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# EVALUATION

## Final Performance Evaluation of the USAID West Africa Energy Portfolio 2009-2014

**Draft Evaluation Report**

**July 2015**

This document was prepared at the request of the United States Agency for International Development (USAID). It was prepared by the Analytical Support Services and Evaluations for Sustainable Systems (ASSESS) activity, a partnership of the United States Department of Agriculture/Foreign Agriculture Service (USDA/FAS), the University of Rhode Island (URI), Delaware State University (DSU), and Kwame Nkrumah University of Science and Technology (KNUST).

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**USAID Cognizant Technical Office: USAID West Africa Regional Trade and Investment Office**

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# ACRONYMS

<b>ADS:</b>	Automated Directive System
<b>AEC:</b>	African Economic Community
<b>AfDB:</b>	African Development Bank/Banque Africaine de Développement.
<b>AIP:</b>	Africa Infrastructure Program (USAID Africa Bureau)
<b>ARE:</b>	Agencia de Regulação Económica (Cape Verde)
<b>ASSESS:</b>	Analytical Support Services and Evaluations for Sustainable Systems
<b>AU:</b>	African Union
<b>BOAD:</b>	Banque Ouest Africaine de Développement/West African Development Bank
<b>CAPEX:</b>	Capital expenditures
<b>CB:</b>	Capacity Building
<b>CBPI:</b>	Capacity Building Initiative
<b>CDCS:</b>	Country Development and Cooperation Strategy (USAID)
<b>CEB:</b>	Communauté Electrique du Bénin
<b>CEET:</b>	Compagnie d'Énergie Electrique du Togo
<b>COMESA:</b>	Common Market for Eastern and Southern Africa
<b>DAC:</b>	Development Assistance Committee
<b>ECCAS:</b>	Economic Community of Central African States
<b>ECG:</b>	Electricity Company of Ghana
<b>ECOWAS:</b>	Economic Community of West African States
<b>ECREEE:</b>	ECOWAS Regional Center for Renewable Energy and Energy Efficiency
<b>EE:</b>	Energy Efficiency
<b>EIA:</b>	Energy Information Administration
<b>EREI:</b>	Renewable Energy Investment Initiative
<b>EREP:</b>	ECOWAS Renewable Energy Policy
<b>ERERA:</b>	ECOWAS Regional Electricity Regulatory Authority
<b>ESIA:</b>	Environmental and Social Impact Assessment
<b>GCC:</b>	Global Climate Change
<b>GHG:</b>	Greenhouse Gas
<b>GRIDGO:</b>	Grid Company of Ghana
<b>ICC:</b>	Information and Coordination Center (WAPP)
<b>IL:</b>	Implementation Letter(s)
<b>IMF:</b>	International Monetary Fund
<b>IP:</b>	Implementing Partner(s)
<b>KNUST:</b>	Kwame Nkrumah University of Science and Technology

<b>LCOE:</b>	Levelized cost of energy
<b>NARUC:</b>	National Association of Regulatory Utility Commissioners
<b>OECD:</b>	The Organization for Economic Co-operation and Development
<b>PA:</b>	Power Africa
<b>PPP:</b>	Public-Private Partnership(s)
<b>RDCS:</b>	Regional Development Cooperation Strategy
<b>RTIO:</b>	Regional Trade and Investment Office (U.S)
<b>SADC:</b>	Southern African Development Community
<b>SBEE</b>	Société Béninoise d'Énergie Electrique
<b>SENELEC:</b>	Société Nationale d'Électricité du Sénégal
<b>SSA:</b>	Sub-Saharan Africa
<b>SWOT:</b>	Strengths, Weaknesses, Opportunities, and Threats
<b>TEFS:</b>	Techno-Economic Feasibility Study
<b>UEMOA:</b>	Union Economique et Monétaire Ouest-Africain
<b>UMA:</b>	Maghreb Arab Union States
<b>USAID:</b>	United States Agency for International Development
<b>USDA:</b>	U.S. Department of Agriculture
<b>USG:</b>	United States Government
<b>WACC:</b>	Weighted Average Cost of Capital
<b>WACEE:</b>	West African Clean Energy & Environment
<b>WAGPA:</b>	West Africa Gas Pipeline Authority
<b>WAPP:</b>	West African Power Pool

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The team would also like to thank the following Implementing Partners and ECOWAS Institutions representatives for the time spent with the evaluation team during the field work and remote consultation, and for sharing relevant documentation: NEXANT, NARUC, WAPP, ERERA, WAGPA and ECREEE. Special thanks go to the ECREEE Executive Secretary for spending time with the team in providing useful information and guidance, and to the WAPP Secretariat in Cotonou for organizing meetings with Power Utility stakeholders in the WAPP Offices.

Finally, the team thank representatives from various Power Utilities, Regulatory Agencies and Government Counterparts, for sharing useful information. The team appreciates the time they took to participate in the online survey undertaken for this report, and those (notably, SBEE in Benin, GRIDCo and ECG in Ghana, and ARE in Cabo Verde) who spent time to participate in the interview sessions during the field work.

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<sup>1</sup> "The team" is referring to the Evaluation team

# EXECUTIVE SUMMARY

This Report constitutes a Final evaluation of the USAID West Africa 2009-2014 Regional Energy Portfolio. It covers activities undertaken initially in response to African development priorities in conjunction with the Global Climate Change Initiative (GCC), and revised in response to the U.S. Power Africa initiative of 2013. The report is intended to assist African partner institutions in general, and ECOWAS in particular, to fulfill the goal of greater access to clean energy. It also provides a focus for USAID West Africa in the choice of priority funding activities to meet these goals within the framework of Power Africa and the Global Climate Change Initiative in the period ahead.

The operating hypothesis of USAID West Africa is straightforward: *“If the ECOWAS institutions (WAPP, ECREEE, WAGPA and ERERA) are effectively strengthened, then more regional investments in energy and efficient energy generation (in hydro, associated gas, solar, and wind) will help to offset over-reliance on fossil fuels.”* A corollary to this is that greater investments in clean energy that result in greater access rates will result in higher levels of per capita income among member countries in the region.

In support of the 2013 Power Africa framework and the Global Climate Change Initiative (GCC), the USAID/West Africa Mission is committed to a well-designed technical assistance program to enhance the capacity of the ECOWAS West Africa’s energy stakeholder institutions – the West Africa Power Pool (WAPP), the ECOWAS Center for Renewable Energy and Energy Efficiency (ECREEE), the ECOWAS Regional Energy Regulatory Authority (ERERA), and the West Africa Gas Pipeline Authority (WAGPA) - to increase electricity access rates through investments that produce greater use of clean energy technologies. USAID/West Africa’s Regional Trade and Investment Office (RTIO) has designed and implemented programs to achieve these objectives.

The Regional Energy Portfolio has focused on three strategic objectives: 1. Facilitate cross-border trade in energy in West Africa, 2. Leverage private investment in late-stage renewable energy generation technologies, and 3. Develop regional public-private partnerships to assist ECOWAS in the transition to a sustainable clean energy future.

USAID West Africa has spent a total of \$6,102,858.89 to deliver Capacity Building, Technical Assistance and knowledge and information sharing services on a variety of mechanisms that constitute the portfolio. USAID West Africa has implemented its energy portfolio objectives through key Implementing Partners (IPs), notably NEXANT Inc., a Washington, D.C. Technical Services Consulting firm, NARUC, the National Association of Regulatory Utility Commissioners, also based in Washington, D.C. and WAPP.

The evaluation has been conducted through documentation review, field visits and interviews with core stakeholders and IPs, as well as online questionnaires directed at primary beneficiary institutions. Criteria used for the evaluation were: 1. Relevance; 2. Efficiency and Effectiveness; 3. Impact; 4. Sustainability; and 5. Lessons Learned. The methodology and specific questions used in reference to these criteria are contained within the report.

Key findings of the evaluation are as follows:

- 1. *Relevance: To what extent have energy program activities been in line with priorities set forth in their respective objectives and how do they address key areas of increased access and energy supply in the region?*** Overall, the USAID West Africa Energy portfolio is relevant and aligned with regional energy policy and with priorities of regional ECOWAS institutions. Capacity building and technical assistance approaches appeared to be critical activities for the regional institutions as they are building principles, procedures and policies in the setup of a regional electricity market and regulatory environment. This said, the team notes the following in particular:

- a. ECOWAS, the main umbrella and regional organization that drives and coordinates the different institutions, does not yet have a clear comprehensive planning process that can integrate its institutions into a more coherent and dynamic framework in which progress can be measured by well-defined indicators and benchmarks. For the present, without a well-defined business plan, USAID energy interventions, while relevant to individual ECOWAS energy implementing institutions, fall short of bringing an essential dynamic framework through which the various actors and markets can realize the full potential of improving access rates of clean energy in a sustainable fashion, and in response to the needs of a growing population within the region.
- b. USAID/WA's use of different mechanisms in implementing activities does not rely on a common set of well-established benchmarks that could permit better understanding and integration of USAID and ECOWAS common goals and objectives. While the 2013 Power Africa program may encourage greater coherence in the formulation and implementation of activities in the period ahead, the absence of common benchmarks is a constraint for the adoption of coherent planning and funding decisions.
- c. Funding mechanisms of USAID have tended to operate through targeted efforts in capacity building and technical assistance among individual implementing institutions (WAPP, ECREEE, ERERA, and WAGPA) similar to a "silo approach" rather than a more coherent integrated pursuit of the underlying goal of greater access to clean energy. While USAID/WA has supported donor coordination meetings in the past that could help reduce overlapping jurisdictions in terms of ECOWAS priorities, there is a lack of sufficient coordination across ECOWAS institutions.

**2. Efficiency and Effectiveness: To what extent is the energy program on target to achieve its objectives and intended results and, what are the factors influencing the achievement and non-achievement of the objectives?** Overall, USAID has achieved some degree of efficiency and effectiveness in the 2009-2014 portfolio of energy activities. The extent to which funding has produced measurable outcomes is somewhat mixed. In particular, the team finds:

- a. USAID helped WAPP to develop and improve energy trading via system monitoring and standardized agreements on trading and power purchasing, along with the adoption of electricity market rules and procedures for governance, metering, and contract settlements. At the same time, the magnitude of short-term energy trading of the kind for which stakeholders were trained with USAID assistance has yet to realize full operational potential.
- b. Through USAID capacity building, NEXANT helped ECREEE to develop a business plan in 2010 that enabled the crafting of a 2012 ECOWAS Renewable Energy Policy. The 2012 Renewable Energy Plan contains time-dated benchmarks for the proportion of electricity to be delivered by renewable energy technology capacity to increase from a zero base in 2010 to 10% of peak load in 2020, and 19% by 2030. Such performance benchmarks are essential in identifying funding challenges and in crafting suitable public-private partnerships.
- c. Training in operating system management has resulted in shorter outage time periods in power utilities, and has reduced the time involved in project feasibility preparation. At ERERA, USAID funding of training has resulted in the adoption of a five-year Strategic Plan with suitable benchmarks that could be used to evaluate performance.
- d. USAID short-term technical experts have been instrumental in assisting with the development of a standardized Operation Manual that can facilitate operations and energy trading, including the preparation of Tender documents and associated negotiation instruments. As regional training centers that would use this Manual are still in the early stage of development, there is not sufficient information on which to formulate findings as to the efficiency and effectiveness of the Operation Manual.
- e. Through NARUC, the USAID West Africa program has supported the development of a regulatory document, *Principles of Regulating Clean Energy in the ECOWAS Region*. This

document provides an inventory of fundamental assumptions, approaches and best practices in the field of clean energy and serves as a practical guide for ECOWAS regulators to facilitate the integration of clean and modern energy practices into evolving traditional energy markets. However, its adoption is at an early stage and therefore sufficient information is not available to determine the extent to which the document has resulted in greater efficiency and effectiveness in operational decisions.

3. **Impact: What changes (positive/negative; intended & unintended) have occurred to date that can be reasonably linked to energy program interventions?** Based on reports and interviews, some degree of success has been achieved through USAID West Africa's funding. In the absence of suitable benchmarks, the team relied to a considerable extent on proxy data to assess the impact of the USAID Regional Energy Portfolio, using data drawn from a mix of ECOWAS and World Bank Development Indicators, as noted in the report. The team finds:
  - a. For ECOWAS countries overall, access rates to electricity have increased from an un-weighted average of 22.5 percent in 1990 to 34 percent in 2010. Despite the success noted here, access rates to electricity in the region are still below those for many other regions. The capacity building and technical assistance of the USAID West Africa program has contributed to the increase in access rates, though by how much can only be explained through additional information on leveraging investments by source and by measurable output performance indicators on ECOWAS implementing institutions.
  - b. A comparison of ECOWAS installed and planned electricity generation capacity for 2012 provides some measure of the extent to which the goal of clean energy is being realized. If fully implemented, 2012 data point to an increase in the clean energy share of generating capacity rising from 23 to 40 percent. USAID technical assistance and capacity building has contributed to the expansion of clean energy technology in the region.
  - c. Using World Bank data, there is evidence of progress in addressing the challenge of global climate change. As per capita incomes in West African countries have risen, so too have levels of per capita energy consumption and per capita environmental emissions. As real per capita GDP in ECOWAS countries expands, so too will per capita environmental emissions. At the same time, investments in clean energy and reducing technical losses have resulted in a drop in environmental emissions intensity, that is, the ratio of kilograms of carbon dioxide per \$2005 dollar of GDP – from .5091 in 1990, to .5012 in 2000, to .4739 in 2010. As long as per capita environmental emissions grow more slowly than per capita GDP, then environmental emissions intensities will continue to decline, which is assessed as a positive achievement for ECOWAS and for the USAID West Africa Regional Energy Portfolio.
  - d. In terms of energy traded, ECOWAS reports analyzed in this evaluation show that for electricity in West Africa, trade currently accounts for approximately 15 percent of all consumption. At the same time, much of this reflects long-term contracting rather than a short-to-medium term market trading mechanism as embodied in some of the training provided to WAPP. USAID's technical assistance and capacity building have been supportive of the expansion of an energy trading market system in the region. However, it is difficult to apply a more detailed benchmark evaluation of the degree of success in regional energy trading.
4. **Sustainability: What mechanisms have been put in place to ensure sustainability of the energy program achievements and what is the potential for sustaining these benefits in the medium to long term?** USAID's West Africa energy portfolio has produced elements that could lead to sustainable outcomes for the future. However, an ECREEE Business Plan, an ERERA Strategic Plan, and a WAPP Roadmap framework on clean electricity pricing do not in and of themselves guarantee sustainability, especially when viewed in reference to a lack of institutionalization of key technical skills and capacity building thus far achieved. In this regard, the team notes:

- a. Electricity tariffs vary widely across ECOWAS member countries. A 2009 study by UPDEA that was undertaken with USAID support revealed the extent of tariff variation. While there are no long-term time series data from which to draw robust conclusion, tariff divergence makes it difficult to move forward with regional energy trading despite the enabling legislation that could support sustainability. As noted in the Power Africa 2015 Annual Report, cost-reflective retail tariff structure is a challenge for the successful implementation of the clean energy access rate goals on which decisions have thus far been made.
- b. Technical assistance and capacity building training programs have expanded the ability of ECOWAS implementing partners to address the challenge of expanding investments to improve clean energy electricity access rates, inevitable turnover of ECOWAS implementing institution staff raises the question of whether achievements can be sustained. At various points in this evaluation, references are made to Regional Centers of Excellence that could take up the task of sustaining capacity within ECOWAS institutions and across beneficiary national electricity generation and transmission entities. In principle, these Centers could assure continuity and sustainability of skills and knowledge, but as they are still in an early stage of development, it has not been possible to draw closer observations that could enable reasonable judgment on the sustainability of operations.
- c. The absence of an integrated business planning framework that encompasses all ECOWAS implementing institutions makes it difficult to identify greater leveraging opportunities for public-private partnerships in the pursuit of clean energy access. As one illustration, the current impasse on renewing funding for the Ex-Im Bank poses a challenge on how investments in the region can move forward with a measure of certainty. A business planning framework that would permit the periodic review of scenarios on which funding decisions are made is not yet in place.

**5. Lessons learned: What best practices, lessons learned need to be capitalized to improve the Energy program?** The team finds overall that the USAID/WA energy program has been consistent in its support of ECOWAS Institutions' efforts to increase access to clean and sustainable energy through a new and functional regional power pool. Despite inconsistencies in the implementation of various intervention mechanisms, this is a significant achievement on the part of USAID that can serve as a success story. In addition, the team notes:

- a. While programming by USAID West Africa to individual ECOWAS institutions in terms of technical assistance and capacity building has been notable, what is referred to as the "silo approach" is inadequate to sustain expanded public-private partnership investments to meet the goals of ECOWAS and Power Africa.
- b. The absence of common outcome performance benchmarks makes it difficult to achieve a more coordinated approach to technical assistance and capacity building training decisions. This constrains the ability to achieve greater leveraging of private sector investments in clean energy in the region, which in turn is likely to result in slower pace of increase in access rates to clean energy across ECOWAS member countries.
- c. While Power Africa may result in greater coherence in planning decisions, the absence of mid-term performance reviews thus far has made it difficult to better evaluate the Regional Energy Portfolio's achievements and potential in terms of the alignment of goals with ECOWAS and participating donor institutions.

**Recommendations for the way forward:**

- I. USAID/WA should re-organize its interventions by using an integrated portfolio approach and a minimum of mechanisms for WAPP, ECREEE, ERERA and WAGPA to be harmonized within the Power Africa and the Regional Development Cooperation Strategy (RDCS). This simplified portfolio approach should revolve around clearly defined common performance benchmarks that can be used to determine how well program activities are working relative to stated goals, to revise as necessary measures critical to keeping the energy program on track, and to assess

public and private funding constraints and opportunities. Reaching out to regional stakeholders to achieve a consensus on the simplified approach is an important first step in moving forward as new funding recommendations are put forth. Along the way, USAID should look to the roles of national governments and agencies in achieving a consensus, and whether they view ECOWAS as the best implementing stakeholder through which to achieve the goal of greater access to clean energy technologies.

