questions and answers
10:30		Tea/coffee/cocoa break
		Film: planned SHP in Sierra Leone (3 min)
11:00	5	The special challenge in W-Africa (30 min), Oliver Froend differences between high head and small runoff compared to low head and high runoff
11:30	6	Questions and answers (15 min)
11:45	7	What is the range of costs? (30 min), Oliver Froend Investment costs, operation costs, electricity production costs; Rough cost repartition; rough figures to evaluate projects
12:15	8	Questions and answers (15 min)
12:30		Lunch break
14:00	9	Isolated versus grid-connected SHP systems (30 min), Martin Bölli Comparative analysis between isolated and grid connected SHP: load factor, profitability, technical requirements, ownership & management, additional costs etc.
14:30 GROUP WORK !	10	Discussion on “What shall be achieved in the MHP and SHP sector?” (60 min) 3 to 4 groups of maximum 20 persons

15:30		Snack break
16:00	11	Short presentation of results from group work in plenary (4 x 5 min)
POLICY AND LEGAL ISSUES		
16:30	12	Options for ownership and management structures; social and environmental impact (30 min), Mr Shafat Sultan Marazi / TERI Different options of "ownership" (utility, community, district...) and respective consequences ; handling of environmental and social impact; "residual flow"
17:00	13	Questions and answers (15 min)
17:15	14	Wrap up of the day
17:30		End of Day

Day Two: 17 April 2012		
Capacity Building Workshop on SHP Project Development		
Location: Monrovia / Liberia		
Time	Session	
8:30	1	Introduction
POLICY AND LEGAL ISSUES (continued)		
8:45	2	Policy and legal framework (30 min), Martin Bölli Policy objectives: steering mechanisms; examples; Legal requirements: licences, water right, permits,... PPA , feed-in tariff; technical implications
9:15	3	Questions and answers (15 min)
IMPORTANCE OF RESOURCE ASSESSMENT		
09:30	4	Assessment of hydropower resources (30 min), Oliver Freund Importance of resource assessment and data collection (potential supply and potential demand) for success / profitability
10:00	5	Questions and answers (15 min)
10:15		Tea/coffee/cocoa break
TOOLS, ware SUCCESS AND RISK FACTORS		
10:45	6	Project cycle and planning tools (15 min), Oliver Freund project cycle for a kW- and a MW-system; planning tools (RETscreen, Homer, etc.)

11:00	7	case study: Akloa micro-hydro project in Togo (15 min), N'Guessan / Econoler as part of UNDP/GEF "Regional mini/micro hydro project in sub-Saharan Africa" using RETScreen tools,
11:15	8	Questions and answers (15 min)
11:30	9	General success and risk factors (30 min), Drona Upadhyay IT Power Analysis of technical, financial, legal, organizational etc. factors with impact on success or failure; impact of quality of design and equipment on sustainability
12:00	10	Questions and discussion (15-30 min)
12:30		Lunch break
13:50		Film: Mutobo MHP (200 kW) in Rwanda), 5 min
14:00	11	Presentation of GIZ experience with small-scale hydropower in East Africa (30 min), Ben Attigah?
14:30	12	Questions and answers (15 min)
FINANCING OF SHP		
14:45	12	How to finance small-scale hydropower schemes (30 min), Michael Sponring PWC crucial financial aspects, calculation of profitability and impact of different parameters
15:15	13	Questions and answers (15 min)
15:30		Snack break
16:00	14	Different operational / business models (lessons learned from Austria) (30 min), Michael Sponring PWC Private and public ownership...
16:30	15	Questions and answers (15 min)
16:45	16	Financing instruments and experience from African Development Bank (30 min), Richard Claudet AfDB "private financing" and "sovereign/public lending"; financing instruments; generic example
17:15	17	Questions and answers (15 min)
17:30		End of Day

