



Regional Centre for Renewable Energy and Energy Efficiency
Centre Régional pour les Energies Renouvelables et l'Efficacité Energétique
Centro Regional para Energias Renováveis e Eficiência Energética
www.ecreee.org

A Study of Capacity Needs for Renewable Energy and Energy Efficiency in the ECOWAS Member States

Regional Report



July 2012

SUMMARY

The ECOWAS region is characterized by a very low overall access rate to modern energy services, thereby inhibiting prospects of developing economic activities, providing basic social services and fighting poverty. ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) was established to among other roles create favourable framework conditions and an enabling environment for renewable energy and energy efficiency markets by supporting activities directed towards mitigating existing barriers. Capacity Building is expected to play a crucial role in the actualisation of the vision of ECREEE, since without the necessary capacities, it would be impossible to implement envisaged renewable energy investment programmes and projects.

The goal of the study is to produce a document that identifies the Capacity Building Needs for RE&EE development in the ECOWAS Region, to be used as a basis for a long term Capacity Development Plan for ECREEE. The study seeks to assess the capacity building needs in RE&EE in the 15 ECOWAS Member States. This implies the involvement of all public and private institutions responsible for the national capacity building in each member state, including the conduct of interviews with different stakeholders, to identify the capacity building gaps and to elaborate a document “*ECOWAS Capacity Building Needs Assessment for RE&EE*”, incorporating all relevant information at national, regional and international levels.

To achieve the above objectives, ECREEE engaged three Universities of the region – the International Institute for water and Environmental Engineering, 2iE (Burkina Faso), the Kwame Nkrumah University of Technology, KNUST (Ghana), and the University of Cape Verde, UniCV (Cape Verde) to conduct this study.

A team from the three Universities worked together to develop the methodology for the implementation of the project. After a joint definition of the document framework and developing the questionnaires to be used for the study, each University assumed responsibility for implementation of the study in the following member states:

- 2iE – Niger, Burkina Faso, Togo, Benin, Cote d’Ivoire, Mali
- KNUST – Nigeria, Ghana, Sierra Leone, Gambia, Liberia
- UniCV – Cape Verde, Guinea Bissau, Senegal, Guinea

The study commenced with the identification of stakeholders involved in RE & EE in each country. This was done with the help of National Focal Persons of ECREEE and also through desk study and review of relevant literature. The stakeholders identified were categorized as, Policy makers, Banking and Financial institutions, NGOs/private companies, Academic and Training Institutions, and International organizations.

Data was then collected from these stakeholders through administration of the questionnaires and interviews with appropriate representatives of the institutions.

Key Lessons from the study

Private and Non-Governmental Organisations

1. Main barriers to effective capacity building in the renewable energy and efficiency sectors are the quality of training, bad regulations in the various countries and lack of financing;
2. Existing regulations and policies in the region do not encourage the fast development of RE and EE projects;
3. Organising periodical training for the actors in the renewable energy sector was vital for an efficient capacity building;
4. Emphasis should be placed on vocational training in specialized areas such as solar PV installation for technicians;
5. Good public-private partnership and energy subsidies for poor people can increase access to energy services in Africa; and
6. Most private organisations seem to focus on the deployment of solar energy technologies and energy efficiency projects.

Training and Research Centres

1. The quality of training is viewed as being fairly good by the trainers themselves. The barriers for capacity building are the lack of funds. In order to improve the education, the funds allocated to education should be increased and educational programmes more relevant to the need of the countries. The Funds related to the operating of the training centres should be doubled to make the centres efficient.
2. Almost all centres have capacity building programs or would like to have one if they had enough funds for it. The recruitment need reported in the centres is usually at bachelor and Master's degree (engineer) level. The average staff qualification in the centres is reported to be master's degree.
3. Periodical training of actors is viewed as the best way of improving capacity building. A recommendation for better energy access for poor people should be a better Private public partnership along with energy subsidy for these people
4. The research conducted in some of the centres can be listed in order of preference as hereafter: solar, Biomass, Wind Energy, Energy efficiency. The research centres recruitment need is mainly at Master's degree personnel.
5. The most frequent (underway) activities in the ECOWAS countries are reported to be decentralized PV electrification and improved stove dissemination for RE and energy audits in administrative buildings along with incandescent lamps abolition for EE. The

mechanism to improve EE and development of RE in ECOWAS countries is viewed by training centres as the subsidy of equipment in both cases.

Decision/Policy Markers

1. Policy makers across the sub-region generally perceive Solar PV and Biomass projects (including improved cookstove dissemination) as the most feasible RE project. This reflects in the manpower needs projections, where 65-84 % of state energy institutions are actually seeking to train their staff and also recruit in these areas. The need for PV experts is highest – with 81 - 84%.
2. Recruitment and staff training-needs also focus more on the training of technicians and senior technicians Up to 30% of institutions need to **recruit** technicians and senior technicians while 25% of state energy agencies seek to **train** their staff at this level.
3. Energy Efficiency capacity development needs are also high, with 73% of agencies expressing the need to train their personnel in this area while 78% also seek to recruit persons with expertise in this area.
4. Demand for expertise in Energy Planning is also very high; 70% of agencies intend recruiting in this area while 73% seek to train their staff in this area.

International and Financial Agencies

1. Main barriers to effective capacity building in the renewable energy and efficiency sectors are the quality of training, bad regulations in the various countries and lack of financing;
2. Existing regulations and policies in the region do not encourage the fast development of RE and EE projects;
3. Organising periodical training for the actors in the renewable energy sector was vital for an efficient capacity building;
4. Emphasis should be placed on vocational training in specialized areas such as solar PV installation for technicians;
5. Good public private partnership and energy subsidise for poor people can increase access to energy services in Africa.

Suggested action plan/Recommendations

- Set up a regional technology centre for the development and promotion of Renewable Energy (RE) and Energy Efficiency (EE) technologies, applications, and entrepreneurship.
- Introduce training modules on RE and EE in the various training programs of higher institute as well in technical training centers.
- Capacity building strengthening (equipment and teaching staff) for national technician training centres.
- Policy-makers and financial institutions should be given short training programmes in Energy Policy and Planning and Renewable Energy and Energy Efficiency Project Analysis with easy-to-use tools.
- Particular emphasis should be given to teaching methods to ensure the acquisition and transfer of skills and know-how while ensuring their adjustment to the audiences.

Based on these ideas the following more specific actions are proposed:

1. Solar PV training needs be met mostly at the technician level, through certificate courses available within the sub-region. This should start with a training of trainer programme at institutions that already have some capacity in running such training programmes. Such training programmes should eventually be available in all countries, following the train-the-trainer session(s).
2. Energy Policy training needs (targeted at policy makers) should also be met through short courses at institutions in both Francophone and Anglophone West Africa. Some of these training programmes already exist and could serve as starting points.
3. Energy Efficiency training should be conducted for both senior-level decision-makers and also technicians. Senior-level managers should focus on policy issues and analysis, while technicians are given more hands-on training to be able to conduct energy audits in building and in industry.

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1. Introduction

1.1 Background

The ECOWAS region is characterized by a very low overall access rate to modern energy services, thereby inhibiting prospects of developing economic activities, providing basic social services and fighting poverty. The region has some of the lowest modern energy consumption rates in the world with average electricity consumption of 88 kWh/capita compared to the continental and global averages of 563 and 2596 kWh/capita respectively. Household access to electricity across the region is about 20%, but wide differences exist between the access rates in urban areas that average 40% while rates in rural areas range between 6% and 8%. Moreover, only four countries (Cape Verde, Cote D'Ivoire, Nigeria, Ghana and Senegal) are classified by the World Bank as lower middle income economies while the remaining ten belong to the low income group. Most countries also remain on the list of Least Developed Countries (LDCs) of the United Nations and are heavily indebted with very low levels of human development, without capacity to achieve the United Nations Millennium Development Goals (MDGs) by 2015.

It is acknowledged that without major investments in sustainable energy infrastructure and policy frameworks in West Africa the regional energy access, energy security and climate objectives cannot be achieved simultaneously in the forthcoming decades.

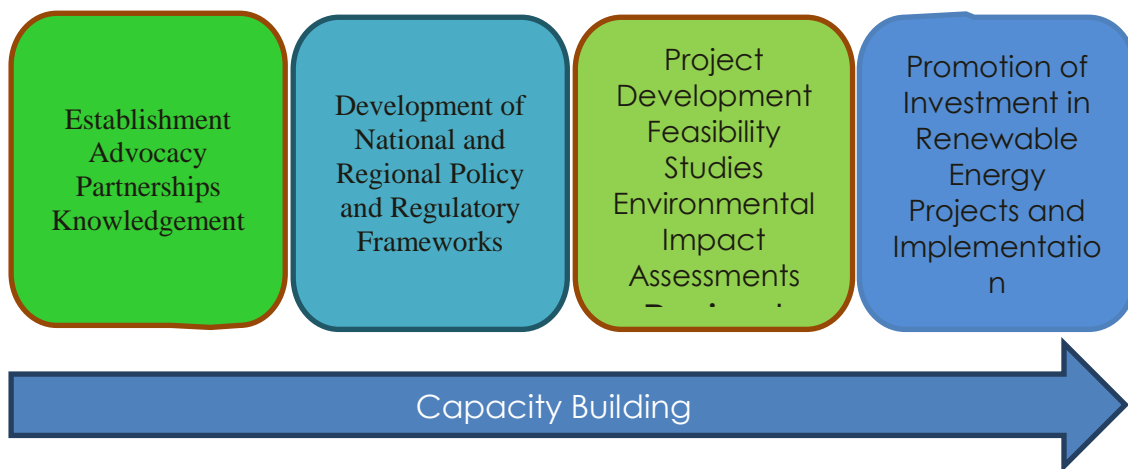
Most ECOWAS Member States do not have a clear-cut policy on renewable energy. As a result, renewable energy development follows an ad hoc path, with little recourse to national energy plans, which are rarely available or out of date and inadequate. In situations where the policies do exist, they are not backed by legislation. In addition, standards and codes are absent or not adequately developed. Coherent, consistent and conducive policy and regulatory frameworks are central to the successful dissemination of renewable energy in the region, yet such frameworks are generally absent.

Furthermore, the ability of relevant personnel and institutions within the region to effectively and efficiently implement RE programmes and projects is significantly impaired due to the general lack of capacity. It is therefore imperative that relevant and local capacities are strengthened, with a view to curbing the often costly and unsustainable reliance on foreign expertise.

It was against this background that the ECOWAS Regional Center for Renewable Energy and Energy Efficiency (ECREEE) was established by Regulation C/REG.23/11/08 of the 61st Session of ECOWAS Council of Ministers in Ouagadougou, on November 23, 2008.

The vision of ECREEE is to contribute to the sustainable economic, social and environmental development of West Africa by improving access to modern, reliable and affordable energy services, energy security and reduction of energy related GHG emissions and climate change impacts on the energy systems. The specific objective of ECREEE is to create favourable framework conditions and an enabling environment for renewable energy and energy efficiency markets by supporting activities directed towards mitigating existing barriers.

The ECREEE Development Strategy, as summarised below, demonstrates the cross-cutting nature of Capacity Building:



Capacity Building is expected to play a very important role in the actualisation of the vision of ECREEE, since without the necessary capacities, it would be impossible to implement envisaged renewable energy investment programmes and projects.

The ECREEE Capacity Building Strategy is based on the following core objectives:

- Build the capacity of market enablers and players to develop and implement renewable energy and energy efficiency investments / programs in the ECOWAS Region;
- Harvest and share knowledge and information on good (and poor) practices to support implementation of renewable energy and energy efficiency investments / programs and communicate progress made in scaling up access to energy services;
- Promote research, development, demonstration and dissemination of renewable energy and energy efficiency technologies and services, as well as facilitate academic exchange between research institutes / centres and universities in members states;
- Enhance knowledge and technology transfer through linkage programs with other universities, research institutions/centres.

The target groups for this Capacity Building Programme are:

- **Decision makers** – Awareness raising on the importance of RE&EE in their countries and region and the international situation of RE&EE and climate change;
- **Investors / National and local banks** – Knowledge about investment risks peculiar to RE&EE projects and programs. Examples from existing financing mechanisms to be followed or replicated.
- **Technicians / Utilities / Energy industries and companies** – Training on operation and maintenance, management schemes. Technology transfer;
- **Users** – Awareness rising for a rational use of energy (energy efficiency) and promotion of access to modern energy. Promotion of local energy business and productive uses of energy systems.

1.2 Objective and Purpose of Study

The objective of the study is to produce a document that identifies the Capacity Building Needs for RE&EE development in the ECOWAS Region, to be used as a basis for a long term Capacity Development Plan for ECREEE.

The specific objectives are:

- To identify the capacity building needs in RE&EE in the 15 ECOWAS Member States. This implies the involvement of all public and private institutions responsible for the national capacity building in each member state, including the conduct of interviews with different stakeholders, to identify the capacity building gaps.
- To elaborate a document “*ECOWAS Capacity Building Needs Assessment for RE&EE*”, incorporating all relevant information at national, regional and international levels.

1.3 Methodology

To achieve the above objectives, ECREEE engaged three Universities of the region – The International Institute of Water and Environmental Institute, 2iE (Burkina Faso) the Kwame Nkrumah University of Technology, KNUST (Ghana), and the University of Cape Verde, UniCV (Cape Verde) to conduct this study.

A team from the three Universities worked together to develop the methodology for the implementation of the project. After a joint definition of the document framework and the methodology (see Appendix A for questionnaire), each University assumed responsibility for implementation of the study in the following member states:

- 2iE – Niger, Burkina Faso, Togo, Benin, Cote d’Ivoire, Mali
- KNUST – Nigeria, Ghana, Sierra Leone, Gambia, Liberia
- UniCV – Cape Verde, Guinea Bissau, Senegal, Guinea

The activities undertaken in the framework of the study included:

- interviews with the following stakeholders, to identify the capacity building gaps and perspectives on RE and EE:
 - Ministries of Energy and other state energy Institutions/departments;
 - Financial institutions and International donor agencies;
 - Private-sector institutions and NGOs; and
 - Training and research Institutions.
- Consolidation and analysis of data gathered from all 15 countries visited, and drafting of country reports (more detailed) from which this regional report is compiled.

Detailed list of relevant energy institutions in the various countries were compiled with the assistance of ECREEE’s National Focal Persons. Particular attention was paid to the ECOWAS/UEMOA Whitepaper on Energy as regards capacity building.

2. Analysis of Stakeholders’ Responses

Institutions interviewed were classified as Decision-makers and state agencies, private and non-governmental organizations, training and research and financial institutions and regional/international agencies see Appendix B for list of institutions contacted. This section presents an analysis of the responses obtained from stakeholders who were interviewed across the sub-region on key issues regarding capacity development:

The percentages given in diagrams are calculated using the number of occurrences over the number of centres or institutions who completed the questionnaire.

2.1 State Agencies and Decision-Makers

A total of 37 state agencies, departments and ministries were interviewed across the ECOWAS sub-region and their responses to key questions on capacity development and related issues are presented in this section.

2.1.1 Existing Staff Situation and Recruitment/Training Needs

A total of 3471 employees with various qualifications and training were documented in selected institutions across the sub-region as indicated by Figure2-1-1 below.

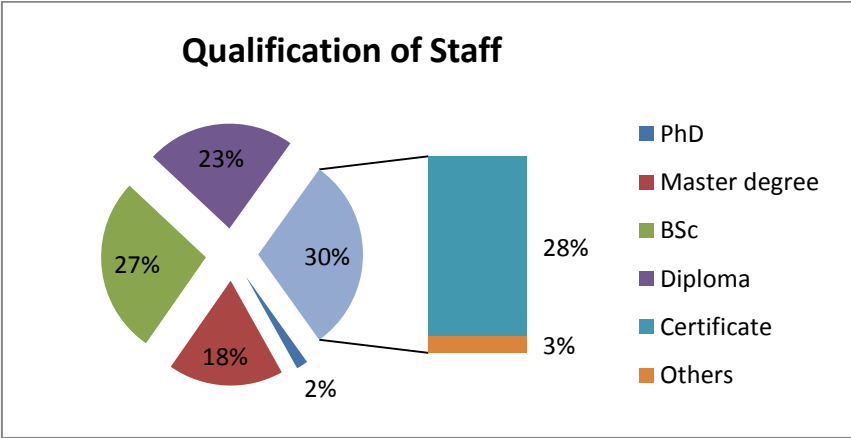


Figure 0-1 Qualifications of Staff

Technician level staff were found to be the largest group of employees, comprising 28% of staff. This is closely followed by Bachelor’s degree holders with 27%.

Recruitment needs were also quite high with 81% of the agencies responding in the positive – needing to recruit personnel. The qualifications they seek and the sectors in which these were needed are also indicated by Figure 2-1-2 and Figure 2-1-3

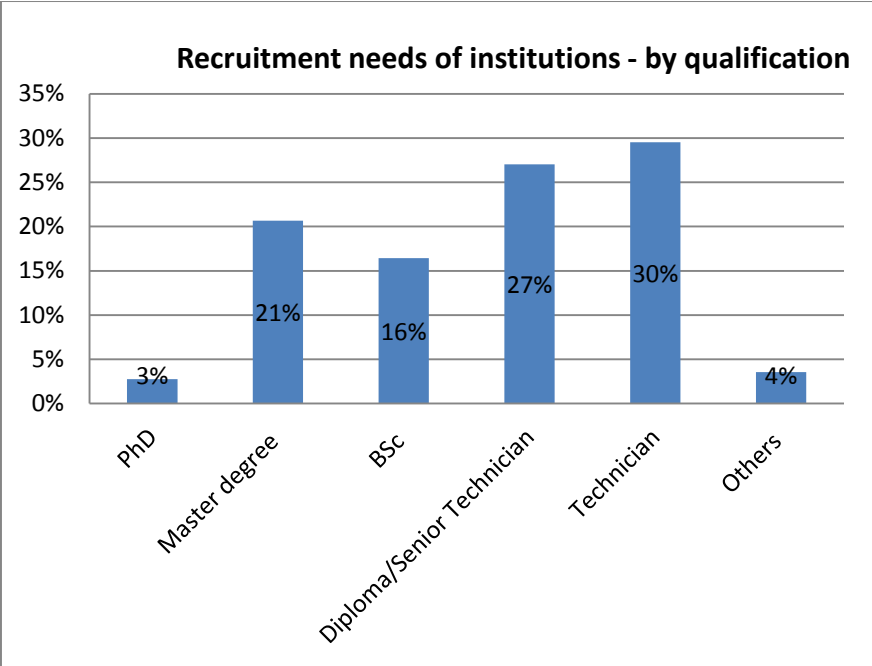


Figure 0-2 Recruitment needs of institutions - by qualification

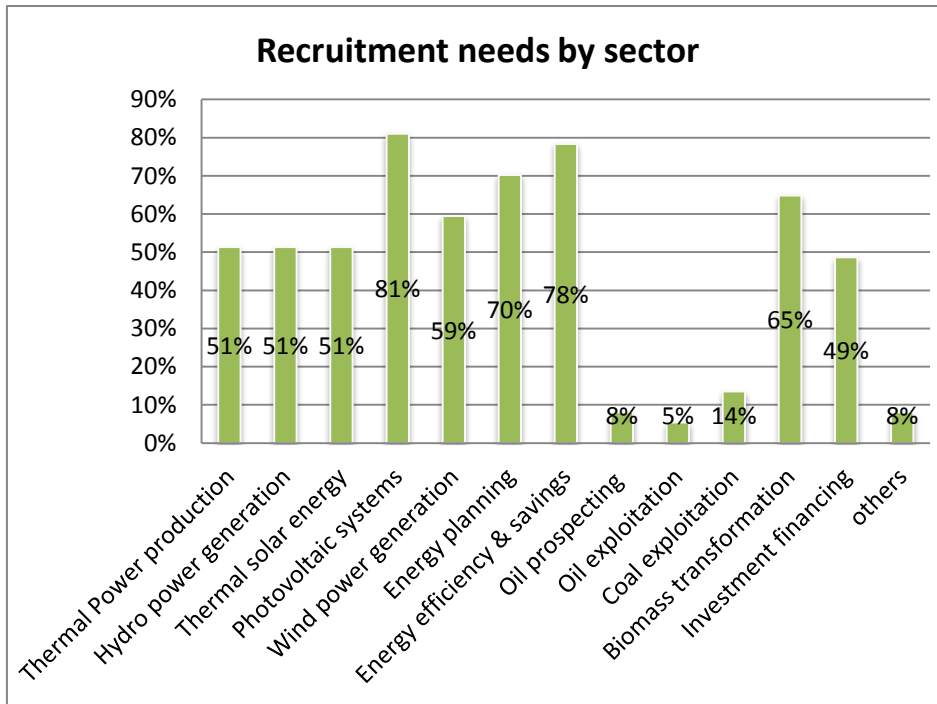


Figure 0-3 Recruitment needs of institutions - by sector

These expected recruitments were however subject to a number of supply/availability constraints, which are presented in figure0-4 . Although 22% of the agencies recruit and train personnel themselves, they also admit having difficulties with recruiting skilled personnel for the various positions.

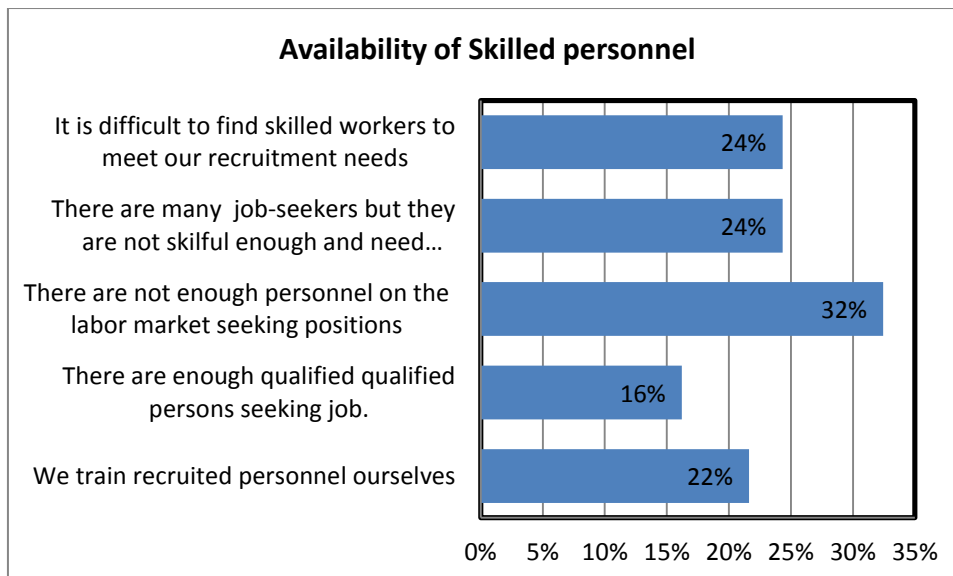


Figure 0-5 Availability of skilled personnel

2.1.2 Approaches to training in national energy agencies/ministries

Most respondents (78%) had refresher training programmes for their employees and are seeking to train/upgrade some of their staff to various levels in the coming years as indicated by Figures 2-1-5 and 2-1-6 below

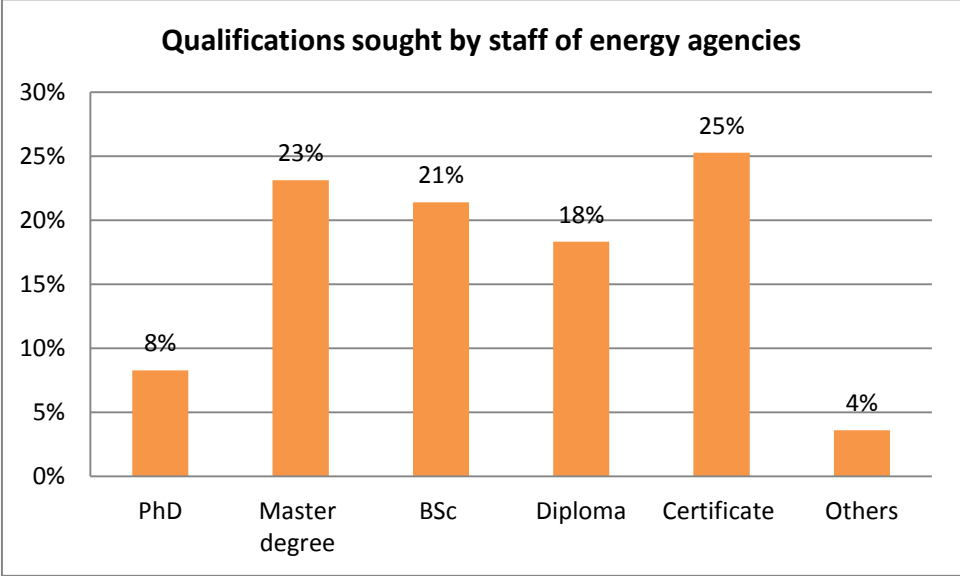


Figure 0-6 Qualifications sought by staff of energy agencies

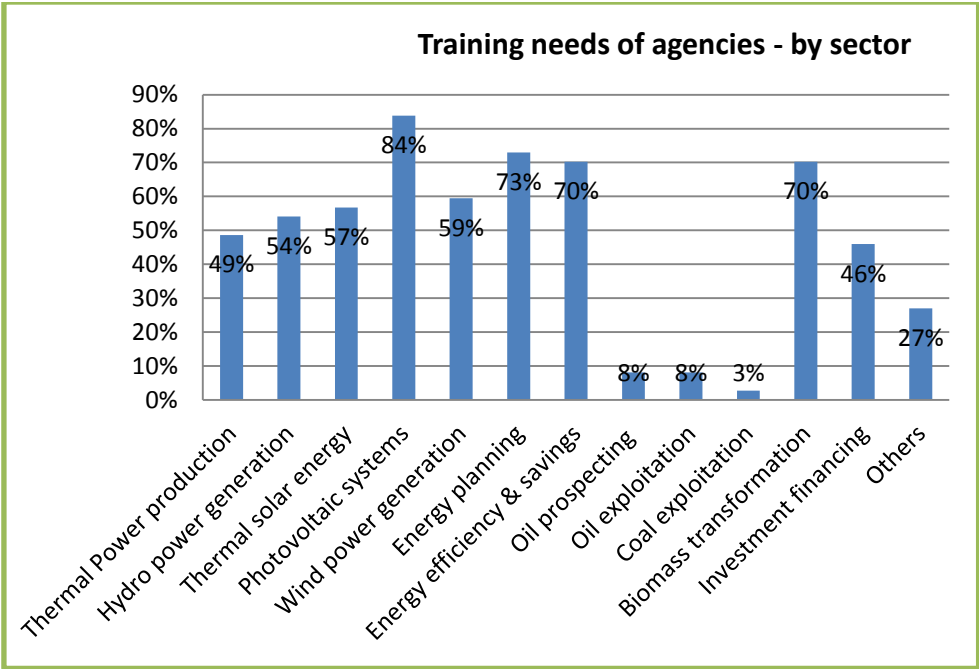


Figure 0-7 Training needs of agencies - by sector

From Figure 2-1-5, it may be deduced that most of the training needs of the state energy agencies is at the technician level (certificate), while they also seek to upgrade many of their staff who are first degree holders to master’s level. Similarly Figure 2-1-6 bring to the fore,

they key areas where most regional energy agencies need some training for their staff, namely: Solar PV – 84%, Energy Planning – 73%, Energy Efficiency – 70% and Biomass transformation – 70%.

Very few of the energy agencies have their own centers and rely mostly on training and workshop opportunities available elsewhere to provide their staff with refresher programmes – See Figure 2-1-7.

Such training and workshop opportunities have been either in the country concerned or in Europe/America (59%) as indicated by Figure 2-1-8. Training opportunities in other ECOWAS member countries appear not to be well patronized, or simply do not exist.

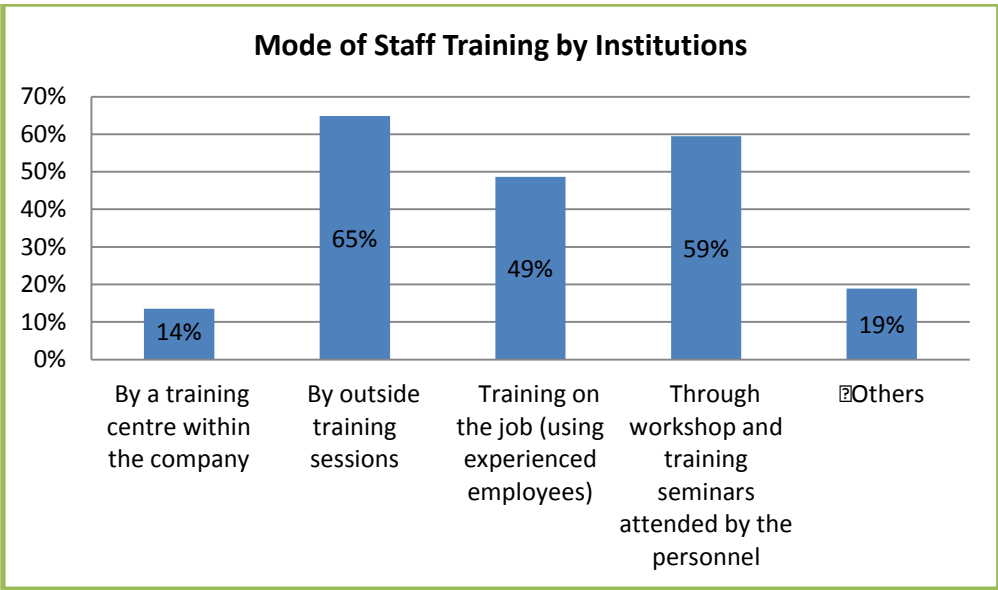


Figure 0-8 Mode of Staff Training by Institutions

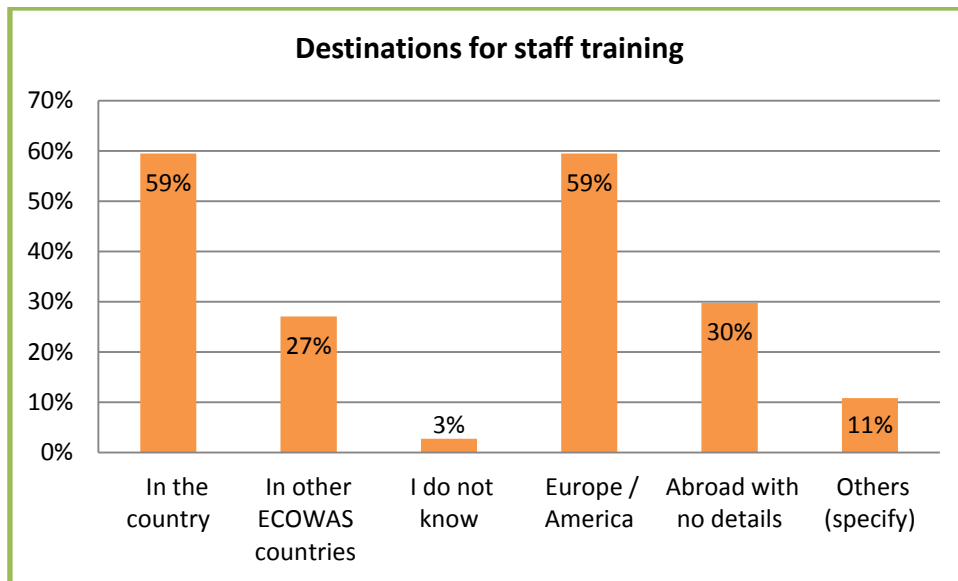


Figure 0-9 Destinations for staff training

2.1.3 Operational Issues in National Energy Agencies and Departments

As per Figure 2-1-9, an overwhelming majority of the state actors in energy mentioned inadequate financing as a significant difficulty that they encounter. The need for energy equipment and logistics also came up as major problems that they encounter.