2. For the future, USAID should work more closely with the ECOWAS Secretariat to develop a market-focused development plan that ensures greater cooperation across ECOWAS institutions. This development plan should be constructed with a business framework that defines a clear set of performance benchmarks common to all implementing institutions that are tracked on a regular reporting basis, where investments can be tracked relative to benchmarks, and where explicit steps are included to attract greater public-private partnership participation through donor coordination meetings, investment promotion forums, and similar marketing efforts.
3. To leverage sufficient investment in helping to realize the goal of greater energy trading mechanisms in the region, USAID/WA should promote the participation of the private sector organizations in the ECOWAS Energy Institutions and donor forums. This will facilitate movement towards a more inclusive PPPs outreach platform that will establish a clearer understanding of energy investment opportunities.
4. To build on achievements thus far, USAID should work with ECOWAS to institutionalize technical skills thus far achieved in ECOWAS stakeholder institutions. More specifically, the team recommends the institutionalization of training of trainers within ECOWAS institutions so that knowledge sharing and skills may be transmitted integrating staff retirements and new recruitment. In-house training programs will better ensure continuity and transmission of critical skills over time. Toward this end, USAID should work closely with the ECOWAS secretariat in helping them to ensure that training of trainers and regular training of staff by these trainers be done in as efficient a manner as possible for all implementing and beneficiary stakeholders.
5. USAID should work with ECOWAS to develop a regional energy information data system that incorporates information on expanding capacity of generation and transmission and distribution levels with electricity access rates, individual and system outage rates, electricity tariffs throughout ECOWAS, taxes and subsidies on energy across ECOWAS member countries, along with basic tracking data on per capita income, the distribution of income, rates of return to sectoral investments, and transparency incentives to promote greater participation in regional energy markets. At present, as these elements exist only in fragmentary and episodic performance and evaluation documents, consistency and transparency of such information is essential in any regional planning strategy for the future.
6. USAID should link its energy portfolio strategy to complementary measures that address ongoing issues of economic reform across member countries that affect regional patterns of trade in all forms, including how monetary and fiscal policies within ECOWAS can be better coordinated to achieve common goals over a given time. While initial efforts to create a common currency, the eco, as one element in such a larger framework, have started, further studies and technical assistance on how greater economic integration overall can proceed will do much to assist USAID's energy portfolio to achieve the goals already established.

# I. INTRODUCTION

The USAID/West Africa Mission has commissioned the Analytical Support Services and Evaluation for Sustainable Systems (ASSESS) activity to conduct a performance evaluation of the U.S. Regional Trade and Investment Office's (RTIO) energy portfolio programs and projects implemented in the last five (5) years (2009-2014). The outcome of this evaluation is expected to help the West Africa Mission better understand what the implemented programs and projects have achieved with respect to the RTIO's main objective of improving access to affordable energy by increasing investments in the sector, and as aligned with Regional Development Cooperation Strategy initiatives (RDSCS).

## I.1 USG Energy Initiatives and the USAID West Africa Energy Program

The lack of reliable electricity is a key constraint to increased trade and broad-based economic growth in West Africa. In 2011, some 599 million, or 47.6 % of Sub-Saharan Africa's population did not have access to reliable electricity, posing significant limitations on the expansion of income in the region<sup>2</sup>. Underinvestment in the region's power sector has negative consequences for opening factories, processing food and, ultimately, for poverty reduction. The energy program of the Regional Trade and Investment Office (RTIO) at USAID/West Africa (WA) is designed to improve access to energy through increased investment and trade in the sector in West Africa. It does so through affiliate institutions of ECOWAS, the Economic Community of West African States<sup>3</sup>.

The hypothesis for the USAID/West Africa Mission's energy portfolio reads as follows: If the ECOWAS institutions (WAPP, ECREEE, WAGPA and ERERA)<sup>4</sup> are effectively strengthened, then more regional investments in energy and efficient energy generation (in hydro, gas<sup>5</sup>, solar, and wind) will help to offset over-reliance on fossil fuels. These investments in clean energy will promote economic growth along an economic and environmentally sustainable path.

The USAID/West Africa Mission is committed to a well-designed technical assistance program to enhance the capacity of the WAPP, ECREEE, ERERA, and the West Africa Gas Pipeline Authority (WAGPA) institutions to leverage public and private sector investment for clean energy in the region. Expanded leveraging capacity supports the ECOWAS and partnering institutions shared goal of sustainable economic growth through a shift to renewable energy resource technologies (RE) that, by lowering dependence on fossil fuels, bring about reductions in greenhouse gas emissions (GHG). As this transition to renewable technology clean energy expansion is strengthened, it will

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<sup>2</sup> The International Energy Agency's *World Energy Outlook* tracks electricity access rates around the world. Africa has the lowest rate of electricity access, which new initiatives are designed to address.

<http://www.worldenergyoutlook.org/resources/energydevelopment/accesstoelectricity/>

<sup>3</sup> ECOWAS, the Economic Community of West African States, was established by the Treaty of Lagos signed on May 28, 1975. Francophone countries in ECOWAS include: Bénin, Burkina Faso, Côte d'Ivoire, Guinée Conakry, Mali, Niger, Sénégal, and Togo. Mauritania withdrew its membership in 2002 to join the Maghreb Arab Union States (UMA). Lusophone members of ECOWAS include Guiné-Bissau and Cape Verde. When added to the Anglophone countries of Gambia, Ghana, Liberia, and Nigeria, ECOWAS total country membership stands currently at fifteen (15). Headquartered in Abuja, Nigeria, data on ECOWAS programs and activities can be found at: <http://www.ecowas.int/>. ECOWAS constitutes one of five regional groups that constitute the African Economic Community (AEC), a subsidiary entity of the Africa Union (AU). The other regional groups are: COMESA (The Common Market for Eastern and Southern Africa), ECCAS (the Economic Community of Central African States), IGAD (the Intergovernmental Authority on Development), and SADC (The Southern African Development Community). A February 1998 protocol defines relations between the AEC and the five regional groups.

<sup>4</sup> WAPP – The West Africa Power Pool; ECREEE – The ECOWAS Regional Center for Renewable Energy and Energy Efficiency; ERERA – The ECOWAS Regional Electricity Regulatory Authority.

<sup>5</sup> For some, natural gas is a clean energy resource that can replace oil and diesel systems. The team have included it here as a possible clean energy resources, but elsewhere note that clean energy can also be viewed in terms of a shift from fossil fuels overall to renewable energy technologies.

enlarge substantial opportunities for investment, job-creation, and increases in per capita income in West Africa.

### **Power Africa**

Power Africa (PA) is a U.S. Government-wide initiative launched by President Obama in June 2013 to increase the supply of, and access to, reliable, affordable, and cleaner power in Sub-Saharan Africa (<http://www.usaid.gov/powerafrica>)<sup>6</sup>. Power Africa seeks to add 30,000 megawatts of clean, efficient generation capacity and connect up to 60 million additional households across Sub-Saharan Africa to electricity. Power Africa is currently working on a targeted energy expansion initiative that will seek to harmonize investments of West Africa francophone countries with those in Ghana, Liberia, Sierra Leone, the Gambia, and Nigeria.

### **USAID's Energy Portfolio in West Africa**

The USAID/West Africa energy program is designed to support achievement of the objectives of the Power Africa program and the U.S. Global Climate Change (GCC) Initiative (<http://www.usaid.gov/climate>)<sup>7</sup>. To achieve the objectives of Power Africa and GCC, the USAID West Africa Mission works with ECOWAS and its affiliated energy institutions: WAPP<sup>8</sup>, ECREEE<sup>9</sup>, ERERA, and WAGPA.

To facilitate cross-border trade of energy in West Africa, USAID/West Africa engages in capacity building activities with both WAPP and ECREEE through training programs and by supporting the expansion of commercial marketing networks to facilitate international energy trade. It promotes utility management capacity building in WAPP along with demonstrations and commercialization of late-stage renewable energy technologies among member states working with ECREEE. It works with ERERA in drafting a regional energy trading market framework in which WAGPA's natural gas trading can work in tandem with the expanding regional electricity generation and distribution network. Additionally, it provides national-level regulatory capacity building to support an enabling environment for regional trade and further investment in the energy sector.

USAID coordinates technical assistance with donors, multilateral development banks and the private sector to leverage greater investment in clean energy generation, enable cross-border trade of energy, and develop regional public-private partnerships (PPPs) to generate energy from West Africa's transnational infrastructure. Activities involve promoting ECOWAS Institutions' capacity to leverage domestic and international public and private partner agencies' investments, including key financial institutions such as the African Development Bank (AfDB) and the West Africa Development Bank (BOAD).

A summary of the West Africa Energy Program Results Framework is provided in Figure 2, below. As the figure suggests, one targeted result is the reduction of otherwise flared natural gas to be used in improving energy efficiency and in the production of additional electricity. Through the emphasis on renewable energy investments, a second targeted result is a reduction in environmental emissions as clean energy generating technologies are brought online. A third is the expansion of regional electricity transmission and distribution networks that could increase electricity access rates across regional energy markets. Finally, through institutional reforms, clean energy expansion can take place as trans-national policies on governance, electricity tariffs, and trading relationships are developed and reinforced across ECOWAS member states.

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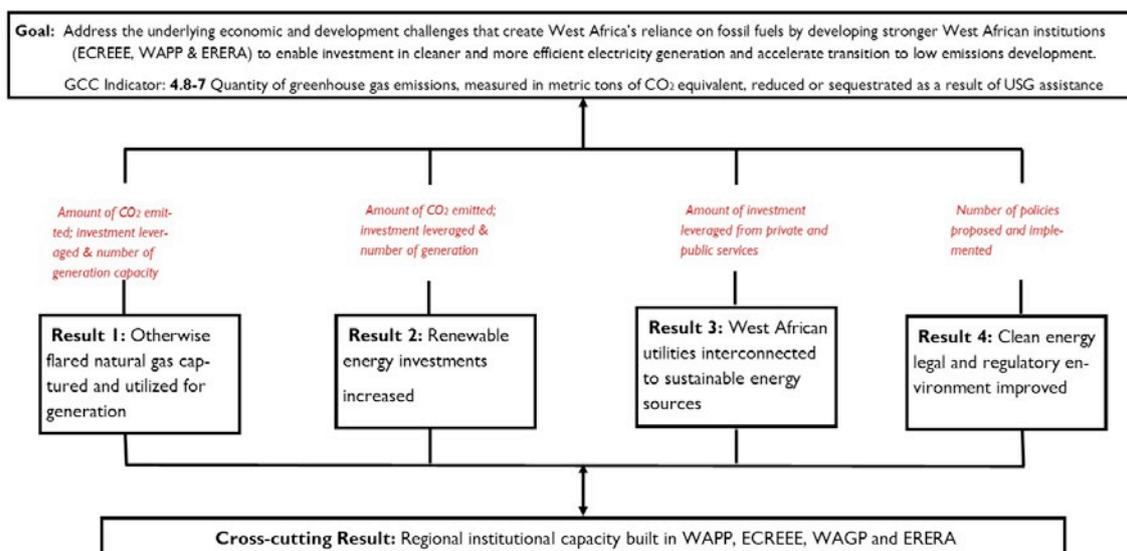
<sup>6</sup> **Power Africa** (PA) is a U.S. Government interagency initiative that includes the following partners: the U.S. State Department, the U.S. Department of the Treasury, the U.S. Department of Agriculture, the U.S. Department of Commerce, the U.S. Department of Energy, the U.S. Trade and Development Agency, USAID, the Overseas Private Investment Corporation, the U.S. Export-Import Bank, the Millennium Challenge Corporation, the United States African Development Foundation, and the U.S. Army Corps of Engineers.

<sup>7</sup> The USAID Global Climate Change and Development Strategy sets out principles, objectives and priorities for USAID climate change assistance over a multi-year time horizon scheduled for review in 2016. <http://www.usaid.gov/climate/gccs>

<sup>8</sup> <http://www.ecowapp.org/>

<sup>9</sup> <http://www.ecreee.org/>

Figure 1. USAID West Africa Energy Program Results Framework



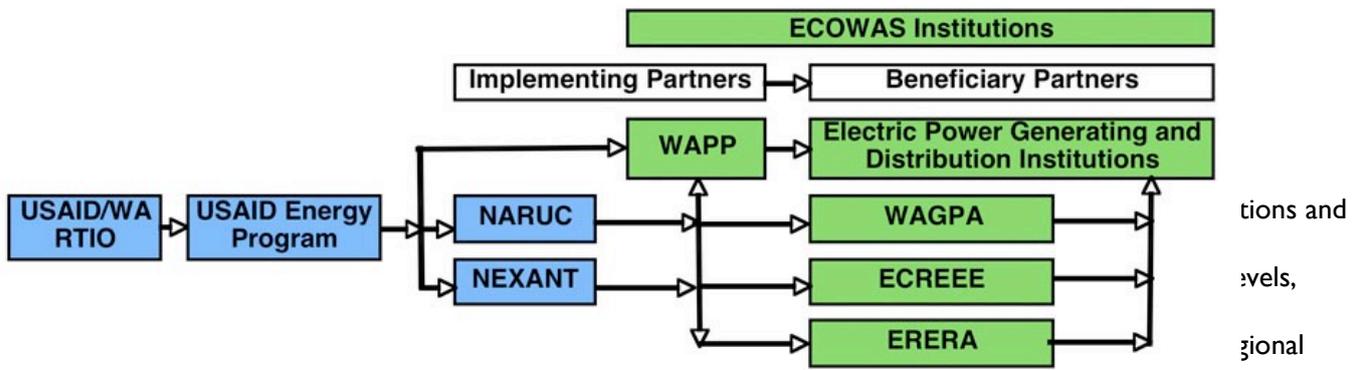
## 1.2 USAID West Africa Energy Portfolio (2009-2014) Mechanisms

The Main objectives of the USAID West Africa Portfolio are: 1) To facilitate cross-border trade of energy in West Africa, 2) To leverage private investment in late stage renewable energy generation, 3) To develop Regional Public Private Partnerships (PPPs). The mechanisms employed by USAID/WA for achieving these objectives involve several mutually reinforcing partnerships across USAID, domestic governmental and private institutions in ECOWAS member countries, as well as donor coordination with key international development institutions and agencies.

The 2009-2014 portfolio focused on the following mechanisms:

- **The West African Power Pool (WAPP) Implementation Letter (IL) with USAID/West Africa:** This IL spans over four years (2010-2014). It has included activities for capacity building (trainings and equipment), an exchange program, staffing and consultancies for a total budget of \$1,889,522.00.
- **NARUC/WAGPA/ERERA/ECREEE<sup>10</sup> Renewable Energy (RE) regulation integration into the traditional regulation of utilities.** NARUC partnered with ERERA and WAGPA between 2011 and 2014. In 2013, the partnership expanded its aims to target capacity building for clean energy for regulators throughout the region and ECREEE joined the partnership. The increased clean energy focus of this partnership with the Power Africa Initiative during the second phase (2013-2014) included a holistic review of regulatory frameworks and systems reserves including natural gas as a bridge fuel to a low carbon future and regulatory tools to encourage renewable energy and energy efficiency. Through its partnership with NARUC, USAID assistance to regulatory authorities in the ECOWAS region have focused on the development of well-regulated, functional, and sustainable electricity generation, namely:

<sup>10</sup> NARUC=National Association of Regulatory Commissioners (<http://www.naruc.org/>); ERERA=ECOWAS Regional Electricity Regulatory Authority (<http://www.erera.arrec.org/>); ECREEE=ECOWAS Regional Center for Renewable Energy and Energy Efficiency (<http://www.ecreee.org/>); WAGPA=West African Gas Pipeline Authority (<http://wagpa.org/wagpa.html>)



- d. Developing and promoting the Principles of Regulating Clean Energy in the ECOWAS Region. In so doing, NARUC supported: training and capacity building, peer-to-peer and regional information exchanges, and collaborative development of regulatory guidance.

The total budget for this mechanism amounts to \$750,000.00.

- **AIP (Africa Infrastructure Program)/NEXANT<sup>11</sup> support to ECREEE on wind and solar resource mapping.** The AIP objective is to help facilitate financial closure of late-stage power projects in Sub-Saharan Africa and provide technical assistance as needed. Under AIP, USAID supports governments or government agencies through capacity building and assistance regarding transactions. The subject task “ECREEE Wind & Solar Resource Assessment (WSRA) and Project Development” is funded through a Buy-in to AIP by the USAID West Africa Mission. The AIP budget was funded at \$842,589, supplemented by \$110,000 for due diligence on the WAPP Generation projects. Overall infrastructure funding involved a budget of \$3,463,336.89. This budget includes an initial mechanism developed by USAID West Africa to support WAPP through NEXANT, replaced in 2010 by the WAPP Implementation Letter (IL).

Figure 1 below illustrates how the USAID West Africa Energy Portfolio works with ECOWAS beneficiary Energy Institutions and/or through other Implementing Partners.

**Figure 2.** The USAID West Africa Regional Energy Program Institutional Framework



<sup>11</sup> NEXANT is a Washington, D.C. consulting firm specializing in the use of advanced digital information systems in pursuit of sustainable energy and economic growth. <http://www.Nexant.com/>.

# 2. EVALUATION PURPOSE, QUESTIONS AND METHODS

## 2.1. Evaluation Purpose and Scope

The purpose of this performance evaluation is to provide USAID/WA, and other interested parties and partners with an independent assessment of the performance of the regional Mission's energy portfolio (2009-2014). The evaluation seeks to determine to what extent the RTIO's energy program portfolio goals and objectives have been achieved as well as provide evidence-based information for future programmatic adjustments and improved decision making.

The evaluation is also to enable USAID/WA to determine the most cost-effective ways to achieve development objectives in the energy sector within the region. The evaluation will additionally highlight the program's major achievements, strengths and weaknesses in order to learn from them and to effectively apply lessons learned for future regional programming. It will further assist USAID/WA and its partners to improve upon development assistance strategies and programs to promote rapid and sustainable economic growth in the sub-region.

This evaluation covers the wide array of projects in the energy portfolio. The ASSESS team was tasked to ensure the use of recommended and tailored scientific techniques to comprehensively evaluate each of the specified mechanisms below:

- a. *The West African Power Pool (WAPP) Implementation Letter (IL) with USAID/West Africa:*
- b. *NARUC/ERERA/ECREEE Renewable Energy (RE) regulation integration into the traditional regulation of utilities.*
- c. *AIP (Africa Infrastructure Program)/NEXANT support to ECREEE on wind and solar resource mapping.*

The outcome of this performance evaluation is expected to help the Mission better understand what the implemented programs and projects have achieved with respect to the RTIO's main objective of improving access to energy and increasing investments in the sector.

