



ECREEE
TOWARDS SUSTAINABLE ENERGY

**ECOWAS RENEWABLE ENERGY
FACILITY - EREF 2**



Promoting Clean Mini-grids in Rural Areas. Providing electricity to Households, commercial establishments and Productive Uses of Electricity to support local economic development

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ECOWAS RENEWABLE ENERGY FACILITY (EREF) 2 IS SUPPORTED BY:

Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BLMFUW);
Austrian Development Agency (ADA);
United Nations Industrial Development Organization (UNIDO);
Spanish Agency for International Development Cooperation (AECID).



IMPLEMENTED BY:

ECOWAS Centre for Renewable Energy and Energy Efficiency





Fellow citizens, partners and readers!

It is a great honour and pleasure for me to present the first edition of the ECOWAS Renewable Energy Facility (EREF 2) booklet which provides a comprehensive summary of the clean mini-grids projects being implemented in the region through EREF.

In its first phase, EREF will provide grants for small and medium sized renewable energy and energy efficiency (RE&EE) projects and businesses in rural and peri-urban areas. The Facility will provide non-repayable funds through regular demand driven competitive calls for proposals. Over the course of its first operational phase (2011 to 2016), EREF will test and sharpen its funding policy and find its comparative advantage in the West Af-

rican market. In the second phase (2016 to 2020) EREF will broaden its portfolio of financial instruments and support schemes (e.g. micro credits).

With the Facility, ECREEE contributes to the achievement of the UN Millennium Development Goals (MDGs), the United Nations (UN) Goal on Universal Access to Clean, Affordable Energy by 2030 and the international agreements to reduce GHG emissions to keep the global average temperature rise below two degrees Celsius. The Facility was selected to be implemented as a priority action under the ECOWAS framework of the UN Initiative for Sustainable Energy for All (SE4ALL). EREF refers directly to the objectives and action plans of the ECOWAS/UEMOA White Paper on Energy Access in Peri-urban and Rural Areas and to the targets set in the ECOWAS Renewable Energy Policy (EREP) and the ECOWAS Energy Efficiency Policy (EEEP). The White Paper foresees that at least 20% of new investments in electricity generation in rural and peri-urban areas should originate from renewable sources. Action line 2 on investment promotion foresees the establishment of an RE&EE investment and innovation fund which raises funding for at least 200 demonstration projects and support local manufacturing and service companies. EREF foresees an increase in the share of the rural population served by off-grid renewable energy solutions to 22% by 2020. EREF also contributes to Result Area 7 of the ECREEE Business Plan which aims at business and investment promotion.

The overall objective of the Facility is to contribute to sustainable development in rural and peri-urban areas of West Africa through increased deployment and usage of reliable and affordable RE&EE technologies and services. The specific objective of EREF is to create a favourable investment and business environment which leads to accelerated deployment and use of RE&EE technologies and services in peri-urban and rural areas of West Africa.

The First EREF Call was launched in 2011 and was supported by ADA, AECID and UNIDO. Forty-one projects were selected and implemented in the region.

The Second call was launched in May 2014 and was supported by the Austrian Ministry of Environment, ADA, AECID and UNIDO. Five projects were selected and are in the implementation phase. The 2nd EREF call focused on mini-grids in peri-urban and rural areas and was very successful in the region. The objective of this booklet is to present the five clean mini-grids projects selected under EREF 2.

As the Executive Director of ECREEE, I will like to thank the Governments of Austria (BLMFUW and ADA) and Spain (AECID) as well as UNIDO, our National Focal Institutions and other development partners—for their continuous support.

Mahama Kappiah
Executive Director of ECREEE



BACKGROUND ON EREF 2

The ECOWAS Renewable Energy Facility (EREF) is a grant facility managed by ECREEE which provides grants for small to medium sized renewable energy and energy efficiency (RE&EE) projects and businesses in rural and peri-urban areas in the ECOWAS region.

Following the successful implementation of the First EREF cycle, from 2011 to 2014, under which 41 projects were approved and awarded grants, the second call (EREF II) documentation was published on 30th May 2014 and it was officially launched during the clean energy mini-grids High Impact Opportunity partnership presentation at the Sustainable Energy for All (SE4All) meeting that took place in New York from 2nd to 4th June, 2014. Proposals were received electronically until 10th August 2014.