Although data provided regarding the budgets of the institutions were discarded by the team (for being unreliable), it was clear that most of the agencies wanted major upward reviews of their budgets (see Figures 2-1-10a and 2-1-10b). Fifty-seven percent (57%) of regional national energy agencies indicated that they would apply these additional resources to recruit younger personnel - Figure 0-10.

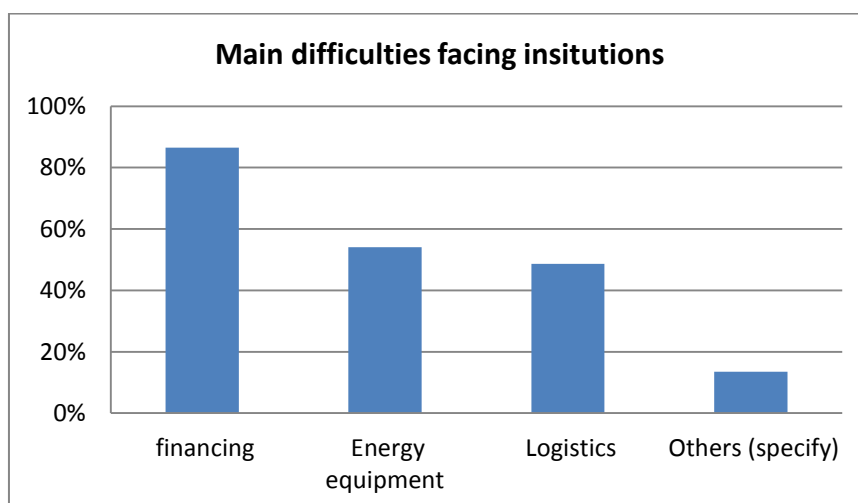


Figure 0-11 Main difficulties facing institutions

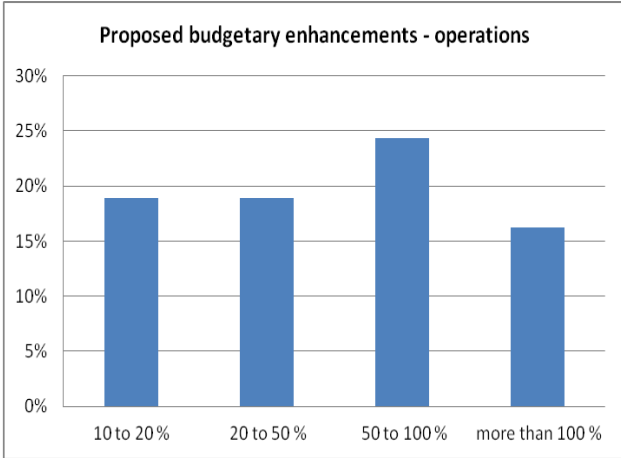


Figure 0-13a Proposed budgetary enhancements – operation

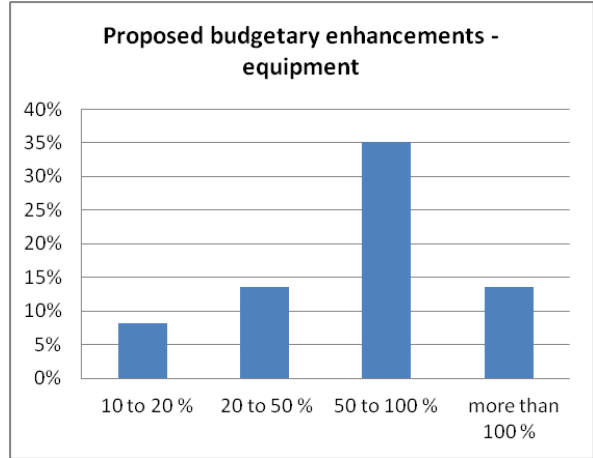


Figure 0-12b Proposed budgetary enhancements – equipment

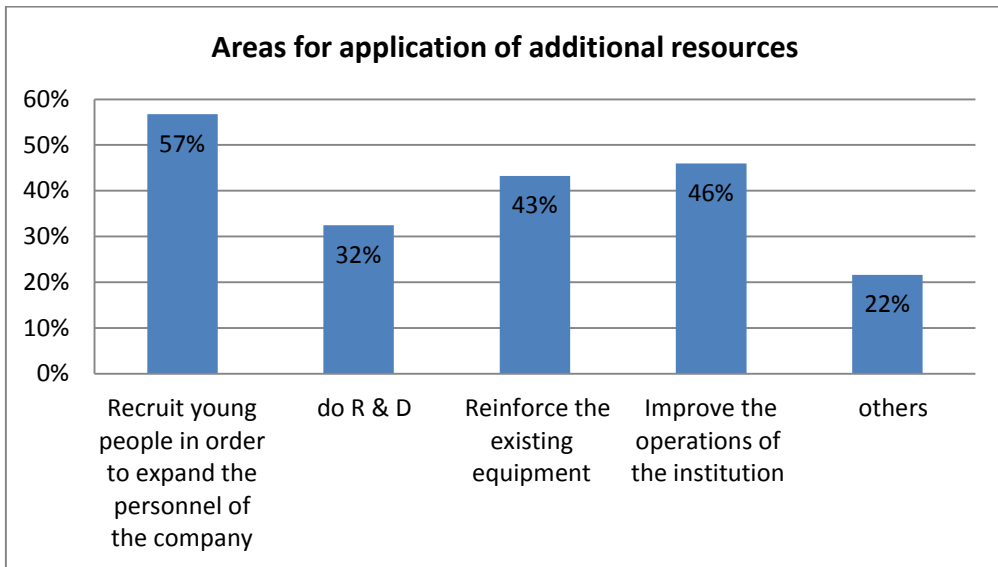


Figure 0-14 Areas for application of additional resources

Many of the state energy agencies across the sub-region (68%) have some forms of capacity-building programmes, whereas 30% did not have any such programmes but were willing to pay for it, see Figure2-1-12 .

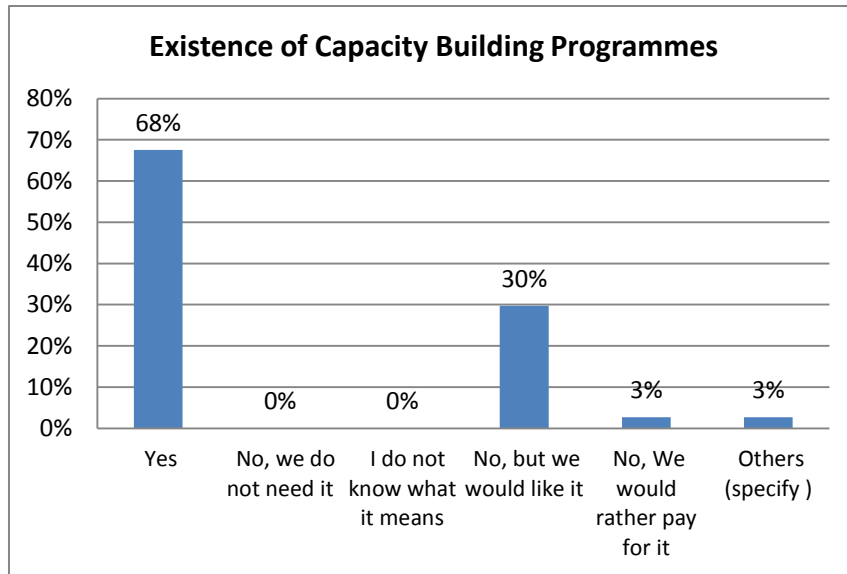


Figure 0-15 Existence of Capacity Building Programmes

2.1.4 Policy, Regulatory and Other Issues Affecting RE and EE

On the question of whether existing regulations and policies allowed for the development of Renewable Energy and Energy Efficiency, opinion were divided; 46% responding in the affirmative and 49% in the negative as indicated in Figure 2-1-13 below.

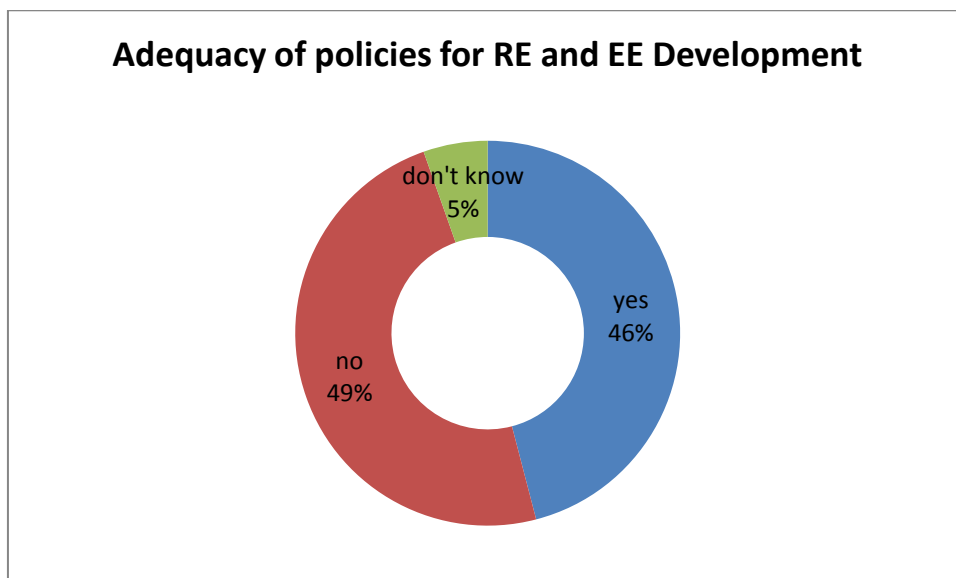


Figure 0-16 Development of RE and EE In The Subregion

On measures to accelerate the development of RE in the sub-region, a significant majority believe that the removal of taxes on imported equipment is the way to go. This is followed by

financing R&D in RE which – 51%. Subsidy for RE equipment also had affirmation from 49% of respondents – further details are provided in Figure 2-1-14.

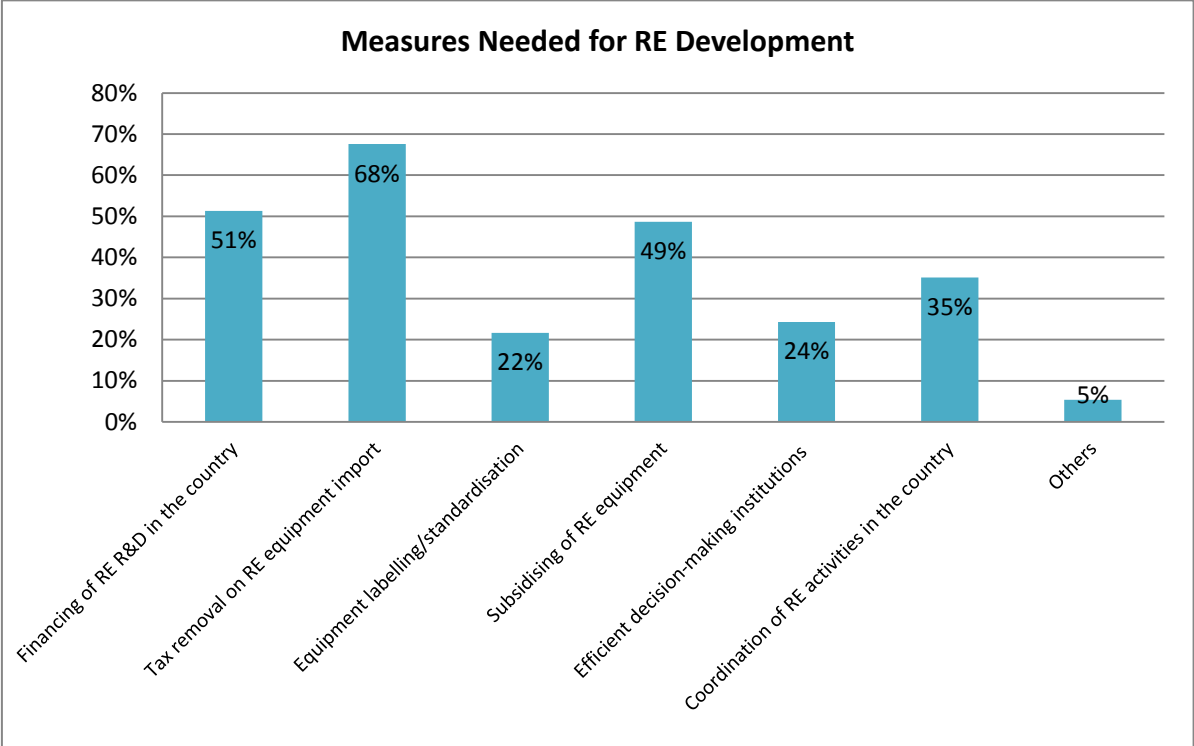


Figure 0-17 Measures Needed for RE Development

On the improvement of energy efficiency in the sub-region, various measures such as the financing of energy audit, tax removal on EE equipment, Equipment labeling and subsidy for EE equipment had approvals of between 49-57% as indicated in Figure 2-1-15.

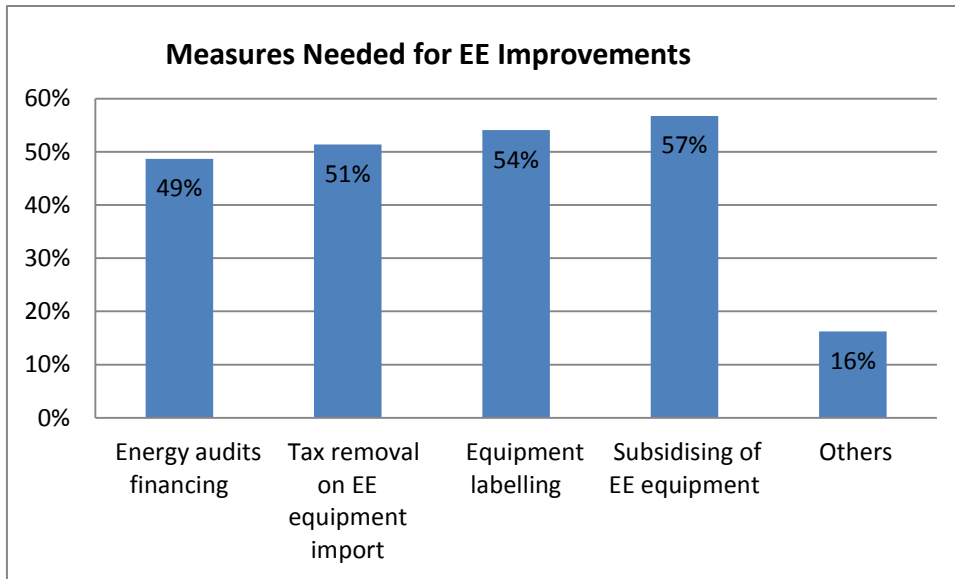


Figure 0-18 Measures Needed for EE Development

There appears to be high unanimity regarding viable RE projects in the sub-region. Solar PV power plants had the high majority, with 76% (see Figure 2-1-16) of respondents perceiving it as the most viable RE project in the sub-region. Dissemination of improved cookstoves and decentralized PV were also considered by 65% of respondents in the national energy institutions as viable projects in the sub-region.

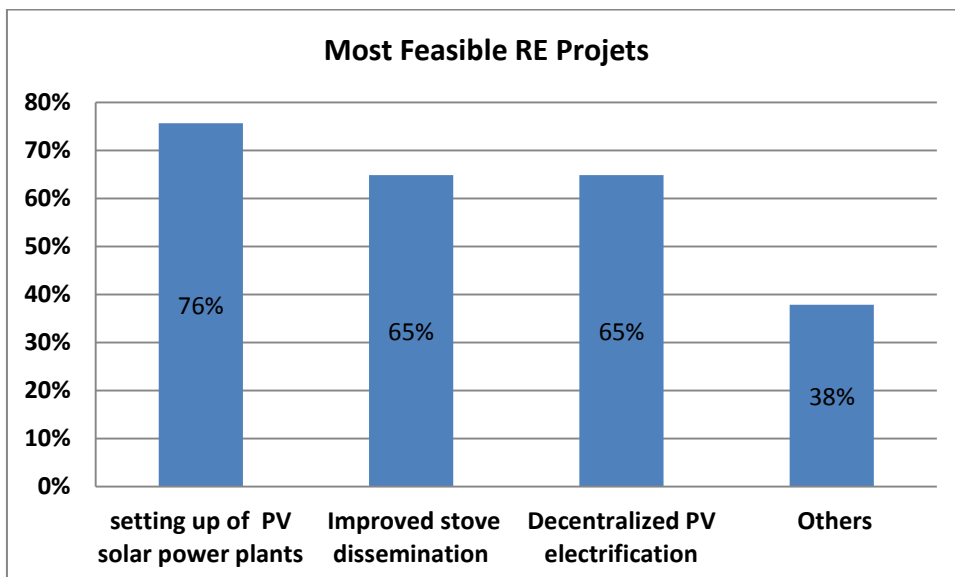


Figure 0-19 Most Feasible RE Projects

A similar unanimity exists with regards to the most feasible EE projects, with the abolition of incandescent lamps having 76% approval from respondents. This is followed by energy audits in commercial/administrative buildings with 49% as indicated in Figure 2-1-17.

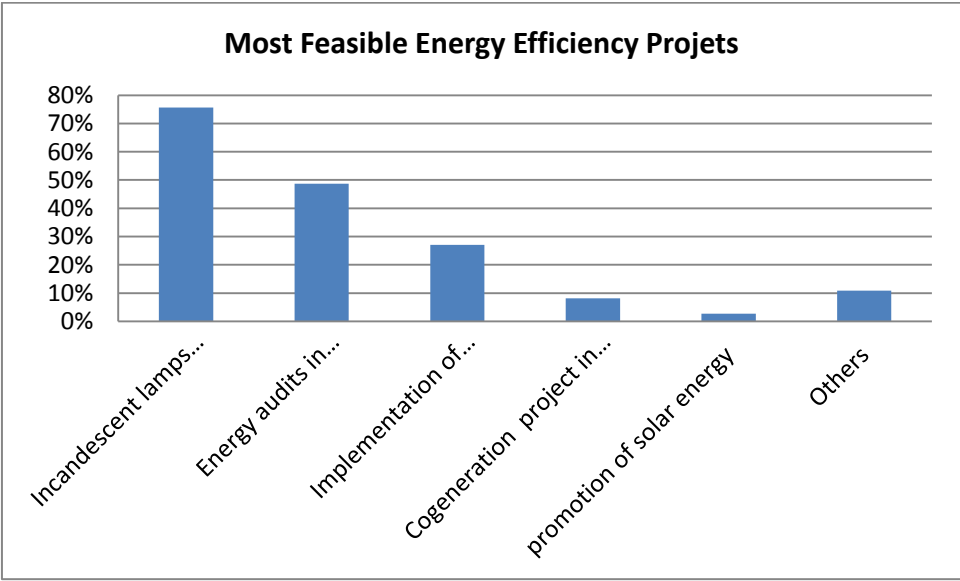


Figure 0-20 Measures Needed for EE Development

In general, lack of financing, quality of training and inappropriate regulations were seen as the main barriers to capacity building in the sub-region by the national agencies. Details of responses to this question are presented Figure 2-1-18 below.

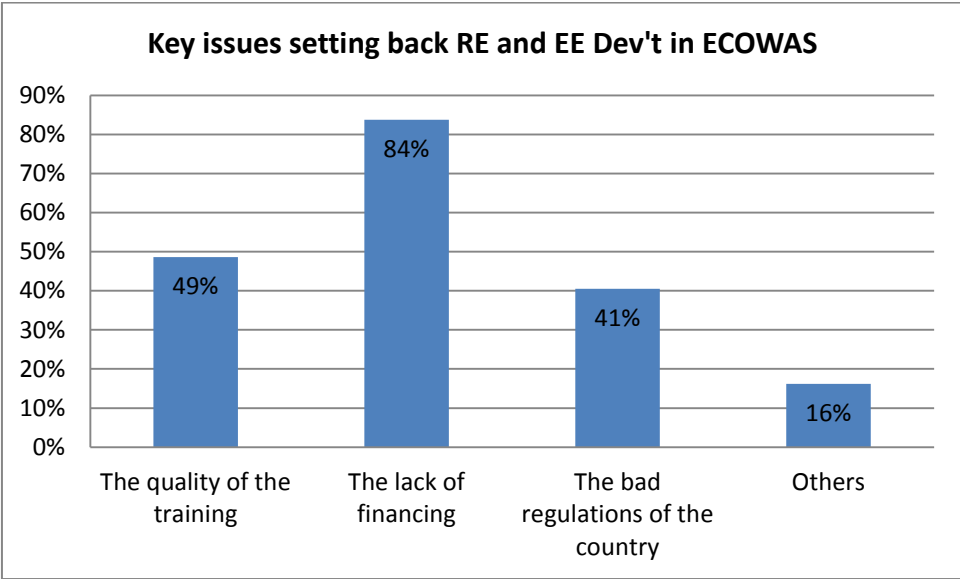


Figure 0-21 Key Issues Affecting RE and EE Dev't in ECOWAS

2.1.5 Key Lessons and Analysis

Policy makers across the sub-region generally perceive Solar PV and Biomass projects (including improved cookstove dissemination) as the most feasible RE project as indicated in Figure 2-1-16. This reflects in the manpower needs projections presented in *figures 2-1-3 and 2-1-6*, where 65-84 % of state energy institutions are actually seeking to train their staff and also recruit in these areas. The need for PV experts is highest – with 81 - 84%.

Recruitment and staff training-needs also focus more on the training of technicians and senior technicians Up to 30% of institutions need to **recruit** technicians and senior technicians (refer to Figure 2-1-2) whiles 25% of state energy agencies seek to **train** their staff at this level.

Energy Efficiency capacity development needs are also high, with 73% of agencies expressing the need to train their personnel in this area while 78% also seek to recruit persons with expertise in this area.

Demand for expertise in Energy Planning is also very high; 70% of agencies intend recruiting in this area while 73% seek to train their staff in this area - see Figures 2-1-3 and 2-1-6.

2.2 Private and Non-Governmental Organisations

Sixty-four (64) private companies and NGO were interviewed across the ECOWAS sub-region to solicit views on the need for capacity development in the renewable energy and energy efficiency sector and their responses are presented below. The organisations sampled were users, suppliers, equipment manufacturers, installers or advocates in the renewable energy and/or energy efficiency sectors.

2.2.1 Importance of training and training needs

Most, about 90%, of the organizations contacted agree that training is important for access to energy across the region.

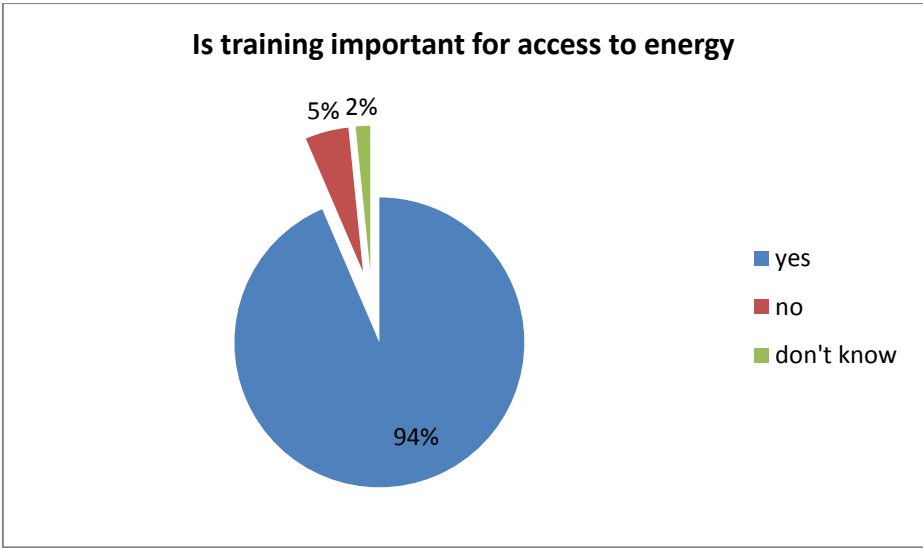


Figure 2-2- 1: Importance of training for access to energy services in Africa according to private institutions

In their view, organising periodical training for the actors in the renewable energy sector was vital for an efficient capacity building as shown in figure 2-2-1. It was also indicated that, much emphasis should be placed on vocational training in specialized areas such as solar PV installation for technicians, see figure 2-2-2.

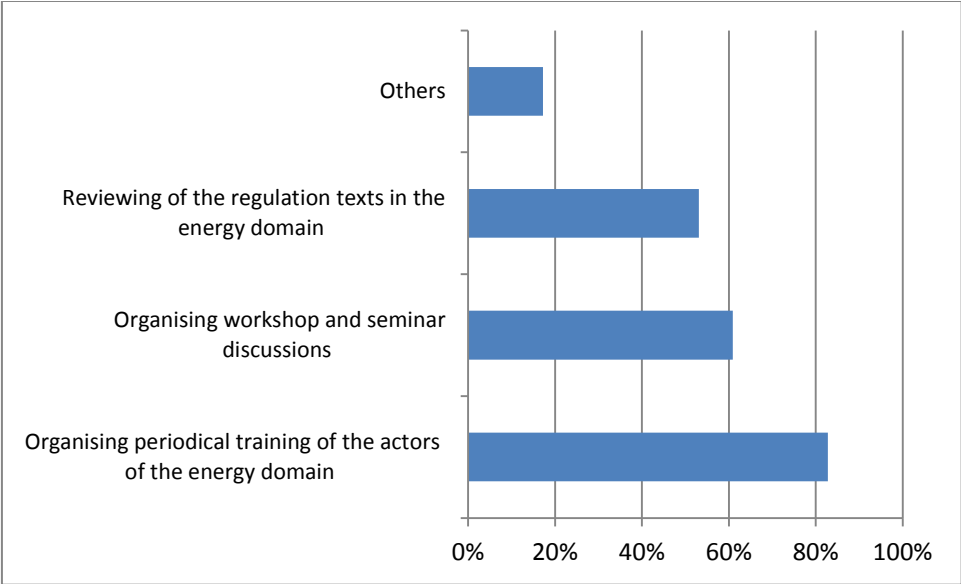


Figure 2-2- 2: Components for efficient capacity building

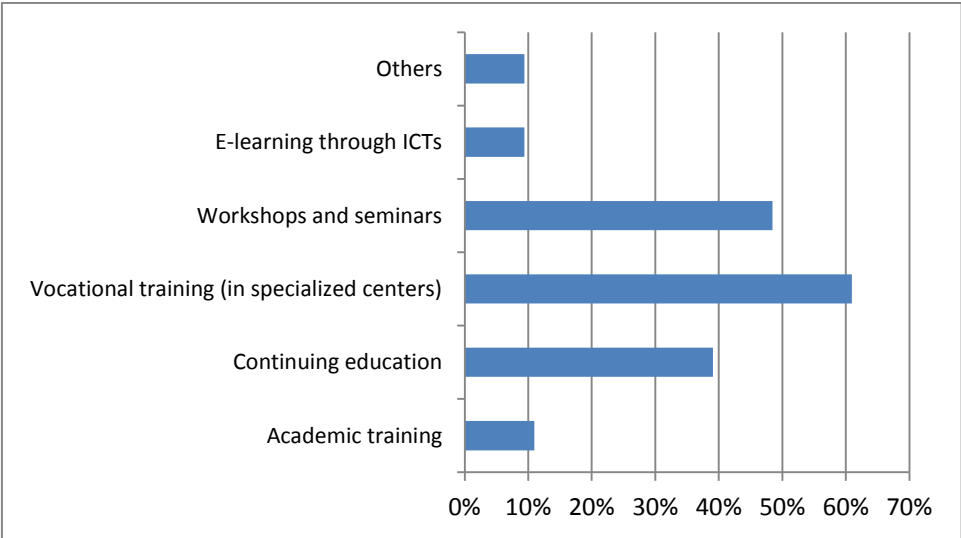


Figure 2-2- 3: Priorities for capacity building

2.2.2 Institutional framework

Although training is identified as key component to build capacity in renewable energy and energy efficiency within the sub region, the private practitioners also indicated that good

private-public partnership, institutional framework and financing are important to build capacity for access to energy in the sub-region, figure 2-2-3.

With the exception of Mali and Niger, most of the private stakeholders believe regulations and policies in their countries do not encourage the fast development of RE and EE projects.

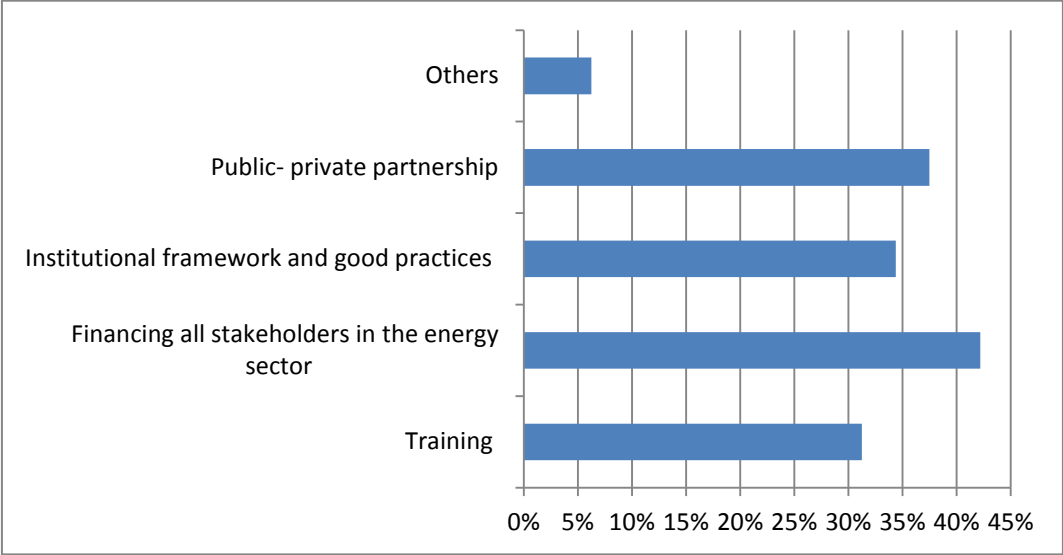


Figure 2-2- 4: Priority actions to build capacities for populations' access to energy services

It is perceived that the main barriers to good capacity building in the renewable energy and efficiency sector are the quality of training, bad regulations in the various countries and lack of financing.