## 2.2. Evaluation Questions

The evaluation team responded to the following questions raised by USAID West Africa which are grouped under the key evaluation criteria of **relevance, effectiveness, efficiency, impact and sustainability**.

### 1. **Relevance**

- a. To what extent have the energy program activities been in line with priorities set forth in their respective objectives?
- b. How do they address key areas of increased access and energy supply in the region?

### 2. **Efficiency and Effectiveness**

- a. To what extent is the energy program on target to achieve its objectives and intended results?
- b. What factors influence the achievement and non-achievement of stated objectives?

### 3. **Impact**

- a. What changes (positive/negative; intended & unintended) have occurred to date that can be reasonably linked to USAID/WA's energy program interventions?

#### **4. Sustainability**

- a. What mechanisms have been put in place to ensure sustainability of the energy program achievements and;
- b. What is the potential for sustaining these benefits over the medium to long term?

#### **5. Lessons learned**

- a. How have program activities produced practical lessons on which improvements in the Energy Program can build for the future?
- b. What best practices, lessons learned need to be capitalized to improve the Energy program?

## **2.3 Methodology, Sampling Frame and Review of Documents**

Consistent with USAID's Automated Directive System (ADS) 203.3.1.6 guidance on evaluation methodologies, the team used both qualitative and quantitative methods for data collection and analysis (Mixed-Method). The team systematically gathered comprehensive information on the program, analyzed and triangulated information gathered to provide accurate and valid responses to the evaluation questions. The ASSESS team also referred to the Mixed-method Evaluation guideline developed by USAID (June 2013) and other relevant evaluation approaches (DAC, OECD) to fine-tune its methods for this evaluation (refer to the evaluation design matrix in the annex). The team developed corresponding tools and instruments including documentation review checklists, SWOT analysis tools, interview guides and questionnaires tailored to the different categories of stakeholders: IPs (WAPP, NEXANT, NARUC), beneficiaries at regional (ERERA, ECREEE, WAGPA) and national levels (power utilities, regulators, government ministries, power producers).

The team employed multiple sampling techniques that were commensurate with the level of detail required to provide a comprehensive response to each of the evaluation questions. In particular, the team ensured the selection of representative samples that provide an accurate reflection of the variations and diversity of the energy portfolio stakeholders identified through an initial beneficiary and partners mapping conducted by the team in collaboration with USAID/WA RTIO and WAPP. Sampling techniques employed in this evaluation include purposive, convenient, quota and random sampling (for the online-survey).

Data collection tools and instruments were pre-tested and validated through initial consultations with IPs, key stakeholders and beneficiaries. Additionally, the team fine-tuned the data collection tools progressively during the field work. This approach was critical in ensuring that contextual variances were appropriately addressed in all countries covered by the evaluation. In the data collection phase of the evaluation, the team conducted field work in three countries (Ghana, Benin and Cape Verde), in addition to remote consultations with core stakeholders in Nigeria and implementing partners based in US (NARUC) and France (ERERA representative's location at the time of the evaluation).

The evaluation team progressively and systematically analyzed data gathered, employing a scientific approach and analytical techniques, including SWOT and statistical techniques, for data analyses. Triangulation of the evaluation information was conducted from three different perspectives ensuring adequate verification of information for accuracy and validity prior to drawing findings and conclusions in respect of the evaluation questions. The team engaged in several brainstorming sessions and consulted additional relevant documents in the assessment of the feasibility and practicability of recommendations, taking cognizance of activities' relevance, available program resources including time and finance.

## **Fieldwork and data analysis**

As part of the information gathering, the evaluation team visited three countries, Ghana, Benin and Cape Verde for field discussions with implementing partners and regional and national beneficiaries of the USAID WA Energy Portfolio. The strategy for field work consisted of interviews and focus group discussions with the stakeholders and working sessions of the evaluation team aimed at analyzing progressively the data gathered. The team interacted with stakeholders both in and out of the three countries visited. The stakeholders were grouped into four categories as: a) USAID West Africa, b) Implementing partners (WAPP, NARUC, and NEXANT), c) ECOWAS Institutions (WAPP, ERERA, ECREEE, WAGPA) and, d) National/local beneficiaries (Power utilities such as ECG and GRIDCO in Ghana, ARE and ELECTRA in Cape Verde and SBEE in Benin).

In Ghana the first point of visit was to the USAID RTIO for interactions that afforded the evaluation team the opportunity to understand the expectations of the USAID and to further refine the evaluation tools and field visit schedules. The team also interacted with representatives of ERERA, a key regional beneficiary of the energy portfolio and two national utilities namely the Ghana Grid Company (GRIDCo) and the Electricity Company of Ghana (ECG). The focus of discussions with ERERA was on the performance of the workshops organized with USAID assistance and how the resulting regulation document impacts renewable energy in the region. The focus of discussions with national level beneficiaries explored the impact of the capacity building received from WAPP and ECREEE (to a limited extent) on their work.

In Benin, discussions held with WAPP centered on the impact of the technical and institutional capacity assistance provided by USAID on the regional power pool and how the capacity building activities have impacted member power utilities in the region. The evaluation team also held discussions with national beneficiaries including SBEE.

In Cape Verde, the team held discussions with the staff of the key regional beneficiary of the energy portfolio, ECREEE on renewable energy and wind and solar resources mapping and how the solar and wind resource mapping has impacted ECREEE's activities as well as users/stakeholders of the data. The discussions also focused on capacity building for the staff of ECREEE in renewable energy technology mapping. The team also held group discussions with a few national utilities such as the Electra, Electric Wind, and the Agência de Regulação Económica (ARE). While in Cape Verde, the evaluation team also held remote discussions via Skype and telephone conference with NARUC personnel and a key staff member of ERERA respectively. NARUC currently has no physical presence in Benin. The focus of the discussions here hinged on the impact of capacity assistance provided by the USAID on the regional power pool and how the capacity building activities have impacted member utilities in the region. NARUC provided additional documents to the evaluation team. The team also interacted remotely with NEXANT focused on their support to ECREEE and WAPP. NEXANT provided a large volume of documentation to the team.

To further augment data collected through interviews and documentation reviews, the team conducted an online-interview to gather feedback from beneficiaries at country level on the capacity building support including quality of training, the relevance of training to their respective contexts, improved capacity (institutional and individual) resulting from training, along with beneficiaries' satisfaction, adoption, and use of the training and recommendations for improving upon future capacity in energy activities. The analysis of data from the online interview-questionnaire complemented other data gathering methods used for this performance evaluation. The online questionnaire was sent to all beneficiaries through the regional institutions and directly from the ASSESS Office in Accra.

## **Review of documentation**

The evaluation team conducted desk studies and reviewed program documents shared by USAID and the implementing institutions and partners – NARUC, NEXANT, WAPP, ECREEE and ERERA. The team also consulted additional documentation relevant to the evaluation. The documentation

review provided valuable information on substantive program issues that enhanced the team's understanding and consequent appreciation of the evaluation questions including appropriate tools and methods for generating findings. Documents consulted in the conduct of this evaluation are indexed in the annex section of this report.

### **Framing the Fieldwork Sample**

For this evaluation, the ASSESS team adopted multiple sampling approaches that were commensurate with the methods employed and the level of detail required to comprehensively address the key questions. A representative sample of the key stakeholders of the energy portfolio participated in this evaluation. The sampling approaches were also informed by the initial beneficiaries and partners' mapping conducted by the team. For the online-interview, the team shared the link with all beneficiaries across West Africa via the three key ECOWAS energy institutions WAPP, ECREEE and ERERA, providing equal opportunities for beneficiaries (national utilities, regulators etc.) to provide independent feedback to the evaluation team. With regards to the interviews and focus group discussions, the team identified key informants to provide in-depth information relevant to the evaluation themes and areas of focus.

### **Working Sessions**

The evaluation team organized working sessions in each of the countries visited. The working sessions afforded the team the opportunity to progressively analyze the data gathered through the interactions with the different stakeholders and consolidate initial findings and recommendations as well as develop the draft field work report.

### **Debriefing Session**

The team held a debriefing session with USAID RTIO and delivered a PowerPoint presentation on the preliminary findings and recommendations. USAID West Africa provided constructive inputs for integration in the evaluation report.

## **2.4 Limitations of Methods**

The evaluation team began its data gathering with a desk study of existing documents and information, followed by consultations with key stakeholders in the region to further refine tools and techniques for data collection and analysis. These were followed by interviews of partners, stakeholders, and beneficiaries in the portfolio's target countries.

Several approaches, desk study, consultations, individual interviews, focus group discussions and on-line interview were employed to conduct the evaluation of the USAID WA Energy portfolio. Each approach has its strengths and limitations. The team used personal interview techniques and tools to limit to the maximum the extent of possible bias linked to the weaknesses of the approaches. Some of the limitations identified in this evaluation have been outlined below.

The absence of more consistent indicators and reporting standards for the respective portfolio mechanisms hampers the evaluation process in assessing the quality/quantity of outputs achieved to date. The team also notes the difficulty in collecting sufficient financial information on various activities by implementing partner institutions that would enable to better map budgeting with institutions and activities. Part of the difficulty in organizing financial data is that initiatives undertaken in the 2009-2014 period appear to have been driven more by a silo approach to individual ECOWAS institutions rather than through a more integrated approach across implementing stakeholders.

# 3. ANALYSIS OF WEST AFRICA ENERGY SECTOR

In preparation for this evaluation, the team gathered a series of documents that cover the themes and implementing institutions cited above. This includes ECOWAS regional clean energy stakeholder institutions –WAPP, ECREEE, WAGPA, ERERA – in addition to USAID West Africa implementing partners, notably NARUC, the consultancy services firm NEXANT, and other sub-contracting agencies (notably Dev2, 3Tier, Tractabel Engineering, and UPDEA).

## 3.1 Transitional Path to Renewable Energy in Africa

At a policy conceptual level, an extensive literature informs the dynamics of energy and development in general and West Africa in particular. One approach provides a thematic theoretical and empirical literature that seeks to craft the contoured relationships across energy consumption, environmental sustainability, and economic growth and development. Beyond theoretical and empirical research, there also is a body of documentary material that incorporates conceptual notions into practical measures for policy design, implementation, and evaluation. While the team review references the former, the latter constitute the bulk of material used in this evaluation report.

At a broader level, an abundant body of research exists on the relationships across human resources, natural resources, physical capital, and technology in terms of increases in per capita income. Savings and investment rates are key to expanding the quality and quantity of inputs to achieve higher levels of per capita income, as are the capacity of financial institutions to allocate scarce resources for their achievement. At the same time, while research has demonstrated that improvements to the quantity and quality of inputs can have measurable consequences on per capita income, it also points to potentially adverse consequences on the environment, particularly in terms of environmental pollution and the associated effects on global climate change.

Faced with growing populations, African countries seek to mitigate the adverse effects on the environment as they pursue policies designed to increase economic growth. What this involves is how to mobilize savings and investment that add to physical capital stocks that use energy in transportation, industry, and commerce, along with the generation and transmission of electricity. The electricity sector consumes various forms of primary energy – fossil fuels for thermal generation, hydropower turbine generation systems, along with a sprinkling of late state renewable energy technologies consisting of wind and solar systems. The challenge is how to facilitate the integration of late-stage renewable technologies in ways that result in an economically and environmentally sustainable path to growth.

There are several underlying issues surrounding any transitional path to renewable resource electricity generation. First is the reliability of existing systems, which bear on technical efficiency of energy end use as well as on environmental emissions. Work done years ago by the World Bank emphasized the key factors in achieving electricity system reliability<sup>12</sup>. Power system reliability at a local or regional network level depends on the age of generation and transmission distribution systems, and on the pricing of electricity across sectors to achieve an economic rate of return consistent with replacement and expansion requirements for engineering and investment decisions. Updated assessments have been published by Joskow (1998), Owen (2004), and Coady (2015) that address how tariffs, taxes, and subsidies bear on the evolution of energy conversion capital stocks,

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<sup>12</sup> The team cites in particular seminal work undertaken by Mohan Munasinghe (1979), notably *The Economics of Power System Reliability* (Baltimore, Md.: The Johns Hopkins University Press for the World Bank), which provided a systematic analytical framework for policy formulation used by the World Bank.

and thus on the prospects for regional electricity markets in particular<sup>13</sup>. The principal finding from these studies is that pricing distortions generate economic inefficiency in terms of adequacy of investment to meet electricity access rate targets, distortions in terms of aggravated environmental damage arising from a continuing bias toward fossil fuels, and in terms of public sector costs in managing public and private investment resources in support of economic growth. Studies on West Africa in particular tend to support this general perspective.

## 3.2 Dynamics of Energy Development in West Africa

Research on energy development in West Africa supports much of what is observed during our field work. As examples, Pineau (2008) finds that WAPP's efforts to create a functioning West Africa Power Pool are constrained by a lack of African ownership in direction, unclear and conflicting objectives, and uncertainty of integration outcomes<sup>14</sup>. Similarly, Oyedepo and Fagbenle (2011) point to imperfect application and budgeting for preventive maintenance as key factors in the performance of the Egbin Thermal Power Plant in Nigeria<sup>15</sup>. Fritsch (2011) finds that neglect of Earnings Before Interest Taxes Debt and Amortization/Sales (EBITA) in company reporting margins confounds the adoption of a more rational tariff policy that could reduce technical losses as well as facilitate new investments in clean energy technologies<sup>16</sup>. And, Reichl (2015) examines how regional governance is critical to creative sustainable pathways to a renewable energy future in Africa<sup>17</sup>.

The above thematic and policy findings bear on the choice of energy strategy for ECOWAS countries and they do help shape directions for future commitments. At the same time, what often is missing in policy documents is a common benchmark tracking system that could systematically link these questions into planning and budgeting decisions. At this point, the team simply takes stock of some of the benchmark issues that are relevant for ECOWAS and for USAID West Africa's energy portfolio planning.

The team notes first wide differences in electricity access rates in ECOWAS countries. Figure 4 illustrates how widely these rates vary for 2012 in terms of national, urban, and rural populations. Using World Bank data on electricity access rates and per capita income, the correlation coefficient is .6528, illustrating the positive relationship but not sorting out the extent of causality. The perspective of USAID and ECOWAS is that investments in clean energy technologies that result in higher access rates determine per capita income levels. This is generally supported by econometric findings from the literature on growth and development.

For the period between 2008 and 2012, the loss rate in electricity (that is the difference between generation and consumption levels) for ECOWAS countries, varied between just under 11 % to just under 14 %<sup>18</sup>. These are higher loss rates than for electricity generation and distribution systems elsewhere, pointing to weaknesses in operating and maintenance across electric utility systems, and to the challenge of attracting suitable investment for replacement of aging systems as part of an expansion designed to incorporate a growing share of renewable technologies.

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<sup>13</sup> Paul Joskow (1998), "The Electricity Sector in Transition," *The Energy Journal* (19:2), pp. 25-52; Anthony D. Owen (2004), "Environmental Externalities, Market Distortions and the Economics of Renewable Energy Technologies." *The Energy Journal* (25:3), pp. 127-156; David Coady, Ian Parry, Louis Sears, and Baoping Shang (2015), How Large are Global Energy Subsidies? IMF Working Paper WP/15/105 (May).

<sup>14</sup> Pierre-Olivier Pineau (2008), "Electricity Sector Integration in West Africa," *Energy Policy* (36), pp. 210-223.

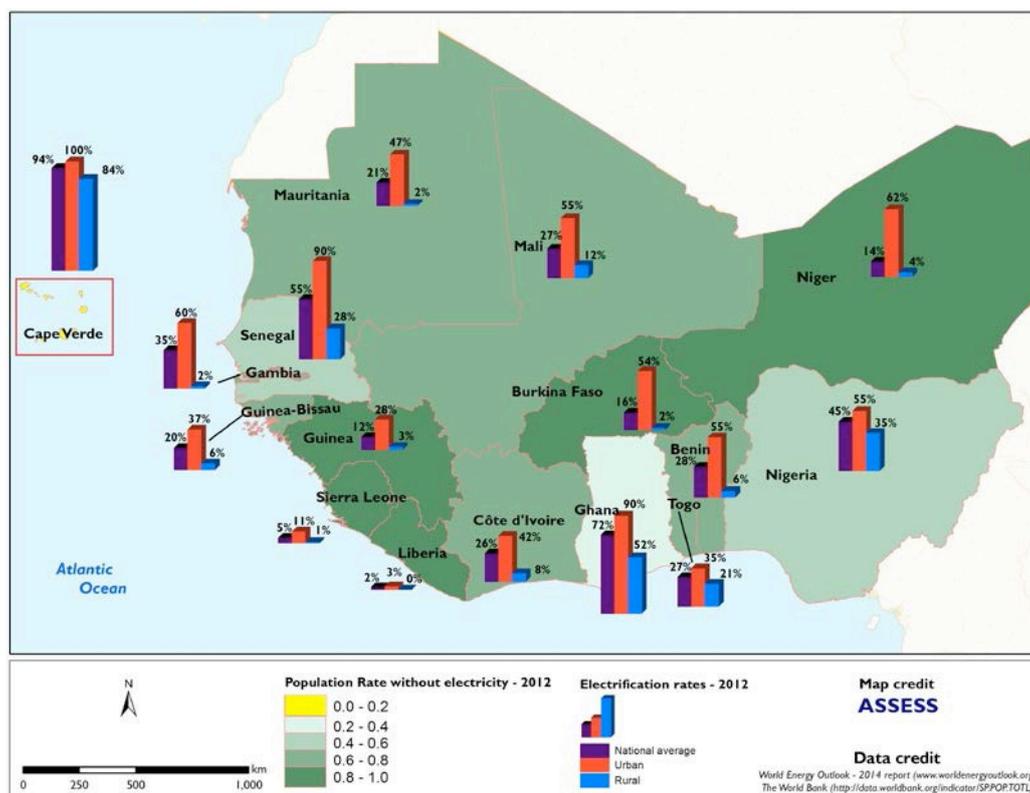
<sup>15</sup> Sunday Olayinka Oyedepo and Richard Olayiwola Fagbenle (2011), "A Study of Implementation of the Preventive Maintenance Programme in the Nigeria Power Industry – Egbin Thermal Power Plant, Case Study," *Energy and Power Engineering* (3), pp. 207-220.