Day Three: 18 April 2012								
Capacity Building Workshop on SHP Project Development								
Location: Monrovia / Liberia								
Time	Session							
SPECIFIC ECOWAS PRESENTATIONS								
08:30	1	Introduction ECREEE/UNIDO						
8:45	2	Experience of Regional Centre for Small Hydro Power Abuja, 30 min, Dr. Esan						
9:15	3	Question and answers (15 min)						
09:30	2	Parallel sessions of ECOWAS presentations (focus on best practices and lessons learned!); 20 min presentation and 20 min discussion						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Focus 1</td> <td style="width: 33%;">Focus 2</td> <td style="width: 33%;">Focus 3</td> </tr> <tr> <td>Presentation 1</td> <td>Presentation 2</td> <td>Presentation 3</td> </tr> </table>	Focus 1	Focus 2	Focus 3	Presentation 1	Presentation 2	Presentation 3
		Focus 1	Focus 2	Focus 3				
Presentation 1	Presentation 2	Presentation 3						
10:15		Tea/coffee/cocoa break						
10:45	4	Parallel sessions of ECOWAS presentations (focus on best practices and lessons learned!); 20 min presentation and 20 min discussion						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Focus 1</td> <td style="width: 33%;">Focus 2</td> <td style="width: 33%;">Focus 3</td> </tr> <tr> <td>Presentation 4</td> <td>Presentation 6</td> <td>Presentation 8</td> </tr> </table>	Focus 1	Focus 2	Focus 3	Presentation 4	Presentation 6	Presentation 8
		Focus 1	Focus 2	Focus 3				
Presentation 4	Presentation 6	Presentation 8						
11:30	5	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Presentation 5</td> <td style="width: 33%;">Presentation 7</td> <td style="width: 33%;">Presentation 9</td> </tr> </table>	Presentation 5	Presentation 7	Presentation 9			
Presentation 5	Presentation 7	Presentation 9						
12:15	6	Plenary: 5 min presentation of lessons learned from each focus						
12:30		Lunch break						
14:00	7	Excursion to a 4 MW hydropower plant (Firestone Rubber Plantation Company)						
18:00		End of Day						

Day Four: 19 April 2012

Workshop on the ECOWAS Up-Scale Programme for Small-Scale Hydropower

Location: Monrovia / Liberia

Time	Session			
08:30	1	Short introduction on procedure Presentation Specific Objective 1: <u>“Policy and Regulatory Frameworks”</u>		
09:00	2	Discussion of Objective 1 in small working groups		
		3 subgroups (6-8 persons each) with focus questions 1a	3 subgroups (6-8 persons each) with focus questions 1b	3 subgroups (6-8 persons each) with focus questions 1c
10:00	3	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 1a	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 1b	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 1c
		10:30 Tea/coffee/cocoa break		
11:00	4	Presentation of the working group results 1a, 1b, 1c (10 min each)		
11:30	5	Presentation Specific Objective 2: <u>“Capacity Building”</u>		
12:00		Lunch break		
14:00	6	Discussion of Objective 2 in small working groups		
		3 subgroups (6-8 persons each) with focus questions 1	3 subgroups (6-8 persons each) with focus questions 2	3 subgroups (6-8 persons each) with focus questions 3
15:00	7	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 2a	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 2b	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 2c
		15:30 Presentation of the working group results 2a, 2b, 2c (10 min each)		
16:00		Snack break		
16:30	9	Presentation Specific Objective 3: <u>“Knowledge Management & Awareness Raising”</u>		
17:00	10	Wrap up of the day		
17:15		End of Day		

Day Five: 20 April 2012				
Workshop on the ECOWAS UP-Scale Programme for Small-Scale Hydropower				
Location: Monrovia / Liberia				
Time	Session			
08:30	1	Short introduction		
08:45	2	Discussion of Objective 3 in small working groups		
		3 subgroups (6-8 persons each) with focus questions 1	3 subgroups (6-8 persons each) with focus questions 2	3 subgroups (6-8 persons each) with focus questions 3
09:45	3	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 3a	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 3b	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 3c
10:15		Tea/coffee/cocoa break		
10:45	4	Presentation of the working group results 3a, 3b, 3c (10 min each)		
11:15	5	Presentation Specific Objective 4: <u>“Business and Investment Promotion / Projects and Programmes”</u>		
11:45	6	Discussion of Objective 4 in small working groups		
		3 subgroups (6-8 persons each) with focus questions 1	3 subgroups (6-8 persons each) with focus questions 2	3 subgroups (6-8 persons each) with focus questions 3
12:30		Lunch break		
14:00	7	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 4a	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 4b	Exchange of ideas between 3 subgroups and bundling of results → preparation of presentation 4c
14:30	8	Presentation of the working group results 4a, 4b, 4c (10 min each)		
15:00		Snack break		
15:30	9	Final discussion of the results, presentation of the final draft for approval by the participants		
16:30	10	Closing of the workshop, speeches		
17:00		End of Day		

Annex 1: Regional ECREEE Workshop on the ECOWAS Scale-Up Programme for Small Hydro Power, 16th to 20th of April 2012, Monrovia, Liberia

Guidelines for ECOWAS Country Presentations

Each nominated expert from the ECOWAS region shall hold a power point presentation (20 min. maximum) in accordance with the guidelines below. Please send the PP presentation file at latest by 26 March to hydro@ecreee.org. Presenters should reflect on the following country-specific aspects in their presentations:

1. Shortly describe the **status quo of micro (< 100 kW) , mini (100 – 1000 kW), small (1 - 30 MW) hydro and large (>30 MW) hydro markets** in your country
 - Present electricity supply from hydro (micro up to large)
 - Rough estimation of hydro potential which is still unused (micro, mini, small); use maps if possible
 - Possible contribution of SHP for rural electrification?
 - Who constructs, owns and operates hydropower plants in your country (utility, private individuals, NGOs, communities...)?
 - Existence of local production of turbines or spare parts? Existence of local consultancy capacity?
 - Existence of hydrology departments at universities and/or training institutes in the country?
 - Existence of a network of gauging stations for regular water level and runoff measurements and hydrological data collection?
2. Shortly describe the **general policy framework** in your country:
 - Who is authorised for electricity generation, transmission and distribution?
 - What is the normal consumer tariff for electricity?
 - What are legal requirements for the development, implementation and operation of a hydropower system: licences, quality standards, permits, water rights, land right, environmental and social impact assessment...?
 - If feeding electricity to the national grid is allowed, how is the feed-in tariff defined (how much you get per kWh, length of contract period)? Standard power purchase agreements are existing?
 - Does the existing legal framework make a difference between micro (< 100 kW), mini (< 1 MW), small (< 10 MW) and large hydro?
3. Describe a **specific case study** (preferably in the range 10-1000 kW) in your country
 - Show some photos if possible
 - Design flow, head, capacity, year of construction
 - Who owns the systems?
 - Who operates the system?
 - does it supply an isolated small grid or is it connected to the national grid?
 - Who benefits?
 - What were the main barriers? Factors for success or failure?
4. What do you **expect from the ECOWAS Small Scale Hydropower Program (SHP) during the coming 5 years**? How ECREEE and UNIDO could assist you to develop the SHP resources in the country?

Annex 2: Call for applications for small hydro experts from the ECOWAS region



The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) in cooperation with the United Nations Industrial Development Organization (UNIDO), the Energy Sector Management Assistance Programme (ESMAP), and the Government of Liberia are jointly organizing a **five-day workshop on small scale hydropower from 16th to 20th of April 2012, in Monrovia, Liberia**. The event features a three day capacity building seminar on (SHP³) project development and a subsequent two day technical meeting to validate the project document of the ECOWAS Scale-Up Programme for Small Scale Hydro Power. It is expected that around one hundred participants from ECOWAS and international levels will attend the workshop, including policy makers, utilities, rural electrification agencies, regional river basin authorities, project developers (NGOs, international organization, private individuals etc.), practitioners, consultants, equipment manufacturers, as well as financiers and banks.

ECREEE offers financial support for a limited number of qualified small hydro experts from the ECOWAS region to participate in the workshop. Interested applicants are asked to send an electronic application by e-mail in at latest by 25 March 2012 to workshop@ecreee.org

Applicants should have the following profile:

You should work in one of the following types of **organizations**:

- Public / government organization clear small hydro mandate
- Consulting or construction company
- Manufacturer of equipment (turbines, penstock pipes, electrical equipment, controllers, etc.)
- Company/organisation managing and/or operating SHP system
- Educational or research institution
- Commercial or development bank
- NGO, donor agency, private project developer or others

You should have been involved in one of the following **activities**:

- Development, planning or implementation of SHP projects
- Energy project financing
- Assessment of hydropower potential
- Manufacturing of SHP equipment
- Training and/or research on SHP related subjects

You should have one of the following educational **backgrounds**:

- Civil, electrical or mechanical engineer
- Hydrologist
- Economist
- Other education related to SHP activities

Applicants should submit the following documents in English, French or Portuguese:

³ “Small scale hydro” in the present context is defined as systems **up to 30 MW, thus also including micro and mini hydropower**

- Short CV indicating the SHP experience
- Motivation letter showing the commitment to work in the SHP sector. The letter should reflect on the following questions:
 - Describe the (type of) organization for which you work and the type of SHP activities which you have been involved? What exactly have been your tasks?
 - What has been the capacity range of the project/s in which you have been involved (micro, mini, small hydro; which capacity range)?
 - What exactly is your educational and professional background?
- Scan of the national passport

Annex 3: Interview: needs assessment for capacity building on small-scale hydropower SHP
(please return at the latest March 12 to hydro@ecreee.org)

The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) in cooperation with the United Nations Industrial Development Organization (UNIDO) is preparing the “ECOWAS Small Scale Hydropower (SHP⁴) Scale-Up Programme”. The project document for this 5 years Program will be elaborated in close cooperation with the ECOWAS countries. To establish a sound basis to plan different activities in the context of the program, ECREEE intends to establish:

1. an inventory on relevant SHP stakeholders in the different ECOWAS countries
2. a needs assessment for capacity building of the different stakeholders
3. an inventory of existing and planned SHP demonstration and investment projects

This survey questionnaire aims at identifying the training needs on small scale hydropower in the ECOWAS region. The survey aims at identifying the training needs of different stakeholders and appropriate modalities for best meeting such needs. The results of the survey will be discussed at the regional SHP workshop to be held from 16 to 20 April 2012 in Monrovia, Liberia (check www.ecreee.org). The results will also be incorporated into the design of the capacity development component of the SHP Program.