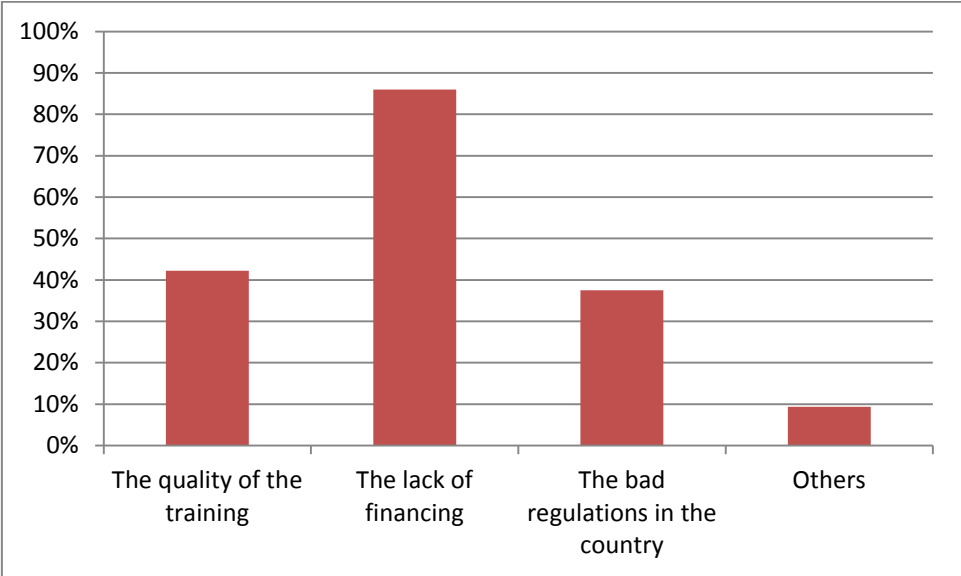


Figure 2-2- 5: Main barriers to good capacity building in the RE and EE sectors according to NGOs and private companies

According to the private sector, it is important not to leave energy supply entirely in the hands of the private sector but to implement healthy public-private partnership and also subsidise energy for poor people in order to increase access to energy services in Africa.

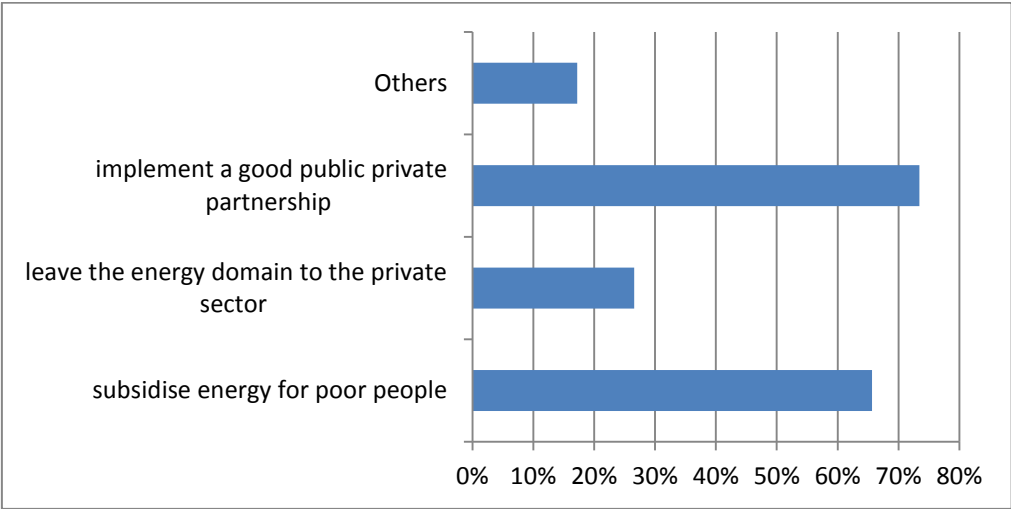


Figure 2-2- 6: Recommendations to deal with energy consumption growth and the issues of access to energy services according to NGOs and private companies

Other recommendations given are to decentralize the supply of energy, reduce inefficiencies in both demand and supply sides of the electricity system through the use of more efficient appliances and equipment, standards and labeling, sustained public education, generation capacity improvement.

It is worth noting that, tax removal, subsidy, financing research of RE projects and energy audits are measures that could improve the development of renewable energy and energy efficiency in the sub-region as shown in figure 2-2-7.

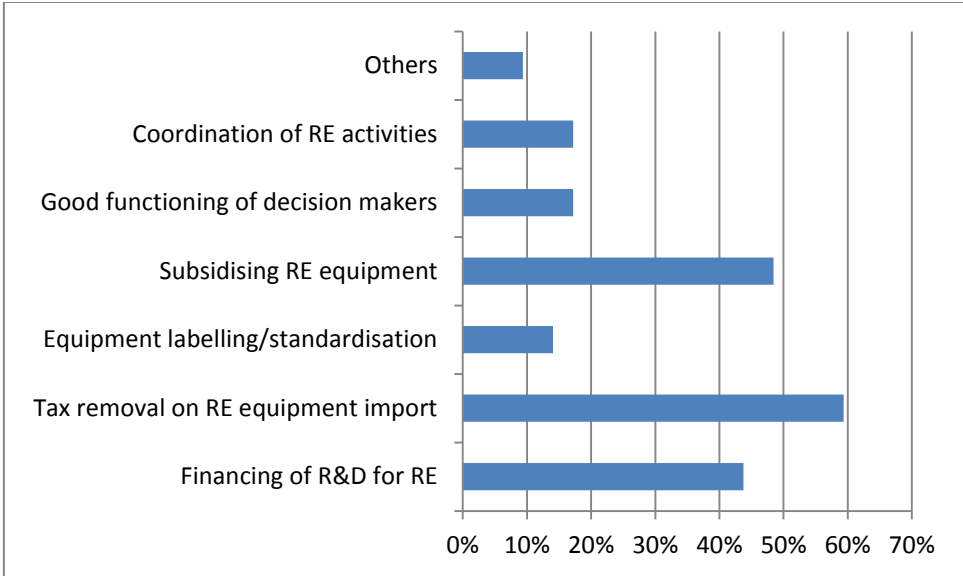


Figure 2-2- 7: Measures and decisions to improve the development of RE according to NGOs and private companies

Incandescent lamp abolition and energy audit in government buildings are deemed as feasible initiatives of governments to enhance energy efficiency in the sub region. Also, solar PV and improved cook stove dissemination are regarded by the private sector as credible initiatives being implemented or yet to be implemented in the various countries, see figures 2-2-8 and 2-2-9.

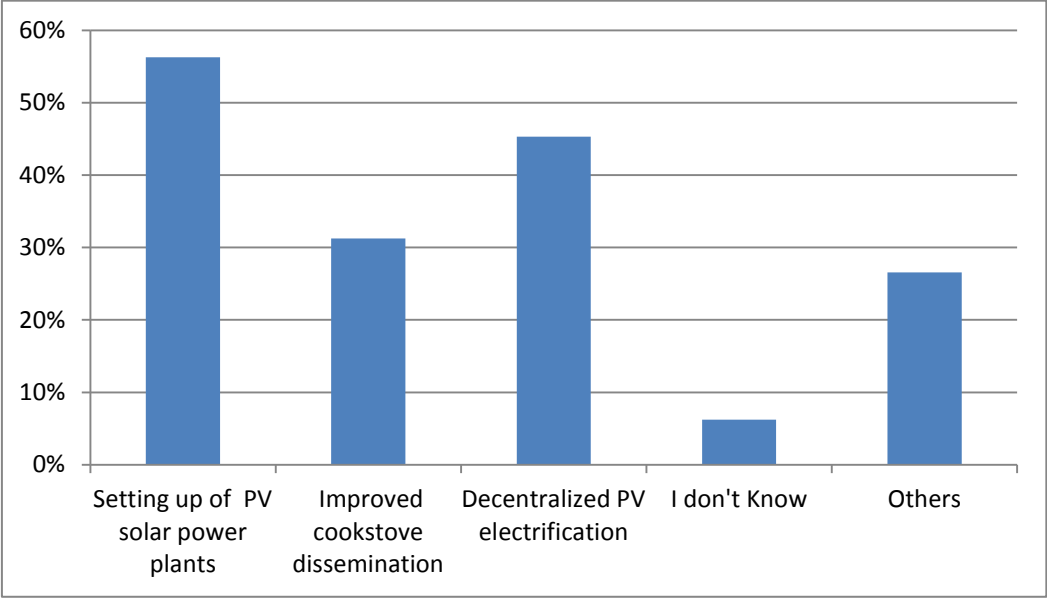


Figure 2-2- 8: Most feasible RE projects in the sub region

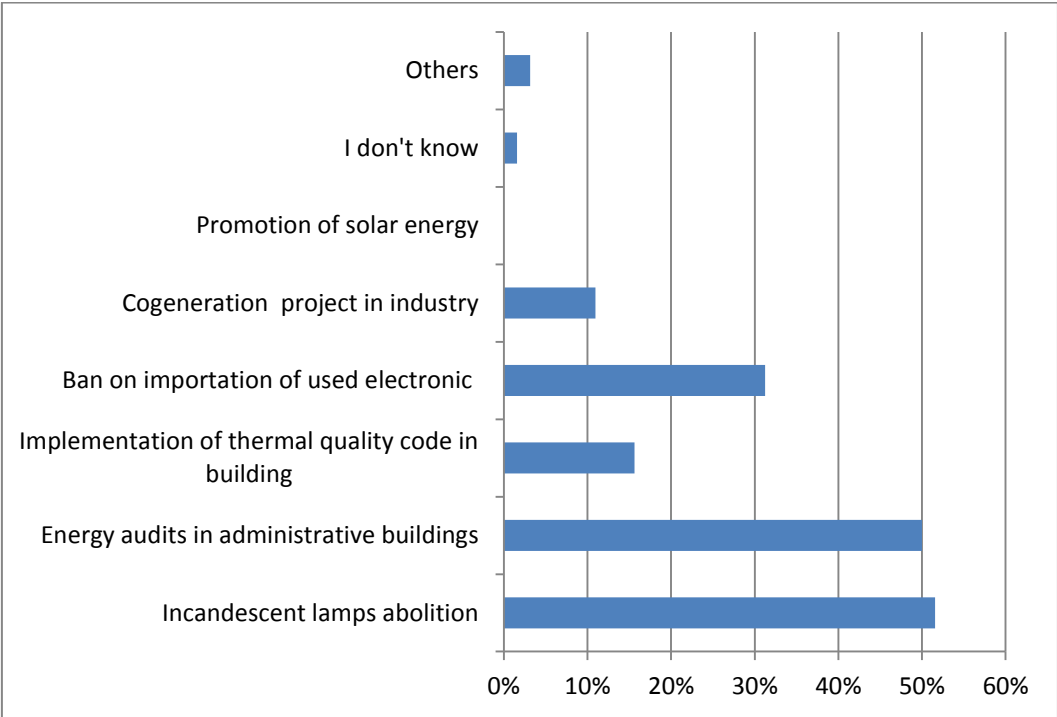


Figure 2-2- 9: Most feasible EE projects underway in the sub region

2.2.3 Key lessons – Private and Non-Governmental Organisations

The main lessons derived from the study conducted are:

7. Main barriers to effective capacity building in the renewable energy and efficiency sectors are the quality of training, bad regulations in the various countries and lack of financing;
8. Existing regulations and policies in the region do not encourage the fast development of RE and EE projects;
9. Organising periodical training for the actors in the renewable energy sector was vital for an efficient capacity building;
10. Emphasis should be placed on vocational training in specialized areas such as solar PV installation for technicians;
11. Good public-private partnership and energy subsidies for poor people can increase access to energy services in Africa; and
12. Most private organisations seem to focus on the deployment of solar energy technologies and energy efficiency projects.

2.3 Training and research centres

Forty-eight (48) training and research centres were interviewed in this survey in 15 ECOWAS countries. They were mainly technical institutes and institutions of higher education. The number of training centres per country is shown figure 2.3.1. The numbers reported on this figure are related to the institutions interviewed in each country.

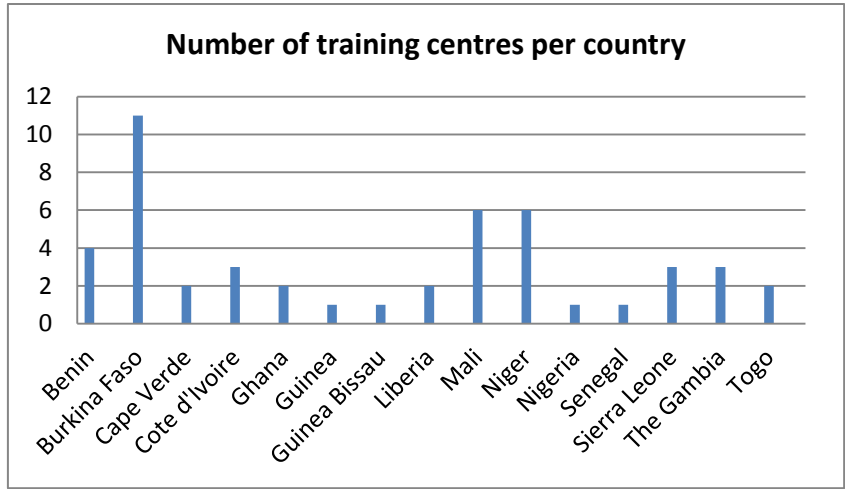


Figure 2-3- 1: Training centres interviewed per country

2.3.1 Personnel and programmes in training centres

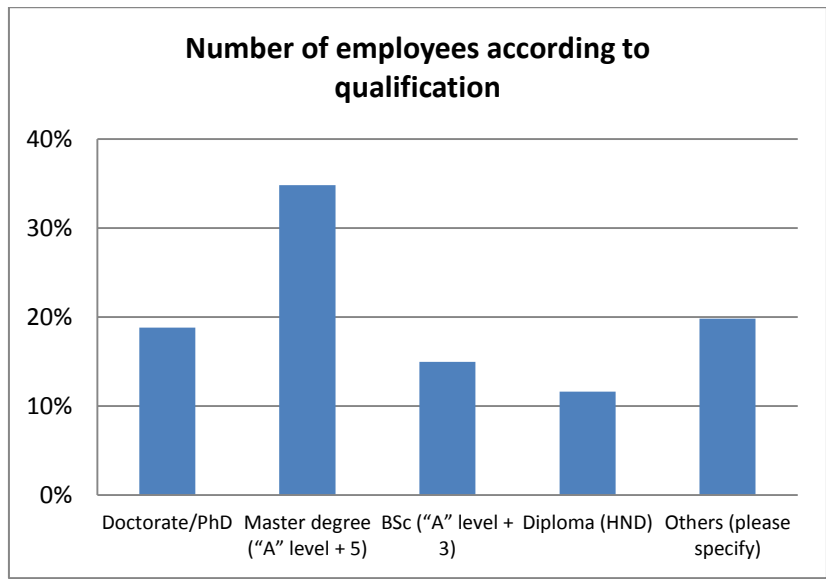


Figure 2-3- 2: Staff qualification rate in the training centres

Figure 2.3.2 shows the proportion of teaching staff qualification in training centres. This figure gives an idea of the dispersion of the staff qualification ranging from Diploma to PhD.

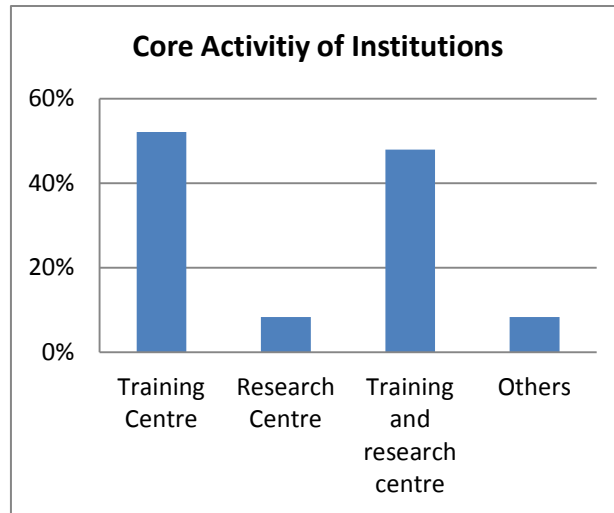


Figure 2-3- 3: Activities of the centres interviewed

The percentages shown on figure 2.3.3 show that the centres interviewed are either training centres only (50 %) or research and training centres (about 45 %). A few of the centres were devoted to research only. These are less than 10 % of the total.

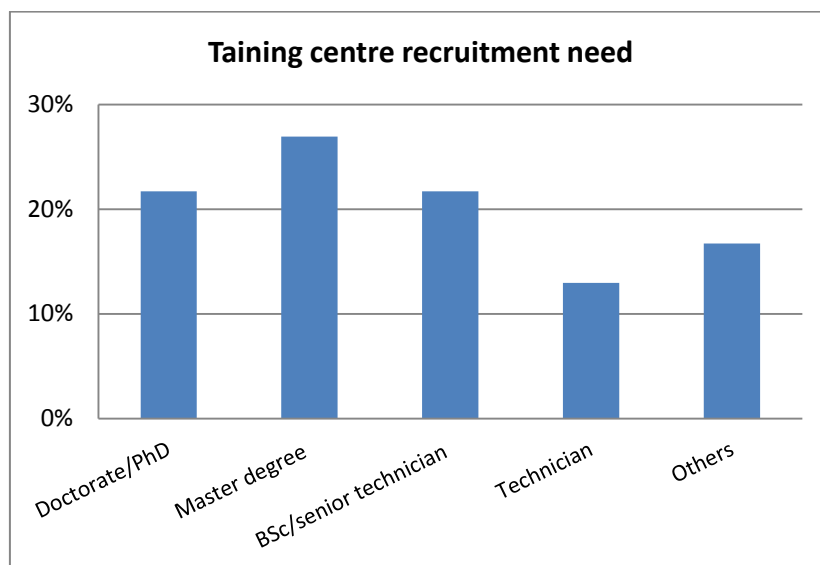


Figure 2-3- 4: Training centres recruitment needs per qualification

Figure 2.3.4 indicates the recruitment need reported by the training centres. One can see on this figure that the master's degree level is the most needed along with technicians and Doctoral Degree holders.

Figure 2.3.5 on the other hand shows the type of research topics carried out in the research and training centres. These topics are reported to be mainly solar energy which is more than

50 % of the total, then biomass and wind energy. One can see that energy efficiency is also treated in these centres.

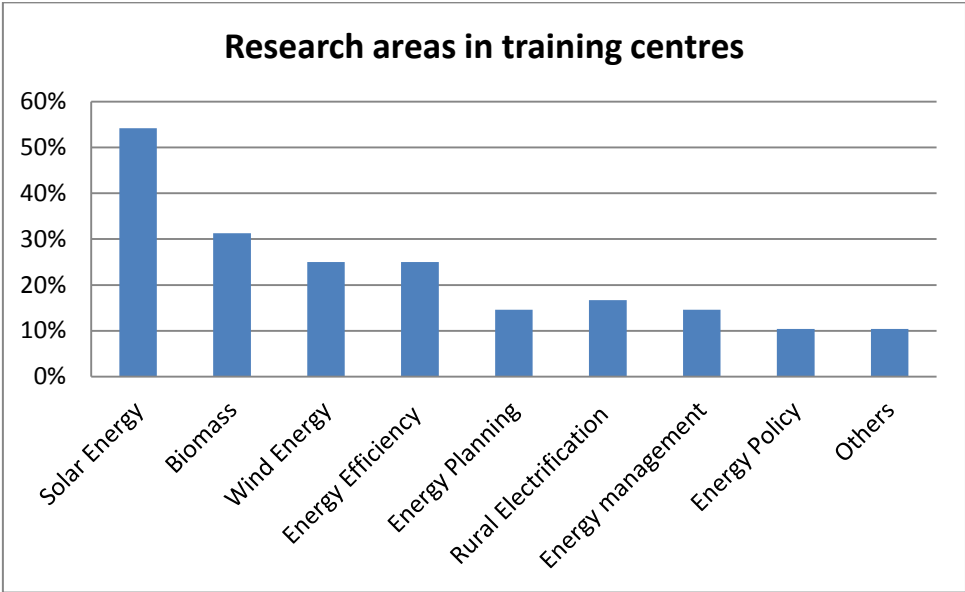


Figure 2-3- 5: Major Research areas in training centres

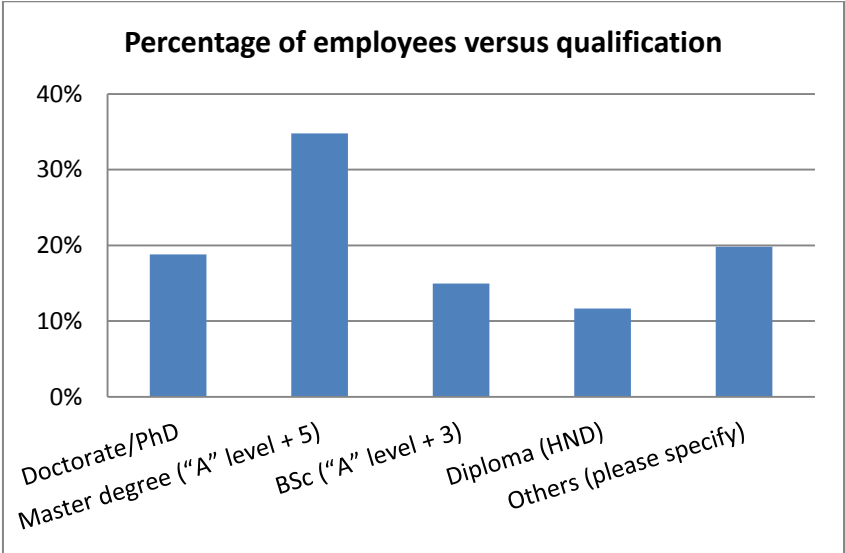


Figure 2-3- 6: Employment structure in the training centres

Figure 2.3.6 shows the relative proportion of employees of various qualifications in the ECOWAS training centres. It can be noticed that the master’s degree programme is the most important. This magnitude of master’s degree among the teaching staff is due to the high percentage of technical institutes among the centres.

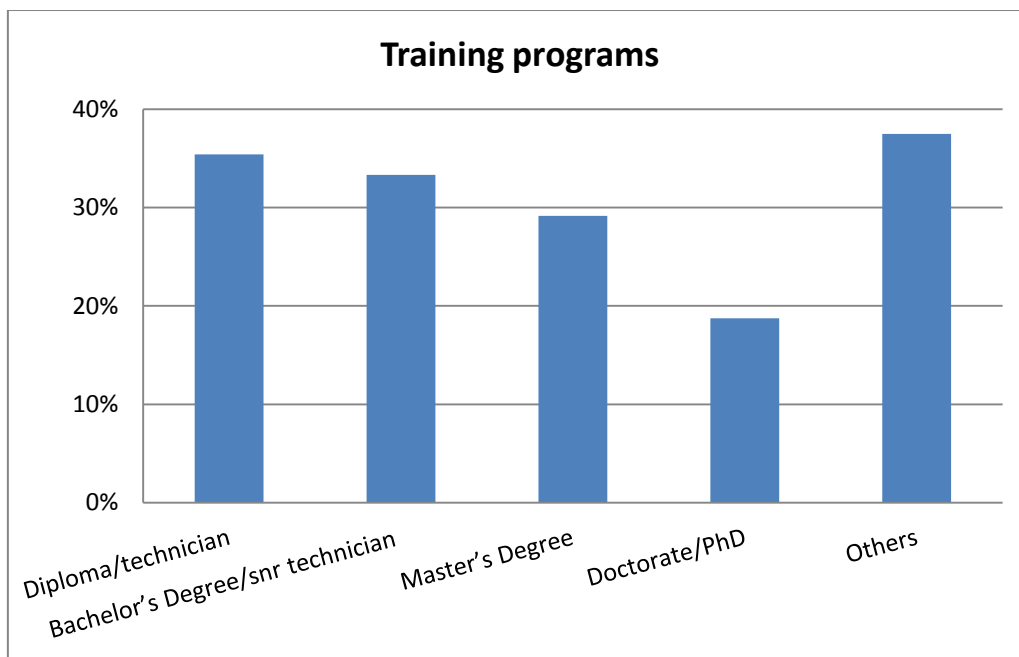


Figure 2-3- 7: Training programmes provided in training centres

Figure 2.3.7 is related to the diplomas delivered in the ECOWAS training centres in relation with energy. This figure shows that the proportion of technician diploma is the highest in the training programmes (more than 60 %). The cumulative percentage of master's degree and doctorate levels is lower than expected

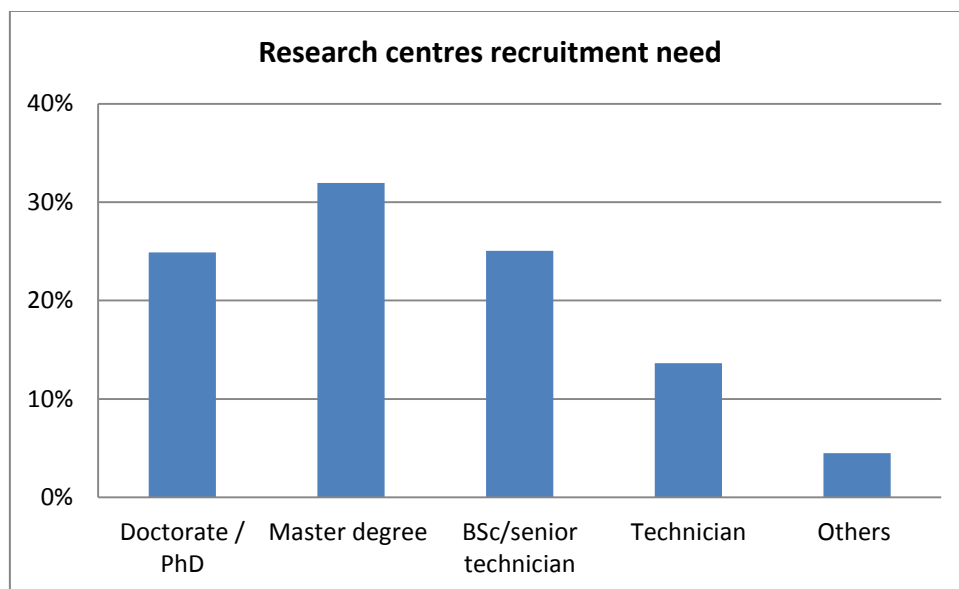


Figure 2-3- 8: Recruitment need in research centres

When it comes to recruitment need the centres are more interested in master’s degree teachers than technician and doctorate level. This is what can be seen n figure 2.3.8

2.3.2 Quality and Relevance of Training programmes

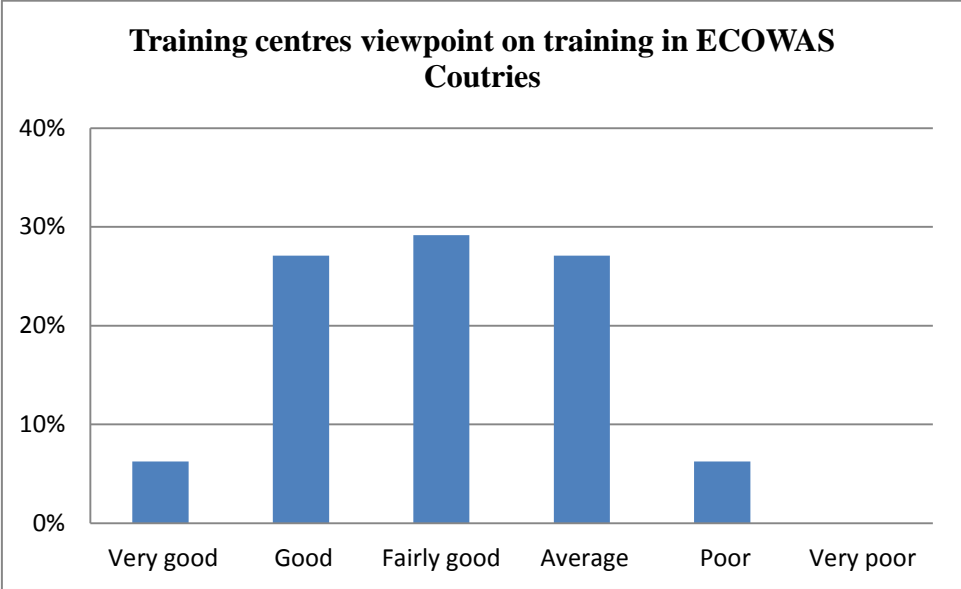


Figure 2-3- 9: Training centres view point of their own activity

Figure 2.3.9 shows the view point of the training centres on their own training performance which is found to be fairly good, on average, meaning that it could be improved.

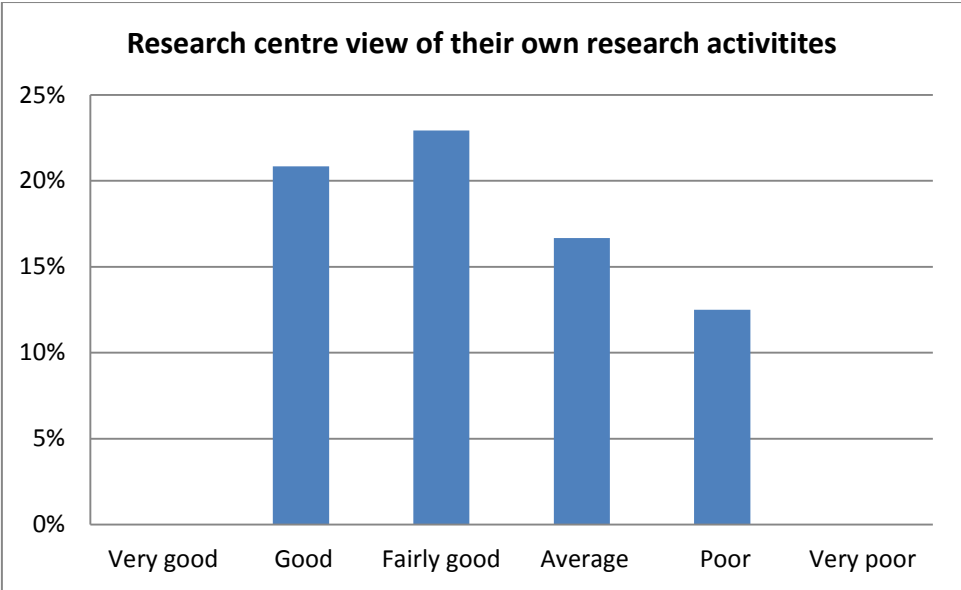


Figure 2-3- 10: Research centres view point over the research activities in the ECOWAS countries

The same appreciation can be noticed for research activities carried out by the centres. If one takes into consideration the three ratings (good, fairly good and average) one can say that most of the centres view research activities as fairly good.