<sup>16</sup> Rémi Fritsch (2011), "Comparative Financial Analysis of Electricity Utilities in West Africa," *Energy Policy* (39), pp. 6055-6064.

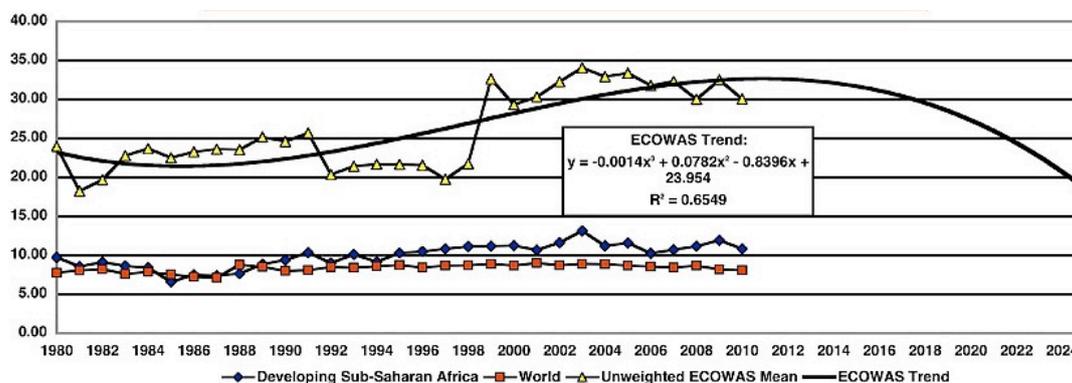
<sup>17</sup> Irene Giner-Reichl (2015), "Renewable Energy In International and Regional Governance: Propelling Development in Africa," *Energy Research and Social Science* (5), pp. 116-119.

<sup>18</sup> These comparisons are drawn from data compiled by the ASSESS team via the International Energy Agency. <http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=2&ipid=2&aid=2>

**Figure 3. Mapping of Electricity Access in West Africa by Country**



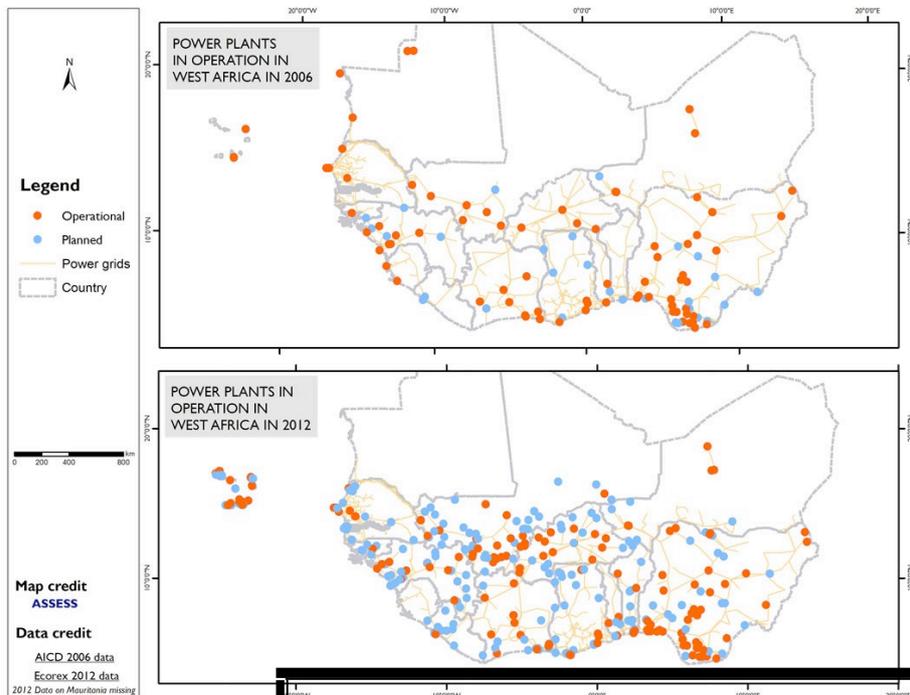
**Figure 4. ECOWAS Electric Power Transmission and Distribution Loss Rates**



Source: The World Bank, World Development Indicators

Figure 4 utilizes World Bank data to track electricity and distribution loss rates in ECOWAS countries. With data only for Benin, Côte d'Ivoire, Senegal, Togo, Ghana, and Nigeria, the correlation between per capita GDP and loss rates is  $-0.8023$ . As such, the inverse relationship between loss rates and per capita income may reflect differences in electricity capital stocks, and differences in individual and institutional management capacity that improve the performance of electricity networks. Given that access rates also vary inversely with loss rates, this also points to how investments in improving energy efficiency can have as important an effect on per capita income as investments in generating capacity alone. What the loss rate data for ECOWAS also suggest is that transmission and loss rates appear higher than for Sub-Saharan Africa as a whole, even though improvements appear to be taking place during the 2009-2014 time period.

Complicating the reliability question is the use of electricity subsidies across countries and sectors. If electricity tariffs do reach levels to reflect the market opportunity cost of capital, that is a pricing



the environmental costs of extent that economies rely on fossil hort of technical efficiency, that is, tribution in the presence of diurnal rther is where electric utilities lated private monopolies, the regulatory capture.

lectricity on various consuming access to electricity, any end s as well as have adverse effects on energy program address many of 1 standards.

While electricity trading markets would help to achieve greater technical efficiency across generating sectors, thus far, countries face the challenge of how to promote electricity trading when market institutions confront inadequate capitalization and performance levels shaped by unfulfilled governance standards and differences in currency and monetary governance. What is known at present is that ECOWAS inter-state trading in electricity during the 2008-2012 period never rose beyond four percent, whereas a more robust electricity trading environment could raise levels well beyond, and in the process increase per capita incomes in countries and regions where the marginal cost of new electricity investments are higher than elsewhere. This is recognized, of course, within the framework of ECOWAS and other continental African institutions, and initiatives such as those supported by Power Africa are designed to respond to the potential opportunity.

### 3.3 West Africa Energy Development and USAID Energy Program

Within this context, as early as 2012, USAID support of the ECOWAS West African Power Pool already looked to strengthening institutional capacity to integrate regional electricity investments and performance. The February 2012 USAID-WAPP Work Plan identified a series of investments that would be linked to capacity building initiatives. Under the USAID West Africa energy program, the U.S. private consulting firm NEXANT has undertaken training workshops across WAPP member utilities and the WAPP secretariat, including management exchange program, along with technical assistance to the WAPP secretariat.

Further to these questions, USAID issued a December 20, 2013 final report on Wind and Solar Resource Assessment for the ECREEE program. This report, conducted by NEXANT, provides a detailed elaboration on the pricing of traditional generating technologies and late-stage renewable technologies using estimates of the weighted average cost of capital (WACC). Estimates undertaken include the mix of debt and equity financing, the tax rate, and the debt interest rate to arrive at a return on equity that can be compared to the opportunity cost of capital. Estimated rates in the report range from 20% (for Benin, Burkina Faso, Niger, and Togo) to 31% for Ghana, and 36% for Guinea and Sierra Leone.

Many of these issues are reflected in the December 2014 National Association of Regulatory Utility Commissioners *Principles of Regulating Clean Energy* in the ECOWAS region. The NARUC document has two objectives: 1. To support regulatory agencies and policy makers by providing an inventory of fundamental assumptions, approaches, mechanisms, tools, best practices, and national experiences on key issues in the field of clean energy; and 2. To reflect best practices based on a local framework as a resource for the ECOWAS region, taking into account energy markets, natural resources, social and environmental priorities and other region-specific factors.

The *Principles* document contains a series of actions that include the creation of a mechanism to pay back renewable energy buyers under obligation, insuring the financial viability of energy buyers, regulation of access to the grid, rules for paying connection costs, and rules to balance fluctuations within a safety margin, among others. It further contains guidelines for precise evaluating the estimated levelized cost of energy (LCOE), the level of capital expenditures (CAPEX) to achieve a given level of capacity in which both technical and economic integration between older fossil thermal and hydro systems can be integrated with late stage renewable technologies.

Together, it is clear that access to clean energy technologies is a key factor in West Africa's economic growth potential. What is not clear is whether sufficient information has been put together in a systematic framework that could enable USAID West Africa and ECOWAS to pursue a more dynamic strategy of attracting sufficient investment in the sector to produce outcomes that achieve performance that bring greater success to the region. To address this question, the team used a performance evaluation framework in the following section and draws findings and recommendations in making future strategic decisions for investments in regional energy.

## 3. FINDINGS AND RECOMMENDATIONS

### 3.1 Relevance

#### 3.1.1 USAID/WA Energy Portfolio vs. ECOWAS Institutions Strategic Pillars

The overall goal of USAID West Africa's Energy portfolio is to address the underlying economic and development challenges arising from West Africa's dependence on fossil fuels and limited access to electricity. It does so through a mix of technical assistance, capacity building, and the promotion of energy market trading opportunities consistent with the ECOWAS regional energy planning process and working with its implementing partner institutions WAPP, ECREEE, ERERA, and WAGPA.

As defined through the US Power Africa framework (2013) and the Global Climate Change Initiative (GCC), the USAID West Africa Energy program seeks to increase access rates for a growing population through support of a transition to sustainable clean energy production and distribution throughout the region. Three strategic pillars define USAID West Africa's energy strategy: 1. To facilitate cross-border trade of energy in West Africa, 2. To leverage private investment in late stage renewable energy generation, and 3. The development of Regional Public Private Partnerships (PPP's) to assist ECOWAS in the transition to a sustainable clean energy future.

#### 3.1.2 ECOWAS strategies and policies in the Energy Sector

Since 2003, from its current headquarters in Abuja, Nigeria, ECOWAS has defined its energy policy and strategy through a series of evolving documents<sup>19</sup>. Chronologically: 1. The ECOWAS Energy Protocol A/P4/1/03 (January 2003), 2 The ECOWAS/UEMOA White Paper on access to energy services for populations in rural and semi-urban areas (2006), 3. The ECOWAS Renewable Energy Policy Statement of September 2012, and 4. The ECOWAS Efficient Lighting Strategy. These policy documents serve as the basis of our understanding of the current overall ECOWAS policy framework.

The ECOWAS Energy Protocol of 2003 established a legal framework to promote long-term cooperation in the energy field, based on complementarities and mutual benefits across existing and new implementing institutions, with a view to achieving increased investment in the energy sector, and increased energy trade in the West Africa region. The protocol stressed the need for an integrated regional power system, the need for improved energy efficiency and the need for increasing renewable energy sources. This would be possible through the establishment of the ECOWAS energy implementing institutions: WAPP, WAGPA, ERERA, and ECREEE.

The first ECOWAS energy implementing institution West Africa Power Pool, WAPP (established in 2006), is designed to work with individual power companies to develop a regional power grid for the region. Second is the creation of the West Africa Gas Pipeline Authority, WAGPA, in 2003, and

<sup>19</sup> The team notes efforts to expand complementary governance institutions in ECOWAS, notably efforts since 2000 to create a common currency in the region, the eco, which would eventually combine the West African CFA and national currencies operating in Nigeria, Ghana, Sierra Leone, Liberia, the Gambia and Cabo Verde, and operate under a single regional central bank.

which built on a West Africa Gas Pipeline first proposed in 1982. Third is the ECOWAS Regional Electricity Regulatory Authority, ERERA (established in 2008), designed to regulate interstate electricity exchanges with support to member state regulatory bodies. Finally is the ECOWAS Regional Center for Renewable Energy and Energy Efficiency, ECREEE (established in 2009), designed to promote clean energy technologies throughout ECOWAS member states.

USAID/WA energy portfolio program activities involving technical assistance, capacity building, and the promotion of public-private partnerships relevance is evaluated through the mapping of its objectives with strategic objectives/pillars of ECOWAS and its Energy institutions WAPP, ERERA, WAGPA, and ECREEE.

**Table 1. Mapping USAID objectives to ECOWAS Institutions Strategic pillars**

ECOWAS INSTITUTIONS STRATEGIC PILLARS	USAID CORE ACTIVITIES (2009-2014 PORTFOLIO)		
	Capacity Building	Infrastructure Development	Creation of an Operational Energy Trading Market
<b>WAPP</b>			
<b>1. Capacity building of power utilities</b>  <b>2. Infrastructure development</b>  <b>3. Regional electricity market development</b>	(Dev2E) update of the Strategic Capacity Building Initiative (CBPI) (2013/12)  (NARUC, NEXANT) training on governance, regional regulatory framework (power systems operations, PPP's, power losses, power industry reforms, market rules and operations, equipment procurement, IT hardware and software with simulation training) (2011-2013)  (NARUC) Study tour and Exchange Program on institutional reforms and governance (2011, 2013)  (USAID/WA) secondment of member utility staff to WAPP for training and technical skills acquisition (2011-2013)	(Tractabel Engineering) update of WAPP Master Plan (2011/10)  (NEXANT) Consulting/Advisory services in preparing financial and legal documents for 450MW Maria Gléta, Benin and 450 MW Domunli, Ghana Combined Gas Power Plants	(USAID/WA) Information and Coordination Center (ICC) preparation of Regional Energy Trading Roadmap (2014)  (NARUC) PPP training for WAPP Secretariat (2012)
<b>ECREEE</b>			
<b>1. Develop policy to respond to the Legal and Regulatory Framework of ECOWAS (aided by NARUC Principles document and training)</b>  <b>2. Capacity Building</b>  <b>3. Knowledge Management, Awareness Raising, Networks and Advocacy</b>  <b>4. Business and Investment Promotion</b>	(NEXANT) Business Plan (2012)  (Nexant/3Tier) Solar and Wind Resource Data Base for the 15 ECOWAS countries and training for SWOT analysis (2012)  (NEXANT/3Tier) –Training on use of System Advisor Model and Applications (2012)  (NARUC) Training in regulation and clean energy policies (May 21-23, 2013)	(NEXANT/3Tier) Renewable Energy Resource Assessment of ECOWAS Observatory for Renewable Energy and Energy Efficiency (ECREEE)	(USAID/WA) Regional clean energy advisor on energy transactions appointed to work at Ghana Energy Commission  (USAID/WA) Support for ECOWAS Renewable Energy Investment and Business Initiative Forum and the West African Forum for Clean Energy Financing)
<b>ERERA-WAGPA</b>			
<b>1. Regulation of cross-border electricity connections and trading; 2. Establishment of clear and transparent tariff setting methodology for regional power pooling; 3. Creation of a regulatory and economic environment for regional trading ; 4) Technical regulation of regional power pooling and monitoring ; 5) Strategy for regional energy policy ; 6) Establishing effective dispute resolution methods among regional market participants ; 7) Capacity building and technical assistance of national regulatory bodies</b>	(NARUC) Workshop on Reducing operating and transmission losses (2012)  (NARUC) Training on basic regulatory principles, reporting and monitoring (2011)  (NARUC) ERERA/WAGPA Study Tours relating to natural gas pipelines and Internships (2011)	(NARUC) Workshop on Gas Pipeline Operating Principles and Management (2011)  (NARUC) Study Tour on Tariff Setting for energy transmission lines (2011)	(NARUC) Document and Training on Principles of regulating clean energy in the ECOWAS Region (December 2014)  (NARUC) Document and training on Implementing Energy Market Trading Rules (December 2014)

### 3.1.3 Findings on the USAID West Africa Portfolio Relevance

WAPP has three strategic pillars: 1) Infrastructure development, 2) Regional electricity market development, 3) Capacity building of power utilities. USAID supports WAPP infrastructure development by providing technical assistance through the recruitment of infrastructure project coordinators, short term specialized technical experts for project preparation, supervision and monitoring, and assistance in financial analysis of power projects in different countries.

USAID support for regional electricity development has taken place through periodic training workshops on how to operate regional power pool markets, and through site visits for WAPP personnel to examine first-hand how such power pool markets work in practice. In addition, USAID has provided technical experts to assist WAPP in the design and establishment of a working electricity market information system to help operate day-ahead and longer term electricity trading contracts.

USAID support to WAPP on capacity building has covered training workshop on energy sector governance, the design and implementation of economic reforms that address electricity regulation, operational aspects of power projects, improving energy efficiency and reducing operating and transmission losses, along with management, maintenance, and energy marketing. In addition, USAID also provided support to WAPP in administrative and financial procedure, equity and gender policy and ethics

For ERERA, the team finds the direction of USAID mechanisms consistent with the overall goal of capacity building that supports the ERERA creation and expansion of a regional market in electricity trading. USAID's objective on facilitating cross-border energy trade in ECOWAS aligns most closely with ERERA's strategic pillars. ERERA has received a smaller degree of direct engagement with the use of USAID experts, but that ERERA staff have participated in some of the training on topics common to WAPP.

USAID/WA's implementing partner NEXANT has served as a key instrument in addressing capacity building and technical assistance to ECREEE. NEXANT helped ECREEE to adopt a well-defined benchmarking process as revealed in its 2012 Business Plan. Goals of the Business Plan align well with the clean energy dimensions of the Power Africa and GCC Initiatives. The ECREEE 2011-2016 Work Plan identifies clear goals and targets for implementation and benchmarking, and which could serve as a model for other ECOWAS implementing institutions.

USAID's strategic objectives of facilitating cross-border energy trade in ECOWAS, with leveraging investments in late stage Renewable Energy and Energy Efficient Technologies, and the Development of Regional Public-Private Partnerships in Energy align with ECREEE strategic pillars.

The team finds:

- Overall, USAID West Africa Energy portfolio is relevant and aligned with regional energy policy and with priorities of regional institutions. Capacity building and technical assistance approaches implemented in the different mechanisms appeared to be critical activities for the regional institutions as there are building principles, procedures and policies in the setup of a regional electricity market and regulatory environment.
- At the same time, ECOWAS as the main umbrella and regional organization that drives and coordinates the different institutions does not at this point have a clear comprehensive planning process that can integrate its institutions into a more coherent dynamic framework in which progress can be measured by well-defined indicators and benchmarks. Until recently, energy projects remained subordinate to the ECOWAS Department of Infrastructure. And while the newly established Department of Energy and Mines now permits the adoption of a more coherent roadmap, at the time of this evaluation, it was not possible to confirm an approved ECOWAS Energy business plan that would bring key elements into a more transparent operating environment.