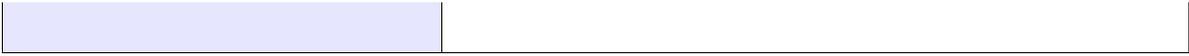
We would appreciate your kind assistance and cooperation in filling-in this questionnaire.

Please note: the white answer fields will extend themselves when you need more space

1. Information about the organisation / company:

Name of org./comp.	
Address and webpage of organisation / company	
Contact person filling this form / being interviewed	
Your position / responsibility	
Your phone number	
Your e-mail address	
Your skype contact	
Country	
Type of your organisation (private company, consultant, construction company, equipment manufacturer, utility, NGO, science & technology institute, Government, financial institution, project developer, international organisation, operator of SHP system etc.)	

⁴ “Small Scale hydro” in the present context is defined as systems **up to 30 MW**; micro hydro < 100 kW, mini hydro 100 - 1000 kW



3. Activities of your organisation in the hydropower sector so far

a) how many hydropower reference project/s does your organisation have? In how many projects have you been involved?	
b) please describe <ul style="list-style-type: none"> • the specific hydropower projects/activities in which you have been involved (capacity in kW or MW, location, grid-connected or isolated operation, current status, possible problems, success factors etc.) and • your specific contribution: did you contribute in project development, planning, implementation or others? 	

4. Small scale hydropower dissemination in your country

a) What is the state of small scale hydro dissemination in your country? Has the SHP potential been studied in your country?	
b) How much of the overall technical and economic feasible small scale hydro potential has been exploited so far?	
c) Do you consider small scale hydro as a competitive source of electricity in your country? Which other sources are more cost-effective in your view?	
d) In your experience and considering the specific situation in your country which are the strategic areas to promote small scale hydro dissemination?	

5. Success factors for small scale hydro dissemination

a) What are the main success factors for small scale hydro dissemination...	
... in your country?	...in your organisation?
b) Are there specific success factors for?	
I) micro hydro (< 100 kW)	
II) mini hydro (100 kW – 1 MW)	
III) small hydro (1-10 MW)	
c) Which are the most important local institutions for SHP development and dissemination? Please specify their names! (e.g. universities, local companies, retailers, producers or consultants, international companies, NGOs, financial institutions, government institutions ...)	
d) Who currently develops small-scale hydro projects in your country?	

6. Knowledge and information about small scale hydropower

a) Please specify hydropower systems (micro, mini, small) which you have already visited : location, capacity and most impressive facts	
b) Which are your main sources of knowledge and information for technical issues, project development, planning, implementation, operation, financing, policy issues etc.?	
c) what is for you the	

most efficient way of knowledge sharing?	
d) What are your main deficits in knowledge about SHP? Please specify in detail!	
e) Which factors, do you think, limit the dissemination of necessary knowledge?	
f) did anybody in your organisation ever participate in a training on hydropower ? If so, please specify : who participated in hydropower training, who offered the training, how many days and on which specific subject/s? Was it a useful training? Why yes, why not?	

5. Demand for SHP capacity building

a) where do you see the main know-how deficits on SHP in your organisation / company ? Please specify in detail: technical (civil engineering, electrical engineering, mechanical engineering, etc.), economic and financial analysis, policy, legal or regulatory issues, project financing, operation and management of SHP systems, others (please specify)	
b) which form of capacity building do you consider to be the most efficient? (practical training on-the job, classroom training, information from internet, e-learning, study tours to other countries, others)	
c) Are you familiar with energy project planning and design tools ? With which ones did you already apply (e.g. HOMER,	

RETScreen)? Would it be useful to get training on such tools?	
d) would you be ready to pay a fee for a training?	
e) which range of capacity should capacity building focus on? (in kW or MW)	From about kW up to about..... kW From about MW up to about MW
f) do you know potential institutions in your country which could be trained to carry out future small scale hydro trainings?	
g) how can the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) and the United Nations Industrial Development Organization (UNIDO) best assist in improving small-scale hydro skills and capacities ?	
h) do you consider a “ question-and-answer ” service to be a useful instrument for continuous support of your work? If yes, which fields should be covered by such a service?	

Anything else you like to add:

Thank you for your valuable support!

PLEASE RETURN THE FILLED QUESTIONNAIRE AT THE LATEST MARCH 12, 2012 VIA E-MAIL DIRECTLY TO hydro@ecreee.org (and to the National Focal Institution from whom you received it). If you have any queries, please also contact our workshop consultant, Mrs. Hedi Feibel or Mr. Martin Lugmayr, ECREEE via e-mail: hydro@ecreee.org.

Annex 4: ECOWAS Small Scale Hydropower Stakeholder Survey

Which organisations, companies, government and non-governmental institutions exist in the country and are of relevance for small-scale hydropower?