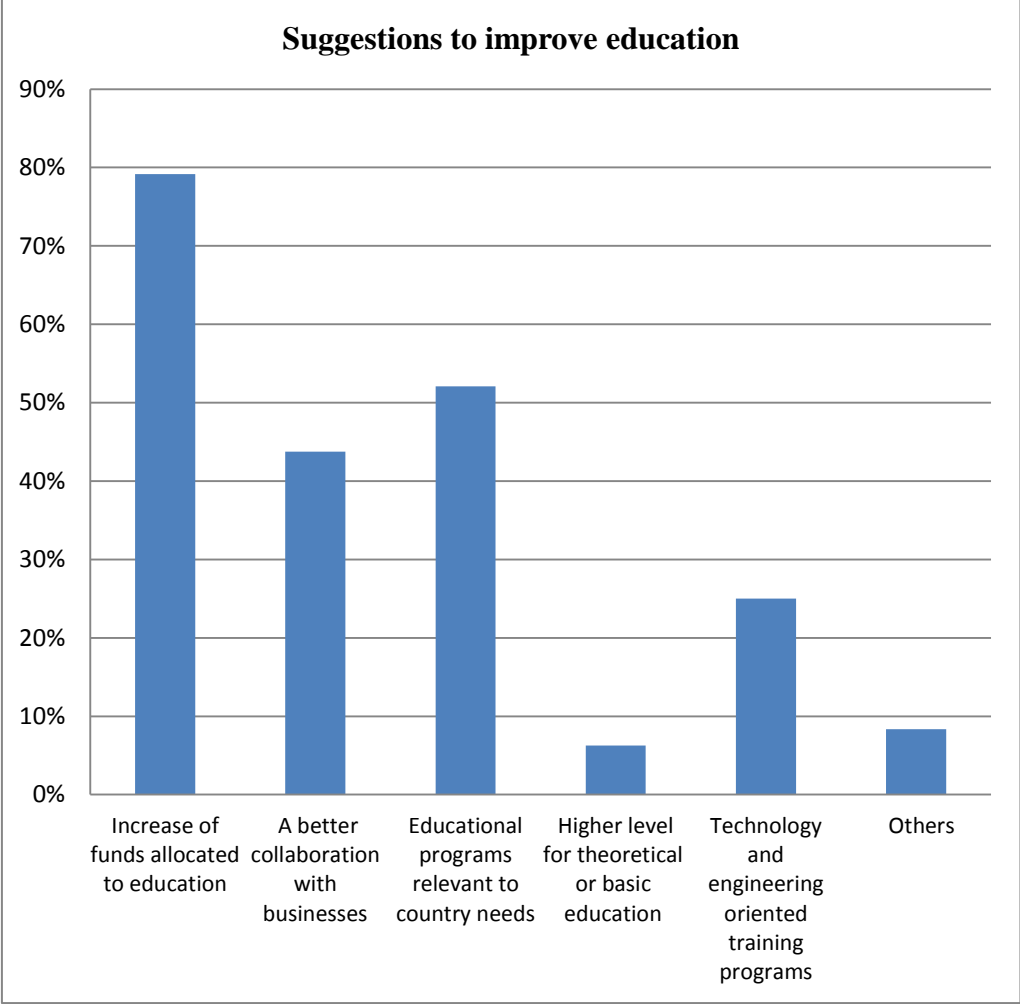


Figure 2-3- 11: Training centres view point of mechanisms to improve education

When asked about their thought on the means for improving training in their countries the centres say that “increasing the funds allocated to education” is the best way to improve it. Then we have “educational programmes relevant to country needs” and also “collaboration with business”, meaning partnership with private sector or companies on a whole.

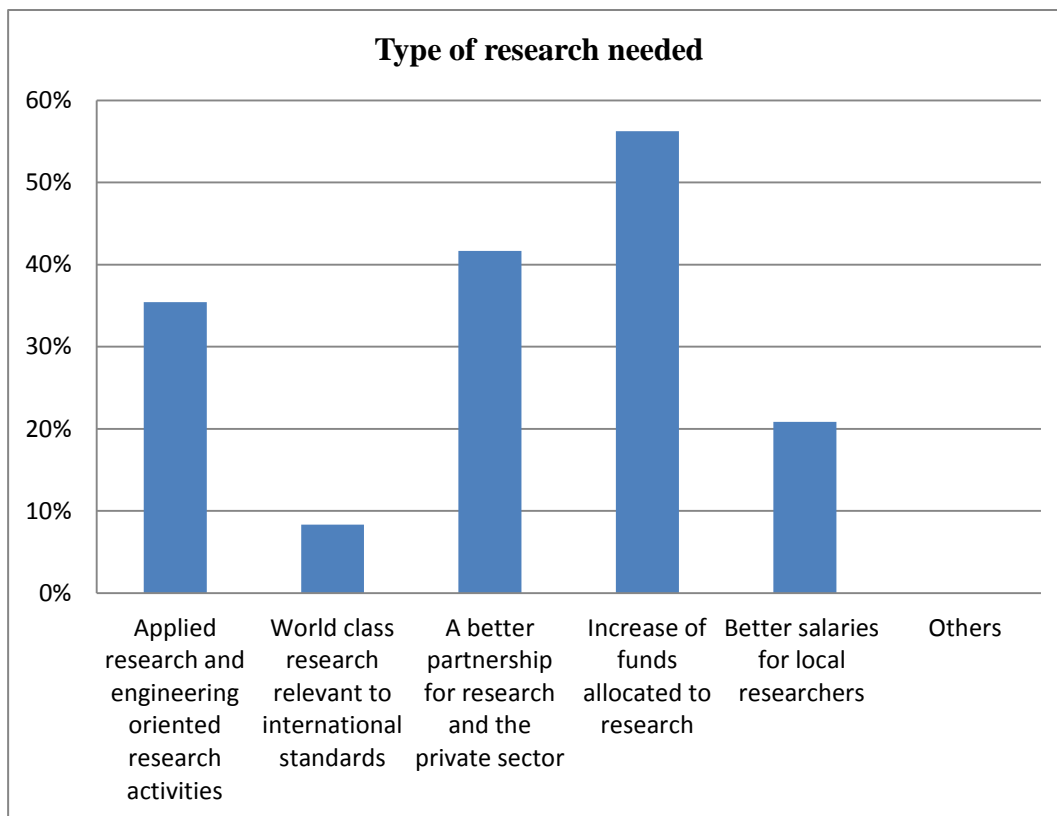


Figure 2-3- 12: Initiatives required to make research more relevant with development needs

Figure 2.3.12 shows the type of research that should be done in ECOWAS countries according to the training centres. Difficulties in funds increase is thought to be the main hindrance for research development

2.3.3 Operational difficulties and financing

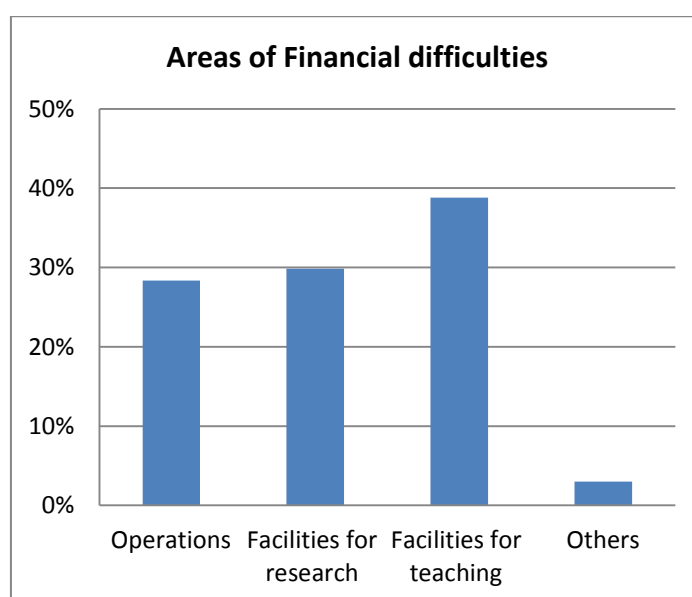


Figure 2-3- 13: Major difficulties faced in training and research centres

Figure 2.3.13 shows the area of major financial difficulties in the education sector. The lack of funds for teaching facilities is viewed as one of the major hindrance to training improvement

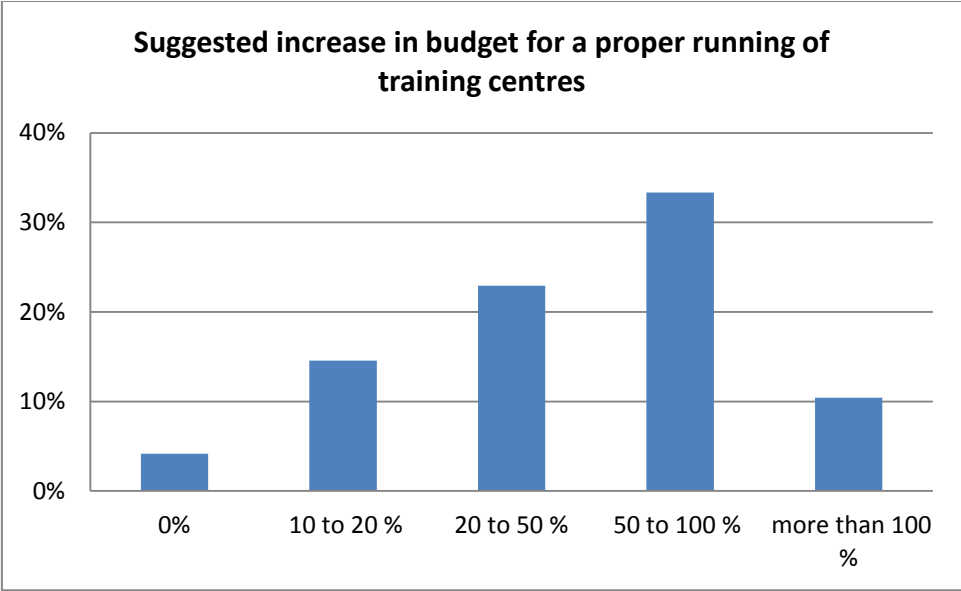


Figure 2-3- 14: Increase of operation budget needed

Almost all training centres in ECOWAS countries mentioned inadequate financing as a problem they encounter. The budgets usually allotted to their yearly activities are always lower than needed. When asked about the magnitude of budget increase needed for a proper functioning of their centres, most responded that “50 to 100 %” should be allotted to them. This can be viewed on figure 2.3.14.

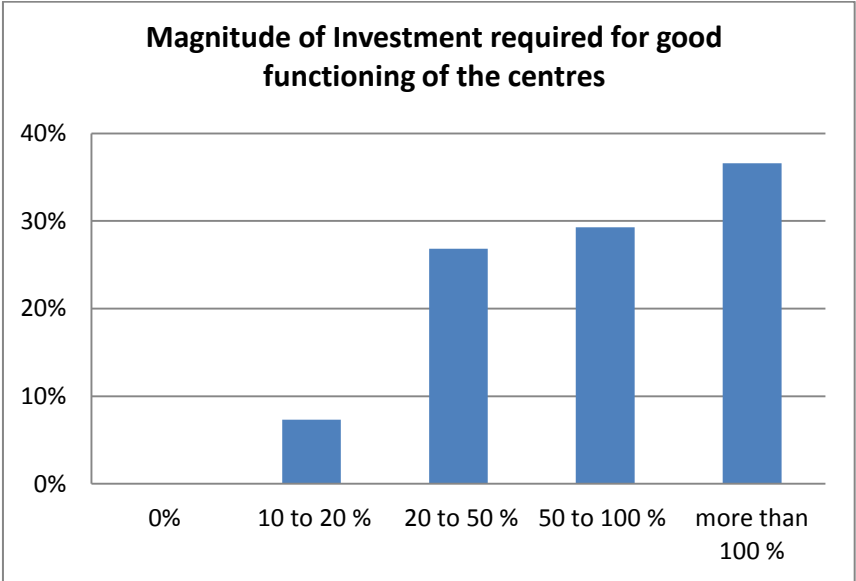


Figure 2-3- 15: Investment required for good functioning of the centres

When investment is involved the budget increase needed is even higher as shown by figure 2.3.15. The survey shows that more than 100 % increase of the budget of the centres would be necessary. This is shown by figure 2.3.15.

2.3.4 Suggestions on capacity building improvement

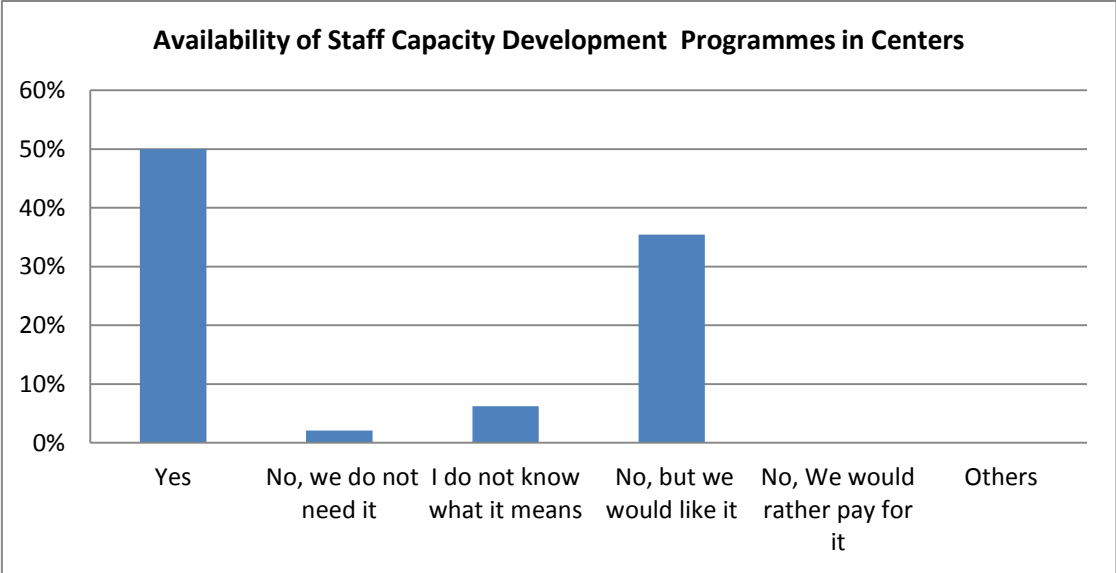


Figure 2-3- 16: Existence of Staff Capacity Development Programmes in training centres

Figure 2.3.16 shows how the training centres are interested in setting up capacity building programmes in their institutions. Fifty percent (50%) of the centres interviewed, already have their own capacity building programmes and 35% say they do not but would like to have it.

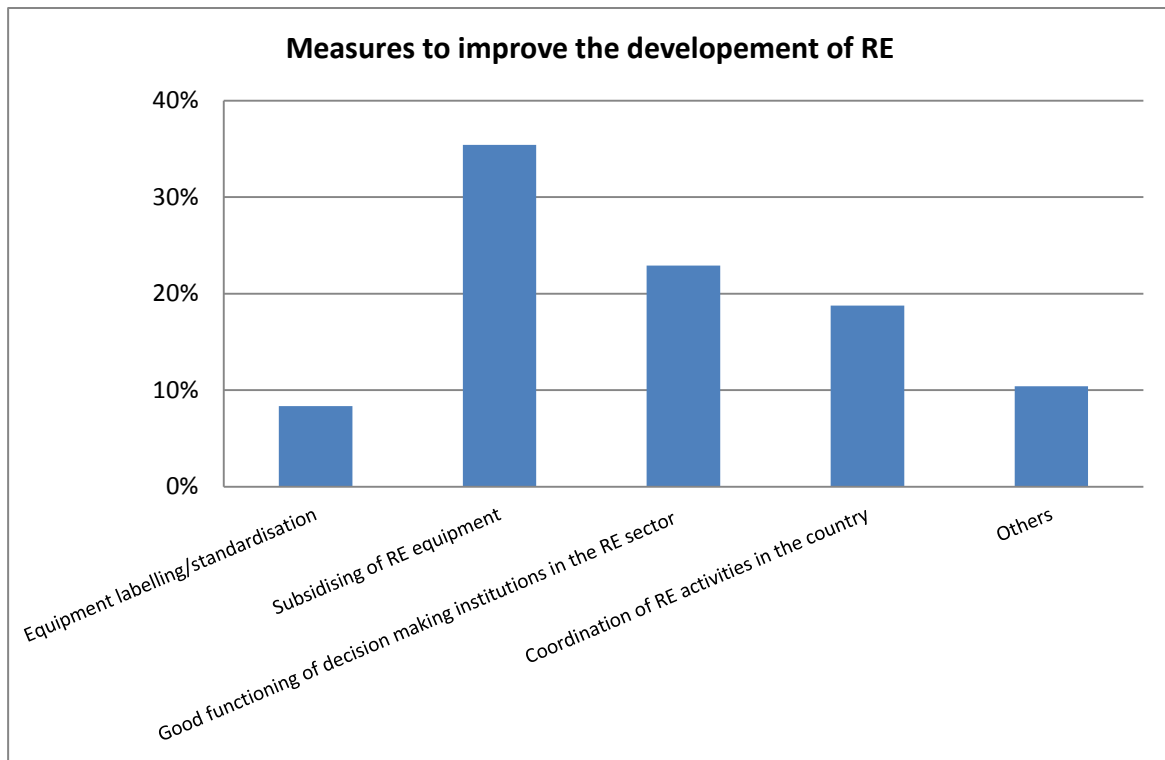


Figure 2-3- 17: Measures and decisions to improve the development of Renewable Energy in the ECOWAS countries

In figure 2.3.17 it is shown that in the view of centers of training and research, the best way to improve the development of Renewable Energy technologies is to subsidise the equipment related to this energy source. This idea goes along with good functioning of the decision making institutions in the renewable energy sector, which was also found to be of importance.

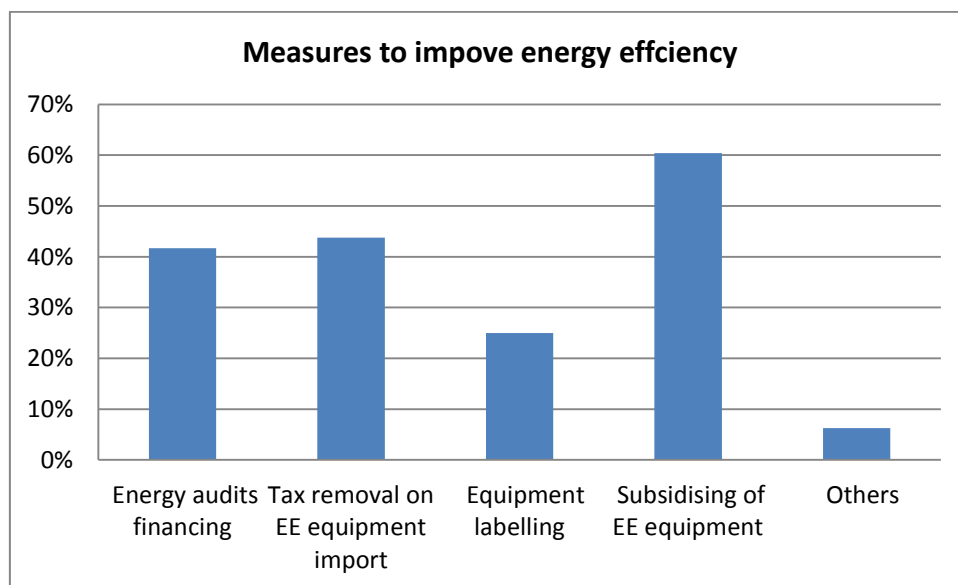


Figure 2-3- 18: Measures and decisions to improve the improvement of Energy Efficiency in the ECOWAS countries

In the energy efficiency sector subsidy of equipment was found to be the most effective way of improving the growth of this activity. Energy audits in various sectors of the economy and tax removal on equipment import are thought to be effective too.

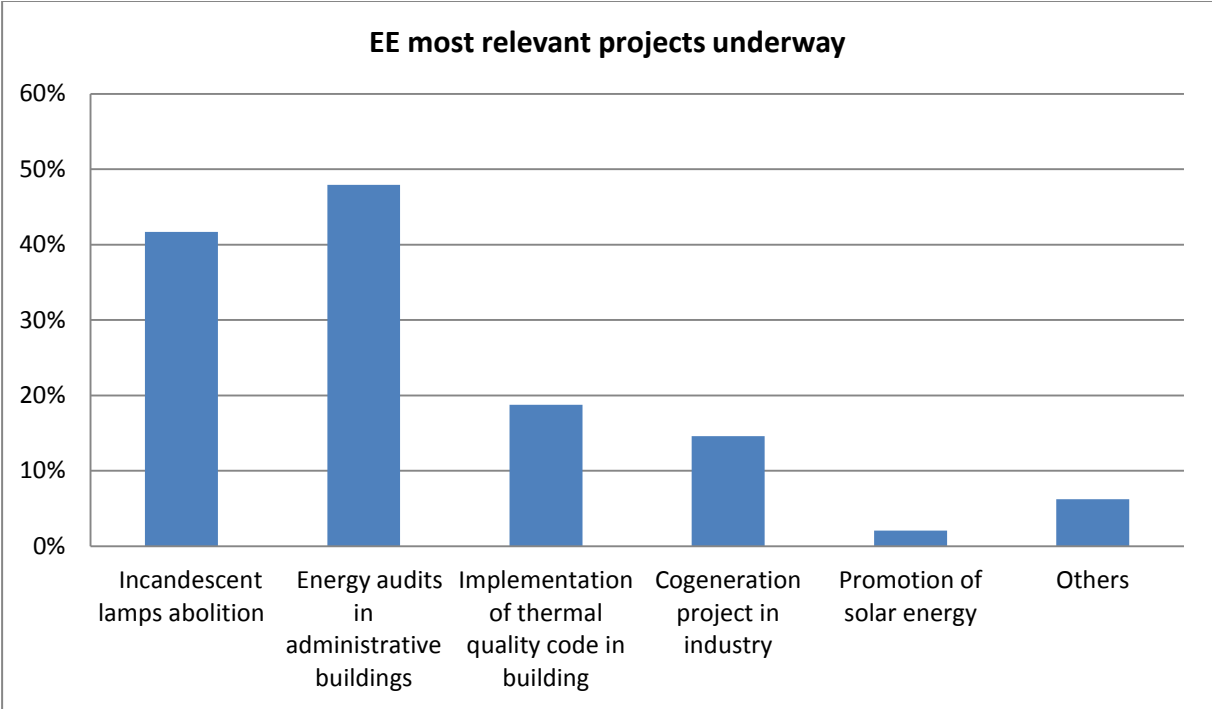


Figure 2-3- 19: Energy Efficiency most pertinent projects underway in the ECOWAS Countries

Figure2.3.19 shows that the most relevant projects underway in ECOWAS countries in the energy efficiency sector are “Energy Audits in administrative buildings”, along with the “replacement of incandescent lamps” by higher efficiency lamps. These two activities are endorsed by more than 85 % of respondents in this category in the countries.

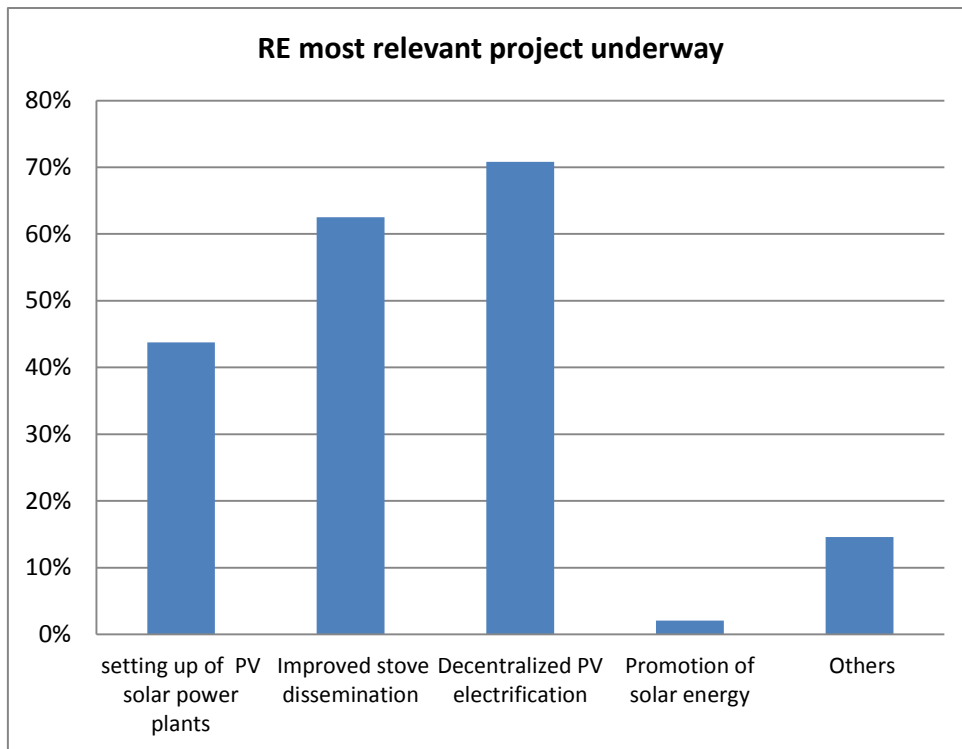


Figure 2-3- 20: Renewable Energy most pertinent projects underway in the ECOWAS Countries

For renewable energy technologies the most effective projects underway are:

- Decentralized PV electrification which represent more than 70% of the preference of the centres
- Improved stove projects represent more than 60% of the preference of the training centres

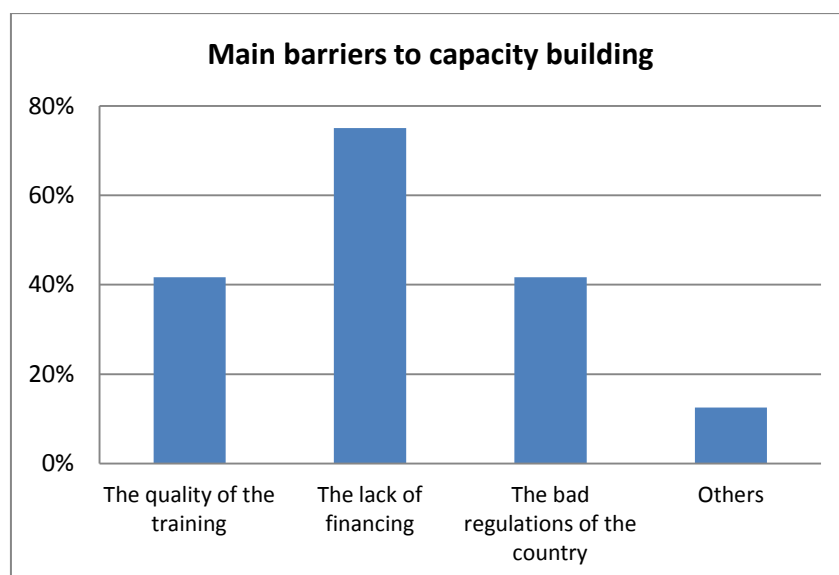


Figure 2-3- 21: Barriers to capacity building in the Renewable Energy and Energy Efficiency sectors

Figure 2-3-21 shows the main barriers to capacity building in ECOWAS countries. The main difficulty is reported to be the lack of financing. The bad quality of training is also found to be of importance

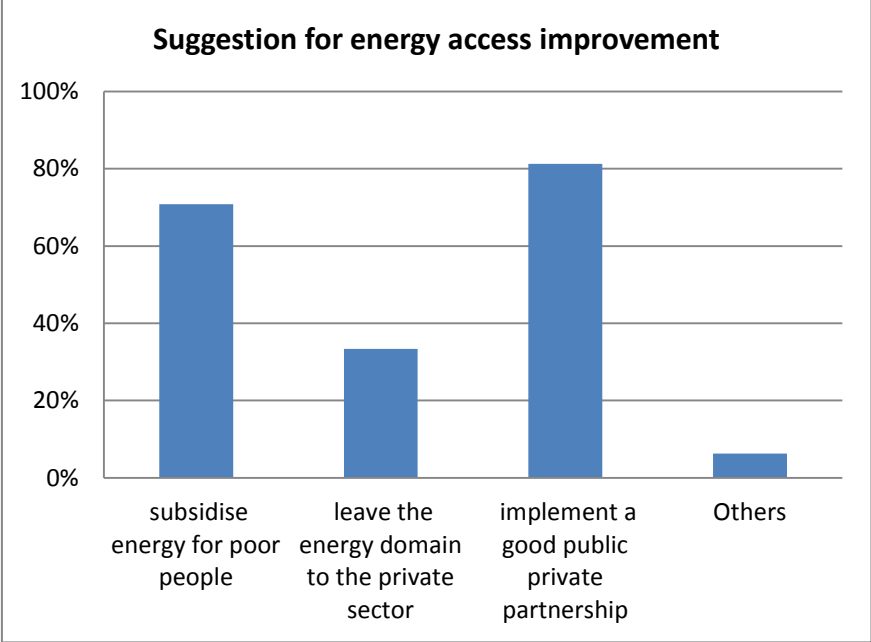


Figure 2-3- 22: Recommendation for Energy service access improvement

As for energy service for poor people the best idea in order to improve it would be a good implementation of public/private partnership access. This partnership is found to be the main trigger of modern energy use in poor neighbourhood. This result is shown by figure 2.3.22. The subsidy of energy for poor people is also viewed as one of the means to enhance the use of energy in ECOWAS countries

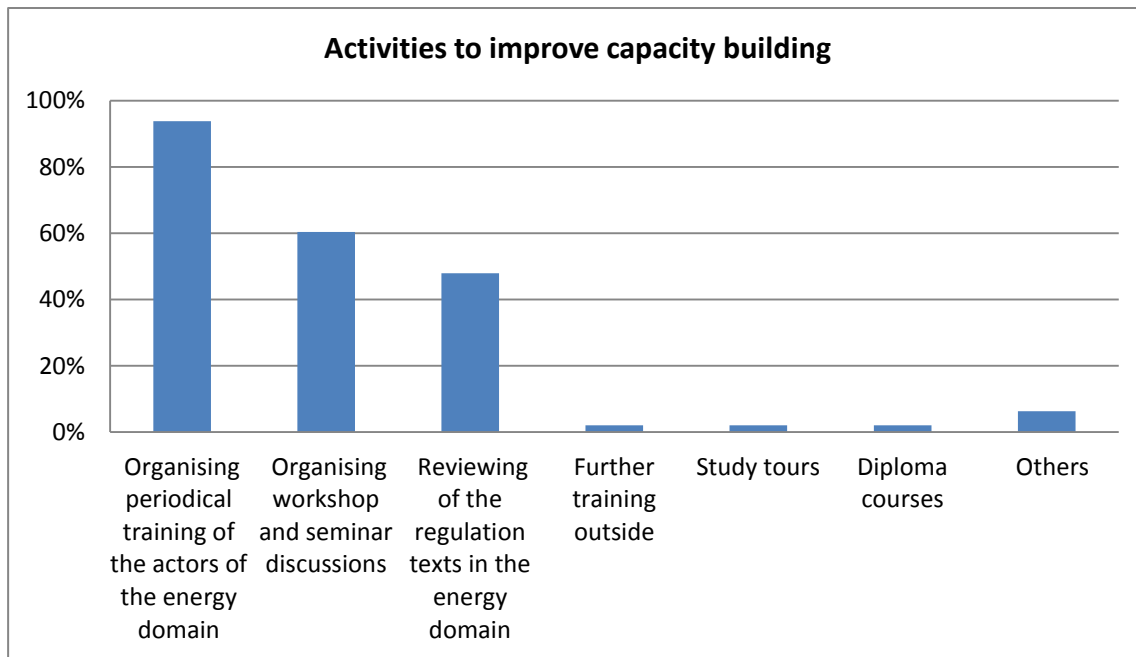


Figure 2-3- 23: Recommendation to improve capacity building

Figure 2.3.23 shows that to the training centres the most effective activity to improve capacity building is a periodical organisation of training of actors in the energy sector. Workshops are also found to be effective by training centres. Surprisingly, Diploma courses are not viewed as an effective way of improving capacity building

2.3.5 Key lessons from Training and Research centres interview

The main lessons from the analysis of the training centres study are:

6. Almost all centres have capacity building programs or would like to have one if they had enough funds for it. The recruitment need reported in the centres is usually at bachelor and Master's degree (engineer) level. The average staff qualification in the centres is reported to be master's degree.
7. The research conducted in some of the centres can be listed in order of preference as hereafter: solar, Biomass, Wind Energy, Energy efficiency. The research centres recruitment need is mainly at Master's degree personnel.
8. The quality of training is viewed as being fairly good by the trainers themselves. The barriers for capacity building are the lack of funds. In order to improve the education, the funds allocated to education should be increased and educational programmes more relevant to the need of the countries. The Funds related to the operating of the training centres should be doubled to make the centres efficient.