The second call aims to support installation of renewable energy powered mini-grids and the establishment of an appropriate management, operation and maintenance system. The overall amount made available under this call is EUR 1,000,000.

The facility will provide grants to co-fund the installation of renewable energy powered micro-grids (including hybrids) in rural and peri-urban areas of the fifteen (15) ECOWAS Member States. The period of implementation of the projects is a maximum of two years (2015-2016).

A total of 51 proposals were received before the deadline. In accordance with the established procedures, the evaluation was conducted in 2 stages:

- The first stage of the selection process (Eligibility Appraisal) by ECREEE officers: in this first evaluation stage, ECREEE ascertained the eligibility of proposals based on basic eligibility criteria listed in the EREF guidelines (country focus, type of applicant & technology, requested grant size, capacity of applicant, alignment with local policies). A shortlist of 20 proposals that satisfied all eligibility requirements was prepared and submitted to the second evaluation stage.
- The second stage of the selection process (technical evaluation): this stage involved technical evaluation of the 20 shortlisted proposals by ECREEE project officers. In parallel, a senior external evaluator conducted an independent evaluation.

ECREEE National Focal Institutions were requested to provide their no-objections to the selected projects. The 20 projects were ranked and taking into account the budget of 1 million Euros currently available for this call. The top 5 ranked projects, whose details are shown in the table below, are currently being co-funded.



DECENTRALIZED HYBRID SYSTEM PHOTOVOLTAIC

Construction of a reliable decentralized hybrid system Photovoltaic/multifunctional Platform and establishment of a sustainable management, operation and maintenance system to benefit the rural population of Gori

Technology: Solar Photovoltaic clean mini-grid and Solar Home Systems

Total capacity to be installed: 38kWp

Total energy production: 75,733 kWh/year

Estimated cost of energy produced: 0.377€/kWh

Storage: use of high quality batteries (lead-acid)

Total estimated project cost: € 390,382.24

Direct beneficiaries:

- 900 inhabitants in rural areas
- 126 Households
- Schools, Health center, worship place
- Small and medium enterprises

Management, Operating and Maintenance Structure: Private enterprises (leasing contract) **Greenfield Project**

Project promoters: Association Tin Tua – ATT

Contact: Yves OUABA - e-mail: courrier@tintua.org - www.tintua.org

CONTEXT

Access to electricity is very low in sub-Saharan Africa (32% in 2010 according to the monitoring report of Sustainable Energy for All, 2012), and this is even worse for West African countries like Burkina Faso, where the overall electrification rate is estimated at 13%. Moreover there is great disparity between urban and rural areas where the electrification rate is 47% and 1% respectively. Several multifunctional platforms (MFP) running on diesel oil have stopped operating, hence there is a need to have them hybridize. In this case this project is going to hybridize an MFP and provide electricity to the Gori community.

PROJECT OBJECTIVES

- To contribute to improve access to energy services in rural areas
- To promote the use of indigenous energy technologies, financial and human resources
- To turn energy into an engine for sustainable development (while respecting the environment – not necessary to include as SD is about respecting the environment).

MAIN ACTIVITIES

- Demand assessment and load profile definition
- Technical and financial feasibility study and environmental impact assessment
- Electrical mini hybrid PV / MFP installation
- strengthening of final users technical capacity
- Implementation of Energy Efficiency measures
- Support to the COOPEL – full title (facilities Manager) on site in the new leasing approach
- Technical support for the Productive Uses Electricity
- Business plan Development for the dissemination of the concept
- Sharing experiences and lessons learned.

EXPECTED RESULTS

- 38 kWp solar PV plant installed and operating
- 75.733 MWh energy generate every year by the PV plant
- 126 consumers and 900 people have access to modern electricity
- A sustainable management and op-



- eration system is established
- improve the working conditions of teachers and nurses
- Income generation



Burkina Faso



PEHGUI IN GUINEA

Small Hydropower in Guinea – PEHGUI: Managing a clean energy mini-grid powered by a hydro and solar PV hybrid system



CONTEXT

The Republic of Guinea has considerable hydroelectric potential, but in rural areas, the electrification rate remains low: 3% in 2012. While the lack of electricity is an obstacle for economic and social development, available RE resources such as hydro and solar pro-



Guinea

vides an opportunity to reduce dependence on fossil fuels and increase access to energy.