- For the present, as long as such a well-defined business plan is not in place, USAID energy interventions, while relevant to individual ECOWAS energy implementing institutions, stop short of bringing an essential dynamic framework through which the various actors and markets can realize the full potential of improving access rates of clean energy in a sustainable fashion.
- USAID/WA's use of different mechanisms in implementing activities does not rely on a common set of well-established benchmarks that could permit better understanding and integration of USAID and ECOWAS common goals and objectives. The team qualifies this in noting that the 2013 Power Africa program may encourage greater coherence in the formulation of implementation activities in the period ahead.
- While USAID/WA has supported donor coordination meetings in the past that could help reduce overlapping jurisdictions in terms of ECOWAS priorities, there is lack of coordination among ECOWAS institutions. For instance donor coordination meetings for an institution such as ECREEE do not necessarily involve those for WAPP or ERERA. As this forum is a device that could help create and sustain greater alignment of goals and objectives is the donor coordination meetings ECOWAS needs to consider some common integrating donor coordination mechanism to promote greater transparency and coherence.
- ECREEE has included WAPP and ERERA in its board and meetings, however the same appears not to be the case for ECREEE membership and participation in WAPP or ERERA forums. This lack of coordination, integration and synergy among ECOWAS Energy Institutions might hinder the overall relevance of USAID programs to ECOWAS.
- While some key prospective private investors may have been invited to some donor coordination meetings, the approach to private sector engagement in such forums stops short of moving to a more inclusive outreach platform that will establish a clearer understanding of energy investment opportunities beyond the operation of traditional tender offerings used in ECOWAS member states. This is particularly important in terms of attracting sufficient investment in helping to realize the goal of greater energy trading mechanisms in the region, particularly for electricity capacity investments in the period ahead.

### 3.1.4 Recommendations on Relevance

On relevance, the team proposes the following recommendations:

1. Capacity building programs are very relevant and should be re-enforced by organizing more training, workshops, and other relevant practical learning opportunities. This should include national and regional bodies so that all issues are addressed in which capacity is developed on multiple levels at the same time.
2. USAID/WA should encourage the ECOWAS commission to complete a timely drafting of its Comprehensive Energy Policy document and to develop a coherent regional business plan with clear indicators over a finite time horizon.
3. The USAID/WA energy portfolio should adopt a standard set of benchmarking report indicators that can be used by participating institutions to better assess how well various programs and mechanisms align with underlying goals and objectives. This includes working more closely with ECOWAS to facilitate crafting of monitoring and evaluation documents to strengthen mutual understanding among its implementing stakeholder institutions in pursuit of the goals of higher access rates to clean energy in the region. Reports on these indicators should be maintained through a common database sharing system accessible to ECOWAS and other users for purposes of developing project monitoring and evaluation activities.
4. USAID/WA should support the establishment of a regional energy donor coordination forum under the ECOWAS Energy and Mines Commission that will bridge integration gap and foster synergy among institutions (WAPP, ERERA, ECREEE and WAGPA) and partners to improve the implementation of ECOWAS strategic objectives in the energy sector.

to what extent is the energy program on target to achieve its objectives and intended results and, what are the factors influencing the achievement and non-achievement of the objectives?

5. USAID/WA should re-organize its interventions by using an integrated portfolio approach that harmonizes mechanisms for WAPP, ECREEE, ERERA and WAGPA within the power Africa and the Regional Development Cooperation Strategy (RDCS). This simplified portfolio approach should revolve around clearly defined common benchmarks that can be used to determine how well program activities are working relative to stated goals, and to revise as necessary measures critical to keeping the energy program on track.
6. To leverage sufficient investment in helping to realize the goal of greater energy trading mechanisms in the region, USAID/WA should promote the participation of private sector organizations in the ECOWAS Energy Institutions' and donor forums. This will facilitate movement towards a more inclusive PPP outreach platform that will establish a clearer understanding of energy investment opportunities.

## 3.2 Efficiency and Effectiveness

The 2009-2014 Portfolio focused on four results: 1) otherwise flared natural gas captured and utilized for generation, 2) Increased renewable energy investment, 3) West African utilities interconnected to sustainable energy sources, 4) Clean energy legal and regulatory framework improved.

Overall USAID funds allocated and spent in the portfolio 2009-2014 and implemented through the different mechanisms (presented above) amount to a total of \$6,102,858.89. Financial information received from USAID and the Implementing Partners (NARUC, NEXANT and WAPP), while helpful, was not sufficiently broken down by year, agency and objectives to permit analytical assessment of expenditures by core USAID results. That fact hindered the team's capacity to make more rigorous conclusions on the efficiency of specific outputs delivered under the different mechanisms of the portfolio.

### 3.2.1 Achievements to Date

#### **West African Power Pool (WAPP) Implementation Letter (IL) with USAID/West Africa and NEXANT initial Capacity Building work with WAPP**

For WAPP and USAID West Africa's efforts in capacity building to establish a regional electricity market for ECOWAS member states, the team notes the following achievements that cover governance support, an effective regulatory framework, best practices for electrical system operations, and a financial environment to speed up investments in priority infrastructure projects. Based on a 2013 Report to USAID by Dev2E a summary of training completed on behalf of WAPP is presented below.

**Table 2.** Number of Participants in WAPP Affiliated Training, 2011-2013

Thematic areas	Number	%
<b>Governance</b>		
Power Pools Advocacy and Awareness	69	41%
Basics of electricity Supply	77	46%
Knowledge and Comprehension of Power Pools and Power Market Operations	22	13%
<b>Sub-Total</b>	<b>168</b>	<b>23%</b>
<b>Regulatory Framework</b>		
Market Regulatory Tools and Policy (vertical integration, competition)	32	100%
<b>Sub-Total</b>	<b>32</b>	<b>4%</b>

Thematic areas	Number	%
<b>System Operation</b>		
Energy Demand Management and Energy Efficiency	59	14%
Electricity Network Management, Open Access and Role of Dispatching	313	74%
Management Information Systems and Electricity Systems Software	49	12%
<b>Sub-Total</b>	<b>421</b>	<b>59%</b>
<b>Financing Environment</b>		
Concession Agreements of System Operators and Stakeholders	35	36%
Principles and Tools for Power Infrastructure Project Finance	62	64%
<b>Sub-Total</b>	<b>97</b>	<b>14%</b>
<b>Grand-Total</b>	<b>718</b>	

In addition, through USAID training, workshops have been held on the use of Microsoft Office Software (January 2011), the use of the SunSystem Accounting Package (February 2011, Lagos, Nigeria), technician training for SBEE (Benin) and CEET (Togo) with SENELEC in Dakar, Senegal in July 2011, in power sector governance for the WAPP Executive Board in September 2011, and in the formation and support of public-private partnerships for the WAPP Secretariat (October 3-8, 2011). USAID financial commitments during the 2011-2012 period for these activities have been \$120,000 for technical assistance staffing, \$99,423, \$93,598, \$94,491, and \$43,688 over various activities for a total of \$331,200 involving 71 participants over 16 training days.

In turn, Exchange programs have involved financial expenditures of \$61,040, \$64,680, and \$83,720 and \$69,320 for a total expenditure of \$278,760 involving 718 participants over 240 training days. Overall, in all phases of operations, USAID financial support to WAPP amounted to \$1,301,400 for the 2011-2012 period, resulting in imputed leveraging of investments on the order of \$50,000,000.

The USAID has provided support to WAPP since its establishment in 2006 through a Technical Assistance Program administered by NEXANT. In the 2009-2014 Energy portfolio, USAID provided direct support to the WAPP Secretariat in its capacity development and training programs in selected areas with the key objective of enhancing the capacity of the WAPP Secretariat to effectively take on the development and monitoring of its priority investment projects and to enhance and strengthen the capacity of its member utilities towards integrating the power systems of member utilities into a unified regional market.

The USAID support has facilitated the establishment of a fully functional WAPP organization and the development of key projects. Between 2010 and 2013, WAPP leveraged approximately 40 percent (US\$ 1,178,300,000) of the estimated cost of the projects (\$ 2,455,500,000). It is worth noting that USAID's contribution to these projects have been mainly through capacity building of WAPP and technical assistance for the conduct of pre-investment studies which are critical to mobilizing funds for project implementation. Additional USAID support that further aided investment leverage has been through funding seconded staff from member utilities to support WAPP in the coordination of pre-investment studies as well as monitoring the implementation of the priority projects.

Overall, these training workshops have no doubt enhanced the operational capacity of key partner institutions in ECOWAS in pursuit of clean energy goals. The ideal was the use of measurable benchmark performance indicators that could further validate the impact of training on performance. As an example, by how much are outage times directly affected by diagnostic training on network management? What performance indicators are there to measure power pool advocacy and awareness? How does knowledge of the basics of electricity supply affect access rates to clean energy? For these and many other categories, the choice of training topics needs to be more closely linked to how outcome performance indicators are affected.

## **NARUC/ERERA/ECREEE Renewable Energy (RE) regulation integration into the traditional regulation of utilities.**

**Establishment of Regulatory Authorities:** Presently, the countries that did not have regulatory authorities (Sierra Leone, Liberia, Guinea, Benin and Burkina Faso) are working towards establishing it. ERERA recently assisted Guinea Bissau to help set up the regulatory framework for its energy sector. The support includes facilitating policy dialogue with key in-country stakeholders such as the Ministries, Parliamentarians whose functions are critical for enacting regulatory policies and laws. ERERA has provided similar support to the Republic of Guinea, Liberia, and Sierra Leone. Sierra Leone has already set up its regulatory authority and is in the process of recruiting staff. The knowledge and skills gained from the USAID-NARUC programs complements the process because these plans were in existence already but the support complemented it.

## **AIP (Africa Infrastructure Program)/NEXANT support to ECREEE on wind and solar resource mapping.**

USAID implementing partner NEXANT was instrumental in helping ECREEE develop its 2012 business plan, and which guides its current and future operations. In turn, NARUC's partnership with ERERA, WAGPA and ECREEE addressed additional operational themes, notably: 1. Providing a regional platform for regulators to discuss and strengthen the regulatory framework for renewable energy; 2. Identifying measures to harmonize regulatory approaches through use of the Principles of Regulating Clean Energy framework; 3. Linking the Principles framework to National Renewable Energy Plans (NREAPs), and National Renewable Energy Policies (NREPs); and 4. Training for ERERA and national regulators to implement NREAPs and NREPs.

The training programs were delivered by NEXANT and NARUC and involved a combination of content methodology workshops, study tours, and demonstrations of skills and technology at WAPP as well as in several ECOWAS countries in the region. ASSESS established an online questionnaire to examine beneficiary responses to the training.

The deliverables of the sub-contract include: a) Database and Mapping; b) Identification of sites in an interactive session with users; c) Capacity building on criteria to be used for resource analysis/screening and ranking of sites and identifying sites of interest for RE projects with input from ECREEE/ECOWAS; and d) detailed SWOT analysis of selected sites to further select sites for wind and solar Photovoltaics (PV) and provide possible project configurations. The data used on the GIS system was modelled for the year 2012 using satellite and weather historical data.

Databases generated used prospecting/querying tools to supplement the quantitative sorting of data. These prospecting tools can be accessed via web browser, and include a graphical interface wherein resource data is overlaid on Google Maps. Two training workshops have been organized by NEXANT under the supervision of ECREEE. The training programs were meant to present the resource maps for each country and the entire ECOWAS region. ECREEE staff training workshop introduced them to how to use the website to build maps and apply SAM software to build a database. Ten sites, five each for solar and wind have been chosen for the continuous collection of data.

### **3.2.2 Analysis of the Achievements**

The team used three categories to track the efficiency and effectiveness of the USAID West Africa Energy Portfolio: a. capacity building, b. technical assistance, and c. knowledge and information sharing.

Performance Management Plans have been developed during the 2009-2014 period based on how these three areas are affecting the efficiency of ECOWAS stakeholder institutions through activities of USAID's primary implementing partners, NARUC and NEXANT. Overall, the team finds that USAID contractual mechanisms have brought notable achievements to ECOWAS energy producing and governance institutions.

#### a) **Technical Assistance**

At an operational activities level, USAID technical assistance has been used to address specific constraints faced by WAPP, ERERA, ECREEE, and WAGPA as they pursue the goals and objectives of increased electricity access rates via clean energy technologies. Outputs and Outcomes include greater efficiency in the preparation and implementation of energy investment projects, identifying mechanisms on how energy trade and investment can be done in a regional market, studies on policy formulation at the individual utility and regional governance level, and the development and implementation of business plans that support the broader goals of Power Africa and ECOWAS.

USAID technical assistance can also be viewed in terms of recruitment and appointments of staff within and to ECOWAS energy institutions. The evaluation team noted first the appointment of staff from power utilities in different countries to WAPP. These medium-to-long term appointments are designed to increase understanding and consensus on shared governance roles of the integration of individual utility entities within the framework of the West Africa Power Pool goals of coordinated production and trading of primary (e.g. gas pipeline operations) and secondary (electric utility operating units) energy across the region. Historically, primary and secondary energy investments were made largely in the context of sovereign national markets with little concern as to how fluctuations in energy production and consumption could support regional trading activities.

USAID has facilitated the secondment of staff from power utilities in different countries to WAPP. The purpose of these staff appointments is to adopt a shared understanding of how individual utilities can participate in the West Africa Power Pool regional energy system through implementation of specific generation technologies that can be linked via transmission or pipelines to regional markets for purposes of energy trading.

In addition, USAID has recruited short-term technical experts to assist in the preparation and implementation of infrastructure development in ECOWAS. These technical experts have worked primarily with WAPP in helping to map how the regional infrastructure can evolve, notably in terms of the sequencing of planned pipeline, transmission, and generating plant energy investments on a regional basis.

USAID short-term technical experts have been instrumental in helping WAPP to procure equipment for regional training centers, to assist in the production and implementation of a standardized Operation Manual with planning and design criteria building elements that can facilitate operations and energy trading. It also helped WAPP to develop and improve energy trading via system monitoring, standardized agreements on trading and power purchasing, along with the adoption of electricity market rules and procedures for governance, metering, and contract settlements. WAPP now has adopted energy project guidelines that include pre-investment studies that address economic feasibility (TEFS), along with Environmental and Social Impact Assessments (ESIA), the latter of which also take into account the impact on gender from energy sector investments at the implementation and end use levels. Equipment acquisitions for the Regional Training Centers have not yet been implemented as planning for the Centers is still under way.

#### b) **Capacity Building**

A second area of USAID energy program intervention has been in terms of capacity building. To reinforce the knowledge provided by technical experts, USAID has supported capacity building in ECOWAS institutions, primarily through training workshops and study tours. For the WAPP secretariat, USAID implementing partners NEXANT and NARUC have been instrumental in delivering workshop and exchange programs on power sector institutional reforms (a September 1-3, 2011 Accra workshop), and in energy conservation and efficiency (September 12-14, 2011 Dakar workshop, among others).

Overall, the quality and content of training received was considered useful for the responsibilities that trainees were tasked with implementing in their various capacities as program managers,

technicians, and other operators within the ECOWAS system<sup>20</sup>. For ECREEE, and ERERA-WAGPA, similar findings were reported.

Various training workshops have enabled WAPP to now implement improved energy project guidelines that include pre-investment studies that are based on economic and financial feasibility criteria (TEFS), as well as Environment Impact Assessments (ESIA). These are commonly used by donor organizations in addressing priority funding proposals.

In addition, training on operating system management has resulted in shorter outage time periods (Benin's SBEE Power utility), and project feasibility preparation times have been reduced by several months (WAPP Secretariat). However validation of how much these cycle times were reduced relative to a baseline benchmark was short of evidence. For future planning, inclusion of such benchmarks would be critical in helping USAID to assess the efficiency and effectiveness of training programs, for example, on these key performance indicators.

At ERERA, USAID funding of training undertaken in 2012 has resulted in the adoption of a five-year Strategic Plan, along with a regional capacity building plan. From these documents, ERERA had adopted a framework that defines access rules to the regional network, a definition of a tariff methodology for determining transmission costs and tariffs, and the development of contractual best practices<sup>21</sup>. As of June 2013, ERERA has obtained approval from ECOWAS of a Community Directive on the organization of the regional power market. The directive contains 14 articles that address regional market design at various stages of implementation, open access to regional transport networks, harmonization of contractual provisions on cross-border power exchanges, and measures to strengthen national regulatory authorities<sup>22</sup>. Representatives from ERERA participated in a Washington, D.C. Regulatory Training program in May 2012, and an Electricity Law Seminar in Washington in October 2012 that helped lead to the above documentary results.

An October 2014 report by NARUC, "Principles of Regulating Clean Energy in the ECOWAS Region" goes further in identifying clear principles to calculate the life cycle, or levelized cost of energy (LCOE) that (with illustrations from the Gambia and Ghana) shows how feed-in tariffs can be used to identify threshold tariff prices for covering the social costs of clean energy technologies and from which prospective positive returns could be gained by private investors in expanding the electricity grid through the use of clean energy technologies<sup>23</sup>. At the time of the evaluation, it was not clear how much of the framework contained in the 2014 NARUC document has been incorporated in the operating framework of ERERA. ERERA's operating capacity has been a subject of concern expressed at various points in this report, and it is emphasized that there is need to examine how ERERA can operate more fully and in tandem with other ECOWAS regional energy institutions.

At ECREEE, USAID has supported capacity building through training programs provided primarily by NEXANT and NARUC. One key achievement is that through NEXANT, ECREEE developed a business plan in 2010 that enabled the crafting of a 2012 ECOWAS Renewable Energy Policy. The 2012 Renewable Energy Plan contains time-dated benchmarks for the proportion of electricity to be delivered by renewable energy technology capacity to increase from a zero base in 2010 to 10 percent of peak load in 2020, and 19 percent by 2030. While it includes estimates of projected funding requirement levels, and a preliminary breakdown of sources of funding, it is not clear how well this will unfold in the period ahead, in part because it is a planning document that has only been adopted recently and for which tracking benchmarks have not yet become available.