9. The most frequent (underway) activities in the ECOWAS countries are reported to be decentralized PV electrification and improved stove dissemination for RE and energy audits in administrative buildings along with incandescent lamps abolition for EE. The mechanism to improve EE and development of RE in ECOWAS countries is viewed by training centres as the subsidy of equipment in both cases.
10. Periodical training of actors is viewed as the best way of improving capacity building. A recommendation for better energy access for poor people should be a better Private public partnership along with energy subsidy for these people

2.4 International donors and Financial Institutions

A total of **29** financial institutions and international donors were interviewed across the ECOWAS sub-region and their responses to key questions on capacity development and related issues in RE and EE are presented in this section. Only four of these institutions representing 7% of respondents have not funded any projects related to RE and EE in the countries they operate, figure 2-4-1.

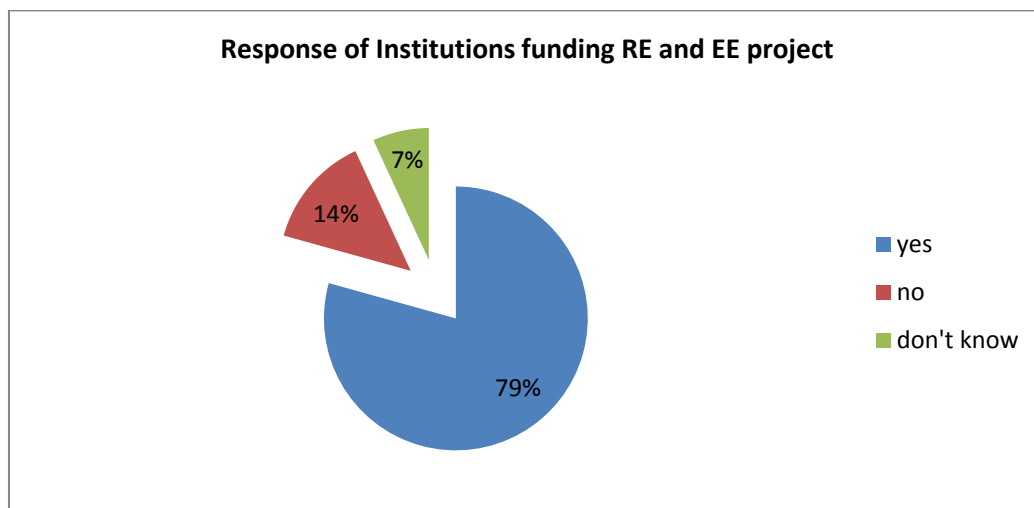


Figure 2-4- 1: Percentage of financial institutions who had already funded RE and EE projects

Interestingly, these financial institutions and international agencies seem to be interested in and are prepared to support projects in renewable energies particularly in solar energy as shown in figure 2-4-2. The figure also indicates their preparedness to finance energy planning and energy efficiency projects.

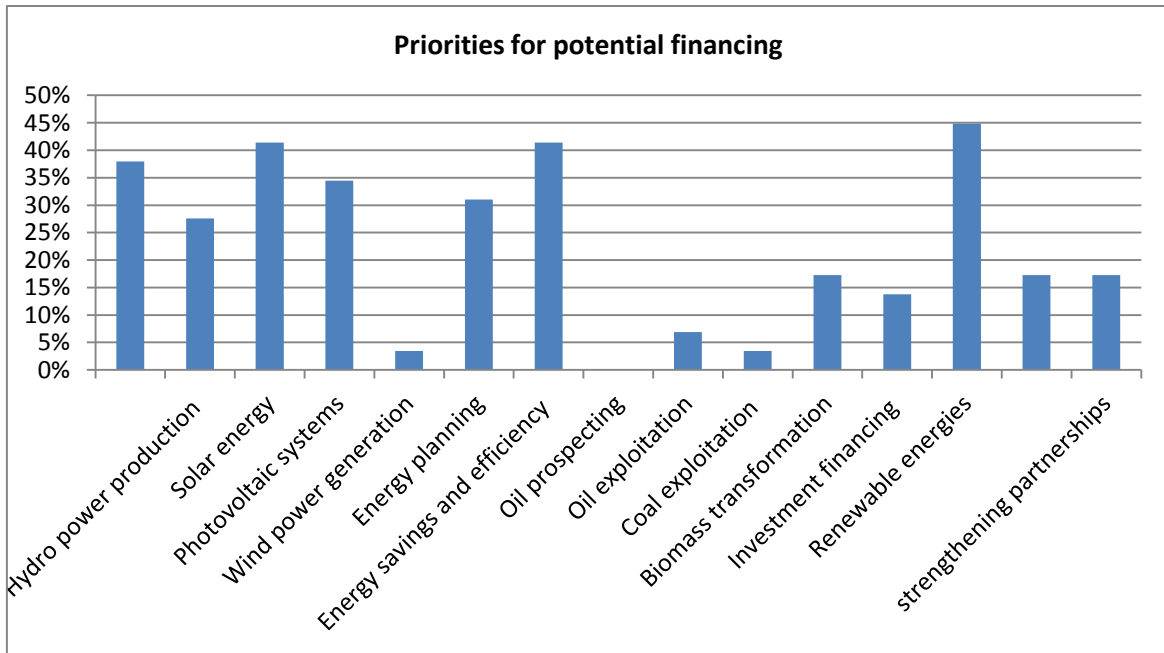


Figure 2-4- 2: Financial institutions’ priorities for potential projects financing

2.4.1 Importance of training and training needs

About 90%, of the financial institutions contacted agree that training is important for access to energy across the region.

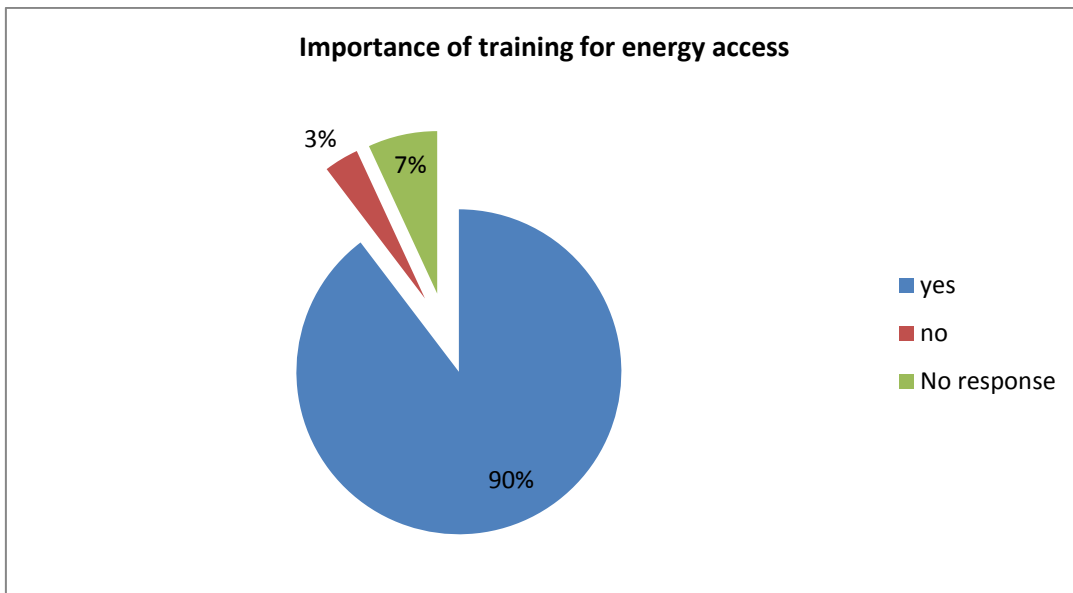


Figure 2-4- 3: Financial institutions’ priorities for potential projects financing

Also, most of the banks had financed capacity building projects in renewable energy and energy efficiency and indicated their willingness to continue financing such projects, figure 2.4-4.

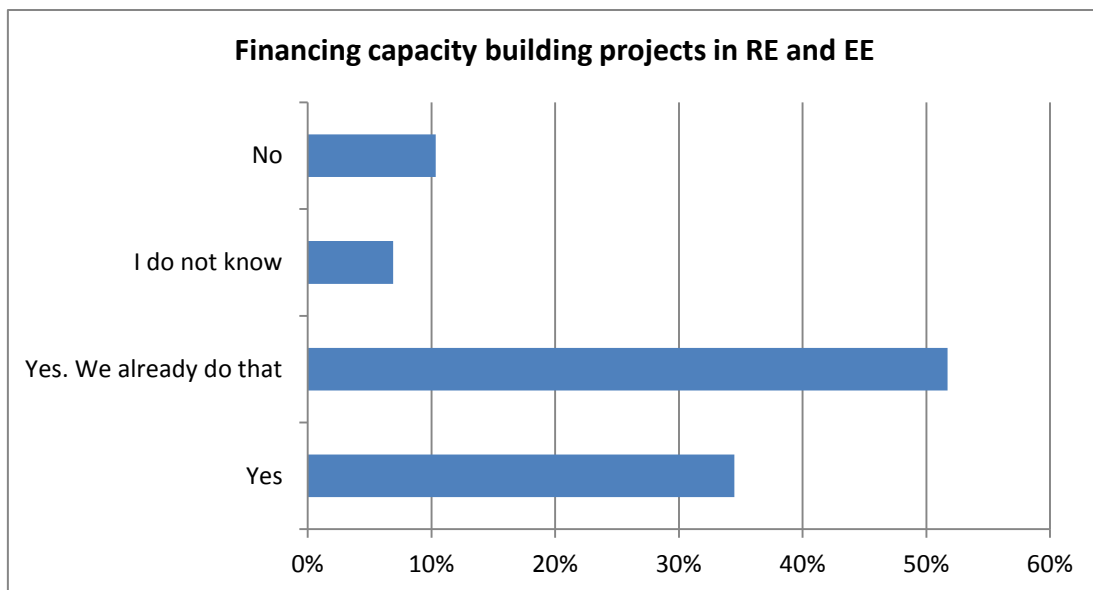


Figure 2-4- 4: Financing capacity build projects in RE and EE.

According to the financial institutions, academic and vocational training are important to building capacity in renewable energy and energy efficiency (See Figure 2-4-5). However, to build capacity to increase populations’ access to energy, public-private partnerships and good institutional regulatory framework are vital.

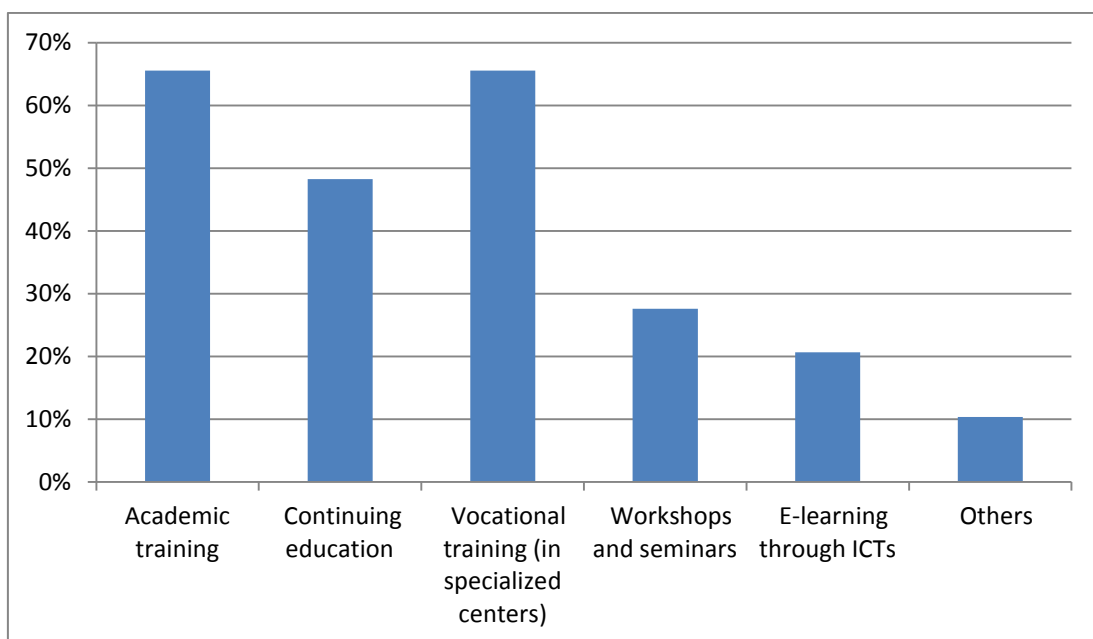


Figure 2-4- 5: Priorities for capacity building

2.4.2 Institutional Framework

Fifty-Four percent (54%) of the funding organizations believe regulations and policies in their countries do not encourage the fast development of RE and EE projects in their countries (see figure 2-4-6).

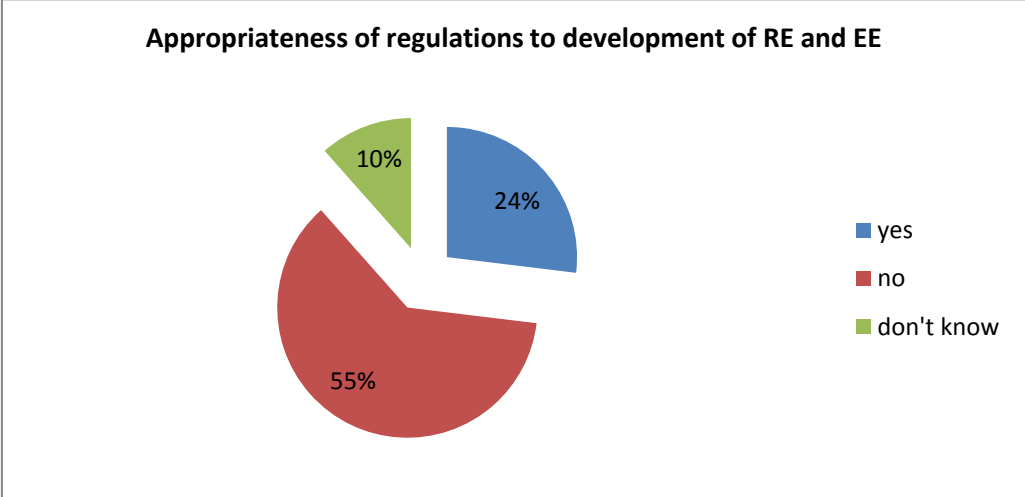


Figure 2-4- 6: A chart showing how financial and international agencies perceive contribution of regulations/policies to development of RE and EE

Although training is identified as key component to build capacity in renewable energy and energy efficiency within the sub region, financial institutions and international organisations indicated that good private-public partnership, institutional framework and good practices are important to build capacity for access to energy in the sub-region, see Figure 2-4-7.

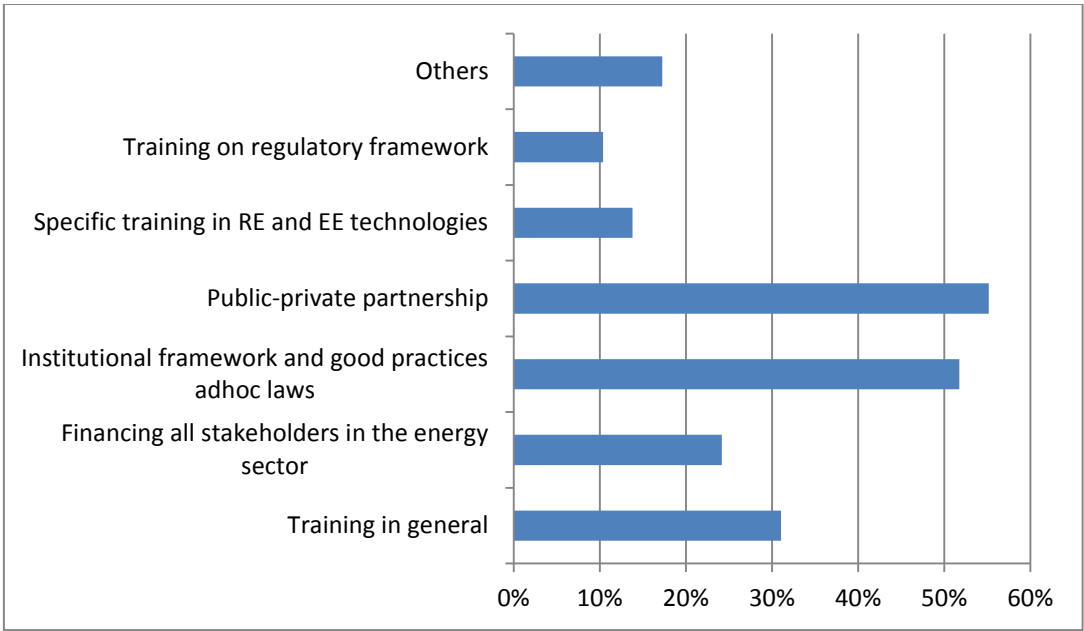


Figure 2-4- 7: Priority actions to build capacities for populations' access to energy services

It is perceived that the main barriers to good capacity building in the renewable energy and efficiency sector are the quality of training, bad regulations in the various countries and lack of financing as indicated in Figure 2-2-8.

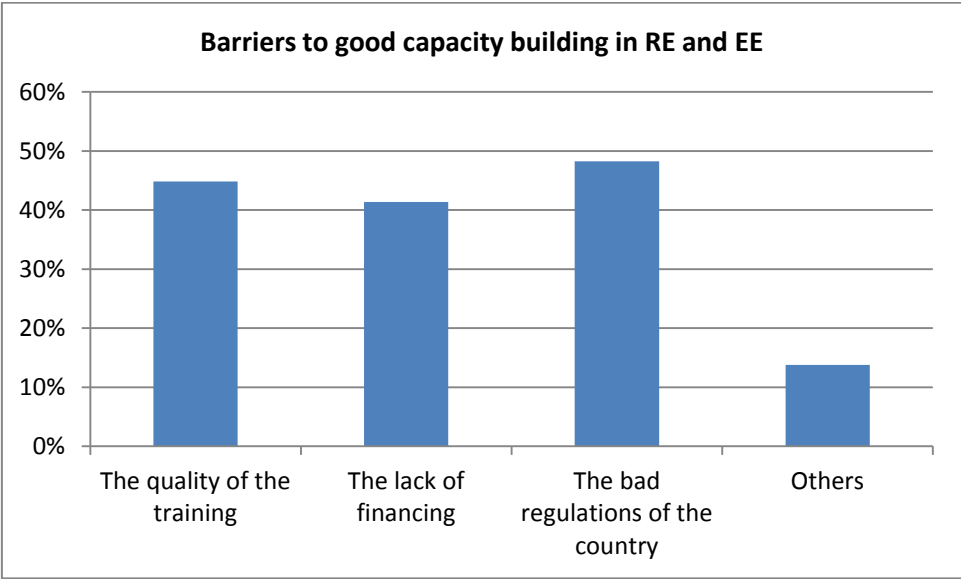


Figure 2-4- 8: Main barriers to good capacity building in the RE and EE sectors according to financial and international agencies

According to the financial institutions, implementing healthy public-private partnership and also subsidising energy for poor people could lead to increase in access to energy services in Africa.

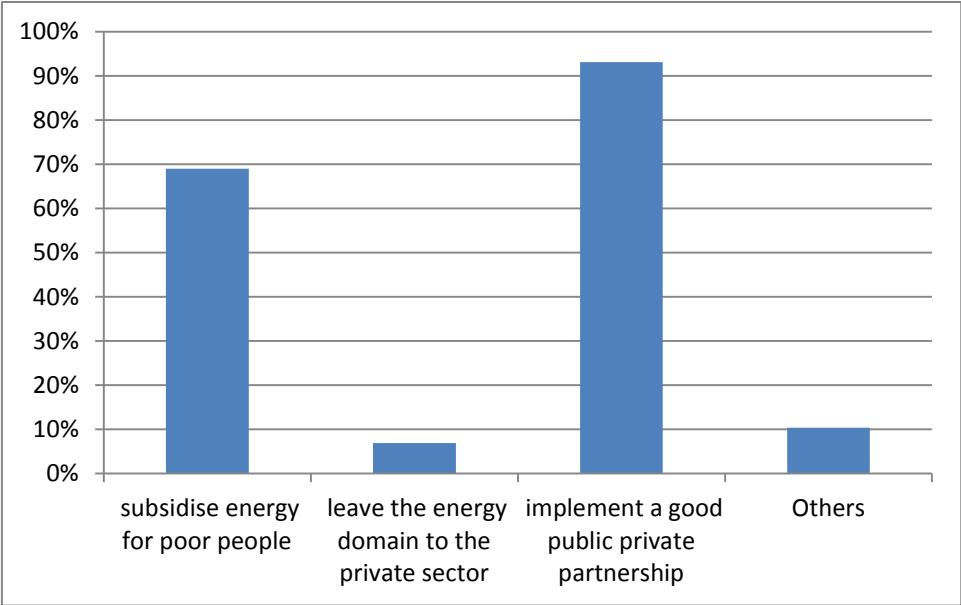


Figure 2-4- 9: Recommendations to deal with energy consumption growth and the issues of access to energy services according to financial institutions

Incandescent lamp abolition and energy audit in government buildings are deemed as feasible initiatives of governments to enhance energy efficiency in the sub region. Also, solar PV and improved cook stove dissemination are regarded by the private sector as credible initiatives being implemented or yet to be implemented in the various countries, see figures 2-4-10 and 2-4-11.

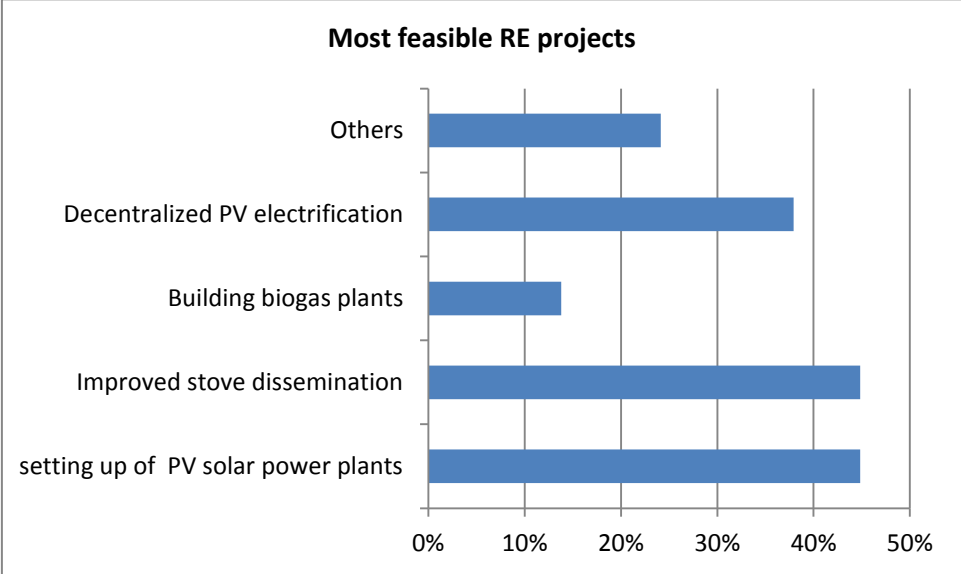


Figure 2-4- 10: Most feasible RE projects in the sub region

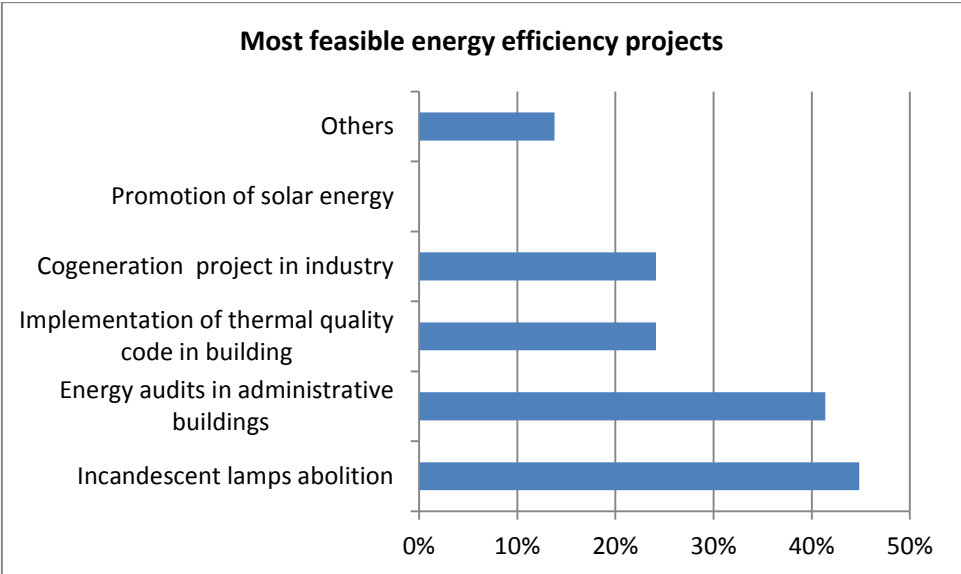


Figure 2-4- 11: Most feasible EE projects underway in the sub region

2.4.3 Key lessons from International agencies and financial institutions

The main lessons from the study conducted are:

6. Main barriers to effective capacity building in the renewable energy and efficiency sectors are the quality of training, bad regulations in the various countries and lack of financing;
7. Existing regulations and policies in the region do not encourage the fast development of RE and EE projects;
8. Organising periodical training for the actors in the renewable energy sector was vital for an efficient capacity building;
9. Emphasis should be placed on vocational training in specialized areas such as solar PV installation for technicians;
10. Good public private partnership and energy subsidise for poor people can increase access to energy services in Africa

2.5 Data Comparison with White Paper for a Regional Policy (ECOWAS/UEMOA)

Capacity building of public and private actors is the first part of the four-pronged regional approach proposed by the ECOWAS/UEMOA White Paper (WP) on access to energy services. This is aimed at both private etc.) and public actors and should address technical and political aspects (e.g. formulating enabling frameworks) for investment in easing access to energy services.

The White Paper highlights eight major issues of concern that are common to all ECOWAS member States, including two direct links to renewable energy and energy efficiency:

- Barriers to the development of local and renewable energy sources.
- Lack of political will for energy efficiency.

The barriers identified by the white paper are re-echoed by data collected in this study:

- Low level of funding for Renewable Energy projects (RE) and Energy Efficiency (EE),
- Shortage of local actors with the capacity
- Institutional and regulatory vacuum/weaknesses
- Lack of incentives and promotion measures

With regard to the training, the approaches proposed in the White Paper are:

- Training of personnel from Ministries, Agencies, local financial institutions, particularly on contractual, regulatory, tax and financial issues,
- Tools for training private actors: for simplified technical studies; equipment and their existing sources of supply in the region or from outside, development of customer management tools dedicated to "small" private operators and training on their use.

These lines do not appear clearly in the inventory of the suggested training programmes. So far the training components have relied on short training sessions (continuing education) in an isolated and discontinuous manner, hence the need of implementing consistent training programs, and based on various methods in order to adapt to target groups.

3. Review of courses available

In general, there are very few institutions that provide training directly in the field of Renewable Energy Technologies and even less in Energy Efficiency. Only a few higher education institutions have postgraduate and undergraduate programmes dedicated exclusively to Renewable Energies and to a lesser extent energy efficiency.

In technical institutions in general, there were no training programmes dedicated to renewable energy or energy efficiency. Most institutions considered in this survey however had programmes in Engineering and Sciences, that are fundamental to renewable energy

technologies for example, Electrical Engineering as applied in Solar Photovoltaic applications.

It is realized, in general, that there are no training programmes in the renewable energy sector (apart from subjects in electricity).

3.1 Training programs available for each country

Below is a list of available training programmes related to RE and EE that were captured during the country missions by the project implementation team.