PLEASE RETURN THE FILLED QUESTIONNAIRE AT THE LATEST MARCH 12, 2012 VIA E-MAIL DIRECTLY TO hydro@ecreee.org

The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) in cooperation with the United Nations Industrial Development Organization (UNIDO) is preparing the “ECOWAS Small Scale Hydropower (SHP⁵) Scale-Up Programme”. The project document for this 5 years Program will be elaborated in close cooperation with the ECOWAS countries. To establish a sound basis to plan different activities in the context of the program, ECREEE intends to establish:

1. an inventory on relevant SHP stakeholders in the different ECOWAS countries
2. a needs assessment for capacity building of the different stakeholders
3. an inventory of existing and planned SHP demonstration and investment projects

This survey questionnaire aims at identifying the relevant public and private stakeholders in the small scale hydropower sector in the ECOWAS region. The results of the survey will be discussed at the regional SHP workshop to be held from 16 to 20 April 2012 in Monrovia, Liberia (check www.ecreee.org). The collected information on stakeholders will also be incorporated into the ECOWAS Observatory for Renewable Energy and Energy Efficiency (EORE).

We would appreciate your kind assistance and cooperation in filling-in this questionnaire.

Please note: the white answer fields will extend themselves when you need more space

1. Public / governmental organisations:

Type of organisation	Name of institution	Contact person	address	Number of employees	e-mail	webpage	Phone number	Skype
Ministry								
Regulatory agency								
Utility								

⁵ “Small Scale hydro” in the present context is defined as systems **up to 30 MW**; micro hydro < 100 kW, mini hydro 100 - 1000 kW

...								
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2. **Consultants** who have already been involved in SHP projects (know how in e.g. site assessment / planning / design / construction supervision etc.) and **construction companies** who have already implemented SHP projects

Type of company	Name of company	Contact person	address	Number of employees	e-mail	webpage	Phone number	Skype

3. **NGO's and donor agencies** who have already been involved in SHP projects (project development, planning, financing, capacity building etc.)

Type of organisation	Name of organisation	Contact person	address	Number of employees	e-mail	webpage	Phone number	Skype

4. Manufacturers of equipment (turbines, penstock pipes, electrical equipment, controllers, etc.) who have already supplied or are interested to produce / supply equipment in the future

Type of company / organisation	Name of Company / organisation	Contact person	address	Number of employees	e-mail	webpage	Phone number	Skype

5. Educational or research institution teaching or researching in the field of small hydropower

Type of organisation / institution	Name of organisation / institution	Contact person	address	Number of employees	e-mail	webpage	Phone number	Skype

6. Commercial banks or development banks, who already financed small hydro projects in the country / region

Type of organisation / bank	Name of organisation / bank	Contact person	address	Number of employees	e-mail	webpage	Phone number	Skype

7. private project developers or others who have already been involved in SHP projects, who are currently planning SHP projects etc.

Name of the private	his involvement	Contact person	address	Number of employees	e-mail	webpage	Phone number	Skype

Anything else you like to add:	



Thank you for your support!

PLEASE RETURN THE FILLED QUESTIONNAIRE AT THE LATEST MARCH 12, 2012 VIA E-MAIL DIRECTLY TO hydro@ecreee.org

If you have any queries, please also contact our workshop consultant, Mrs. Hedi Feibel or Mr. Martin Lugmayr, ECREEE via e-mail:
hydro@ecreee.org



Annex 5: Job Description Technical Assistance for the Preparation of a Small Hydropower Workshop of ECOWAS

Project No.	to be included
Post Title:	Technical Assistance for the Preparation of a Small Hydropower Workshop of ECOWAS
Type of Contract:	International Individual Consultant
Duration:	43 w/d spread over 4 working months (w/m)
Duty Station:	Home base and travel to Liberia
Application deadline:	05 January 2012
Expected Start date:	as soon as possible

A. Background:

The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) in cooperation with the United Nations Industrial Development Organization (UNIDO), the Energy Sector Management Assistance Programme (ESMAP), and the Government of Liberia are jointly organizing a five-day workshop on small scale hydropower from 16th to 20th of April 2012, in Monrovia, Liberia. The event features a two day technical meeting to validate the project document of the ECOWAS Scale-Up Programme for Small Hydro Power and a three day capacity building seminar on SHP project development. It is expected that around one hundred participants from ECOWAS and international levels will attend the workshop, including policy makers, utilities, rural electrification agencies, regional river basin authorities, practitioners, equipment manufacturers, as well as financiers and banks. UNIDO in cooperation with ECREEE are seeking technical support of an experienced international small hydropower expert to assist in the preparation of the SHP workshop and related documents. Further background information on the workshop and ECREEE are available in the annex of the terms of reference and at: <http://www.ecreee.org>. The draft project document for the ECOWAS Regional SHP Programme will be provided by ECREEE to the assigned consultant.