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<sup>20</sup> ASSESS tabulation of online questionnaire survey results, June 2015.

<sup>21</sup> A Dutch team led by Viren Ajodhia, Wiebe Mulder, and Thijs Slot undertook for ERERA a 2012 study, "Tariff Structures for Sustainable Electrification in Africa", (Arnhem, Netherlands: KEMA Consulting Services). This study complements a 2009 Study by UPDEA on Comparative Electricity Tariffs in Africa-Étude Comparative des Tarifs d'Électricité Pratiqués en Afrique.

<sup>22</sup> ERERA, Annual Report 2012-2013.

<sup>23</sup> Matthew Leonardi (2014), "Principles of Regulating Clean Energy in the ECOWAS Region," (Washington, D.C.: National Association of Regulatory Utility Commissioners, for USAID).

The NARUC-USAID workshops created platforms for ECREEE and ERERA to effectively engage in the promotion of Renewable Energy development in the region. Prior to this support, the engagement between these two institutions was very minimal.

#### **c) Knowledge and Information Sharing**

A third area of USAID interventions that bear on efficiency and effectiveness is knowledge sharing. Trainings in the use of various computer software packages for office documentation and accounting, along with project cycle evaluation tools are already noted. Beyond that, in reference to ECREEE, USAID/WA also has supported knowledge sharing in ECREEE through its institutional capacity building efforts to use GIS technology in the identification and adoption of solar and wind power electricity investments.

Within this context, NEXANT subcontracted 3tier for the development of a Wind and Solar resources database for ECREEE, which is to enable ECREEE to utilize the SAM (System Advisor Model) software program to identify prospective renewable energy sites for solar and wind power. Achievements include the collection and mapping of Wind and Solar Resource Data (WSRD), capacity building in the form of 2 training events for ECREEE staff and the member states, and the selection of 20 sites for the continuous collection of WSRD data.

There are some issues related to the license of the database in regards to the needs of ECREEE and ECOWAS members. The evaluation team gathered technical information related to the database, its content, licensing, and the sustainability and impact on ECREEE's work as well as the usage of the resources by ECOWAS member countries.

The database license is valid for two years, after which it will require renewing (\$10,000.00) or discontinue data query on the ECOWREX online platform for the solar and Wind resource. NEXANT paid 3tier to allow ECREEE give access to users to Query the maps for a period, i.e. to be able to click on a feature in the map and view the attribute information.

As at the time 3tier through Nexant produced the resource maps, another contractor CENER (National Renewable Energy Centre) from Spain was brought in to conduct a CSP (Concentrated Solar Power) assessment for the region, which includes producing a Direct Normal Insolation (DNI) map. These solar maps are without license restrictions. The DNI map from CENER was put online instead of NEXANT's. Users can query on the DNI at no cost while queries on the GHI (Global Horizontal Irradiance) and wind maps developed by NEXANT/3tier attracts charges (10,000 for 2 years). NEXANT paid the initial cost which spans the period October 2012 through October 2014.

Due to lack of funds, ECREEE has not been able to produce time-series data for a number of years for the wind and solar maps. In a comparative assessment conducted by independent consultants in a separate project, NEXANT maps (produced using 3-Tier data) were preferred to that of CENER. However the report made recommendations for improvement of the NEXANT Maps such as acquiring time-series data annually and also as wind resource varies with height, NEXANT should produce wind maps for heights above 50m (since modern wind turbines can be as high as 120m).

The evaluation could not establish the extent of use of the wind and solar resource data. What is clear is that some experts requested for more data following a presentation on the maps in their respective countries. Some ECOWAS member States have also requested for the data as well. ECREEE has always maintained the terms of use of the resource data and therefore shares only Level 2 and/or Level 3 data to ECOWAS region governments who are actively pursuing project development. ECREEE however cannot provide answers of project's outputs from the analysis of the resource data.

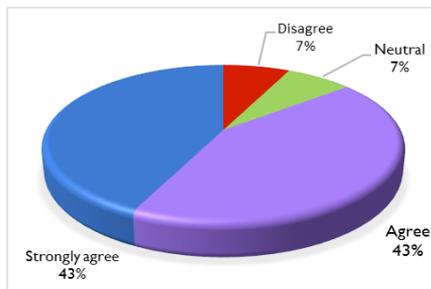
### 3.2.2 Summary of data analysis from online questionnaire

Overall 22 respondents completed the online – interview questionnaire: 86 percent are employees at an electric utility, 14 percent work in a regulatory agency. Of the respondents, 16 had work experience with WAPP, 5 with ECREEE, 6 with ERERA, 2 with WAGPA, and 3 in all other categories. Countries represented by the online questionnaire responses included: Ghana (27.3 percent), Togo (22.7 percent), Benin (13.6 percent), Gambia (13.6 percent), Cabo Verde (9.1 percent), with one each from Burkina Faso, Côte d’Ivoire, Mali, Niger, Nigeria, and Guinea-Bissau.

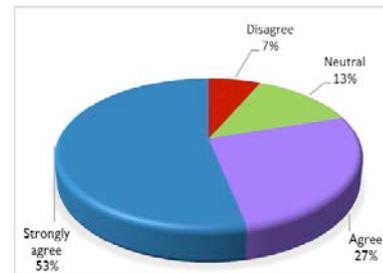
**Figure 6.** Key Results from Beneficiary Online-Interviews

#### 1) WAPP beneficiaries

Trainings, Exchange programs and other capacity building support received from WAPP were relevant to my institution’s needs and priorities.

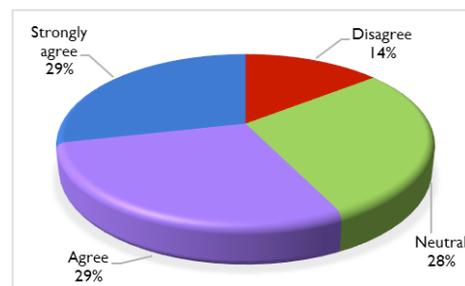


The knowledge and skills from the WAPP Training, Exchange programs and other capacity building support have improved my capacity to effectively contribute to the operations and management of my organizations in the regional power pool.



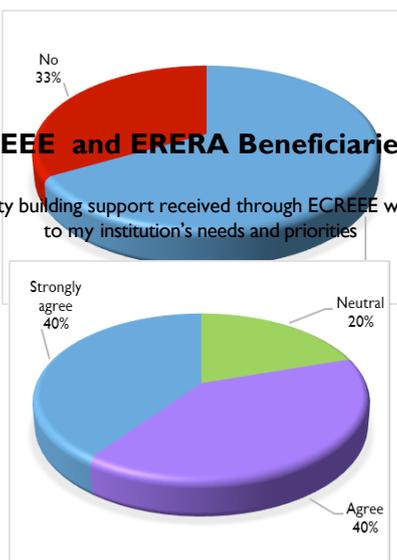
Infrastructure development, technical assistance, equipment and logistical, research, projects preparation and implementation or funds mobilization Supports received from WAPP were relevant to my institution’s needs and priorities.

Infrastructure development, technical assistance, equipment and logistical, research, projects preparation and implementation or funds mobilization Supports have improved my capacity to effectively contribute to the operations and performance of my organizations in the regional power pool.

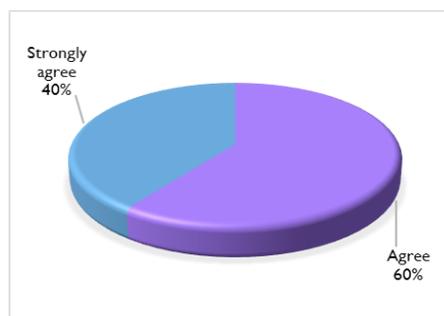


## 2) ECREEE and ERERA Beneficiaries

The capacity building support received through ECREEE was relevant to my institution's needs and priorities



The knowledge and skills from the ECREEE capacity building support has improved my capacity to effectively contribute to the operations and management of my institution.

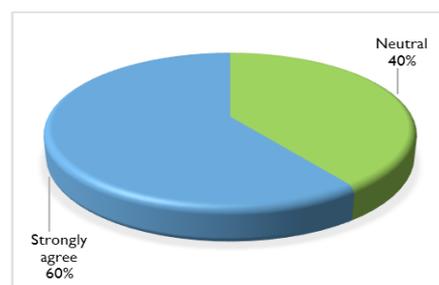


## 2) ECREEE beneficiaries

Does your institution have access to the region wide database on wind and solar resource mapping database?

## 3) ERERA beneficiaries

The capacity building support received from ERERA/NARUC was relevant to my institution's needs and priorities.



### 3.2.3 Factors Influencing the Achievements

The team used SWOT analysis approach to assess factors influencing the achievements. Overall USAID capacity building and technical assistance approaches and the Power Africa and Global Climate Change consistency and coherence influenced positively the achievements on leveraging investments in the West Africa Power Sector.

In the support to the implementation of the ICC, achievements are hindered by the lack of clear private sector strategy (WAPP vs. ERERA institutional roles) as well as the lack of clear market analysis (emphasis so far biased toward supply strategies). This in addition to the absence of a clear implementation timeline may impact negatively the ICC agenda.

Tariff differences across ECOWAS countries make adoption of regional clean energy technologies more complicated than in-country adoption decision. There are also weaknesses in the clarity of role and responsibility assignment (WAPP, ERERA, and ECREEE). Overlapping roles in ECOWAS at the WAPP and ERERA levels may affect the speed of clean energy adoption rates.

ECOWAS does not have a fully endorsed mandate to expedite regional electricity trading on which ERERA could take pro-active actions. Also, ERERA's framework of regulation and control strikes us as somewhat at odds with the implementation orientation of WAPP, ECREEE, and WAGPA.

Quality of infrastructure (progress on reliable energy delivery depends on the quality of technical ability among transmission and generating utilities) and the lack institutionalization of Power Utilities staff competency are major challenges for the implementation of the West Africa Power Pool infrastructure and regulatory system.

Factors affecting the capacity building achievements depend critically on the selection process and on logistics management. USAID training experts seek the most appropriately responsible individuals to participate in training workshops, which in some cases has worked well, but less so in others.

Personnel turnover in ECOWAS institutions contributes to some extent to the success or lack of it in training programs as staff responsibilities evolve at times around the presence or absence of a clearly delineated set of personnel advancement policies within a given institution. Those institutions with a clear mandate are likely to have greater efficiency results from a selection process that undertakes a careful matching of training topics with given and anticipated responsibilities. In short, management practices and standards within implementing agencies often is a critical factor for success.

### 3.2.4 Findings on Efficiency and Effectiveness

- Overall, while USAID has achieved measurable efficiency and effectiveness in the 2009-2014 portfolio of energy activities, the absence of more consistent evaluation indicators and reporting standards hampers the evaluation process in assessing the quality/quantity of outputs achieved so far. This includes the choice and limitations in the numbers of performance indicators, as well as how these indicators can be mapped into a coherent evaluation framework. ASSESS team members have spent a considerable amount of time looking for evidence of satisfactory performance indicators in the reporting process that could help validate the choice of activities and strategies.
- The team also notes the difficulty in collecting sufficient financial information on various activities by implementing partner institutions that would enable to better map budgeting with institutions and activities. Part of the difficulty in organizing financial data is that initiatives undertaken in the 2009-2014 period appear to have been driven more by a silo approach to individual ECOWAS institutions rather than through a more integrated approach across implementing stakeholders. USAID activities often have relied to a considerable extent on a silo approach to individual institutions (WAPP, ERERA, WAGPA, and ERERA) to achieve the goals of ECOWAS, Power Africa, and the Global Climate Change Initiative.
- Recruitment of short-term technical experts has no doubt resulted in moving individual institutions to accomplish a particular objective. At the same time, it is somewhat problematic that greater coherence across institutions has not been undertaken to ensure greater consistency built around a common set of benchmarks.
- In some cases, USAID implementing partners have utilized sub-contracting to satisfy particular technical needs. The contractual mechanisms for sub-contracting can create confusion and misunderstanding regarding how property rights issues are handled. In conjunction with a series of staff changes at NEXANT, a decision to sub-contract with 3Tier posed a question of how property rights were to be allocated between 3Tier and ECREEE in terms of the use of the satellite renewable energy database.
- It clearly cost 3Tier resources to assemble the data on which site analysis was undertaken, as well as the development of the corresponding extraction and analytical software to make suitable site choices. What has emerged from this is that 3Tier now receives a leasing royalty for access to its database and services, but which was not made clear to ECREEE at the outset as considering its institutional role of making freely available access to information and site data that had been acquired by research by 3Tier. In our view, NEXANT did not anticipate this sufficiently as it proceeded with implementation of its performance management plan, and which may have set back investment adoption rates across ECOWAS member countries to some

extent, and which should be rectified for the future in terms of contractual transparency as to who bears the cost of information acquisition and the associated analytics. However, the 3Tier subcontractor that NEXANT turned to for applying GIS data has enabled ECREEE to put forth a more concrete set of project proposals to ECOWAS via its implementing partner WAPP. NEXANT has offered to enter into a clarification of access to data by ECREEE and Third Parties upon request.

- The efficiency of USAID’s activities in technical assistance, capacity building, and knowledge and information sharing can be viewed in terms of results thus far observed. SBEE (Benin) utility operators and members of the WAPP secretariat in Cotonou informed that outage delays have been reduced by approximately half as a result of the adoption of diagnostic tools and skills acquired through USAID supported experts. In addition, at that same gathering, the average time involved in project preparation cycles has been reduced from approximately 8 years to little over one. To the extent that this is affirmed and inferred by data, it would validate a faster investment turnaround time, and enable WAPP to implement generation, transmission, and power sharing investment projects at a faster rate and which would result in higher electricity access rates across ECOWAS member countries.
- For WAPP, the SWOT analysis points to the need to revisit priorities in continuing technical assistance, while for ECREEE the team finds it important to embrace greater marketing strategies to accelerate the adoption of clean energy technologies. In this context, the team finds that ERERA has had until now a limited role in implementation, which merits a review as to its role in moving forward.
- The team recognizes that some of the issues highlighted in this context transcend the framework of a performance evaluation, they go to the heart of governance at the regional level and for which leadership needs to come first and foremost from ECOWAS member countries as to the delegation of authority in reaching a clear direction for the future. To the extent that USAID can provide constructive assistance in the evolving framework of governance it should be ready to assist with the common goal of achieving higher per capita income in the region through the spread of clean energy technologies. Toward this end, USAID should work with ECOWAS in examining the broader context of economic policy rules and practices with a view toward reducing the risks associated with measures to promote regional energy trading markets. For U.S. prospective investors this may involve greater participation by the Ex-Im Bank or other lending institutions, but so far it is not clear how these institutions have been involved in regional energy sector investments thus far.

### 3.2.5 Recommendations on efficiency and effectiveness

1. It would be helpful to ECOWAS in general and to USAID’s capabilities and initiatives in particular to work toward a more coherent plan of energy sector activities that could facilitate the emergence of efficient and effective regional energy trading markets while increasing access rates to clean energy electricity. Suitable benchmark indicators should be defined at the outset for all implementing stakeholder institutions to give ready access to how well a regional strategy on energy can meet expectations. This planning should shift from a silo-driven approach to a market-driven demand approach to facilitate investment in clean energy technologies.
2. While the capacity building should continue, to improve efficiency and effectiveness, greater attention should be given to the thematic adoption process and to the selection process for participating institutions. In this context, institutional capacity among ECOWAS institutions depends on a continuing process of skills training and diffusion, and that attention should be given to the extent to which external capacity building is sufficient against a growing need for domestic training in key areas, in particular systems operations, project cycle management, and energy trading institutional rules and practices. At some point, there is a need for internalization of these attributes among ECOWAS institutions that USAID should place some emphasis on accomplishing as part of its strategic planning.

What changes (positive/negative, and intended/unintended) have occurred to date that can be reasonably linked to USAID energy program interventions?

3. USAID should support WAPP in the adoption of a clear benchmark timelines to assess key steps toward achievement of a regional energy trading market (ICC) with indicator measures and timelines for successful completion.
4. USAID should support ECREEE in updating the 2012 Business Plan with indicators and timeline benchmarks that can show measurable progress on how ECOWAS member states can better integrate clean energy investments through use of ECREEE institutional capacity and technical expertise. ECREEE's progress in meeting its goals has been positive, though less than originally anticipated, for reasons relating to the coordinating functions across ECOWAS institutions.
5. USAID should support ERERA in adopting a benchmark Business Plan that clearly demarcates the role ERERA can play in fostering regional governance on energy trading markets and on tariff harmonization. This may require an enabling framework mandate from the ECOWAS secretariat to energize a harmonious evolution of the respective roles of WAPP, ECREEE, and ERERA.
6. USAID should consider support for WAGPA to adopt a benchmark Business Plan that defines timeline benchmarks with suitable indicators on clean gas delivery in the ECOWAS evolving regional energy market framework, and which also provides indicators of the relevance and impact of WAGPA efforts to control flaring to environmental standards in the region, and consistent with the GCC initiative.
7. It would be helpful to USAID in general and to ECOWAS as well, to have a more standardized format of financial reporting that could be used to identify funding gaps in planning, areas of success and a more coherent basis on which to revise budgeting and programming in pursuit of the shared goals of clean energy access in the region. Despite the complexities of different systems engaged in West African energy decisions, standardization is a useful step in terms of transparency and accountability, in addition to the benefit it can bring in attracting private investment in the energy sector.

### 3.3 Probable Impact of USAID Energy Portfolio

#### 3.3.1 How the USAID West Africa Portfolio Can Affect Energy in West Africa

USAID works to build institutional capacity to more efficiently and effectively manage scarce resources that lead to increases in real per capita income. At the same time, USAID interventions do not unfold in isolation. Instead, they work in collaboration with stakeholders to leverage outcomes, whether in terms of the level of economic activity or in terms of changes in the composition of output. In adopting the goals of Power Africa and the Global Climate Change Initiative, USAID's West Africa Energy Program works to strengthen policies that lead to more sustainable paths of development than would otherwise be the case.