Table 1. List of institutions and courses offered

Institutions	Country	Sector	Modules	Level		
Koforidua Polytechnic	Ghana	Renewable Energy	Biogas production and Utilization	Undergraduate		
			Solar Energy	Undergraduate		
			Thermo-chemical Biomass Conversion	Undergraduate		
					Wind power systems	Undergraduate
				Energy Efficiency	Energy Management	Undergraduate
					Energy Audit	Undergraduate
					Energy and Environnement	Undergraduate
KNUST	Ghana	Renewable Energy	Solar PV	Technician/master's/PhD		
			Biofuels Technology	Technician/master's/ PhD		
			Small Hydro-power	Master's		
				Solar Thermal Power	Master's/ PhD	
				Energy Efficiency	RE Project Analysis with RETScreen	Advanced/ PhD
				Rural Electrification	GIS-based Energy Access Review/and Renewables (GEAR) Toolkit	Advanced
		Other Programmes	Network Planner	Advanced		

			Energy Policy and Planning (with introduction to LEAP software)	Master's /PhD
Fourah Bay College	Sierra Leone	Renewable Energy	New Energy & RE Technologies	Undergraduate
			Energy Studies	Masters
		Energy Efficiency	EE & Demand side Management	Masters
		Rural Electrification	Energy Poverty & Development	Masters
Njala University	Sierra Leone	Renewable Energy	Renewable energies and sustainable development	Undergraduate
			Waste Management	Undergraduate
			Solar energy	Undergraduate
			Biomass energy	Undergraduate
	Energy Efficiency	Principles of Environmental Technology	Undergraduate	
		Power Sector	Undergraduate	
		Energy Modelling	Undergraduate	
		Electricity economics	Undergraduate	
	Rural Electrification	Rural energy issues	Undergraduate	
		Energy Policy	Undergraduate	
Government Technical Institute	Sierra Leone	Renewable Energy	Solar Water Heating	Certificate/Diploma
			Solar Water pump	Certificate/Diploma
			Biofuel	Certificate/Diploma
			Solar PV	Certificate/Diploma
Stella Maris Polytechnic	Liberia	Renewable Energy	Introduction to renewable energy	Undergraduate
		Energy Efficiency	-	-
University of Liberia	Liberia	Renewable Energy	Modules under development	Undergraduate/certificate
		Energy Efficiency	Modules under development	Undergraduate/certificate

University of Ilorin - <i>National Centre for Hydropower Research and Development</i>	Nigeria	Hydropower research and development		MSc/PhD
University of Benin - <i>National Centre For Energy and Environment</i>	Nigeria	Basic and applied research in biofuel, solar, wind energy, waste to energy		MSc/PhD
University of Lagos - <i>National Centre for Energy Efficiency and Environment</i>	Nigeria	Residential, commercial, transport and industrial energy efficiency studies and implementation		MSc/PhD
Department of chemical and energy research - <i>Federal Ministry of Science and Technology</i>	Nigeria	Research and development in Renewable energy fuels		
Usmadu Danfodiyo <i>University Sokoto Sokoto Energy Research Centre</i>	Nigeria			MSc/PhD
University of Nigeria, Nsuka (<i>National Centre for Energy Research and Development</i>)	Nigeria			MSc/PhD
University of The Gambia	The Gambia	No programs in renewable energy and energy efficiency		
National Agricultural Research Institute, NARI	The Gambia	No programs in renewable energy and energy efficiency		
GREC	The Gambia	GREC was commissioned as a research institution to facilitate the development and popularisation of small-scale power systems		
EPAC Ecole	Benin	Renewable Energy	Solar Energy (PV and thermal)	Master's/PhD

			Biomass energy	Master's/PhD
			Wind power systems	Master's/PhD
		Energy Efficiency	Energy Efficiency	Master's/PhD
			RE Project Analysis with RETScreen	Advanced
Centre des Métiers de l'Electricité (Communauté Electrique du Bénin)	Bénin	Other Programmes	Electricity	Technician
Lycée Technique COULIBALY	Bénin	Other Programmes	Electricity	Technician level
CBRST (Centre Béninois de la Recherche Scientifique et Technique)	Bénin	Renewable Energy	Research Renewable Energy	
INP-HB (Institut National Polytechnique Félix Houphouët Boigny de Yamoussoukro)	Côte d'Ivoire	Renewable Energy	Solar PV Energy	Undergraduate/Master's
			Solar Thermal Energy	Undergraduate/Master's
			Biomass energy	Undergraduate/Master's
			Wind power systems	Undergraduate/Master's
		Energy Efficiency	Undergraduate/Master's	
Lycée Technique d'Abidjan (LTA)	Côte d'Ivoire	Other programmes	Electricity	Technician
IFHER (Institut de Formation à la Haute Expertise et de Recherche) du BNETD	Côte d'Ivoire	Other programmes	Electricity	Advanced
IPNETP (Institut Pédagogique National de l'Enseignement Technique et Professionnel)	Côte d'Ivoire	Other programmes (Trainers' training)	Electricity	Undergraduate/Master's

Centre des Métiers (CDM) de la CIE (Compagnie Ivoirienne d'Electricité)	Côte d'Ivoire	Other Programmes	Electricity	Technician
IREN (Institut de Recherche sur les Energies Nouvelles) Université d'Abobo-Adjamé	Côte d'Ivoire	Renewable Energy	Research Renewable Energy	
ENSI (Ecole Nationale Supérieure d'Ingénieurs)	Togo	Other programmes	Electricity	Undergraduate/Master's/Ph.D
Lycée d'Enseignement Technique et Professionnel de Lomé	Togo	Other programmes	Electricity	Technician
EAMAU (Ecole Africaine des Métiers de l'Architecture et de l'Urbanisme)	Togo	Other programmes	Electricity	Advanced
Laboratoire sur l'Energie Solaire (Université de Lomé)	Togo	Renewable Energy	Research Renewable Energy	PhD
2iE	Burkina Faso	Renewable Energy	Biodiesel production	Undergraduate/Master's PhD
			Solar Energy	Undergraduate/Master's PhD
			Biomass	Undergraduate/Master's PhD
		Energy Efficiency	Energy Management	Undergraduate/Master's
			Energy Audit	Undergraduate/master's
			Energy and Environment	Undergraduate/master's

UFR/SEA University Of Ouagadougou	Burkina Faso	Renewable Energy	Solar PV RE Research	Technician PhD
ISGE (Institut supérieur de génie électrique)	Burkina Faso		Electricity / PV	Senior Technicians
IUT (Institut Supérieur de Technologie)	Burkina Faso		Electricity / PV	Technician
IRSAT (Institut de Recherche en Sciences Appliquées et technologies)	Burkina Faso	Renewable Energy	Research in RE	No training
(IN2SAT) L'Institut Supérieur des Sciences Appliquées et Technologies	Burkina Faso	Energy as a whole	No module dedicated to RE or EE	Training in Energy
Lycée professionnel Dr Bruno Buchwieser	Burkina Faso	No programs in renewable energy and energy efficiency		Technician level
Lycée Professionnel Régional Guimbi Ouattara	Burkina Faso	No programs in renewable energy and energy efficiency	Technician level	
Centre de Formation professionnel Don Bosco	Burkina Faso		Technician Level	
DR de l'ANPE des hauts bassins	Burkina Faso	No programs in renewable energy and energy efficiency	Technician Level	

		No programs in renewable energy and energy efficiency		
ENI (Ecole Nationale d'Ingénieurs)	Mali	Renewable Energy	Solar Energy	Undergraduate/Master's
Faculté des Sciences et Techniques (University of Bamako)	Mali	Renewable Energy	Research and education in various Renewable Energy topics	Undergraduate/master's/ PhD
CFP Soumahoro Kante	Mali	No programs in renewable energy and energy efficiency		Technician Level
Atelier Ecole de Kayes (ANPE)	Mali	No programs in renewable energy and energy efficiency		Technician Level
ESICA (Ecole Centrale pour l'Industrie le Commerce et l'Administration)	Mali	No programs in renewable energy and energy efficiency		
EMIG (Ecole des Mines de l'Industrie et de la Géologie)	Niger	No Renewable Energy & Energy efficiency	Training in different topics (no RE or EE training)	Research only in solar, Wind and Energy Efficiency
FAST (Faculté des Sciences et Techniques) University of Niamey	Niger	Renewable Energy	Research and training in RE (only Solar Energy)	Undergraduate only (Master's degree has been stopped)
CNS (Centre National d'Énergie Solaire)	Niger	Renewable Energy	Research and some Short courses for adults delivered	

2iE	Burkina Faso	Renewable Energy	Biodiesel production	Undergraduate/Master's PhD
			Solar Energy	Undergraduate/Master's PhD
			Biomass	Undergraduate/Master's PhD
		Energy Efficiency	Energy Management	Undergraduate/Master's
			Energy Audit	Undergraduate/master's
			Energy and Environment	Undergraduate/master's
UFR/SEA University Of Ouagadougou	Burkina Faso	Renewable Energy	Solar PV RE Research	Technician PhD
ISGE (Institut supérieur de génie électrique)	Burkina Faso		Electricity / PV	Senior Technicians
IUT (Institut Supérieur de Technologie)	Burkina Faso		Electricity / PV	Technician
IRSAT (Institut de Recherche en Sciences Appliquées et technologies)	Burkina Faso	Renewable Energy	Research in RE	No training
(IN2SAT) L'Institut Supérieur des Sciences Appliquées et Technologies	Burkina Faso	Energy as a whole	No module dedicated to RE or EE	Training in Energy
Lycée professionnel Dr Bruno Buchwieser	Burkina Faso	No programs in renewable energy and energy efficiency		Technician level

Lycée Professionnel Régional Guimbi Ouattara	Burkina Faso	No programs in renewable energy and energy efficiency		Technician level
Centre de Formation professionnel Don Bosco	Burkina Faso	No programs in renewable energy and energy efficiency		Technician Level
DR de l'ANPE des hauts bassins	Burkina Faso	No programs in renewable energy and energy efficiency		Technician Level
ENI (Ecole Nationale d'Ingénieurs)	Mali	Renewable Energy	Solar Energy	Undergraduate/Master's
Faculté des Sciences et Techniques (University of Bamako)	Mali	Renewable Energy	Research and education in various Renewable Energy topics	Undergraduate/master's/ PhD
CFP Soumahoro Kante	Mali	No programs in renewable energy and energy efficiency		
Atelier Ecole de Kayes (ANPE)	Mali	No programs in renewable energy and energy efficiency		
ESICA (Ecole Centrale pour l'Industrie le Commerce et l'Administration)	Mali	No programs in renewable energy and energy efficiency		
EMIG (Ecole des Mines de	Niger	No Renewable	Training in different topics (no RE or EE	Research only in solar, Wind and

l'Industrie et de la Géologie)		Energy & Energy efficiency	training)	Energy Efficiency
FAST (Faculté des Sciences et Techniques) University of Niamey	Niger	Renewable Energy	Research and training in RE (only Solar Energy)	Undergraduate only (Master's degree has been stopped)
CNS (Centre National d'Energie Solaire)	Niger	Renewable Energy	Research and some Short courses for adults delivered	
CTK (Centre Technique Kalmahoro) CFPP (Centre de Formation et de Perfectionnement Professionnel) LEP Issa Béri (Lycée d'enseignement professionnel)	Niger	No programs in renewable energy and energy efficiency		Technician level
DECM-UNICV Department of Engineering and Marine Science	Cape Verde	Renewable Energy	Solar Energy (PV and thermal)	Post-secondary, Professional
		Electrical & Electronics Engineering	RE – PV and Grid technology	Undergraduate
		Mechanical Engineering	Application of Renewable Energy & Solar Thermal Process	Undergraduate
Business and Technology School	Cape Verde	Renewable Energy	Solar (PV and thermal), Wind	Technician
Centro de Instrução e Formação Artesanal Profissional – CIFAP – S. José	Guiné-Bissau	Renewable Energy	Solar (PV Energy) Wind	Professional
University Kofi Annan	Guinea Conakry	Renewable Energy	Solar, Wind, hydro, Biomass & Electricity, and Energy Efficiency	Undergraduate
Institute Polytechnique –	Guinea Conakry	Renewable Energy	Solar, Hydro, Biomass and Wind	Undergraduate/Master

University de Conakry				
Centre de recherche scientifique de conakry rogbane - cerescor	Guinea Conakry	Renewable Energy and Energy Efficiency	Biomass and bio carburant	PhD and advanced
CNQP – Centre National de Qualification Professionnelle	Senegal	Renewable Energy & Electricity	Solar PV and thermal and Electricity	2-year college
Université Cheikh ANTA DIOP de Dakar – École Supérieure polytechnique	Sénégal	Renewable Energy	Solar, Biomass, Wind, etc.	Undergraduate/Master and PhD
Institut Sénégalais de Recherches Agricoles - ISRA	Sénégal	Renewable Energy	Bio carburant et Biomasses	PhD & advanced
Info Energie	Sénégal	Renewable Energy	Solar PV and thermal	Professional
Performances	Sénégal	Renewable Energy	Solar PV and thermal	Professional
Centre de Formation Professionnelle et Technique Sénégal/Japon	Sénégal	Renewable Energy	Solar PV and thermal	Professional
ISADE – Institut Supérieur Africain pour le Développement de l'Entreprise	Sénégal	Multi-disciplinary	Multi	Professional
Université Cheikh ANTA DIOP de Dakar – Faculté des Sciences et Technique	Sénégal	Renewable Energy	Energy Solaire, Matériaux et Systèmes.	Master
Université Cheikh ANTA DIOP de Dakar – Faculté des Sciences et Technique	Sénégal	Renewable Energy & EE	Renewable Energy and Energy Efficiency.	Master
Université Cheikh ANTA DIOP de Dakar – Faculté des Sciences et Technique	Sénégal	Renewable Energy	Energy Renouvelables dans le batiment.	Undergraduate

UVA	Sénégal	Renewable Energy	Installeur de PV.	Technicien
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3.2 Regional and sub-regional training programs

There were no regional centres of training identified during this study. Regional centres in this regard is a centre that is founded by ECOWAS or jointly owned by Governments within ECOWAS. There are nonetheless several centres which have students from several countries (KNUST, ENI etc.). The only exception is 2iE which is an international training centre jointly owned and governed by a number of African countries.

4. Proposals for Capacity Development in ECOWAS

The study found that many of the training institutions in the sub-region do not have specific programmes on renewable energy and energy efficiency. Training in energy efficiency is particularly lacking. These subjects are mostly part of a broader program and is therefore insufficient for a good training. As a result the trainees are not adapted to the market demand. Technical training related to solar energy and other renewable energy technologies tend to be quite expensive. Isolated training centres do not have enough funds to set up quality training programmes matching the demand of the labour market.

In view of this high cost of technical training, in some situations, pooling resources to conduct training at the regional level will be more cost-effective, and also assure the quality of training that will meet the labour market demands.

With the exception of a few countries, training in the RE and EE sectors attract low participation. A regional approach will therefore yield a more efficient use of resources.¹

4.1 Target Groups

Considering the different capacity-development needs of different stakeholders, training should be done at three levels:

- advanced level (Master's degree, specialized RE&EE technology training, etc.) for engineers,
- technician level training, and
- policy/ decision makers and financial institutions.

The result of this study leads to the following suggestions:

¹ A study conducted by 2iE in June 2008 had already led to that same conclusion (ref: investigation report in the ECOWAS countries, 2iE 2008).

4.1.1 Training of engineers

Training for engineers in RE and EE, particularly at the Masters level should be undertaken at the *Regional* Level through selected centres, particularly those that already have ongoing initiatives that could be supported.

4.1.2 Technicians/Senior Technicians

The training of technicians should be done at the country-level, starting with a training-of-trainers session at selected institutions in both Francophone and Anglophone countries. Training requirements at this level appears to be the most needed in the sub-region – from the responses received and analyzed. This category will greatly benefit private-sector practitioners who are involved in system installation and maintenance.

4.1.3 Policy/Decision Makers and Financial Institutions

The category of policy-makers, financial institutions can also be trained at both the national and regional levels. The interviews indicated high level of demand for training in energy policy and planning; this will mostly benefit policy makers and state institutions. All agencies in this category, particularly the financial institutions will also benefit from tailored training in analysis and appraisal of RE and EE projects. The initiative of ECREEE² in this direction should therefore continue, and be expanded to benefit institutions that provide financing

This study therefore recommends:

- Adoption of institutions located in one or two training centres for higher level trainings.
- Strengthening of one or two training centres per country for the training of technician/senior technician by funding educational materials and other needed equipment.

4.2 Assessment of Pedagogical Aspects of Training

The results of this study indicate that technician-level expertise is the most needed in the sub-region. This is a crucial vacuum that needs to be urgently addressed. There is also a need for short training session for higher level personnel in most of the agencies and organizations.

The required training programmes can be categorized as:

- Degree/Diploma training (on-campus or distance learning)
 - Master's and Bachelor's degree programmes

² ECREEE has initiated a series of training programmes in Clean Energy Project Analysis using RETSCREEN.

- Senior technician programme
- Skills training
 - Short trainings (short courses)

Training of engineers in renewable energy and energy efficiency is necessarily a function of the energy sources available in the ECOWAS countries and end-use applications:

- Hydropower, Solar, Biomass, Wind energy - for renewable energy;
- Energy efficiency in buildings and industry, optimization of energy processes - for energy efficiency.

Training of technicians on the other hand, in these same areas, will impart competence at a lower level as compared to the master's degree training. The knowledge and skill needed should focus on installation, and maintenance of energy equipment.

These two proposals require training programmes with curricula developed around the outline below:

(i) Master's degree:

- Hydro Power technology (hydrology, turbo-machine, motors, Hydro power sizing, etc);
- Solar Energy (Solar thermal and applications, PV power and applications, sizing of solar systems, etc);
- Wind Energy (wind energy potential, turbo-machine & wind turbines, sizing of wind turbines, etc);
- Biomass Energy (resource assessment and development, transformation into biofuels and other modern energy products, etc);
- Etc

(ii) Technicians for RE and EE:

a. Technician for Electricity and PV

- General Electricity
- Electric motors
- Wind turbines
- PV power generator
- LV power in building and/or industry
- Applications : Power generator, stand-alone PV, Solar water pumping plants, grid connected PV plants

b. Technician in thermal/mechanical engineering and energy efficiency domain

- Solar thermal
- Building thermal
- Biomass processing (biogas, alcohol, charcoal, combustion and cogeneration of heat and power)

- Industrial maintenance
- Energy efficiency in building and industry

Education methods:

They should be based on methods that include the use of ICT to optimize efficiency in training and reduce costs. Employers often complain about the quality of technicians and engineers trained by local institutions. This could be noticed during this survey. The approach to training tends to be very theoretical and employers spend significant resources and time to re-train them. For this reason capacity development programmes must include a significant portion of practical and hands-on work. Furthermore it is essential that the teaching staff from academia and practicing engineers from companies and design offices.

The training programmes for engineers as for technicians should be based on variable proportion of theoretical knowledge and hands-on practice using a sound combination of the items listed below.

Knowledge

- Course delivery
- Tutorial sessions

Hands-on

- Practical work sessions
- Study visits
- Projects (individual and group)
- Internships

Distance learning (e-learning) will become an increasingly preferred method for capacity development in order to minimize training costs and increase the pool of learners by reaching out to personnel of companies that are interested in degree programmes but cannot leave their job. Experience has proved that knowledge acquisition using ICT and e-learning can be as efficient as by traditional class methods. However for hands-on skill acquisition, there is still a discrepancy. This is why one has to be careful in introducing e-learning methods. Especially in this RE and EE domain, a minimum hands-on training is necessary in order meet the labour market demand.

As examples, 2iE delivers the following diploma courses in distance education:

- Bachelor in Energy Efficiency and Renewable Energy since 2010
- Master of Science in Energy Engineering and Renewable Energy since 2009

KNUST delivers a Master of Science in Renewable Energy Technology by eLearning.

4.3 Suggested action plan

Action plan can be summarized as follows:

- Moving towards regional training of Master's degree in the field of Energy;
- Capacity building strengthening (equipment and teaching staff) for national technician training centres.
- Policy-makers and financial institutions should be given short training programmes in Energy Policy and Planning and Renewable Energy and Energy Efficiency Project Analysis with easy-to-use tools.

- The introduction of training modules on RE and EE in the various training programs of higher institute as well in technician training centers.
- Particular emphasis should be given to teaching methods to ensure the acquisition and transfer of skills and know-how while ensuring their adjustment to the audiences.

Based on these ideas the following more specific actions are proposed:

1. Solar PV training needs be met mostly at the technician level, through certificate courses available within the sub-region. This should start with a training of trainer programme at institutions that already have some capacity in running such training programmes. Such training programmes should eventually be available in all countries, following the train-the-trainer session(s).
2. Energy Policy training needs (targeted at policy makers) should also be met through short courses at institutions in both Francophone and Anglophone West Africa. Some of these training programmes already exist and could serve as starting points.
3. Energy Efficiency training should be conducted for both senior-level decision-makers and also technicians. Senior-level managers should focus on policy issues and analysis, while technicians are given more hands-on training to be able to conduct energy audits in building and in industry.

KNUST in Ghana, 2iE in Burkina Faso, EPAC in Benin, INP-HB in Cote d'Ivoire, ESP in Senegal have ongoing programmes in Renewable Energy and Energy Efficiency, and Energy Policy and Planning at various levels – Undergraduate, Master and Ph.D.

The Energy Commission of Nigeria has established centers of excellence in Renewable Energy and Energy Efficiency located in a number of universities across the country: University of Nigeria, Nsukka; Usmanu Danfodiyo University, Sokoto; University of Lagos; and University of Ilorin. These institutions should be considered for RE and EE capacity development initiatives for Nigeria.

2iE, KNUST UNICV and can serve as the regional training poles as follows:

- 2iE: for French speaking countries
- KNUST: for English speaking countries
- UNICV for Lusophone countries.

At the country-level, identification of reference centers will ensure the multiplication of the action in each country and the following institutions are proposed:

- Benin : EPAC
- Burkina Faso : 2iE
- Cap Vert : UnivCV
- Côte d'Ivoire : INP-HB
- Gambia : University of The Gambia
- Ghana :KNUST
- Guinée :
- Guinée Bissau :
- Liberia : Stella Maris Polytechnic
- Mali : ENI-ABT
- Niger : EMIG
- Nigéria : National Energy Research Centers of the Energy Commission of Nigeria.
- Senegal : ESP
- Sierra Leone : Fourah Bay College
- Togo : ENSI

For the training of technicians, it is equally important to identify in each country one or more centers (technical colleges, vocational schools, vocational training center ...) that will integrate RE and EE into their curriculum modules. Initial identification can consider:

- Benin : Lycée Technique Coulibaly
- Burkina Faso : Lycée Professionnel du Centre, Lycée Technique Lamizana
- Cap Vert :
- Côte d'Ivoire : Lycée technique d'Abidjan
- Gambie : Gambia Renewable Energy Center
- Ghana : Kumasi and Accra Technical Institutes
- Guinée :
- Guinée Bissau :
- Liberia : Stella Maris Polytechnic
- Mali :
- Niger :
- Nigéria :
- Senegal :
- Sierra Leone : Government Technical Institute
- Togo : Lycée Technique et professionnel de Lomé

Particular emphasis should be given to training of trainers. Training centers, trainers must integrate RE and EE in their programs and future teachers should be trained in these areas. The study identified the following centers:

- IPNETP (Institut Pédagogique National de l'Enseignement Technique et Professionnel) in Cote d'Ivoire
- ENSK (Ecole Normale Supérieure de Koudougou) in Burkina Faso
- Koforidua Polytechnic in Ghana

5. Conclusion

The study concludes that there is indeed a human resource deficit in the ECOWAS region with regards to Renewable Energy and Energy Efficiency. This needs a coordinated approach and strategy to properly address it.

Expertise is required mainly in the areas of Solar PV, Biomass technology (cookstove dissemination), Energy Efficiency and Energy Policy and Planning. This should however be further informed by the type of renewable energy resources available in various countries.

These experts are required mostly at the technician level rather than advanced level. Technician level training can be undertaken at the country levels by strengthening one or two existing institutions in terms of staff and equipment. Advanced level training for engineers and management-level staff should be addressed in a regional context through selected institutions with some existing capacity and ongoing activity.

APPENDIX A – Questionnaires for Interviews

Energy Capacity Building. Decision maker questionnaire: Ministries, National Energy agencies, commissions and Departments.

Regional Centre for Renewable Energy and Energy Efficiency (ECREEE)

Consultancy: 2iE, KNUST, UNICV

Identification

1. Date: ___/___/_____

2. Country:

3. Name of company: _____

4. Company address:

5. Company status:
 Public Private public/private Do not know

6. Name of the person interviewed:

7. Position / Responsibility of the interviewed person:

8. Email / Tel number of the interviewed person:

9. Documents provided (institutional and/or national) related to this capacity building theme:

Current resources and recruitment needs

10. Among the following activities, can you indicate those related to your company *You can choose up to two items*

- | | |
|---|--|
| <input type="checkbox"/> Ministry in charge of Energy | <input type="checkbox"/> Rural electrification Agency (or |
| <input type="checkbox"/> Technical department in charge of Energy | <input type="checkbox"/> Funding of Electrification projects |
| <input type="checkbox"/> Regulation agency of the Energy sector | <input type="checkbox"/> Others (Please Specify) |

11. Total number of employees: _____

12. Number of executives: _____

13. Can you estimate the number of employees according to the following qualifications?

PhD	
Master degree	
BSc	
Diploma	
Certificate	
Others	

14. Does your company need recruitment for the next years?

- Yes No I do not know

15. What can be the recruitment needs of your company for the positions bellow (in figure)?

PhD	
Master degree	
BSc	
Diploma	
Senior Technician	
Technician (“A” level)	
Others (please specify)	

16. Which areas will these recruitments concern in the energy sector

- | | |
|--|---|
| <input type="checkbox"/> Thermal Power production | <input type="checkbox"/> oil prospecting |
| <input type="checkbox"/> Hydro power generation | <input type="checkbox"/> oil exploitation |
| <input type="checkbox"/> Thermal solar energy | <input type="checkbox"/> Coal exploitation |
| <input type="checkbox"/> Photovoltaic systems | <input type="checkbox"/> Biomass transformation |
| <input type="checkbox"/> Wind power generation | <input type="checkbox"/> Investment financing |
| <input type="checkbox"/> Energy planning | <input type="checkbox"/> |
| <input type="checkbox"/> Energy efficiency & savings | <input type="checkbox"/> Others |

17. Concerning the recruitment of senior technicians, which of these options is relevant to your situation?

- o We train our own senior technician and do not need any from outside
- o There are enough qualified senior technician seeking job. As a result we do not bother training any
- o There are many senior technician seeking positions but they are not skilful enough and need additional
- o There are not enough senior technician on the labor market seeking position
- o Others

18. Please specify for others above in question (17):

19. What kind of training do you provide for young people / new recruitments?

Training needs of the company personnel

This part concerns in-house training of your personnel to upgrade their skills etc.

20. Does your company have a refresher training schedule for its employees?

- Yes No I do not know

21. For the following qualification can you estimate the number of employees to be trained in the next few years?

PhD	
Master degree	
BSc	
Diploma	
Certificate	
Others	
	For example: 3 BSc for the next 5 years

22. Which areas will these professional trainings cover?

- Thermal Power production
- Hvdro power generation
- Thermal solar energy
- Photovoltaic systems
- Wind power generation
- Energy planning
- Energy efficiency & savings
- oil prospecting
- oil exploitation
- Coal exploitation
- Biomass transformation
- Investment financing
- Others

23. Please specify for others above:

24. How is the practical training of senior technicians taken care of in your company?

- By a training centre within the company or owned by the
- By outside training sessions
- Training on the job (using experienced employees)
- Through workshop and training seminars attended by the
- Others

25. Please specify for others above:

26. If your organisation trains its senior technicians outside the company can you indicate the address and contact of these centres?

27. Where have the majority of the Engineers of the company been trained? You can choose up to two items

- In the country
- In other ECOWAS countries
- I do not know
- Europe / America
- Abroad with no details
- Others (specify)

Financial and material resources of the Institution

28. What is the rough operating budget of the institution?

Amount in local currency?	
---------------------------	--

I do not know (tick the box)	
Impossible to guess (tick the box)	
I am not allowed to give it (tick the box)	
Others (specify)	

29. What is the estimated annual investment budget of the organisation / institution?

Amount in local currency?	
I do not know (tick the box)	
Impossible to guess (tick the box)	
I am not allow to give this amount (tick the	
Others (specify)	

30. Does your organisation / institution have difficulties in?

- financing
- Energy equipment
- Logistics
- Others (specify)

31. If your organisation has financial difficulty as stated in (30), in which area would you apply additional financial resources (indicate priority)?

1. Recruit young people in order to expand the personnel of the company
2. do R & D
3. Reinforce the existing equipment
4. Improve the operating of the company
5. others

32. If others, Please give the details of your financial needs for the next two or three years:

33. What is the most pressing needs of the company regarding equipment?

- rooms and space for offices
- office equipment
- laboratory and research equipment
- Light equipment in the energy
- Big energy investments
- Others

34. Overall financial and/or equipment requirements: For a good functioning of your institution the yearly budget should be increased by:

Operations	Investment (equipment)
<input type="checkbox"/> 0 %	<input type="checkbox"/> 0 %
<input type="checkbox"/> 10 to 20 %	<input type="checkbox"/> 10 to 20 %
<input type="checkbox"/> 20 to 50 %	<input type="checkbox"/> 20 to 50 %
<input type="checkbox"/> 50 to 100 %	<input type="checkbox"/> 50 to 100 %
<input type="checkbox"/> more than 100 %	<input type="checkbox"/> more than 100 %

35. Do you have any capacity building program in your institution?

- Yes
 No, but we would like it
 No, we do not need it
 No, We would rather pay for it
 I do not know what it means
 Others (specify below)

Institutional framework regarding Renewable Energy and Energy Efficiency

36. Do you think the regulations/policies in your country allow a fast development of RE and EE?

- Yes
 No
 I do not know

37. In your opinion what would be the measures and decisions to improve the development of RE in your country? : You can choose up to two answers.

- Financing of RE for R&D in the
 Cordination of RE activities in the country
 Tax removal on RE equipment
 Others
 Equipment labelling/standardisation
 Subsidising of RE equipment
 Good functioning of decision institutions in the RE sector

38. Please specify for others above:

39. In your opinion what would be the best measures and decisions to lead to energy efficiency in your country:

- Energy audits financing
- Tax removal on EE equipment import
- Equipment labelling
- Subsidizing of EE equipment
- Others

40. Please specify for others above:

Current RE & EE projects in your country and their pertinence

41. What are the 2 or 3 most feasible RE projects under way (or to come) in your country ?

- setting up of PV solar power plants
- Improved stove dissemination
- Decentralized PV electrification
- Others

42. Please specify for others above:

43. What are the 2 or 3 most feasible EE projects under way (or to come) in your country?

- Incandescent lamps abolition
- Energy audits in administrative buildings
- Implementation of thermal quality code in Building
- Cogeneration project in industry
- Others

44. Please specify for others above:

Additional Comment and suggestions: Your own advice to end the interview.

45. In your opinion what do you think are the main barriers to good capacity building in the RE and EE sectors in your country: *(Please specify in order of importance).*

- The quality of the training
- The lack of financing
- The bad regulations of the country
- Others

46. Please specify for others above:

47. To deal with the energy consumption growth and the issue of access to energy services, what would be your recommendation: *You can choose up to three items.*

- subsidise energy for poor people
- leave the energy domain to the private sector
- implement a good public private partnership
- Others

48. Please specify for others above:

49. In your opinion, an efficient capacity building would consist of: *you can choose up to three items.*

- Organising periodical training of the actors of the energy domain
- Organising workshop and seminar discussions
- Reviewing of the regulation texts in the energy domain
- Others

50. Please specify for others above:

51. Thank you for filling this capacity building form for ECOWAS countries. The space below is for your comments, suggestions, and any other information related to this survey you would like to provide.

Energy Capacity Building
Questionnaire for International and Banking Institutions

Regional Centre for Renewable Energy and Energy Efficiency (ECREEE)

Consultancy: 2iE, KNUST, UNICV

Identification

1. Date: ___/___/_____

2. Country:

3. Name of Company: _____

4. Company address:

5. Name of the person interviewed:

6. Position / Responsibility of the interviewed
person: _____

7. Email / Tel number of the interviewed
person: _____

8. Interest of the institution in the development of energy sector:

Yes No Moderate Do not know

9. Documents provided related to this capacity building theme:

Targeted Fields in Energy Sector for Country Support

10. Have your institution already financed RE or EE projects in this country?

- Yes No I do not know

11. Can you indicate the reasons and the corresponding amounts of funds if your institution has already financed RE or EE projects?

12. Among the following themes, can you indicate the priorities for your institution for potential financing? You can choose up to two answers.

- | | |
|--|---|
| <input type="checkbox"/> Electricity production in general | <input type="checkbox"/> Oil prospecting |
| <input type="checkbox"/> Hydro power production | <input type="checkbox"/> Oil exploitation |
| <input type="checkbox"/> Solar energy | <input type="checkbox"/> Coal exploitation |
| <input type="checkbox"/> Photovoltaic systems | <input type="checkbox"/> Biomass transformation |
| <input type="checkbox"/> Wind power generation | <input type="checkbox"/> Investment financing |
| <input type="checkbox"/> Energy planning | <input type="checkbox"/> Renewable energies |
| <input type="checkbox"/> Energy savings and efficiency | <input type="checkbox"/> Others |

13. Would your company finance a capacity building project in RE and EE in this country?

- | | |
|--|--|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| <input type="checkbox"/> Yes. We already do that | <input type="checkbox"/> No. we have already tried (or done) |
| <input type="checkbox"/> I do not know | <input type="checkbox"/> |

14. Do you think training is important for access to energy services in African countries?

- Yes No I do not know

15. Among the following training activities which ones do you think are priorities for capacity building on RE and EE in this country?

- Training
- Continuing education
- Vocational training (in specialized centers)
- Workshops and seminars
- E-learning through ICTs
- Others

16. Please specify for others above:

17. What do you think is more important to build capacities for populations' access to energy services in this country?

- Training
- Financing all stakeholders in the energy sector
- Institutional framework and good practices ad hoc laws
- Public private partnership
- Others

18. Please specify for others above:

Institutional framework regarding Renewable Energy and Energy Efficiency

19. Do you think the regulations in force in your country allow a fast development of RE and EE?

- Yes No I do not know

20. In your view, what should be the measures and decisions to improve the development of RE in your country? You can choose up to two answers.

- Financing of RE for R&D in the
- Tax removal on RE equipment
- Equipment labelling
- Subsidising of RE equipment
- Good functioning of decision institutions in the RE sector
- Coordination of RE activities in the
- Others

21. Please specify for others above:

22. In your opinion, what would be the best measures and decisions to lead to energy efficiency in your country:

- Energy audits financing
- Tax removal on EE equipment import
- Equipment labelling
- Subsidizing of EE equipment
- Others

23. Please specify for others above:

Current RE & EE projects in your country and their relevance

24. What are the 2 or 3 most feasible RE projects under way (or to come) in your country?

- setting up of PV solar power plants
- Improved stove popularization
- Decentralized PV electrification
- building of biogas plants
- Others

25. Please specify for others above:

26. What are the 2 or 3 most feasible EE projects under way (or to come) in your country?

- Incandescent lamps abolition
- Energy audits in administrative buildings
- Implementation of thermal quality code in Building
- Cogeneration project in industry
- ban on importation of used electronic
- Others

27. Please specify for others above:

Additional Comment and suggestions: Your own advice to end the interview.