B. Objectives of this Assignment:

The objectives of the assignment are:

- to review and improve the project document for the ECOWAS Up-Scale Programme for Small Hydropower in cooperation with ECREEE
- to assist ECREEE in the preparation and execution of the five-day regional workshop on small scale hydropower in the ECOWAS region
- to assist in the follow-up of the workshop and fund raising activities for the SHP programme

C. Scope of Assignment:

Under the direct supervision of UNIDO/ECREEE, the consultant will take responsibility for implementing the following activities:

1. to review and improve the draft project document for the ECOWAS Small Hydropower Programme in cooperation with the ECREEE Secretariat and its National Focal Institutions (NFIs), as well as SHP experts from the ECOWAS region (by phone interviews); incorporation of further comments after the workshop;
2. to develop the workshop agenda and the module structure/content for the three days training seminar on SHP project development; suggest a list of qualified instructors and trainers for the different modules (e.g. technical basics, financing, policy and legal aspects);
3. to develop a questionnaire to undertake a SHP capacity needs assessment in the ECOWAS region in advance to the workshop;

4. to review and compile a list of SHP investment projects/sites in the ECOWAS region; organize list according to categories and data relevant for financiers and investors (e.g. feasibility, cost-effectiveness); a draft list will be provided by ECREEE;
5. to develop a questionnaire for the establishment of an ECOWAS inventory on SHP resource/potential data, project sites, country institutions and policies, SHP experts and businesses; suggest a methodology for a GIS based regional SHP resource/potential assessment to be undertaken by ECREEE;
6. Participation in the Workshop, moderation of the capacity building workshop; minutes of meeting;
7. to ensure follow-up to the SHP workshop: finalization of SHP programme document and assistance in fund raising, evaluation and analytical report on results of questionnaires and preparatory works for the SHP resources assessment;

D. Deliverables and time schedule:

The output of this assignment will be as below:

Action:	Indicative time schedule (to be discussed)	Location
0. Inception report/work plan to be approved by UNIDO/ECREEE	Immediately	Home based
1. Improved project document for the ECOWAS SHP Programme to be circulated for comments at least 15 days in advance to the workshop; incorporation of comments;	10 w/d	Home based
2. Elaborated workshop agenda and module structure/content for the SHP training seminar; compiled list with contacts of seminar instructors; handling and follow-up of invitations the instructors;	5 w/d	Home based
3. Developed questionnaire for the SHP capacity needs assessment to be circulated 15 days in advance to the workshop	3 w/d	Home based
4. Reviewed and compiled list for SHP investment projects in the ECOWAS to be circulated at least 15 days advance to the workshop	3 w/d	Home based
5. Developed questionnaire to establish an inventory on SHP information/data; developed methodology for GIS based SHP resources/potential assessment/atlas;	5 w/d	Home based
6. Participation in the workshop, moderation of the capacity building workshop and elaboration of workshop report	7 w/d	Liberia
7. Assist in the follow-up of the workshop: 1.) finalization of SHP programme document and in fund raising assistance 2.) analytical report on undertaken questionnaires 3.) preparatory works for the SHP resource assessment/atlas	10 w/d	Home based
Total	43 w/d	

E. Qualification Requirements:

- Individual SHP consultant
- Postgraduate degree in engineering, hydrology, renewable energy technologies or other relevant field. In case of more experienced candidates in the relevant area, the academic requirements could be reduced;
- Minimum of seven years of work experience in relevant fields of small hydropower: engineering, project development, training and curricula development, SHP resource/potential assessment/atlas;
- Experience in consulting and/or implementation of international SHP projects and particularly in the Africa
- Particular certification in SHP is an added value
- Ability to organize, analyze and synthesize different types of information in a systematic manner
- Effective management skills, good coordination ability and team working spirit;

- Proficiency in English; other ECOWAS language is an added value (e.g. French, Portuguese)

F. Application Process:

Interested and qualified consultants send their application at latest by 22 December 2011 to tender@ecreee.org. The electronic application contains the following documents:

- Detailed Personal History Form of consultant (see attached)
- Track record of assignments of similar scope and focus (list of int. projects and descriptions)
- Scanned copy of highest university certificate and other technical certifications, licenses and quality standards related to the assignment
- Scanned copy of passport



Annex 6: Job Description for Workshop Instructor and working group moderator for the Small Hydropower Workshop of ECOWAS, 16th to 20th of April 2012 , Monrovia, Liberia (1)

Background

The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) in cooperation with the Energy Sector Management Assistance Programme (ESMAP), the United Nations Industrial Development Organization (UNIDO) and the Government of Liberia are jointly organizing a five-day workshop on small scale hydropower from 16th to 20th of April 2012, in Monrovia, Liberia. The event features a three day capacity building seminar on SHP project development and a two day technical meeting to validate the project document of the ECOWAS Scale-Up Program for Small-Scale Hydro Power. It is expected that around 80 participants from ECOWAS and international levels will attend the workshop, including policy makers, utilities, rural electrification agencies, regional river basin authorities, practitioners, equipment manufacturers, as well as financiers and banks. UNIDO and ECREEE are seeking professional experts to present key aspects during the three day capacity building seminar. Further information on the workshop can be found at: <http://small-hydro.ecreee.org>.