Given the nature of USAID energy interventions, any performance assessment must by definition rely on proxy data to establish reasonable linkages between USAID activities and associated outcome indicators. For this assessment, the team's choice of impact indicators reflects the conceptual and policy framework set forth in ongoing USAID West Africa energy interventions. The list of impact indicators include the following: a) the level of investment in energy production and distribution, and the extent to which USAID interventions can be attributed on a leveraged basis; b.) changes in the composition of electricity production (with estimates of the clean energy share); c) access rates to electricity in ECOWAS countries, d) measures of energy technical efficiency that reflect progress on environmental quality in the context of Global Climate Change initiatives, and e) changes in per capita real GDP in ECOWAS countries. With all of these, the team looks to how

various mechanisms of USAID interventions can be reasonably associated with these impact indicators.

A condensed formulation of how ASSESS team has framed this analysis is that USAID/WA energy interventions work to expand access to clean energy in ECOWAS member countries by fostering accelerated investments in energy production and distribution markets, including regional energy trading in primary and secondary energy resources. In turn, these investments in energy support the expansion of energy trading markets that could enhance energy efficiency among stakeholder countries, thus avoiding traditional single-country energy sufficiency strategies that may reduce a country's level and rate of growth of per capita GDP.

Because per capita energy consumption correlates positively with the level of per capita GDP, the challenge is how to nurture investments in clean energy that simultaneously can reduce stress on natural resources while preserving or improving environmental quality. At this point, because the data are somewhat limited, the team relies on attribution to validate the impact of USAID energy interventions that are consistent with Power Africa goals, the Global Climate Change Initiative, and the underlying goals of regional economic integration and development embodied in the framework of ECOWAS initiatives.

### 3.3.2 Level of investment in energy production and distribution

The team has not been able to compile an annual profile of energy investments by funding source, country, and region that could provide additional insights into the impact of USAID's energy program. From various reports and interviews, it is understood that expenditures by the USAID energy program are helping to leverage energy investments. The team emphasizes that USAID alone cannot claim credit for such a ratio, but the dollars spent on capacity building and technical assistance have likely been matched by at least an equivalent impact in terms of investment. WAPP reporting has referenced this type of impact from USAID, even though it is clear that multiple investment sources are involved, as are complementary bilateral aid programs.

**Table 3. Investments Leveraged for Infrastructure Projects in West Africa**

Project Description	Investors (Committed)	Projected Project Cost (Million US\$)	Amount Leveraged with USAID support from 2010-2013 (Million US\$)	USAID support start date
(Ghana) – 225 kV Bolgatanga (Burkina Faso) - Ouagadougou Interconnection Project	IMPLEMENTATION PHASE: WB, EIB, AFD, GRIDCo, SONABEL	156.00	156.00	March-06
(Côte d'Ivoire) – 330 kV (Ghana) Interconnection Reinforcement Project	EU-Africa Infrastructure Trust Fund - EIB (Implementation phase)	117.00	117.00	October-08
Han (Ghana) - Bobo Dioulasso (Burkina Faso) - Sikasso (Mali) - Bamako (Mali) Interconnection Project	EU-Africa Infrastructure Trust Fund-EIB,USAID (Pre-investment phase)	0.77		June-06
	EIB, AFD, AfDB, EBID (Implementation phase)	213.72	186.34	June-06
(Côte d'Ivoire) – Man, Sannequille (Liberia) – Buchanan (Liberia) - Monrvia (Guinea) – Nzérékore (Guinea) – Bumbuna (Guinea) – Linsan Interconnection Project.	EU-Africa Infrastructure Trust Fund, EIB-KfW (Pre-investment phase)		0.22	January-09
	World Bank (Pre-investment phase)		1.95	January-09
	World Bank (Project Preparation Advance)			May-09

Project Description	Investors (Committed)	Projected Project Cost (Million US\$)	Amount Leveraged with USAID support from 2010-2013 (Million US\$)	USAID support start date
	IMPLEMENTATION PHASE : European Investment Bank, African Development Bank, KfW, EBID, WB	469.91	21.92	January-09
225 kV OMVG Interconnection Project (Guinea, Guinea Bissau, The Gambia, Senegal) including hydropower sites at Sambangalou (128 MW) and Kaleta (240 MW) - PHASE I IMPLEMENTATION	IMPLEMENTATION PHASE : AfDB, WB/IDA, EIB, AFD, EBID, KfW, Abu Dhabi Fund, BOAD, IDB	678		July-06
330 kV Volta (Ghana) – Lomé 'C' (Togo) - Sakete (Benin) Interconnection Project	IMPLEMENTATION PHASE : WB, AfDB, KfW, VRA, CEB	120.00	120	September-06
WAPP Information and Coordination Center	IMPLEMENTATION PHASE : EU	136.00	41.00	July-07
225 kV Guinea - Mali Interconnection Project	African Development Bank (Pre-investment phase)	4.00	5.00	May-09
		220.80	220.80	May-09
Capacity Building in Environmental Safeguards	World Bank	0.86	1.72	March-09
Reconstruction of 64 MW Mount Coffee Hydropower Facility	EU-Africa Infrastructure Trust Fund, EIB-KfW (Pre-investment phase)	2.10		October-09
	EU-Africa Infrastructure Trust Fund, EIB-KfW (Implementation phase)	225.00	225.00	October-09
Emergency Power Supply Programme for Conakry	ECOWAS (Implementation Phase)	108.00	78.00	February-11
TCN-CEB 330kV Double Circuit Interconnexion Reinforcement Project	(Pre-investment phase)	3.43	3.43	September-11
<b>Source: USAID West Africa/WAPP</b>				

### 3.3.3 Electricity Production in ECOWAS Countries

For the second impact measure, the team looked at the composition of operating and planned electricity generation capacity by technology and across ECOWAS member countries. As continuous time series data set on planned and operating capacity were not available, further inference has been made of how clean energy outcomes can be reasonably associated with ongoing investments. To do so, WAPP 2012 data on generating plants were taken and organized in a way to extract clean energy shares in 2012 and how the realization of planned investments will transform the clean energy share as new plants become operational.

**Table 4. ECOWAS 2012 Installed and Planned Electricity Generating Capacity**

	Actual	Planned	Total		Installed Clean Share	Planned Clean Share	Total Clean Share
Coal	32.00	1,105.00	1,137.00				
Diesel	1,441.19	768.95	2,210.14	Benin	28.47%	74.96%	61.78%
Gas	12,944.76	12,189.40	25,134.16	Burkina Faso	12.91%	50.80%	33.12%
Heavy Fuel	475.28	508.59	983.87	Cabo Verde	23.10%	99.91%	85.44%
Biomass	77.84	77.84	155.68	Côte d'Ivoire	45.50%	5.68%	25.60%
Large Hydro	3,867.70	11,257.50	15,125.20	Gambia	0.00%	15.00%	7.65%
Medium Hydro	234.44	2,100.24	2,334.68	Ghana	54.43%	33.90%	42.63%
PV Solar	11.37	658.01	669.38	Guinea	40.39%	93.72%	90.61%
Small Hydro	227.60	846.45	1,074.05	Guinea Bissau	5.69%	32.73%	30.08%
Wave	0.00	10.50	10.50	Liberia	0.00%	61.15%	59.53%
Wind	26.03	531.67	557.70	Mali	52.21%	72.62%	64.01%
Total	19,338.21	30,054.15	49,392.36	Niger	0.00%	41.95%	34.54%
				Nigeria	15.13%	42.57%	29.83%
Traditional	14,893.23	14,571.94	29,465.17	Senegal	0.01%	30.11%	21.23%
Clean	4,444.98	15,482.21	19,927.19	Togo	17.84%	100.00%	51.33%
Traditional	77.01%	48.49%	59.66%	ECOWAS	22.99%	51.55%	40.37%
Clean	22.99%	51.51%	40.34%				
	100.00%	100.00%	100.00%				

**Source:** ECOWAS 2012 tabular data as provided to ASSESS

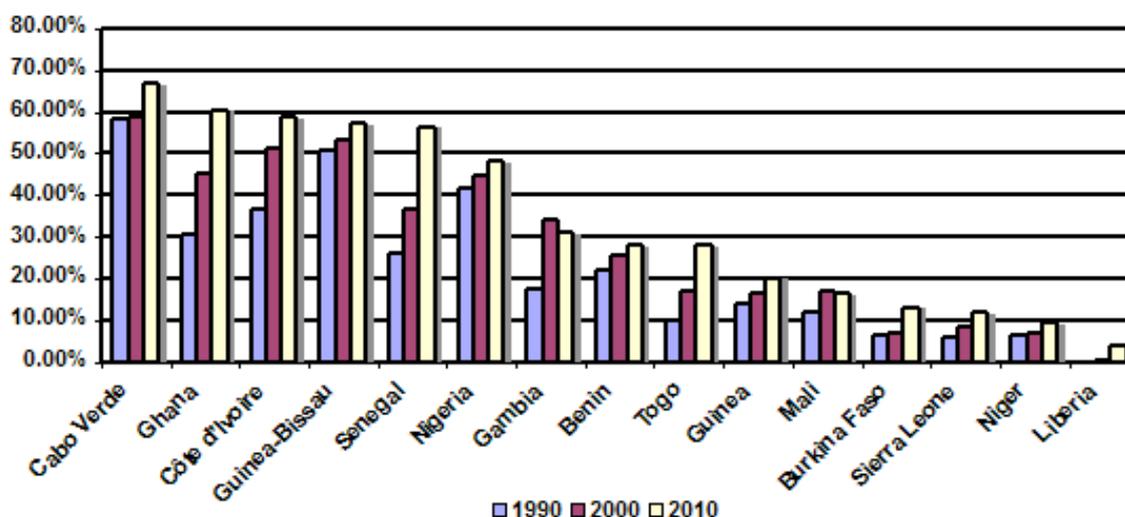
For ECOWAS as a whole, installed operating capacity in 2012 relied mostly on gas, followed by large hydro, then diesel, with the remainder accounted for by heavy fuel, medium and small hydro, coal, biomass, PV solar, wave, and wind technology systems. Although some would classify gas as a clean energy technology in comparison to coal, diesel, and heavy fuel, the team used a more rigorous definition in grouping all exhaustible fossil fuels together and then calculating the residual share of renewable technologies to arrive at a clean energy share. Overall, clean energy accounted for just under 23 percent of installed operating capacity in 2012, and were all investments in electricity generation to be realized as planned, the clean energy share would rise to 40.34 percent, once all generating systems were in operation.

The team uses this definition to derive the clean energy share of current and planned electricity generation on a country-specific level. Using this configuration, the clean energy share of future fully operational generating capacity would be highest in Guinea, followed by Cape Verde, Benin, Mali, Liberia, and Togo all standing with over half of capacity accounted for by clean energy technologies. In our view, USAID's efforts to engage in ECOWAS energy implementing institutions contribute in part to this composition transition now taking place. What would be useful to do with annual time series data would be to look at the year-to-year change in the clean energy share, which could then be more closely linked with particular energy initiatives undertaken by USAID.

### 3.3.4 Electricity Access in ECOWAS Countries

Using data compiled from the World Bank, from 1990 through 2010, electricity access rates have increased from a simple average of 22.5 % to 34.0 %. This still is significantly below other regions in the world, but it reflects continuing efforts to expand electricity access as part of individual country planning and investment programs as well as in collaboration with member states to create regional energy trading in gas and electricity. Short of a more calibrated dataset that could enable the team to make more precise inferences about the relative impact of any of USAID's West Africa energy program in individual countries or region, as these energy initiatives have unfolded in light of USAID's energy program initiatives, it is reasonable to infer that at least some of the increases in access rates reflect the impact of various intervention mechanisms. More recent data that might enable us to pursue this question more closely over the 2009-2014 evaluation horizon are not available at present.

**Figure 7. Electricity Access Rate in ECOWAS Countries**



Source: The World Bank and IEIA

As access rates vary significantly over ECOWAS member states. As noted, there is a positive relationship between access rates and per capita GDP. With a larger data set it might be possible to examine with econometric modeling the separate effects of access rates, loss rates, and environmental emissions intensity rates to clarify the respective contributions of these variables to economic growth. In so doing, this would permit a more calibrated estimate of the impact of energy portfolio investments on economic growth, and in which countries investments in clean energy have a greater impact on growth in comparison to others.

### 3.3.5 Energy Technical Efficiency and Environmental Quality

*How do energy interventions translate into the impact on the environment?* USAID already has been working with WAGPA to develop greater capacity to engage in gas trading as a regional pipeline distribution system is completed. At the same time, WAGPA also is working to reduce flaring from gas plants. Reductions in flaring are beneficial to the environment, as are reductions in energy generation and transmission losses. Together one impact indicator cited here is the level of energy emissions intensities across ECOWAS member countries.

Energy emission intensity measures the quantity of CO-2 atmospheric emissions from all generation and end uses per constant dollar of GDP in an economy. When energy intensities themselves are lowered, this reflects improvements in controlling environmental emissions as well as technical efficiency improvements in all energy conversion technologies.

The latter includes loss reductions in generation and transmission but also improvements in insulation in buildings and increases in fuel efficiency for transportation systems ranging across rail, freight, and passenger bus and individual automobile stocks. As such, reductions in emissions, as well as in reductions in energy intensity reflect to some extent the evolution of public policy regarding energy transformation efficiencies overall rather than just energy interventions by USAID.

	Emissions in Kg of CO <sub>2</sub> per \$2005 GDP						Decade Annual Rates of Change				
	1960	1970	1980	1990	2000	2010	1960-70	1970-80	1980-90	1990-00	2000-10
Benin	0.1689	0.2209	0.3104	0.3122	0.4537	0.9915	2.72%	3.46%	0.06%	3.81%	8.13%
Burkina Faso	0.0480	0.1170	0.2558	0.2454	0.2596	0.2360	9.32%	8.13%	-0.41%	0.56%	-0.95%
Cabo Verde	0.1515	0.3693	0.8073	0.3522	0.2541	0.2754	9.32%	8.13%	-7.96%	-3.21%	0.81%
Cote d'Ivoire	0.1406	0.3223	0.4910	0.4260	0.3975	0.3045	8.65%	4.30%	-1.41%	-0.69%	-2.63%
Gambia, The	0.1343	0.2816	0.5778	0.4898	0.5111	0.6032	7.68%	7.45%	-1.64%	0.43%	1.67%
Ghana	0.4567	0.6107	0.5750	0.7136	0.7492	0.6078	2.95%	-0.60%	2.18%	0.49%	-2.07%
Guinea	0.4744	0.6343	0.5973	0.6137	0.5069	0.3782	2.95%	-0.60%	0.27%	-1.89%	-2.89%
Guinea-Bissau	0.1843	0.2464	0.4712	0.5001	0.2725	0.3455	2.95%	6.70%	0.60%	-5.89%	2.40%
Liberia	0.2668	1.4558	1.7077	1.2389	0.9647	0.9385	10.46%	1.61%	-2.69%	-0.56%	-6.69%
Mali	0.0535	0.1206	0.1586	0.1606	0.1391	0.0894	8.47%	2.78%	0.13%	-1.43%	-4.32%
Niger	0.0185	0.1033	0.2410	0.3545	0.2840	0.3222	18.80%	8.84%	3.93%	-2.19%	1.27%
Nigeria	0.1347	0.5525	1.1002	0.8043	1.1670	0.4962	15.16%	7.13%	-3.08%	3.79%	-8.20%
Senegal	0.2991	0.3909	0.8454	0.6219	0.5680	0.6810	2.71%	8.02%	-3.02%	-0.90%	1.83%
Sierra Leone	1.0035	0.8088	0.4493	0.2627	0.3721	0.3242	-2.13%	-5.71%	-5.23%	3.54%	-1.37%
Togo	0.1532	0.2874	0.4951	0.4800	0.6780	0.6217	6.49%	5.59%	-0.31%	3.51%	-0.86%
<b>Inweighted ECOWAS Rate</b>	<b>0.2459</b>	<b>0.4348</b>	<b>0.6055</b>	<b>0.5091</b>	<b>0.5012</b>	<b>0.4739</b>	<b>0.0764</b>	<b>0.0435</b>	<b>-0.0124</b>	<b>-0.0024</b>	<b>-0.0053</b>
<b>SS Africa</b>	<b>0.7911</b>	<b>0.8817</b>	<b>1.0331</b>	<b>1.1007</b>	<b>1.0763</b>	<b>0.8297</b>	<b>1.09%</b>	<b>1.60%</b>	<b>0.64%</b>	<b>-0.22%</b>	<b>-2.57%</b>
<b>World</b>	<b>1.0162</b>	<b>0.9477</b>	<b>0.8556</b>	<b>0.7186</b>	<b>0.6085</b>	<b>0.6394</b>	<b>-0.70%</b>	<b>-1.02%</b>	<b>-1.73%</b>	<b>-1.65%</b>	<b>0.50%</b>
<b>North America</b>	<b>0.9993</b>	<b>0.9861</b>	<b>0.7900</b>	<b>0.5794</b>	<b>0.4966</b>	<b>0.3997</b>	<b>-0.13%</b>	<b>-2.19%</b>	<b>-3.05%</b>	<b>-1.53%</b>	<b>-2.15%</b>

Source: The World Bank, *World Development Indicators*

Turning again to data from the World Bank, energy emissions intensities in ECOWAS countries from 1960 through 2010 reflect an initial increase as countries expanded primary and secondary energy production and consumption in the course of rising per capita incomes. However, by the 1990s, countries have turned their attention to the adverse impact of rising energy intensities on the environment. For some ECOWAS countries, emissions intensities have continued to increase (notable in Benin, the Gambia, Cape Verde, and Guinea-Bissau), while in others emissions intensities have been undergoing reductions as clean energy policies are implemented. Nigeria has made significant progress from its position as the most emissions intensity economy in ECOWAS in 2000, with other countries making additional transformations. For ECOWAS as a whole, between 2000 and 2010, energy emissions intensities have declined moderately from .5012 to .4739. USAID's support of clean energy investment played a role in helping countries to improve environmental quality, and are likely to do more in the future.

### 3.3.6 Changes in per capita real GDP in ECOWAS Countries

The last impact indicator is the level of real per capita GDP. Rising per capita GDP generally correlates significantly with per capita energy consumption. A key in development strategy is to reduce the linkage between energy consumption and per capita GDP, and this is what ECOWAS has given attention to in its efforts to promote regional energy trading markets with economic integration.