28. In your opinion what do you think are the main barriers to good capacity building in the RE and EE sectors in your country: (Please specify in order of importance).

- The quality of the training
- The lack of financing
- The bad regulations of the country
- Others

29. Please specify for others above:

30. To deal with development of access to energy services, would you say that one should: (You can choose up to three items).

- subsidise energy for poor people
- leave the energy domain to the private sector
- implement a good public private partnership
- Others

31. Please specify for others above: _____

32. In your opinion, an efficient capacity building would consist of : you can choose up to three items.

- Organising periodical training of the actors of the energy domain
- Organising workson and seminar discussions
- Reviewing of the regulation texts in the energy domain
- Others

33. Please specify for others above: _____

Energy Capacity Building
Private and Parastatal Sectors' Stakeholders

Regional Centre for Renewable Energy and Energy Efficiency (ECREEE)

Consultancy: 2iE, KNUST, UNICV

Identification

1. Date: ___/___/_____

2. Country: _____

3. Name of company: _____

4. Company address: _____

5. Name of the person interviewed: _____

6. Position / Responsibility of the interviewed person: _____

7. Email / Tel number of the interviewed person: _____

8. What link do you have with the RE/EE sector?

9. Documents provided related to this capacity building theme:

Renewable Energy and Energy Efficiency

10. How are you involved in RE sector?

- User Other (specify)

11. How involved are you in EE sector?

- User Other (specify)

12. In your opinion, which among the following themes are priorities for your institution for potential financing? You can choose up to two answers.

- | | |
|--|---|
| <input type="checkbox"/> Electricity production in general | <input type="checkbox"/> Oil prospecting |
| <input type="checkbox"/> Hydro power production | <input type="checkbox"/> Oil exploitation |
| <input type="checkbox"/> Solar energy | <input type="checkbox"/> Coal exploitation |
| <input type="checkbox"/> Photovoltaic systems | <input type="checkbox"/> Biomass transformation |
| <input type="checkbox"/> Wind power generation | <input type="checkbox"/> Investment financing |
| <input type="checkbox"/> Energy planning | <input type="checkbox"/> Renewable energies |
| <input type="checkbox"/> Energy savings and efficiency | <input type="checkbox"/> Others |

13. Do you think training is important for access to energy services in African countries?

- Yes No I do not know

14. Among the following training activities which do you think are priorities for capacity building on RE and EE in this country?

- Continuing education
- Vocational training (in specialized centers)
- Workshops and seminars
- E-learning through ICTs
- Others

15. Please specify for others above:

16. What do you think is more important to build capacities for populations' access to energy services in this country?

- Training
- Financing all stakeholders in the energy sector
- Institutional framework and good practices ad hoc laws

- Publi- private partnership
- Others

17. Please specify for others above:

Institutional framework regarding Renewable Energy and Energy Efficiency

18. Do you think the regulations/policies in force in your country allow for fast development of RE and EE?

- Yes
- No
- I do not know

19. In your view, what should be the measures and decisions to improve the development of RE in your country? : You can choose up to two answers.

- Financing of RE for R&D in the
- Tax removal on RE equipment
- Equipment labelling/standardisation
- Subsidising of RE equipment
- Good functioning of decision institutions in the RE sector
- Coordination of RE activities in the
- Others

20. Please specify for others above:

21. In your opinion, what would be the best measures and decisions to lead to energy efficiency in your country:

- Energy audits financing
- Tax removal on EE equipment import
- Equipment labelling
- Subsidising of EE equipment
- Others

22. Please specify for others above:

Current RE & EE projects in your country and their relevance

23. What are the 2 or 3 most feasible RE projects under way (or to come) in your country?

- setting up of PV solar power plants
- Improved stove popularization
- Decentralized PV electrification
- Others

24. Please specify for others above:

25. What are the 2 or 3 most feasible EE projects under way (or to come) in your country?

- Incandescent lamps abolition
- Energy audits in administrative buildings
- Implementation of thermal quality code in Building
- Ban on importation of used
- Cogeneration project in industry
- Others

26. Please specify for others above:

Additional Comment and suggestions: Your own advice to end the interview.

27. Would you rather say that the main difficulty to lead to a good capacity building in the RE and EE sectors in your country are related to: *You may choose up to two answers.*

- The quality of the training
- The lack of financing
- The bad regulations of the country
- Others

28. Please specify for others above:

29. To deal with the energy consumption growth and the issue of access to energy services, what would be your recommendation: *You can choose up to three items..*

- subsidise energy for poor people
- leave the energy domain to the private sector
- implement a good public private partnership
- Others

30. Please specify for others above:

31. In your opinion, an efficient capacity building would consist in: *you can choose up to three items.*

- Organising periodical training of the actors of the energy domain
- Organising workshops and seminar discussions
- Reviewing of the regulation texts in the energy domain
- Others

32. Please specify for others above:

33. Thank you for filling this capacity building form for ECOWAS countries. The space below is for your comments, suggestions, and any other information related to this survey you would like to provide.

Energy Capacity Building
Training and Research Centre Questionnaire

Identification

1. Date: ___/___/_____

2. Country:

3. Name of company: _____

4. Company address:

5. Company statute:

Public

Private

Mix (public/private)

Do not know

6. Name of the person interviewed:

7. Position / Responsibility of the interviewed person:

8. Email / Tel number of the interviewed person:

9. Documents provided (institutional or national) related to this capacity building theme:

Current resources and recruitment needs

10. Among the following activities, can you indicate those related to your institution *You can choose up to two items*

Training Centre

Policy Think Tank

Research Centre

Others

Training and Research Centre

11. Total number of employees: _____

12. Number of executives: _____

13. Can you estimate the number of employees according to the following qualifications?

Doctorate/PhD	
Master degree (“A” level + 5)	
BSc (“A” level + 3)	
Higher National Diploma (HND)	
Others (please specify)	

14. Does your company need recruitment for the next years?

- Yes No I do not know

15. What can be the recruitment needs of your institution for the positions below (in figure)?

Doctorate/PhD	
Master degree	
BSc	
Technician	
Others (please specify)	

16. If you are a research centre what can be your recruitment needs for the positions below?

Doctorate / PhD	
Master degree	
BSc	
Technician	
Others (please specify)	

17. Which training programs do you provide in the field of energy?

- Bachelor’s Degree
 Master’s Degree
 Doctorate/PhD
 Others

18. As a training centre in the field of energy, please specify for each field, the modules and/or subjects taught with the level of studies concerned, training duration, schedules for each activities (lectures, practical work, etc)

Renewable Energies

<i>Modules/subjects</i>	<i>Level concerned</i>	<i>Duration (hours)</i>	<i>Number of hours</i>			<i>Observations</i>
			<i>Lectures</i>	<i>Practical Work</i>	<i>Other practical work (please specify)</i>	

Energy Efficiency

<i>Modules/subjects</i>	<i>Level concerned</i>	<i>Duration (hours)</i>	<i>Number of hours</i>			<i>Observations</i>
			<i>Lectures</i>	<i>Practical Work</i>	<i>Other practical work (please specify)</i>	

Rural Electrification (or related field)

<i>Modules/subjects</i>	<i>Level concerned</i>	<i>Duration (hours)</i>	<i>Number of hours</i>			<i>Observations</i>
			<i>Lectures</i>	<i>Practical Work</i>	<i>Other practical work (please specify)</i>	

19. As a training centre in the energy sector, please specify for each field the description of modules and/or subjects taught and equipment used for practical work

Renewable Energies

<i>Modules/subjects</i>	<i>Description</i>	<i>Description of available equipment</i>	<i>Observations</i>

Energy Efficiency

<i>Modules/subjects</i>	<i>Description</i>	<i>Description of available equipment</i>	<i>Observations</i>

Rural Electrification

<i>Modules/subjects</i>	<i>Description</i>	<i>Description of available equipment</i>	<i>Observations</i>

20. What are your key research areas as a research center in the field of energy?

- Solar Energy
- Biomass
- Wind Energy
- Energy Efficiency
- Energy Planning
- Rural Electrification
- Energy management
- Energy Policy
- Others

Development-Oriented Research and Training

22. In your opinion, considering the country development needs, how do you rate the relevance and adequacy of the training programs delivered on energy areas?

- Very good
- Good
- Fairly good
- Average
- Poor
- Very poor

23. In terms of relevance and adequacy, how would you rate research on energy issues according to the country's development needs?

- Very good
- Good
- Fairly good
- Average
- Poor
- Very Poor

24. In your opinion, what would help improve the relevance of education to development requirements? *You can choose up to two answers.*

- Increase of funds allocated to education
- A better collaboration with businesses
- Educational programs relevant to country needs
- Higher level for theoretical or basic education
- Technology and engineering oriented training programs
- Others

Please specify for others above:

25. According to you, what initiatives are required to make research more appropriate with development needs? *You can choose up to two answers.*

- Applied research and engineering oriented research activities
- World class research relevant to international standards
- A better partnership for research and the private sector
- Increase of funds allocated to research
- Better salaries for local researchers
- Others

Please specify for others above:

26. Would you participate in developing continuing training programs for energy capacity building?

- Yes No I do not know

27. Can your institution provide with trainers for continuing education courses in the energy area?

- Yes No I do not know

Training on Rural Electrification

28. How would you rate the relevance of training programs in the field rural electrification delivered in the country in terms of development needs?

- Very good
- Good
- Fairly good
- Average
- Poor
- Very poor

29. In your opinion, what initiatives are required to make training programs relevant to development needs? You can choose up to two answers.

- Increase of funds allocated to education
- A better collaboration with businesses
- Educational programs relevant to country needs
- Higher level for theoretical or basic education
- Technology and engineering oriented training programs

Others

Please specify for others above:

30. Would you participate in developing initial training programs for rural electrification capacity building?

Yes No I do not know

31. Can your institution provide trainers to deliver lectures in initial training in the field of rural electrification?

Yes No I do not know

32. Would you participate in developing continuing education programs for rural electrification capacity building?

Yes No I do not know

33. Will your institution provide with trainers to deliver lectures in continuing education programs in the field of rural electrification?

Yes No I do not know

34. Will your institution host an initial training program in the field of rural electrification?

Yes No I do not know

If yes, why (please argue)

.....

35. Will your institution host a continuing education program in the field of rural electrification?

Yes No I do not know

If yes, (why) please argue

Financial and material resources of the Institution

28. What is the rough operating budget of the institution?

Amount in local currency?	
I do not know (tick the box)	
Impossible to guess (tick the box)	
I am not allowed to give it (tick the box)	
Others (specify)	

29. What is the estimated annual investment budget of the organisation / institution?

Amount in local currency?	
I do not know (tick the box)	
Impossible to guess (tick the box)	
I am not allow to give this amount (tick the	
Others (specify)	

30. Does your organisation / institution have difficulties in?

- financing
- Energy equipment
- Logistics
- Others (specify)

31. If your organisation has financial difficulty as stated in (30), in which area would you apply additional financial resources (indicate priority)?

1. Recruit young people in order to expand the personnel of the company
2. do R & D
3. Reinforce the existing equipment
4. Improve the operating of the company
5. others

32. If others, Please give the details of your financial needs for the next two or three years:

33. What is the most pressing needs of the company regarding equipment?

- rooms and space for offices
- Light equipment in the energy

- office equipment
- Big energy investments
- laboratory and research equipment
- Others

34. Overall financial and/or equipment requirements: For a good functioning of your institution the yearly budget should be increased by:

Operations	Investment (equipment)
<input type="checkbox"/> 0 %	<input type="checkbox"/> 0 %
<input type="checkbox"/> 10 to 20 %	<input type="checkbox"/> 10 to 20 %
<input type="checkbox"/> 20 to 50 %	<input type="checkbox"/> 20 to 50 %
<input type="checkbox"/> 50 to 100 %	<input type="checkbox"/> 50 to 100 %
<input type="checkbox"/> more than 100 %	<input type="checkbox"/> more than 100 %

35. Do you have any capacity building program in your institution?

- Yes
- No, but we would like it
- No, we do not need it
- No, We would rather pay for it
- I do not know what it means
- Others (specify below)

Institutional framework regarding Renewable Energy and Energy Efficiency

36. Do you think the regulations/policies in your country allow a fast development of RE and EE?

- Yes
- No
- I do not know

37. In your opinion what would be the measures and decisions to improve the development of RE in your country? : You can choose up to two answers.

- Financing of RE for R&D in the
- Cordination of RE activities in the country
- Tax removal on RE equipment
- Others
- Equipment labelling/standardisation
- Subsidising of RE equipment
- Good functioning of decision institutions in the RE sector

38. Please specify for others above:

39. In your opinion what would be the best measures and decisions to lead to energy efficiency in your country:

- Energy audits financing
- Tax removal on EE equipment import
- Equipment labelling
- Subsidising of EE equipment
- Others

40. Please specify for others above:

Current RE & EE projects in your country and their relevance

41. What are the 2 or 3 most feasible RE projects under way (or to come) in your country ?

- setting up of PV solar power plants
- Improved stove dissemination
- Decentralized PV electrification
- Others

42. Please specify for others above:

43. What are the 2 or 3 most feasible EE projects under way (or to come) in your country?

- Incandescent lamps abolition
- Energy audits in administrative buildings
- Implementation of thermal quality code in Building
- Cogeneration project in industry
- Others

44. Please specify for others above:

Additional Comment and suggestions: Your own advice to end the interview.

45. In your opinion what do you think are the main barriers to good capacity building in the RE and EE sectors in your country: (Please specify in order of importance).

- The quality of the training
- The lack of financing
- The bad regulations of the country
- Others

46. Please specify for others above:

47. To deal with the energy consumption growth and the issue of access to energy services, what would be your recommendation: You can choose up to three items.

- subsidise energy for poor people
- leave the energy domain to the private sector
- implement a good public private partnership
- Others

48. Please specify for others above:

49. In your opinion, an efficient capacity building would consist of: you can choose up to three items.

- Organising periodical training of the actors of the energy domain
- Organising workshop and seminar discussions
- Reviewing of the regulation texts in the energy domain
- Others

APPENDIX B – List of Persons Contacted

Mission to Bénin from 17 to 21 janvier 2012 – List of persons contacted in BENIN

Expert : Francis SEMPORE (2iE), francis.sempore@2ie-edu.org

ECREEE National Focal Point : Clément B.AKEOUEDENOUDJE, Directeur des Energies Nouvelles et Renouvelables, bill.akoue@yahoo.fr

Point Focal Centres de formation : Clément AHOUNNOU, Responsable du Master Energies Renouvelables et Systèmes Energétiques de l'EPAC, ahouannou_clem@yahoo.fr,

N°	Institution	Persons Contacted
1	Direction Générale de l'Energie, point focal CREREE	Justin AGBO , Directeur Général, justicoagbo@yahoo.fr , +229 21 37 42 14 Clément Bill AKEOUEDENOUDJE , Directeur des Energies Nouvelles et Renouvelables, bill.akoue@yahoo.fr , +229 95 71 20 45/21 37 73 84/85 Daniel ASSOGBA , Chef de service de promotion des énergies de proximité, d_assogba@yahoo.fr , +229 97 60 19 64 Justin GOMIHOUE , Assistant Directeur de l'Electricité, gomihoujustin@yahoo.fr
2	ABERME (Agence Béninoise de l'Electrification Rurale et de la Maîtrise d'Energie)	EOULAM Zacari , Directeur Général, eoulam@yahoo.fr , +229 97 47 83 95 Toussaint AHOUANGBENAGNON , Directeur de l'Electrification Rurale, aberme1474@yahoo.fr , +229 97 27 54 39 Florent OROU FICO , Directeur de la Communication, de la Coopération et de la Formation, ficflor2@yahoo.fr , +229 90 03 10 36/95 73 48 82
3	EPAC (Ecole Polytechnique Abomey Calavi)	Clément AHOUNNOU , Enseignant Chercheur, Responsable du Master Energies Renouvelables et Systèmes Energétiques, ahouannou_clem@yahoo.fr , +229 97 60 33 23
4	IUT LOKOSSA (Institut Universitaire Technologique de LOKOSSA)	HOUNGAN Aristide , Chef Département Productique (Mécanique & Energie), hounaris@yahoo.fr , +2R9 97 32 82 55
5	CONTROLECH	PADONOU Dieudonné , Directeur Général, padonou_dieudonne@yahoo.fr , +229 97 98 88 56/94 01 70 01
6	CEB (Communauté Electrique du Bénin)	Delphin AGOSSOU , Chef de service Exploitation DRTB (Région BENIN), delphagossou@yahoo.fr , +229 94 49 80 64/96 66 68 48
7	SBEE (Société Béninoise d'Energie Electrique)	OLOULADE Arouna , Chef de service Formation, olouarou@yahoo.fr
8	CBRST (Centre Béninois de la Recherche Scientifique et Technique)	Basile , kbbasile@yahoo.fr , Chef Département Recherche Industrielles et Technoligiques, Coordonnateur Programme Appropriation des Energies Renouvelables +229 97 22 46 38
9	Lycée Technique COULIBALY	AMOUSSOU Roland , Proviseur, amoussouroland@yahoo.fr
10	CCIB (Chambre de	BELLO Camarou Dine Rodrigue , Chef Service Etudes

	Commerce et d'Industrie du Bénin)	Stratégiques et Prospectives, camar_dine@yahoo.fr , +229 07 69 73 66/94 12 04 07
11	WAPP (West African Power Pool)	AYE Marie, Chargé de l'Administration, marie_wapp@hotmail.fr , +229 21 37 41 95/21 37 71 44

Mission to Togo from 23 to 27 January 2012 – List of persons contacted in TOGO

Expert : Francis SEMPORE (2iE), francis.sempore@2ie-edu.org

Point Focal National ECREEE : TCHAKPIDE Traoré, Directeur de l'Electricité et des Equipements Energétiques, tchakpide3@yahoo.fr

Point Focal Centres de formation : BAYOR Sibiri, Directeur Adjoint de l'ENSI, bayores1@yahoo.fr

N°	Structures	Personnes Ressources
1	Direction Générale de l'Energie, point focal CREEE	ABIYOU Tcharabalo , Directeur Général, tcharabalo_abiyou@yahoo.fr , +229 90 28 28 11 TCHAKPIDE Traoré , Directeur de l'Electricité et des Equipements Energétiques, tchakpide3@yahoo.fr , +228 90 23 82 33/22 32 19 01 NASSOMA A. Robil , Chargé d'Etudes, naspaz@hotmail.com , +228 90 09 55 44 DJASSAH M'Ba Staphane , Chargé d'Etudes/Système d'information, stedjass1975@yahoo.fr , +228 22 23 14 53
2	ENSI (Ecole Nationale Supérieure d'Ingénieurs)	KASSEGNE Komlan Assogba , Directeur, kkassegn@yahoo.fr , +228 22 25 66 42 BAYOR Sibiri , Directeur Adjoint, bayores1@yahoo.fr , +228 904 60 21
3	EAMAU (Ecole Africaine des Métiers de l'Architecture et de l'Urbanisme)	ADJAMAGBO Ambroise Comlan , Directeur du Développement et Recherche, ambroiseadjamagbo@yahoo.fr , +228 22 21 62 53
4	Laboratoire sur l'Energie Solaire (Université de Lomé)	BANNA Magolmèna , Responsable GPTE, magbanna@yahoo.fr , +228 901 25 18 OURO-DJOBBO Sanoussi , odsanoussi@gmail.com , +228 90 12 73 92
4	NIOTO	KOSSI Agbéko , Assistant au Chef de Service Energie, koscasimir@yahoo.es , +228 92 26 22 30
6	CEET (Compagnie Energie Electrique du Togo)	TIEM François Bolidja , Directeur Planification et Investissements (DPI), tiem_bolidja@yahoo.fr , +228 90 17 42 63 BLAKINE Moussa , Service Qualité, Sécurité Environnement, kadblakime@yahoo.fr , +228 90 13 56 07 HOUESSE Kofi , Ingénieur Génie Electrique (DPI), houesse.kofi@gmail.com
7	CEB (Communauté Electrique du Bénin)	ATRI Ama Mokpokpo , Chef de section Electricité, matri@cebnet.org , +228 90 02 78 11 BONI Y. Oyono , Chef de section Planification, oboni@cebnet.org , +228 90 35 45 96 BALOGOUN Younousse , Ing. Electricien, ybalogoun@cebnet.org , +228 91 95 41 69 KANFOR-LARE Mingdièbe , Ing. Electricien, mkanforlare@cebnet.org , +228 90 87 88 26
8	TdE (Société Togolaise des Eaux)	FUMEY Kwassivi Séwavi , Sous Directeur Production, fumjoe@yahoo.fr , +228 22 25 21 67
9	Lycée	DE SOUZA Louis Félicien , Proviseur, felkodes@yahoo.fr ,

	d'Enseignement Technique et Professionnel de Lomé	+228 22 25 10 94/22 25 28 15
10	Direction de l'Environnement	TONYEBA Komi , tomyebaki@gmail.com , +228 90 29 57 24 BAMALI P.A. Tahantan , dibamail@yahoo.fr , +228 90 20 16 66
11	CERFER (Centre Régional de Formation pour l'Entretien Routier)	SAMH Ouro-Djobo , Directeur Général, odsamah@yahoo.fr , +228 22 61 02 38/22 26 06 70

Mission to Côte d'Ivoire from 6 to 9 February 2012 – List of persons contacted

Expert : Francis SEMPORE (2iE), francis.sempore@2ie-edu.org

Point Focal National ECREEE : **KOUAKOU Kouamé Augustin**, Directeur des Energies Nouvelles et Renouvelables, kkouameaugustin@yahoo.fr

Point Focal Centres de formation : **GBAHA Prosper**, Responsable du Laboratoire d'Energies Nouvelles et renouvelables de l'INP-HB de Yamoussokro, pgbaha@yahoo.fr

N°	Structures	Personnes Ressources
1	Direction Générale de l'Energie, point focal CREREE (DGE)	<p>KOUAKOU Kouamé Augustin, Directeur des Energies Nouvelles et Renouvelables, kkouameaugustin@yahoo.fr, +225 07 59 67 89/01 73 28 07</p> <p>KOUHIE Guéi Guillaume Fulbert, Sous Directeur de la Promotion et du Développement, kouhieg@yahoo.fr, +225 40 70 04 57/60 10 87 89</p> <p>ASSI Pika Jean Baptiste, Sous Directeur des Etudes et de la Programmation, assi_pika2000@yahoo.fr, +225 02 26 47 54/08 69 54 91</p> <p>KOFFI Komenan, Chargé d'études, +225 20 20 61 25 – 07 86 72 83, koffikomenan@yahoo.fr</p> <p>GNIGBOGNIMA Siriki, BEE, +225 20 20 60 65 – 01 60 07 05, siriki_mme@yahoo.fr</p> <p>N'DRI Kouassi, DRSE, +225 20 20 62 36 – 07 58 70 13, anankoues@yahoo.fr</p> <p>KOBLAN ALOUKO Narcisse, Chargé d'études, +225 20 20 61 25 – 07 80 35 57, aloukonarcisse@yahoo.fr</p> <p>N'CHO N'GUESSAN Pacôme, Charge d'études, +225 20 20 61 25 - 05 05 56 76, guesnchopac@yahoo.fr</p> <p>OMEPIEU Sosthène, BEE, +225 48 62 99 09, odas1983@yahoo.fr</p> <p>KACOU Léontine, DENR, + 225 40 70 06 60, lkacouchiadon5@yahoo.fr</p>
2	ANARE (Autorité Nationale de Régulation du Secteur de l'Electricité)	<p>SORO Napian, Directeur des Etudes Techniques, nsoro@anare.ci, +225 20 20 61 98</p>
3	CODINORM (Côte d'Ivoire-Normalisation)	<p>AHOTI Yapo François, SG, responsable documentation, ahoti@codinorm.org ;</p> <p>KOUASSI Edmond, Chef Département Centre d'Information sur les Normes et la Réglementation, edmondkouassi@codinorm.org, +225 40 46 83 35- 20 01 10 76</p>
4	LYNAYS	<p>YEO L. Emmanuel, Chief Executive Officer, info@lynays.com, +225 05 14 30 52</p> <p>SORO Yiguéfohoma André, +225 01 22 57 95, yigue@voila.fr</p>
5	APBEF-CI (Association Professionnelle des Banques)	<p>GNEZALE Roland, rolang@apbef-ci.org, +225 07 36 13 15</p>

	et Etablissements Financiers)	
6	IPNETP (Institut Pédagogique National de l'Enseignement Technique et Professionnel)	BERTE Zakaria , Secrétaire Général, zakaria.berte@yahoo.fr , +225 05 00 86 96
7	CIE (Compagnie Ivoirienne d'Electricité) – CEM (Centre des Métiers de l'Electricité)	ONGUI Emile , Directeur Adjoint des RH chargé de la Formation, Directeur du Centre des Métiers de l'Electricité, eongui@cie.ci , +225 05 74 56 57 ZANNOU Tchoko Jean De Dieu , Chef de service Conception, Planification et Sélection, dzannou@cie.ci , +225 05 09 28 46/01 50 23 18
8	UPDEA (Union des Producteurs, Transporteurs et Distributeurs d'Energie Electrique d'Afrique)	SANNO MONDRE , Assistant Technique, sanno.mondre@updea-africa.org , +225 06 03 93 08
9	MCT CARRIER	KONE Lamine , Directeur Général, mct.lkone@afnet.net , 01 BP 1618 Abidjan, +225 07 03 27 32
10	Société Ivoirienne de Technologie Tropicale (I2T)	BOSSEY Gérard , Chef de service, 04 BP 1137 Abidjan 04, +225 21 27 90 50 / 52
11	Ministère de l'Industrie	TRA Bi et KONE Konondja , respectivement sous directeur et assistant du directeur, BPV 65 Abidjan, cageemal@yahoo.fr
12	Agence Nationale de l'Environnement (ANDE)	BOTI – DOUAYOUA Rachel , Coordonnateur de l'Autorité Nle du MDP, 08 BP 09 Abidjan 08, +225 22 43 23 10, rbdouayoua@gmail.com
13	SODEXHAM	DJE KOUAKOU Bernard , Chef de département Climatologie et Agro Météo, 15 BP 990 Abidjan 15, djekbernard2003@yahoo.fr
14	IFHER (BNETD)	BROU Charles , Chargé des relations extérieures, +225 01 01 38 99, charlesmian@yahoo.fr
15	Lycée Technique d'Abidjan (LTA)	ANNO Souroukou , Censeur chargé de la gestion des ateliers, BP 89 Abidjan, +225 08 14 39 70, anno_lazare@yahoo.fr
16	SEEE – CI	NYAMIEN Yao Thomas , Chargé d'affaires au département Hydraulique et ER, 04 BP 342 Abidjan 04, +225 21 27 46 05 – 02 23 00 22, tomsir2003@yahoo.fr
17	IREN	BOUA Kouakou Yao Benjamin , + 225 58 17 34 88, bouakben@yahoo.fr
18	ANARE / DT	SORO Napian , +225 20 20 62 62, soronapian@live.fr , nsoro@anase.ci
19	Groupe SIFCA	EBA Franck , Directeur développement durable, 01 BP 1289 Abidjan 01, +225 07 08 10 38, ebafranck@sifca.com
20	Institut National Polytechnique Félix Houphouët Boigny (INP-HB) de Yamoussoukro	GBAHA Prosper , Responsable du Laboratoire d'Energies Nouvelles et renouvelables, BP 1093 Yamoussoukro, +225 07 86 73 38, pgbaha@yahoo.fr
21	Banque Africaine de	KONATE Ibrahima , Chef de division P.I ONEC1, BP

	Développement (BAD)	323 Tunis (Tunisie), i.konate@afdb.org
22	Délégation de l'Union Européenne en Côte d'Ivoire	DUREL Ludovic , Chargé des programmes infrastructures, BP 1821 rue docteur Gozet Abidjan 01, ludovic.durel@ec.europa.eu
23	Ministère de l'Enseignement Technique et de la Formation Professionnelle	FOFIE Koffi , Directeur de l'enseignement technique et professionnel, 20 BP 256 Abidjan 20, + 225 20 21 99 05, fofieabout@yahoo.fr
24	Bureau National d'études techniques et de développement (BNETD)	KOUMOIN Arkadius , Chargé d'études principal hydrocarbures et projet MDP Energies renouvelables, 04 BP 495 Abidjan 04, koumoinarkadius@yahoo.fr

Mission to Mali from 16 - 20 January 2012 – List of persons contacted

Expert : Yézouma COULIBALY (2iE), yezouma.coulibaly@2ie-edu.org

Point Focal National ECREEE : Cheick Oumar SANOGO, Directeur Général,
nosa_159@yahoo.fr

Point Focal Centres de formation : Daouda COULIBALY, chargé des relations extérieurs et de la coopération, ddcoulibaly@yahoo.fr

N°	Structures	Personnes Ressources
1	Direction Nationale de l'Energie, point focal CREREE	Cheick Oumar SANOGO , Directeur Général, nosa_159@yahoo.fr , + (223)20 22 45 38 Sékou Oumar TRAORE , Directeur Du centre national de l'Energie solaire et des Energies Renouvelables, straore7@yahoo.fr , (223) 20227184
2	AMADER (Agence Malienne pour le développement de l'Energie Domestique et de l'Electrification Rural)	Seydou KEITA , Directeur de l'énergie domestique, skeita@amadermali.net , (223) 20 23 82 39)
3	ANADEB (Agence Nationale de Développement des Biocarburants)	Mme Thera Aminata FOFANA , Directeur Général Adjoint, batarath@yahoo.fr , +(223) 66 69 67 99
4	AEDD (Agence de l'Environnement et de l'Assainissement)	Amidou TRAORE , Chef département formation et documentation, amtraore22@yahoo.fr , +(223) 66 78 44 07
5	CENESOLER (Communauté Electrique du Bénin)	Sékou Oumar TRAORE , Directeur Du centre national de l'Energie solaire et des Energies Renouvelables, straore7@yahoo.fr , (223) 20227184
6	FAST (Faculté des Sciences et Techniques – Université de Bamako)	Abdramane BA vice Doyen, abdranameba@yahoo.fr + (223) 76 49 84 72
7	ENI (Ecole Nationale d'Ingénieurs)	Daouda COULIBALY , chargé des relations extérieurs et de la coopération ddcoulibaly@yahoo.fr + (223) 76 49 79 52
8	CFP (Centre de formation professionnelle Somaoro Kanté)	Mamadou KEITA Chef de travaux, keita@hotmail.com , + (223) 76 48 43 79
9	ANPE (Atelier Ecole de Kayes)	Faféré KAMATE , Directeur, faferekamate@yahoo.fr , + (223) 21 59 45 21
10	ECICA (Ecole Centrale pour l'Industrie, le Commerce et l'Artisanat)	Brahima Hamadi TIMBILA chef de travaux, brahtim@yahoo.fr + (223) 76 49 74 47
11	Builders Diawara Solar SA	Ibrahima TRAORE , Directeur Général, ibtraore@buildersdsolar.com , +(223) 76 19 2674
12	SINERGIE SA (Société d'Ingénierie de l'Energie) Réseau Electrique, Adduction d'eau, Energie Solaire	Bengaly SALIFOU , Directeur Général, sinergie@afribone.net.ml +(223) 20 21 27 22 / 20 21 25 82 / 66 75 04 83