Objective of this Assignment

The objective of the assignment is the presentation of key aspects on SHP project development as listed below, during the capacity building seminar of the above mentioned ECREEE workshop. All produced deliverables during the assignment become a property of ECREEE and will be used further for other activities.

Scope of Services

1. Preparation of Power Point Presentations on the following subjects:
 - **What are we talking about? (30 min):** overview on “small-scale hydropower” SHP); comparative analysis of micro, mini, small hydro (and large hydro for comparison) → short striking presentation with many photos showing 3 examples 10 kW, 200 kW, 2 MW; crucial differences in specific costs (USD/kW); technical requirements / standards; risks; etc.
 - **Isolated versus grid-connected SHP systems (30 min):** Comparative analysis between isolated and grid connected SHP: load factor, profitability, technical requirements (control unit, voltage level, transformer, transmission line...), ownership and management, additional costs for transmission (typical costs per m or km for certain voltage levels); Advantage for WAPP: decentralised generation units stabilise the grid at points were high losses and low voltage normally lead to grid failures
 - **Policy and legal framework (30 min):** **Policy objectives:** steering mechanisms; examples; **Legal requirements:** licences, water right, permits,... advantage of “one-stop-shop”; necessity to have different requirements for different capacity ranges (e.g. for environmental impact assessment) **PPA:** crucial aspects; tariff systems and feed-in tariff; examples from other countries... technical implications

The detailed content of the presentations has to be discussed and harmonized with Mrs. Hedi Feibel, who was assigned by ECREEE/UNIDO to support these preparatory activities. The ppt presentations shall be submitted before April 3, 2012.

2. For each subject reference has to be made to respective publications, tools etc. Moreover, the contractor provides links or files of interesting SHP online-publications to be published on the workshop website: <http://small-hydro.ecreee.org>.

3. Presentation during the workshop April 16 to 20 and participation in discussion sessions (answering questions, providing additional input)
4. moderation of working groups discussing on “what shall be achieved in the MHP and SHP sector” on day 2 (14.30 – 15.30 o'clock)
5. moderation of working groups discussing on the 4 specific objectives of the Small-Scale Hydropower Programme
6. act as rapporteur in sessions and provide written summaries of discussions and/or working groups for the workshop report as needed by ECREEE (inputs have to be provided at latest two days after the workshop).

Time Schedule:

Action	Indicative time schedule	Location
Preparation of ppt presentation “what are we talking about”	1.5 w	Home based
Preparation of ppt presentation “isolated vs. grid-connected systems”	1.5 w	Home based
Preparation of ppt presentation “policy and legal framework”	1.5 w	Home based
Travelling to Liberia and back	3.0 d	Liberia
Participation in workshop: presentations and moderation as defined above	5.0 d	Liberia
	12.5 days	

Qualification Requirements:

- Individual SHP consultant
- Postgraduate degree in engineering, hydrology, renewable energy technologies or other relevant field. In case of more experienced candidates in the relevant area, the academic requirements could be reduced;
- Strong knowledge and focus on small scale hydro power
- Minimum of seven years of demonstrated work experience in project planning, consulting and implementation of international SHP projects
- Demonstrated experience in developing countries and development cooperation (particularly in Africa)
- Experience in teaching and curricula development
- Proficiency in English; other ECOWAS language is an added value (e.g. French, Portuguese)

Application Process

Interested and qualified persons send their CV together with their honorary expectations (including tax) to ECREEE (mlugmayr@ecreee.org). In addition to the honorary, ECREEE covers the cost for the flight ticket to Monrovia and daily per diems (in accordance with ECOWAS rates). These travel costs should be not included in the offer. Applicants provide the following documents:

- Detailed CV
- Track record of assignments of similar scope and focus (list of int. projects and descriptions)
- Scanned copy of highest university certificate and other technical certifications, licenses and quality standards related to the assignment
- Scanned copy of passport

Annex 7: Job Description for Workshop Instructor and working group moderator for the Small Hydropower Workshop of ECOWAS, 16th to 20th of April 2012 , Monrovia, Liberia (2)

Background

The ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) in cooperation with the Energy Sector Management Assistance Programme (ESMAP), the United Nations Industrial Development Organization (UNIDO) and the Government of Liberia are jointly organizing a five-day workshop on small scale hydropower from 16th to 20th of April 2012, in Monrovia, Liberia. The event features a three day capacity building seminar on SHP project development and a two day technical meeting to validate the project document of the ECOWAS Scale-Up Program for Small-Scale Hydro Power. It is expected that around 80 participants from ECOWAS and international levels will attend the workshop, including policy makers, utilities, rural electrification agencies, regional river basin authorities, practitioners, equipment manufacturers, as well as financiers and banks. UNIDO and ECREEE are seeking professional experts to present key aspects during the three day capacity building seminar. Further information on the workshop can be found at: <http://small-hydro.ecreee.org>.