The challenge is to promote broad access to electricity services through the use of mature and environmentally friendly technologies tailored to the country's energy resource appropriate governance.

PROJECT OBJECTIVES

- Over 200 households in the selected community have access to electricity through the installation of a clean mini-grid fed by a small hydropower and a photovoltaic solar plant,
- The electrical infrastructure managed in an independent and sustainable way,
- Economic activities are developed and social services improved, benefiting its inhabitants.

MAIN ACTIVITIES

- Demand assessment and load profile definition
- Technical and financial feasibility study and environmental impact assessment

- Electrical mini hybrid Hydro-PV installation
- Private operator mentorship in the management of Electricity Services
- Support the development of Productive Uses of Electricity, and health and educational services
- Sharing of experiences and lessons learned

EXPECTED RESULTS

- 70 to 75% of users will have stopped buying oil, batteries or other pollutant sources of energy.
- The air quality in homes is significantly improved, preserving the respiratory health
- 75 to 80% of users reduce their energy costs, and over 90% have better lighting.
- 80 to 100% of students will improve their academic performance, as better lighting conditions are created.
- More access to information.
- At least 40% of people feel more secure against theft and 40% against aggression.
- Charging of mobile phones has become easy for 80 to 90%
- Improving communities outcomes

Technology: solar-diesel hybrid mini-grids

Total capacity: 372kWp

Total energy production: 31,630kWh/year

Estimated cost of energy produced: N.A

Storage: use of high quality batteries (lead-acid)

Total estimated project cost: € 262,731.41

Direct beneficiaries:

- 7,642 inhabitants in rural areas (Three villages)
- 105 Households
- Schools, Health center, worship place
- Small and medium enterprises

Management, Operating and Maintenance Structure: will be determined by the project **Greenfield Project**

Project Promoters: Fondation Energies pour le Monde

Contact: Yves MAIGNE - e-mail: energiespourlemonde@energies-renouvelables.org - www.energies-renouvelables.org



PROMOTING ENERGY ACCESS THROUGH CLEAN MINI-GRID

Technology: Solar Photovoltaic clean mini-grid

Total capacity to be installed: 27.5kWp

Total energy production: 44,200 kWh/year

Estimated cost of energy produced: 0.37 €/kWh

Storage: use of high quality batteries (lead-acid)

Total estimated project cost: € 390,382.24

Direct beneficiaries:

- 4,412 inhabitants in rural areas
- 105 Households
- Schools, Health center, worship place
- Small and medium enterprises

Management, Operating and Maintenance Structure: Private Company and local association.

Greenfield Project

Project Promoters: Fundación Plan International España

Contact: Concha López - e-mail:luis.garcia@plan-international.org - www.plan-espana.org

Improving the life quality of a rural, poor community in the Sahel region through the promotion of access to modern, affordable and sustainable sources of energy

CONTEXT

Extreme energy poverty and energy insecurity are jeopardizing any possible development in rural Niger leaving the country in the last position in the human development index (HDI) in 2013. Rural areas in Niger suffer as a result of less than 3,6% rural access rate to electricity, high level of poverty, high prevalence of gender inequality and food insecurity as well as lack of enough technical and institutional capacity. Through a strong community approach, project developers have identified solar energy powered mini grid systems as being the only way to electrify isolated rural communities and having great potential to improve equally and sustainable the socio-economical level of the target rural community households.