13	Banque Mondiale Bamako	Peggy MISCHKE , Sepecialiste en Energie, chargé des projet d'Energie au mali, pmischke@worldbank.org
14	PNUD (programme des Nations Unies pour le Développement)	Abdoulaye BAYOKO , Conseiller en Changement Climàtique, abdoulaye.bayoko@undp.org +(223) 66 72 70 11
15	FAFPA (Fonds d'Appui à la Formation Professionnelle et à l'Apprentissage)	Bakary SANGARE , chef de section chargé du financement et de la formation des agents du secteur BTP, sagare_bakary@yahoo.fr

Mission to Niger from 22 - 26 January 2012. List of persons contacted

Expert : Yézouma COULIBALY (2iE), yezouma.coulibaly@2ie-edu.org

Point Focal National ECREEE : **Ibrahim HASSANE**, Directeur des Energies Renouvelables et des Energies Domestiques

Point Focal Centres de formation : **Moustapha Atoumane KOSSO**, Chef de Département Génie Electrique

N°	Structures	Personnes Ressources
1	Direction Générale de l'Energie, point focal CREREE	Ibrahim HASSANE , Directeur des Energies Renouvelables et des Energies Domestiques, Bello NASSOUROU , Chef de la Division des Energies Renouvelables, nassourou_bello@yahoo.fr , +(227) 96 59 28 10
2	Ministère de l'Energie et du pétrole,	Zakaonanou NOUHO , Directeur de l'électricité znouhou@yahoo.fr
3	Groupe de travail sur la maitrise de l'énergie	Sani IBRAHIM , Chef division Maitrise de l'Energie, ibrahimdak@yahoo.fr + (227) 96 2935 66 / 90 49 79 54
4	LEP ISSA BERI (Lycée d'Enseignement professionnel ISSA BERI)	FREI JB , Proviseur, jbcfec@yahoo.fr , + (227) 97 00 72 79 / 20 48 24 84
4	EMIG (Ecole de Mines de l'Industrie et de la Géologie)	Moustapha Atoumane KOSSO , Chef de Département Génie Electrique, + (227) 96 97 40 87
6	(CNES) Centre National d'Energie Solaire	Yahaya SALEY , Directeur Général, cnes@intnet.ne + (227) 20 72 39 23
7	SONICHAR (Société Nigérienne de Charbon d'Anou Araren)	Souleymane IBRAHIM ZAKARIA Directeur des exploitations, desou_zak@yahoo.fr +(227) 97 67 84 01
8	TOUTELEC NIGER SA	IDRISSA SOUNA ALI , Directeur Général, ali.idrissa@toutelec.ne , + (227) 94 13 13 95 / 90 60 74 02
9	Centre Technique Kalmharo	Ibrahim AMADOU , chef des travaux, ibrahim_2008@yahoo.fr , + (227) 96 99 71 16
10	Société Niger Services	Charles HOUNTONDI , Président Directeur Général, snsniger@orange.ne +(227) 20 34 01 30 / 20 34 01 24
11	CFPP (Centre de Formation et de Perfectionnement	Ari BOULAMA , Chef des travaux, cms_niger@yahoo.fr + (227) 96 96 14 37

	Professionnelle)	
12	FST (Faculté des Sciences, Département de Physique, université de Niamey)	Makinta BOUKAR , Enseignant chercheur, chef du département de physique, makinta@yahoo.fr +(227) 93 80 38 57
13	NIGELEC (Société Nigérienne d'Electricité)	Mamadou DIARRA Attaché DEI, mamadou_diarra@yahoo.fr , + (227) 96 56 11 61
14	PNUD Niger	Elhadj Mahamane lawali , Chargé de programme environnement-énergie, mahamane.lawali@undp.org +(227) 96 13 94 74

Mission au Burkina Faso from 11 to 14 January 2012 and February 2012 – List of persons contacted BURKINA FASO

Expert : Yézouma COULIBALY (2iE), yezouma.coulibaly@2ie-edu.org

Point Focal National ECREEE : DIALLO/IVANOVA Vera Directrice des Energies Renouvelables et des Energies traditionnelles, bbadolo@gmail.com

Point Focal Centres de formation : Yézouma COULIBALY, Chef de l'Unité Génie Energétique et Industriel de 2iE

N°	Structures	Personnes Ressources
1	DGE (Direction Générale de l'Energie) point focal CREREE	DIALLO/IVANOVA Vera Directrice des Energies Renouvelables et des Energies traditionnelles + (226) 50 47 65 70 / 70 25 32 25 Blaise B. BADOLO Ingénieur Electricien chef de service, bbadolo@gmail.com , + (226) 78 50 50 46
2	FDE (Fonds de Développement de l'Electricité)	Mme Marie-Blanche BADO , Directrice Générale, +(226) 50 31 02 47
3	AESE (Autorité de Régulation du Sous-Secteur de l'Electricité)	Mme Mariam Gui NIKIEMA , Présidente, riamniki@yahoo.fr , +(226) 50 32 48 17
4	BIB/UBA (Banque Internationale du Burkina membre du groupe United Bank of Africa)	Francis Zongo , Staff Corporate Service, francis.zongo@ubagroup.com + (226) 70 70 06 74
5	SGBB (Société Générale du Burkina Faso)	Marian DABIRA , Responsable logistique, + (226) 50 32 54 45
6	Banque Mondiale	Sedogo Leopold , Spécialiste Energie, lsedogo@worldbank.org + (226) 70 44 28 02
7	PNUD (Programme des Nations Unies pour le Développement) BF	Sawadogo ARMANDE , Chargé de programme, armande.sawadogo@undp.org
8	PPI BF (Projet Production Internationale)	Pierre MALDAME , Chargé de projet, pierre.maldame@ppi.industriel.com + (226) 71 44 67 10
9	CIPAM (Compagnie Industrielle Agricole Marchande)	Adama GANOU , chef d'usine, adama@cipam.bf + (226) 78 03 61 05
10	SOFITEX (Société Burkinabè des Fibres Textiles)	Arsène KOMPAORE , chef de service Energie, kompaore.arsene@sofitex.bf + (226) 76 66 01 17
11	SEB (Shaina Select Batiment)	S.A. Eric Aimé HIEN , Electricien Responsable SEB, shainabatiment@yahoo.fr ,
12	FILSAH (filature du Sahel)	Jean-Luc B. KIMA , Directeur Industriel, + (226) 70 75 45 00
13	SN CITEC (Société Nouvelle Huilerie et Savonnerie CITEC)	Jean-pierre MONTHUBERT , Directeur Général, sncitec@fasonet.bf , + (226) 20 97 25 50 /51
14	SOGETEL (Société Générale	(J. Allergue , Directeur)

	de Travaux et Construction Electriques)	Keltoum ONADJA BEKHTAOUI , Directrice Technique, sogetel@cenatrin.bf +(226) 50 34 25 70
15	2iE (Institut International d'ingénierie de l'eau et de l'environnement)	Yezouma COULIBALY chef de l'UTER Génie Energétique et Industriel, yezouma.coulibaly@2ie-edu.org , + (226) 78 75 80 62
16	IRSAT (Institut de Recherche en Sciences Appliquées et Technologies)	Xavier SAWADOGO Ingénieur Electro-Energéticien, ingénieur de Recherche xavier_swd@hotmail.com
17	ISGE (Institut Supérieur de Génie Electrique du Burkina Faso)	Gombila NIKIEMA , Directeur des études, nikiemamth@yahoo.fr
18	ISIG International (Institut Supérieur d'Informatique et de Gestion de Bobo Dioulasso)	Panka Nazaire KINI , Directeur Général, panaki_1@yahoo.fr + (226) 20 98 04 42 / 70 10 69 53
19	IN2SAT (Institut Supérieur des Sciences Appliquées et Technologies)	Amadou SANOU fondateur et coordonnateur, amadou_samou@hotmail.com + (226) 70 25 30 37
20	Direction Régionale de l'ANPE des Hauts Bassins (Bobo Dioulasso)	Karim SANOU Directeur Général, sanou_karim@yahoo.fr + (226) 70 741 60 94 / 76 96 96 15
21	IUT (Institut Universitaire de Technologie, Universitaire Polytechnique de Bobo Dioulasso)	Bétaboalé NAON , Directeur, betaboale.naon@univ-bobo.bf + (226) 70 22 92 93
22	CPFP DON BOSCO (Centre privé de Formation professionnelle Bobo Dioulasso)	Jose Javier PENA , Directeur, cpf_db_bobo@yahoo.fr , + (226) 20 97 10 85
23	Lycée professionnel Régional Guimbi Ouattara, Bobo Doulasso	Abou Georges TRAORE , Proviseur + (226) 20 97 62 70
24	Lycée professionnel Docteur Bruno Buchwieser (ex centre Austro, Ouagadougou)	Abou Dramane Héma OUATTARA , chef de travaux, abudra@hotmail.com , +(226) 70 84 26 76 : 76 60 70 62

Mission to Guinée Bissau from 29 - 31 janvier 2012 – List of persons contacted GUINEE BISSAU

Experts : Antúnio BARBOSA (UnivCV), antunio@yahoo.com et Robert SPENCER (UnivCV), robertspencer6@yahoo.com

Point Focal National ECREEE : **Biabé SIGA**, Chef de la division, biabesiga@yahoo.com.br,

Point Focal Centres de formation : **Emiliano Gomes**, Directeur du Centre

N°	Structures	Personnes Ressources
1	<p>Secretaria de Estado da Energia/Direcção Geral de Energia, point focal CREREE</p> <p>BP 311 – Bissau</p> <p>Guiné-Bissau</p>	<p>Biabé SIGA, Chef de la division, biabesiga@yahoo.com.br, +245 322 30 59 Cell +2456604971</p> <p>Júlio António RAUL, Directeur de Service des Energies Renouvelables et Efficacité, antoniobolo@yahoo.com.br, antonio2005@gmail.com</p> <p>Fernando José BENÍCIO, Directuer General de la Energie, fjbenicio@yahoo.com.br</p> <p>Portable +245 663 7221 ; Téléphone : +245 3203058/59</p>
2	<p>CENTRO DE INSTRUÇÃO E FORMAÇÃO ARTESANAL PROFISSIONAL – CIFAP – S. José</p> <p>Alto Bandim,</p> <p>B.P. 20 Bissau</p>	<p>Emiliano Gomes, Directeur du Centre, gomesemiliano@yahoo.com.br, +245 6608971 et 245 6520713</p> <p>bissau@muriado.org</p>
3	<p>ELECTRICIDADE E ÁGUAS DE GUINE-BISSAU</p>	<p>Mr Murilo</p>

**Mission au SENEGAL from 31 January - 5 February 2012 – List of persons contacted
SENEGAL**

Experts : António BARBOSA (UnivCV), antunio@yahoo.com et Robert SPENCER (UnivCV), robertspencer6@yahoo.com

Point Focal National ECREEE : **Lamine Diop**, Directeur des Energies Renouvelables, lapadio@hotmail.com

Point Focal Centres de formation : **Pape NDIAYE**, Directeur des Etudes, papaas.ndiaye@ucad.edu.sn

N°	Structures	Personnes Ressources
1	Direction des Energies Renouvelable	Lamine Diop , Directeur des Energies Renouvelables E-Mail : lapadio@hotmail.com Tel +221 33 88 95 200 Kader Diop , E Mail : Kader_diop@hotmail.com Ismael Lo , Chef de la Division Energie Solaire, Direction des Energies Renouvelables Ministère des Energies Renouvelables ; E-mail : gaideel1@yahoo.fr Tél. (bureau):+221 33 889 52 05 Faty Sana , Directeur Service Biocarburant et Biomasse Seynabou Kane , Kaneseynabou29@yahoo.fr
2	CNQP – Centre National de Qualification Professionnelle – BP 12099 Dakar – COLOBANE Fax + 221 33 832 1641 Tél. : + 221 33 832 6024 - + 221 33 832 3979 Site web : www.cnqp.org	Pape Amadou Bah , Directeur responsable du laboratoire, papamadoubah@yahoo.fr , +228 22 25 66 42
3	Université Cheikh ANTA DIOP de Dakar École Supérieure Polytechnique UCAD – BP 5085 Dakar-fann Tél. : + 221 77 819 6001 et + 221 77 634 5888 http://www.ucad.sn http://www.esp.sn	Pape NDIAYE , Directeur des Etudes, papaas.ndiaye@ucad.edu.sn , Pape Magatte TALL , tpapemagatte@yahoo.fr 00221 33 873 0014 (fixe) 00 221 77 643 4510 (portable)
4	Institut Sénégalais de	YACINE NDOUR , Directrice du Institut,

	Recherches Agricoles ISRA-SIÈGE, Bel Air, Route des hydrocarbures BP 3120, Dakar (Sénégal) Tél. : + 221 832 2431 – FAX : + 221 832 2427 E-mail : dgisra@isra.sn http://www.isra.sn	yacine.ndour@ird.fr ,
4	INFO ENERGIE infoen@info-energie.net	Boubacar TOURÉ , bouba_toure@hotmail.com Tel : 00221 832 60 24 ,Cell : 00221 776460814
6	ISADE – Institut Supérieur Africain pour le Développement de l’Entreprise ISADE, SA – 2, Place de l’Indépendance Immeuble SDIH 2 ^{ème} étage BP 3827 DAKAR RP Sénégal Tél. : + 221 33 822 2266 Mob : + 221 77 569 7253 E-mail : isade@orange.sn	Mamadou Falilou SAMBE , Directeur Général
7	Performances Expertise pour un Développement Durable Villa 318 Gibraltar 2 – BP 11497 Dakar (Sénégal) Tél. : (221) 33 823 0705 – Fax : (221) 33 823 8263 E-mail : performances@arc.sn	Bruno Legendre , Directeur, legendre@ariane-services.com , +221 77 644 7275
8	Centre de Formation Professionnelle et Technique Sénégal/Japon BP 8411 – VDN SUD FIDAK (CICES) www.cfpt-sj.sn et E-mail : cfptsj@orange.sn DAKAR (Sénégal) Tél. : (221) 33 869 8283 ; Fax : (221) 33 827 8881	Ousseynou GUEYE , Directeur, ogueye2@orange.sn , Portable : (221) 77 450 0267 Balla TIMERA , Directeur des Études, mdtim2@yahoo.fr Portable (221) 77 656 6883

Mission to GUINEE from 5 - 8 February 2012 – List of persons contacted GUINEE

Experts : Antúnio BARBOSA (UnivCV), antunio@yahoo.com et Robert SPENCER (UnivCV), robertspencer6@yahoo.com

Point Focal National ECREEE : Biabé SIGA, Chef de la division, biabesiga@yahoo.com.br,

Point Focal Centres de formation : Emiliano Gomes, Directeur du Centre

N°	Structures	Personnes Ressources
1	<p>Direction Nationale de l'Energie, point focal CREREE</p> <p>Tel +224 60270970 et + 224 62980558</p> <p>BP: 1217 Conakry</p>	<p>Mr NFaly YOMBOUNO, Chef de Division Energie Renouvelable, nfalyguelo@yahoo.fr</p> <p>Sourakata CAMARA, Directeur Nationale Adjoint, sourakatacamara@yahoo.fr, +224 30 45 1702 ; Portable : +224 60349647 ; +224 68493488</p> <p>IBRAHIMA Sylla Dinie, Responsable de la Section d'Energie Domestique, Tél. : +224 60521941 ; +224 68245614</p> <p>CAMARA Mamadou Samba, Ingenieur Chef Section Bioénergie, Tel. : 00224 65816854</p> <p>Mme Guilawogui Nancy vala, section Micro centrale Tel. : 00224 67394706 ; 00224 60394706</p> <p>Souma Mohamed Lamine, Ingenieur Electricien chargé de l'étude ,Division Energies Renouvelable Tel. : 00224 63168586/64254924 E.Mail Soumlamine74@yahoo.com</p> <p>Diallo Alpha Oumar, Ing Electricien Division ER Tel. : 00224 60571604/65123696</p> <p>Aly Bangoura, Ingénieur Mécanicien Tel. : 00224 64782967</p> <p>Aguibo Sow, Ingenieur Civil , chef de division Planification et Réglementation Energetique, Tel. : 00224 60270928/64516798/68516798 E. Mail sowaguibou53@yahoo.fr</p>

2	<p>ELECTRICITE DE GUINEE</p> <p>Direction Efficacité Energétique et de Lutte contre la Fraude</p> <p>Immeuble EDG – Cité chemin de fer – Kaloun</p> <p>BP 1463 Conakry - Guinée</p>	<p>Mme Conté Marie Diaby, Responsable Efficacité Energétique des Etudes Techniques, dyarie78@yahoo.fr, Tél. : (bureau) +224 30451948, (portable) +224 62 343029 ; (portable) +224 60 34 3029 ; (portable) +224 67 34 3029.</p> <p>Ansoumane Camara, Chef de Département Production Energie Renouvelable, ansou_cam35@yahoo.fr Tél. : (+224) 62546863</p> <p>Siba Koivogui, Ingénieur – Electricien, Chef de Département Efficacité Energétique, Tél. : +224 64 40 95 83 et +224 62 94 66 12</p>
3	<p>Université Kofi Annan</p> <p>Formateur</p>	<p>KOMARA, Traoré, Formateur, blykomara@yahoo.fr, +224 62 67 43 23</p>
4	<p>Institute Polytechnique – Université de Conakry</p>	<p>Dr. Sékou TRAORÉ, Directeur des Etudes, sktraore@gmail.com, +224 68332176</p>
5	<p>CENTRE DE RECHERCHE SCIENTIFIQUE DE CONAKRY ROGBANE- CERESCOR</p> <p>BP 1615 Conakry - République de Guinée</p> <p>Site web. : http://ipl.estis.net/sites/cerescor</p>	<p>Dr. Clotaire Gnan MAOMY, Ph-D in Technical Sciences, Directeur Général gnanclotaire@yahoo.fr, et dgcerescor@yahoo.fr</p> <p>Portable : +224 64 39 69 54 ; +224 68 52 35 40 ; +224 60 27 18 72</p>

Mission to The Gambia from 27 February – 02 March 2012 – Contacts GAMBIA

Expert : Ing. Joseph X. F. Ribeiro (KNUST)

Point Focal National ECREEE : **Modou Manneh**, Permanent Secretary, Ministry of Energy, afmanneh@yahoo.com,

Point Focal Centres de formation : **Dr. P. Gomez**, Acting Dean of Arts and Science, University of the Gambia, pgomez@utg.edu.gm

No.	INSTITUTION	PERSONNEL CONTACTED (With contact details)
1	Ministry of Energy, The Gambia	Modou Manneh , Senior Energy Officer, Ministry of Energy 2nd Floor Futurelec, Bertil Harding Highway, (+220) 9835172/3664047 Email: afmanneh@yahoo.com
2	University of The Gambia	Dr. P. Gomez , Acting Dean of Arts and Science, University of the Gambia P.O. Box 3530, The Gambia Email: pgomez@utg.edu.gm , Tel: +2203650013
3	National Agricultural Research Institute, NARI	Ansumana K. Jarju , Principal Research Officer, NARI Email: akjarju2000@yahoo.com
4	GAM Solar	Hans Noteboom , GAM – Solar Energy & Engineering Company Ltd. Manjai BB Highway, Kotu-East, P.O. Box 3493, Serrekunda, The Gambia, West Africa Tel: +220 4460189, Email: gamsolar@gmail.com , gamsolar.sales@gmail.com Website: www.gam-solar.com
5	Communications & Electrical Services (C.E.S)	Papa Sanneh , CEO, # 2 West Street, Kanifing South, The Gambia Tel:00220 – 9904160, 00220 – 7944160, Email: psanneh@hotmail.com
6	Public Utilities Regulatory Authorities (PURA)	Sokpo Ceesay , Deputy Director – Energy 94 airaba Avenue, Email: sec@pura.gm , +220 9917010
7	GreenTec – Environmental Solutions	Lenja Guenther , Consultant & Project Coordinator, Senegambia, Kololi, P.O.Box 464, Banjul, The Gambia, West Africa Phone: +220 6762622, E-Mail: consultant@greentechgambia.com , Web: www.greentechgambia.com
8	National Water and Electricity Company Limited (NAWEC)	Edrissa Jarjue , Transmission and Distribution Manager, Mamady Manjang, H/W, P. O. 609, Kanifing, The Gambia, Email: edijar77@yahoo.com , Tel: +220 9960594

9	Regional Solar Energy and Engineering Services	Seedou Barrow , Managing Director No. 5 Kairaba Avenue, P. O. Box 1252, Banjul, The Gambia, Email: regionalsolar07@hotmail.com
1	Swe-Gam Company Ltd	Ebrima Cole , Managing Director / Technician 21 treet East Kanifing Industrial Estate, Email: swegam@gamtel.gm
1	ABC Gaye	Alhaji B. C. Gaye , General Manager Kanifing Housing Estate, block F.45, Email: abcgaye@yahoo.com , Tel: +220 9938575
1	Concern Universal	Katie Tiller , Project Support Officer, Donor Liaison and Grants Coordinator P. O. 2164, Serrekunda, The Gambia, Tel: +220 449 4473, Mob: +220 7157987 Fax : +220 4494474, Email : katie.tiller@concern-universal.org Website: www.concern-universal.org
1	Trust Bank	Tumani Dembajang , Deputy Manager 3-4 Ecowas Avenue, Banjul, Email: tumani.d@tblgambia.com
1	Sun Power	Mr. Ebrima Jammeh , General Manager 18 nglesea Street, Banjul, The Gambia, Email: ibrahimdiame@yahoo.com
1	ESEIM Solar Company Ltd	Mr. Gibbi Jallow , Technical Manager Bijilo Sene – Gambia Highway , Bijilo, +220 7710131
1	Power Systems Engineering	Byron Christopher Dean , General Manager / Chief Engineer 52 ait Matty Rd. , Bakau, Email: leroipoisson2002@gmail.com
1	ComAfrique	Ram Mohan, General Manager Famara Dampha, Implementation and Sales, No. N103, First Floor, “The Village” Bertil Harding Highway, Kololi, P. O. Box 2389, Serrekunda, The Gambia Tel: +220 9965771, +220 3365771, +220 3336224, +220 3908892 Email: rammohangambia@gmail.com , Website: www.comafrique.gm
1	LED Lighting Solutions Ltd	Mr. Malcolm Robertson, 49 Garba Jahumpa Road, Bakau New Town, The Gambia, Email: malcolm@ledlightingsolutionsltd.net
1	Solar Project Gambia / Solar Association Tiloo	Eva Jaiteh, Manager Email: tiloogambia@gmail.com , Tel: +220 – 7053822
2	GREC	Adama Gassama , Energy Officer Email: adagas@hotmail.com

Mission to Liberia from 26 February – 03 March 2012 – Contacts LIBERIA

Expert : Julius Cudjoe Ahiekpor (KNUST)

Point Focal National ECREEE: Augustus V. Goanue, Executive Director, Rural and Renewable Energy Agency, gusgoanue@yahoo.com,

Point Focal Centres de formation :

No.	INSTITUTION	PERSONNEL CONTACTED (With contact details)
1	Ministry of Lands, Mines and Energy	Sylvester Massaquoi , Director of alternative Energy, satmquoi@yahoo.com , +231-886.522.634
2	Rural and Renewable Energy Agency	Augustus V. Goanue , Executive Director, gusgoanue@yahoo.com , +231-886.559.266. Stephen Potter , Technical Services Director, stephenvpotter@yahoo.com , +231-886.525.505
3	Dept Electrical Eng, University of Liberia	Jackson L. Tamba, HOD , jltamba@yahoo.com , +231-777.859.370, Adolphus Nippae , aanippae@yahoo.com , +231-886.560.919.
4	Stella Maris Polytechnic	Julius E. Adighibe, Dean of Technical College , jezeadighibe@yahoo.com , +231-886.510.867
5	Centre for Sustainable Energy Technology	Hady M. Sherif, Executive Director , mhsherif@cset.org , +231-886.513.489
6	Malaya Energy/Petroleum and Environment Consultancy Group Inc.	Mr. Jacob Sandikie, Executive Director, saawallo@yahoo.com , +231-886.578.336
7	Solar Technology Inc.	Mr. Reginald Gardiner , Managing Director, reggiegardiner@yahoo.com , +231-886539591
8	Alternative Energy Inc.	Thomas M. Kpoto , CEO, aeliberia@yahoo.com , +231-886526509
9	SDEJI Green Energy	Royston Gbelia , Chief Finance Officer, rgbelia@yahoo.com , +231-880747924
10	WINROCK International/LESSP (USAID-Funded) ³	Mr. Russ Brown ,
11	UNDP ¹	Moses Massah

Mission to Nigeria from 27 February – 02 March 2012

Mission to Nigeria from 27 February – 02 March 2012 – Contacts NIGERIA

Experts : Edward Antwi

Point Focal National ECREEE:

Point Focal Centres de formation :

No.	INSTITUTION	PERSONNEL CONTACTED (With contact details)
1	Ministry of Power	Engr. Peter O. Ewesor , Deputy Director, ogetomeegbe@yahoo.co.uk 08036745149
2	Bank of Industry	Segun Adaju , Project Manager, segunadaju@yahoo.com , +234802407468
3	SolarForce Company	Arinze Obiora Head of Engineerring, info@solarforce.com +234.09.874.8313
4	Energy Commission of Nigeria	Dr. Dioha , Deputy Director, diohaj@yahoo.com
5	Ecobank Nigeria	Mr. Faruk , Head EBJ. FCT North, farukillo@live.com , 08030956620
6	Ministry of Environment, Renewable Energy Section	Engr. Mrs Bahijjahtu Abubakar , National Coordinator, bahijjah@yahoo.com , +2337037877034
7	Ministry of Science and Technology	Dr. S. O. Fadoju , Ag. Director, Fadoju2001@yahoo.com . +2348059687783/8023534383
8	Nigerian Electricity Regulatory Commission	Engr Chinedun O. Ukabiala , Deputy General Manager, cukabiala@nereng.org +2348055160180
9	UNDP (GEF)	Etiosa Uyigue , National Project Coordinator, etiosa@credcentre.org +2348028978877
10	Foresight International Company	Mr. Itodo John Job , Project Manager, Itodo78@yahoo.com , 08064323996
11	Simba Group Nigeria	Paul Maiiga , Sales Manager, paul@simba.com.ng +2348052443546
12	Access Bank	Yemi Ola , yemi.ola@accessbankplc.com
13	National Centre for Hydropower Research and Development (NACHRED)	Prof. B.F. Sule Director, nachred@unilorin.edu.ng , 234 803 745 6689
14	Centre for Energy Research and Development	Hassan Yahya Nawawi (Focal Point) enquiry@cerd.gov.ng , secretary@cerd.gov.ng , +(234) 36 234036, +(234) 803 407 2001
15	National Centre For Energy and Environment	info@ncee.org.ng , +2348023353847
16	Rubitec Nigeria Limited	info@rubitecsolar.com , bolades@rubitecsolar.com , +234 (1) 773 9108, +2348034499670

Mission to SIERRA LEONE from 27 February – 02 March 2012

Expert : MIZPAH ASASE

Point Focal National ECREEE: Yvette Stevens, stevensye@yahoo.com, Ministry of Energy and Water Resources

Point Focal Centres de formation :

No.	INSTITUTION	PERSONNEL CONTACTED (With contact details)
1	African Development Bank	Ibrahim Babangida, Wilson , i.wilson@afdb.org
2	Environmental Foundation for Africa	Tommy Garnett , tgarnett@efasl.otg.uk Tel: +232 76611410
3	Addax Bioenergy Sierra Leone	Dr. Andrew Turay , +232 76697032
4	Fourah Bay College	Dr. Kelleh G. Mansaray , mansarayk@yahoo.com Tel: +232 78476527
5	Energy for Opportunity	Chernor Maryn Jalloh , jalloh@energyforopportunity.org , Tel: +232 78615384
6	Government Technical Institute	Mohammed A. B. Kamara , jeabimagball@yahoo.com , Tel: +232 76646920
7	Supreme Ventures INC.	Alie Lamin , Lamin.alie@gmail.com , Tel: +232 78309251
8	Standard Chartered Bank SL Ltd.	Kumba Ngongou , kumba.ngongou@sc.com
9	Ministry of Energy and Water Resources	Yvette Stevens , stevensye@yahoo.com , Tel: +232 76611419
10	UNIDO	Stephen Baines Kargbo , s.Kargbo@unido.org , Tel: +232 78620380
11	Njala University	John Mambu Koroma , Mambu_koroma@yahoo.com , Tel: +232 33652256
12	UN FAO	Lidia Martinez Frances , Lidia.martinez@fao.org , Tel: +232 78003629
13	Rural Commercial & Domestic Solar Co. Ltd.	Crispin Gray , crispingee@yahoo.com , Tel: +232 76617883
14	EPA Sierra Leone	Dr. Kolleh A. Bangura , Kolleh.bangura@gmail.com , Tel: 76268409
15	World Bank	Fatu Karim-Turay , fkarimturay@worldbank.org , Tel: +232-76 605 622
16	Safer Future	Idriss Kamara , Idriss.kamara@gmail.com , Tel : +232 76607990
17	The Environmental Forum for Action	Mr. Ansumana Swarray , +232 76463653
18	GIZ	Marina Mdaihli , Marina.mdaihli@giz.de
19	ECOBANK Sierra Leone	Aina Moore , amoore@ecobank.com , Tel : +232 78222248

20	Ministry of Agriculture and Food Security	
21	USAID	Jean E. Benedict , jbenedict@usaid.gov , Tel: 232 -76-515000 ext. 5200

Mission in GHANA. March 2012

Expert : Mispah Asase

Point Focal National ECREEE: Kwabena Otu-Danquah, Head of Renewable Division,
K.a.otudanquah@gmail.com

Point Focal Centres de formation : Energy Commission

No.	Institution	PERSONNEL CONTACTED (With contact details)
1	Ministry of Energy	Turkson Dennis , Monitoring Officer, denturk@gmail.com , +233 302 668 048
2	Energy Commission	Kwabena Otu-Danquah , Head of Renewable Division, K.a.otudanquah@gmail.com , +233 302 813 756, +233 546 995 989
4	Ministry of Environment, Science & Technology	Peter Dery , CDM Focal Person, peterdery@yahoo.com , +233 243646749
5	VRA	Jonathan Walker , Electrical Engineer, jonathan.walker@vra.com , +233543084365
6	Energy Centre, KNUST	Prof. Abeeku Brew-Hammond , Director, abeeku@brewhammond.com , +233 202 013 625
8	Energy Systems, Koforidua Polytechnic	Richard Arthur , Senior Lecturer, richard.arthur@koforiduapoly.edu.gh , +233 244 748 252
9	Energy Foundation	Stephen Duodu , Technical Director, sduodu@yahoo.com , +233-302515610 +233 302515611
10	KITE	Clement Nartey , Assistant Projects officer, enartey@kiteonline.net , +233-302256800 +233-243936523

11	CEESD	Julius C. Ahiekpor , Director, juliusahiekpor@ceesdghana.org , +233 244 529589, +233 201 786800
12	DENG	Hellena Buabeng , Administrative secretary, hbuabeng@dengltd.com , +233 302 257 100 +233 302 257 099, +233 302 233 779
13	SNV	Sarah Naa Dedei Agbey , Senior Advisor, nagbey@snvworld.org , +233 302-776198/ 775240/ 772858/ 774782
14	GIZ (GTZ)	Karsten Posse , Deputy Country Director, operations, Karsten.Posse@giz.de , +233 302 777375, +233544337450
17	JICA	Osamu Sakurai , Project formulation advisor, sakurai.osamu@jica.go.jp , +233302760781/2, +233544347974
18	Ecobank	Musa Salah , Regional Account Manager, UN, Agribusiness & Climate Initiatives, msalah@ecobank.com , +233302 680437 / 681167/8