Objective of this Assignment

The objective of the assignment is the presentation of key aspects on SHP project development as listed below, during the capacity building seminar of the above mentioned ECREEE workshop. All produced deliverables during the assignment become a property of ECREEE and will be used further for other activities.

Scope of Services

7. Preparation of Power Point Presentations on the following subjects:

- **The special challenge in W-Africa (30 min):** General difference between high head and small runoff compared to low head and high runoff. Difficulties with intake structure, high costs for civil works, problem of water level during flood... for low head systems
- **What is the range of costs? (30 min):** Investment costs, operation costs, electricity production costs; Rough cost repartition between civil works, electrical and mechanical equipment; costs for transmission lines per meter or kilometre; costs for transformers... crucial elements which allow cost reduction; comparison hydro-diesel (investment and operation cost) → this presentation should provide the participants with rough figures to evaluate other projects
- **Assessment of hydropower resources (30 min):** Importance of resource assessment and data collection (potential supply and potential demand) for success / profitability; required input data and field survey; rough explanation on importance of measuring water level and runoff (required equipment for level and runoff measurement); runoff data as monetary value; “duration curve” for design (isolated / grid connected)
- **Project cycle and planning tools (30 min):** How a project cycle for a kW- and a MW-system looks like; for which purpose can planning tools be used for (RETscreen, Homer etc.)

The detailed content of the presentations has to be discussed and harmonized with Mrs. Hedi Feibel, who was assigned by ECREEE/UNIDO to support these preparatory activities. The ppt presentations shall be submitted before April 3, 2012.

8. For each subject reference has to be made to respective publications, tools etc. Moreover, the contractor provides links or files of interesting SHP online-publications to be published on the workshop website: <http://small-hydro.ecreee.org>.
9. Presentation during the workshop April 16 to 20 and participation in discussion sessions (answering questions, providing additional input)
10. moderation of working groups discussing on “what shall be achieved in the MHP and SHP sector” on day 2 (14.30 – 15.30 o'clock)

11. moderation of working groups discussing on the 4 specific objectives of the Small-Scale Hydropower Programme
12. act as rapporteur in sessions and provide written summaries of discussions and/or working groups for the workshop report as needed by ECREEE (inputs have to be provided at latest two days after the workshop)

Time Schedule:

Action	Indicative time schedule	Location	Cost in EUR (including all taxes)
Preparation of ppt presentation “The special challenge in W-Africa”	1.5 w	Home based	
Preparation of ppt presentation “what is the range of costs”	1.5 w	Home based	
Preparation of ppt presentation “assessment of hydropower resources”	1.5 w	Home based	
Preparation of ppt presentation “Project cycle and planning tools”	1.5 w	Home based	
Travelling to Liberia and back	3.0 d	Liberia	
Participation in workshop: presentations and moderation as defined above act as rapporteur of sessions and provide written summaries of discussions as demanded by ECREEE	5.0 d	Liberia	
Total	14.0 days		

Qualification Requirements:

- Individual SHP consultant
- Postgraduate degree in engineering, hydrology, renewable energy technologies or other relevant field. In case of more experienced candidates in the relevant area, the academic requirements could be reduced;
- Strong knowledge and focus on small scale hydro power
- Minimum of seven years of demonstrated work experience in project planning, consulting and implementation of international SHP projects
- Demonstrated experience in developing countries and development cooperation (particularly in Africa)
- Experience in teaching and curricula development
- Proficiency in English; other ECOWAS language is an added value (e.g. French, Portuguese)

Application Process

Interested and qualified persons send their CV together with their honorary expectations (including tax) to ECREEE (mlugmayr@ecreee.org). In addition to the honorary, ECREEE covers the cost for the flight ticket to Monrovia and daily per diems (in accordance with ECOWAS rates). These travel costs should be not included in the offer. Applicants provide the following documents:

- Detailed CV
- Track record of assignments of similar scope and focus (list of int. projects and descriptions)
- Scanned copy of highest university certificate and other technical certifications, licenses and quality standards related to the assignment
- Scanned copy of passport

Annex 8: Draft ECOWAS Small Hydro Power Programme (see separate document)



*ECOWAS Regional Centre for
Renewable Energy and Energy Efficiency*

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

*Centro Regional para Energias Renováveis e
Eficiência Energética da CEDEAO*

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