PROJECT OBJECTIVES

- Promote and electrify different commercial and productive activities such as agricultural irrigation, solar dryer, electrical tailoring, electrical milling or commercial boutique activities
- Provide modern electricity to 105 households, schools, health centers,

place of worship, through the installation of a clean mini-grid powered by a photovoltaic solar plant,

- Build the capacities of local and national authorities in Niger and of the private sector
- Support local economic development

MAIN ACTIVITIES

- Demand assessment and load profile definition
- Technical development: design of the final technical solution, preparation of tender dossier
- Technical and financial feasibility analysis (regulations, tariff system, etc.)
- Installation and operation of electrical milling services, and canalization to bring water to the women group in the fields and connection of customers
- Training on preventive maintenance to the community of Zibane, with at least 50% women
- Mentoring the private operator in the management of electricity services

EXPECTED RESULTS

- One solar energy powered mini-grid of 27.5kWp installed and operative in



the community of Zibane, Niger

- Increased access to reliable, clean, sustainable and affordable energy services at domestic, public and productive level for at least 4,412 people
- Local and national institutions have improved technical capacity on RE&EE



NIGER



REGIONAL SOLAR-DIESEL HYBRID MINI-GRIDS

Strengthening management and energy business models in existing micro-grids in Lusophone ECOWAS member states (Cabo Verde and Guinea-Bissau)



CONTEXT

The project is being implemented in two countries with vastly different circumstances in terms of energy access. Cabo Verde, with a very high electrification rate, is looking at mini-grids as a complementary option to grid-extension, in order to reach 100% access rate



CABO VERDE & GUINEA-BISSAU

in the short-term. On the other end of the spectrum, Guinea-Bissau has a very low access rate, restricted to the main urban areas; both countries are heavily reliant on fossil fuels for electricity generation. The development of a sustainable management model for the sustainability of project is envisaged in order to ensure long-term success of isolated micro-grids in rural areas.

PROJECT OBJECTIVES

- improvement of population living conditions and increased income
- increased business opportunities for traders and local business companies and job creation
- improving the quality of electrical services provided to communities
- reduction of greenhouse gas emissions by using RE technologies

MAIN ACTIVITIES

- Definition of service quality criteria and inspection procedures for the concessionaires
- Review and monitor management, operation and maintenance model,

including overhaul and technical assistance to implement procedures

- Demand assessment and establish load profile
- Technical development and innovative approach (design of the final technical solution and development of tendering material).
- Draft a regulatory document for the management and tariff setting of mini-grids
- Technical and financial review of existing minigrids
- Extension of minigrids in order to cover most/all households in the communities

EXPECTED RESULTS

- Sustainable management, operation and maintenance system established for 372kWp solar PV plant in Bamberinca (Guinea Bissau) and Monte Trigo and Vale da Costa (in Cabo Verde), including a sound financial study and with the participation of all relevant stakeholders
- Strengthening of capacities of local, national and regional stakeholders on rural electrification policy design.

Technology: solar-diesel hybrid mini-grids

Total capacity: 372kWp

Total energy production: 31,630kWh/year

Estimated cost of energy produced: N.A

Storage: use of high quality batteries (lead-acid)

Total estimated project cost: € 262,731.41

Direct beneficiaries:

- 7,642 inhabitants in rural areas (Three villages)
- 105 Households
- Schools, Health center, worship place
- Small and medium enterprises

Management, Operating and Maintenance Structure: will be determined by the project.
Brownfield Project

Project Promoters: Instituto Tecnológico de Canarias, S.A. (ITC)

Contact: Antonio Marquez Fernandez - e-mail: dhenriquez@itccanarias.org - www.itccanarias.org



PROMOTING ENERGY ACCESS

Technology: Solar Photovoltaic, Wind and Hydro powered clean mini-grids

Total capacity to be installed: 26kWp

Total energy production: 125,000 kWh/year

Estimated cost of energy produced: N/A

Storage: use of high quality batteries (lead-acid)

Total estimated project cost: € 375,940

Direct beneficiaries:

- 2,000 inhabitants in rural areas
- 200 Households
- 5 Public institutions (Schools, Health center, worship place)
- 40 Secondary businesses

Management, Operating and Maintenance Structure: Private Company and local authority.
Greenfield Project

Project Promoters: Welthungerhilfe - WHH

Contact: Moninger Jochen - e-mail: jochen.moninger@welthungerhilfe.de - www.welthungerhilfe.de

Extension of Renewable Energy Hybrid Mini-Grid Systems in the Western Area Peninsula in Sierra Leone

CONTEXT

Poor access to electricity is recognized as a binding constraint to long-term economic growth in Sierra Leone. Fixing this problem is a major focus of the country's Agenda for Prosperity, which includes a goal of "cheap, affordable energy for all".

The national electrification rate remains below 10%, as at 2011; the majority of the remote areas does not have access to electricity, and the country's four major cities consume 90% of the available electricity.

Biomass from fuel wood and charcoal still accounts for more than 85% of total energy use. Energy access for rural communities is critical in Sierra Leone where about 60% of the population live in rural areas.

PROJECT OBJECTIVES

- 16 kW hydro-power mini-grids at Ni-geria River (Waterfall) and John Obey river
- 10 kW additional solar generation capacity for existing mini-grid
- Research for the potential of installation of a 25 kW wind turbine

MAIN ACTIVITIES

- Technical training on principles and technical feasibility of micro-hydro and wind installations
- Design of technical system
- Technical Installation of RE systems and households, public institutions, companies and tourism facilities connection
- Establishment of public management system including customer involvement
- Handover to beneficiaries

EXPECTED RESULTS

- Boost to eco-tourism facilities, 5 new investments expected as direct impact (40 jobs), increase in overnight stays by 100% minimum
- Boost to fish industry through the establishment of alternative fish processing techniques; output maximization of 100% expected, 40 new jobs in sector created
- Facilitation of a direct substitute for existing fish smoking practices that rely on fuel wood as climate change mitigation activity
- 40 secondary businesses will be supported, this will include trading shops,



sell agencies, information centres, leisure opportunities and office facilities, generation of 50 jobs including RE supply market

- About 200 households and 2 000 people supplied with constant power
- Investor interest and expansion to new geographical locations



Sierra Leone

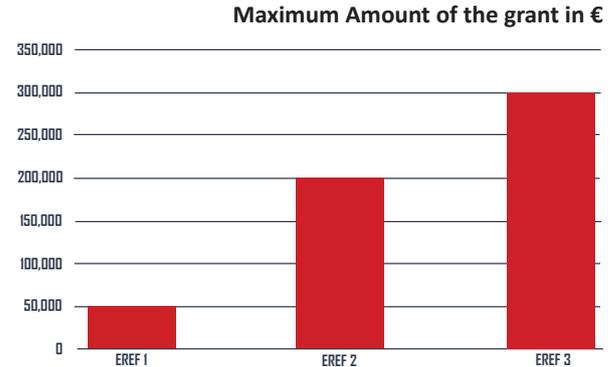
EREF PERSPECTIVE — THIRD CALL

Due to the crucial role clean energy mini-grids have to play in the energy access growth in peri-urban and rural areas in West Africa and the huge success of the second EREF call, the third call of proposal (EREF 3) will be focusing again on clean energy mini-grids with a specific attention to those initiatives supporting and promoting productive uses of electricity (PUE). This ensures sustainability of the systems and poverty reduction by contributing to increase micro, small and medium enterprises incomes.

EREF 3 will contribute directly to the achievement of the rural renewable energy targets of the ECOWAS Renewable Energy Policy (EREP) that foresees an increase on the share of the rural population served by off-grid renewable energy solutions to 22% by 2020, setting the target of promoting 60,000 mini-grids and 2.6 million stand-alone systems across the region by that date.

Based on the experience accumulated in the previous rounds, EREF 3 aims to move in the direction of supporting the commercial viability of clean-energy mini-grids. Therefore, in comparison with previous rounds, EREF 3 will reduce the maximum grant co-funding to 30% and increase the maximum amount per project to 300,000 euro. This will allow for the co-funding of bigger projects, reducing the levelized cost of electricity by making use of economy of scale and therefore increasing the sustainability of the intervention.

A budget for the launch of the call of 3,000,000 euro is foreseen. It will enable co-funding of at least 10 projects and promote sustainable access to electricity to a minimum of 3,000 households, enterprises and public institutions through the installation of at least 1 MW of additional renewable energy capacity and leveraging a minimum of 7,000,000 euro from project promoters.



The first call for proposal of EREF provided a maximum grant amount of 50,000 Euro representing 75% of project cost, for the second call it was 200,000 Euro representing 50% of project coast and EREF 3 seeks to co-finance 30% of project cost with a maximum grant of 300,000 Euro.



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