**Table 6. Real \$2005 per Capita GDP in ECOWAS Countries**

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A key premise of ECOWAS regional energy strategy is that instead of single economies, a regional grouping can enjoy higher levels of per capita income through expanded inter-regional trade and investment. Using once again data from the World Bank, looking back as far as 1960, it is seen that ECOWAS countries have achieved measurable progress in terms of real per capita GDP. Relative to Sub-Saharan Africa, per capita real GDP in ECOWAS countries have risen from 65 percent of Sub-Saharan Africa to just under 70 percent in 2013. However, the ratio of ECOWAS per capita to world GDP has fallen from just under 15 percent to just under 9 percent during the same time period, all of which give urgency to the development of regional economic integration in ECOWAS in general and to the importance of sustainable clean energy investments that can bring greater rates of access to the region while promoting increases in real per capita incomes at rates thus far still not fully realized.

**Table 7. Megawatt Hours of Electricity Traded in Some ECOWAS Countries**

	Megawatt Hours of Traded Electricity					
	Exports			Imports		
	2011	2012	2013	2011	2012	2013
Nigeria	1,721,710	1,722,000	1,789,000			
Ghana	177,045	675,000	653,000	675,347	177,000	120,000
Côte d'Ivoire	675,347	658,000	825,000	54,275	54,000	32,000
Senegal				290,318	290,000	308,000
Gambia						
Burkina Faso				472,427	472,000	482,000
Niger	4,187	4,000	4,000	640,670	641,000	602,000
Mali	494,061			13,403	494,000	809,000
Benin-Togo		2,000	2,000	1,784,117	1,812,000	1,935,000
Guinea						
SOGEM		980,000	1,002,000			
<b>Total</b>	<b>3,072,350</b>	<b>4,041,000</b>	<b>4,275,000</b>	<b>3,930,557</b>	<b>3,940,000</b>	<b>4,288,000</b>

Source: WAPP Reports

Energy trading data have been only loosely tracked for purposes of USAID programming efforts. While there are no annual time-series data that could be used to calibrate the impact of USAID energy portfolio capacity building, infrastructure development and energy trading efforts, WAPP data show an increase in electricity imports and exports over the 2011-2013 time period. When calculated against the level of electricity generation, the trade share of electricity has increased steadily from 6.56 percent in 2011, to 7.27 percent in 2012, and to 7.60 percent in 2013. In our view, the technical assistance and capacity building by USAID in ECOWAS partner institutions has played a role in achieving these rates of increase.

In citing ECOWAS data on traded electricity, the team notes that this does not reflect the level of robust trading envisioned by ECOWAS and by USAID. As transmission and distribution networks expand, many contractual mechanisms still focus on longer term horizons, whereas the training undertaken by USAID implementing partner NARUC clearly envisions the emergence of next-day and other short-term trading mechanisms. Suffice to say at this point while long-term electricity may be a necessary step in achieving greater access rates in the region, a fully functioning trading market will require adoption of market instruments for which trading has been provided but which have not yet realized their full potential.

In this regard there are no more recent data with which to arrive at a closer examination of the extent to which short-term trading is emerging from efforts to promote a regional electricity trading market. What is emphasized here is that there may be significant information gaps and institutional constraints that bear on the emergence of short-term trading opportunities, among them, how differences in tariff rates across member countries will affect prospects for short-term trading, and how taxes and subsidies will be harmonized in ways that permit more consistent short-term trading. At the same time, some efforts in this direction were undertaken and which may serve as a guide to future directions.

**Table 8. Trade Share of Electricity Generation in ECOWAS Countries**

	Trade Share of Generated Electricity		
	2011	2012	2013
Nigeria	1,721,710	1,722,000	1,789,000
Ghana	426,196	426,000	386,500
Côte d'Ivoire	364,811	356,000	428,500
Senegal	290,318	290,000	308,000
Gambia			
Burkina Faso	472,427	472,000	482,000
Niger	322,429	322,500	303,000
Mali	253,732	494,000	809,000
Benin-Togo	1,784,117	907,000	968,500
Guinea			
SOGEM		980,000	1,002,000
Total	3,501,454	3,990,500	4,281,500
Production	53,387,295	54,854,000	56,361,000
Trade Share	6.56%	7.27%	7.60%

Source: WAPP Reports and World Bank data

One such effort is a study commissioned by ERERA by the consulting firm UPDEA in 2009 on electricity tariffs across ECOWAS countries. The difficulty found is that while offering some insights, a single year's worth of data is insufficient to gauge how well electricity trading can emerge over time. Gathering and publishing a regular ongoing series of tariff rates is a critical step in moving to more active energy trading markets. Without annual indicator tracking on tariff rates, it strikes us as a major constraint on not only estimating the impact of USAID activities, but how USAID and ECOWAS can move forward on dynamic energy trading markets.

### 3.3.6 Recommendations on impact

Based on the above findings the team recommends the following measures:

1. Although advances in clean energy production and distribution technologies are an important building block for economic development in ECOWAS, a larger problem is how to accelerate progress in the future in ways that would enable the region to enjoy sustainable levels of per capita income that are closer to average world levels. USAID West Africa's energy program can contribute to this, but emphasis thus far has been on capacity building and technology acquisition rather than on programs of dynamic implementation. USAID should consider crafting a regional energy strategy that brings greater cooperation across implementing stakeholders in WAPP, ERERA, ECREEE, and WAGPA that moves them into a more focused leadership role than has been the case until now. Such an integration strategy should form part of a USAID regional energy master plan that works in tandem with ECOWAS to achieve this goal and should be adopted before continuing with fragmentary contractual relationships, as has been the practice to date. The team note the 2013 Dev2E Capacity Building Program Initiative Interim Report as a starting point for integration in USAID programming decisions.
2. Key to shifting USAID's West Africa energy partnerships into a more dynamic mode is to place greater emphasis on market promotion, starting with complementary efforts at the trading level, and extending directly to primary and secondary energy trading markets. Market promotion initiatives should embrace efforts to strengthen regional governance institutions in terms of economic policy reforms that include regulatory changes and fiscal policy choices that facilitate regional trading opportunities. Until now, regulatory reform training has been conducted with support from USAID, but it is not seen as an action plan that could facilitate these reforms in a significant benchmarking form by which progress could be tracked against identifiable indicators that are associated with increases in per capita real income. This

framework would require going beyond past practices to establish a consensus across ECOWAS and donor countries as to the beneficial effects of indicators generated for such purposes of evaluation.

3. Statistics on the Energy sector are weak and not up to date. USAID could support capacity building on the development and maintenance of a statistical database that can be used for monitoring, evaluation and planning of future projects.

### 3.4 Sustainability

- USAID has delivered a number of capacity building initiatives to WAPP in the form of training and technical assistance. While initiative to build regional centers of excellence where advances in electricity technology and best practices can be diffused through training for engineers has started, it is not clear how this will enable WAPP to sustain the level of quality of its programs as technical staff at Power Utilities level move to eventual retirement and in which new technical staff may not have sufficient skills and knowledge of existing professionals working with local utility firms.
- Electricity tariffs vary widely across ECOWAS member countries. While ERETA has worked to craft a legal framework for energy trading, disparities in tariff rates reflect a combination of differences in production costs across countries, subsidies used in various countries, along with inefficiency of operations among ECOWAS member countries.
- Beyond the crafting of a legal framework for regional electricity trading, ERETA is not yet able to play a strong leadership role in bringing about a robust energy trading market. In this context, the wide variation in tariffs that exist across ECOWAS member states, reflecting a mix of technical differences and policy choices that may well include the perpetuation of subsidies among some ECOWAS countries is a challenge for achieving a sustainable regional electricity market. How ERETA can lead to the adoption of feed-in tariffs that reflect fully life cycle unit costs is not clear from the review of documentation and interviews.
- An absence of a stronger leadership role reflects in part the institutional constraints that ECOWAS in general faces in trying to craft regional operating institutions in the context of entrenched national practices, but also the institutional capabilities of ERETA itself. ERETA has not received greater support in part because it has not adopted an integrated role for the implementation of clean energy initiatives, but also because it lacks the benefits of capacity building that other ECOWAS electricity agencies have received. While the ERETA mandate is based on promotion cross-border electricity trade, it has thus far no clear focus on how to integrate renewable energy technologies within its operating framework.
- One study members of the team have come across as this evaluation began to unfold is a May 2015 (Brookings Institution study by Amadou Sy and Fenohasina Maret Rakotondrzaka, "Private Capital Flows, Official Development Assistance, and Remittances to Africa: Who Gets What"). It calibrates external capital flows to Africa from 1990 through 2012, and indicates that while remittances account for only 5 percent of ECOWAS inflows, it exceeds the average of 3.9 percent for Sub-Saharan Africa and is the highest among all regions. Attracting investment to the electricity sector is likely to succeed by incorporating the potential role of remittances into projected estimates of Official Development Assistance (ODA) that continues to dominate capital flows to the region.
- While the team assessed ongoing technical assistance as important to the realization of a sustainable energy policy, greater attention should be given to stakeholder capacity to maintain the requisite skills and expertise once training and technical assistance have been undertaken with

support from USAID. At this point, it is not clear how completion of any given capacity and skill set is linked to efforts to sustain them by stakeholder institutions.

**The team makes the following recommendations:**

1. In adopting a more comprehensive energy portfolio planning document, USAID/WA should integrate approaches that include a more active role in ERERA's capacity to implement clean regional energy trading. Additional training in energy regulation is one way to achieve this. Another is to look to how representation by WAPP, ECREEE, ERERA, and WAGPA in each other's boards can improve communication and promote coordination beyond donor coordination meetings.
2. USAID/WA should encourage ECOWAS to develop internal capacity building initiatives to address ongoing issues of resource renewal. This might work through the planned regional centers of excellence or they may be appropriate through single agency internal training programs. USAID may be able to provide technical assistance to get this moving forward but it should look to institutionalization of training capacity as it plans for the future.
3. USAID/WA should place greater emphasis on market-based electricity partnerships than it has done thus far. This can take place in terms of capacity building initiatives in which outreach institutions such as WAPP and WAGPA can look to prospective investors to solicit prospective financing on planned future investments. It also includes ECREEE as a key partner in terms of how renewable wind and solar project investors may be encouraged to consider investing in clean energy technologies. A useful place to pursue this question is to examine country and regional financial intermediation capacity (e.g. equity and debt marketing capacity) and to then look to factors that determine dynamic investment flows.
4. Regional agencies work separately and in isolated manner. National utilities do the same as well. Training workshops are an opportunity for people to mingle and share ideas. At the same time, USAID should look at how ECOWAS institutions can institutionalize capacity building programs, including the adoption of internal training workshops on an as needed basis, and that can work through newly defined regional centers of excellence now being planned by WAPP.
5. None of these recommendations can unfold in the absence of a clear tariff structure that addresses underlying taxes and subsidies that can distort investment in clean energy technologies. Feed-in tariffs alone do not resolve the issue, even as some renewable energy levelized costs in some countries already have reached parity with traditional generation technologies. In this context, ECOWAS should be encouraged to look to more precise steps in implementing regional energy trading while at the same time looking at how tariff reforms can assist in a smooth transition. A more dynamic marketing effort built on benchmarking indicators can help in the regard and in which new investment may help ECOWAS reach the goal of greater access to clean energy through regional energy trading markets.

### 3.5 Lessons learned

USAID/WA maintains a variety of portfolio programs that have complementary objectives. The team views investment in energy as one of the more critical, given its ability to address questions of poverty, the participation of women in society, and the realization of a dynamic growing regional economy that can hold its own in an increasingly globally competitive marketplace. Leveraging investments in clean energy is clearly a priority for moving ahead. The question is how, in which direction, and with what emphasis.

From this larger context, the team finds overall that the USAID/WA energy program has been consistent in its support of ECOWAS efforts to increase access to clean and sustainable energy through a new operating regional power pool. Despite inconsistencies in the implementation of

various intervention mechanisms, this is a significant achievement on the part of USAID that can serve as a success story.

Some dimensions of success include: a. rising rates of access to electricity; b. an increase in the mix of clean energy technologies; c. the emergence of a regional electricity trading market; d. some success in leveraging USAID resources toward investments in clean energy in the region; e. Cape Verde's success in integrating renewable energy in its mix of energy generation technologies; progressive steps in expanding the ECOWAS gas pipeline and electricity transmission and distribution regional network; f. Benin's SBEE has achieved notable success in outage diagnostic and remediation decision-making as well as in project cycle preparation planning.

Despite success, West African countries still suffer from continuing power outages and in which access rates to clean energy remain at the lower end of the global regional spectrum. This is a condensed way of saying that investments in a regional power pool and clean energy technologies are still far from reaching both stated goals and their underlying potential.

Consistent with the framework of this evaluation, the team finds the following lessons learned to be useful in adopting future energy portfolio decisions:

- While fragmentary programming by USAID West Africa in its recent energy portfolio has produced notable outcomes in terms of capacity building, the silo approach to individual stakeholder institutions (WAPP, ECREEE, WAGPA, and ERERA) is inadequate to a sustained pattern of expanded public-private partnership investments that could help meet the ECOWAS goals of greater electricity access rates to clean energy for the period ahead.
- The absence of comprehensive and consistent regular benchmarking across ECOWAS institutions makes it difficult to undertake a more dynamic regional approach to regional energy markets that generate higher rates of access to clean energy. Scattered performance reports with uneven standards reflect the need for a more consistent decision-making framework. This is noted in reference to the lack of a common table of benchmarks, and the fact that no mid-term evaluation of the portfolio appears to have been undertaken using a consistent set of performance indicators.
- ECOWAS implementing stakeholder institutions have incomplete and uneven cross-representation and communications, even though they all report to the ECOWAS secretariat. This makes it difficult to act more in concert with the overlapping but mutually reinforcing goals of ECOWAS, whether at the project design and implementation level, or in attracting suitable public-private partnerships that now take place through uneven donor coordination efforts.
- There are concerns about the sustainability of achievements reached thus far through the USAID West Africa energy portfolio technical assistance and capacity building training workshops. How the proposed ECOWAS Centers of Excellence can institutionalize skills training is a question that remains unaddressed, especially as staff retirements and new recruitments are undertaken. Although some anticipation of institutionalization has been taken up by NEXANT and NARUC, the team views this as a priority concern for future USAID programming.
- At the present stage, it is not clear how capacity building and technical assistance provide a clear framework through which prospective stakeholders can derive sufficient information on prospective rates of return to investments in regional clean energy technologies to make competitive funding decisions. The absence of greater transparency in donor coordination meetings (involving greater outreach to prospective investors), weaknesses in reaching out to traditional and non-traditional sources of investment (e.g. remittance and informal economy financing mechanisms), and complex procedural rules in the face of diverse electricity tariff rates and diverse monetary and fiscal policies among ECOWAS countries can be as much a barrier to investment as the level of financing requirements alone.

- Beneficiary institutions often were not consulted on the selection process for implementing partner institutions within a particular funding mechanism of specific task contract. Greater consultation in advance with greater transparency in the contracting process, especially in terms of work undertaken regarding ongoing access to site-mapping via ECREEE would help to clarify how information is to be gathered, paid for, and utilized well in advance of investment commitments to be undertaken.
- The ASSESS team's advocacy of an integrated energy strategy built on collaborative market principles is essential to the promotion of economic growth through greater electricity access rates and clean energy technologies.

The following are key recommendations that are considered important to the evolution of any future energy portfolio commitment:

1. There is a need for a dynamic market-oriented strategy at ECOWAS and in which USAID's energy portfolio does not replicate past activities and instead implements moves to institutionalize sustainable achievements in terms of capacity building, infrastructure development and leveraged investments in clean energy technologies within ECOWAS institutions themselves.
2. In concert with ECOWAS, USAID/WA should develop a comprehensive planning document that identifies key priorities in which energy trading can be benchmarked on an annual basis and in which feedback can help ECOWAS to assess how support from USAID to capacity building, and infrastructure development contribute to economic integration of markets in general and electricity trading in particular.
3. Given the complexity of USAID West Africa's energy portfolio engagement with a geographically diverse set of stakeholder institutions, a mid-term evaluation is an important measure in ensuring that suitable benchmarks have been adopted and are being acted upon consistent with implementation letters of agreement that provide useful information for the ECOWAS secretariat to reach prudential planning decisions in support of its regional energy goals. Such evaluations should proceed only on the basis of commonly agreed upon performance benchmarks at the outset of any portfolio planning horizon, and which can be matched directly with funding by USAID and its donor coordination implementing partners working in concert with ECOWAS.
4. Unbundling of production, transmission, and distribution in ECOWAS electric utilities is an important step toward the expansion of regional electricity trading markets. While Nigeria and Ghana are the only countries thus far in the region to have made this separation, USAID should work with WAPP, ERERA, and the ECOWAS secretariat to facilitate unbundling as a step away from single source providers and the emergence of a regional energy market trading system. While this may not be feasible for smaller countries, this provides all the more reason why there should be a regional framework to guide overall energy market trading integration.
5. Given large differences in terms of per capita installed electricity generating capacity, electricity access rates, and electricity consumption per capita, USAID West Africa should work with ECOWAS to address the extent to which reducing regional disparities constitutes an integral component of regional planning strategies. The USAID Multilateral Regional Development Cooperation Strategy (RDCS) as well as Bilateral Country Development Cooperation Strategy documents are the logical way for this to be addressed and which should inform decisions undertaken through the USAID West Africa energy portfolio decision process.
6. Given the need for regular benchmarking data, USAID West Africa should consider the development with the ECOWAS secretariat of a regional energy statistical unit similar to the energy information arm of the Caribbean Community (CARICOM), the Caribbean Energy Information System (CEIS) that could help better formulate investments in clean energy across the ECOWAS region. NARUC's experience with regional utility operations and the U.S. Energy

Information Administration is a useful institutional resource through which this may be suitable to pursue.

7. USAID/WA should work with the ECOWAS secretariat to ensure that lessons learned from technical assistance and training be absorbed at the national member country level. USAID support of training of trainers at the stakeholder implementation level should incorporate this as an operational planning objective.
8. For purposes of periodic evaluations of USAID energy program initiatives, future visiting teams should have comprehensive data and reports distributed in advance of site visits in order to more effectively examine strengths and weaknesses. This includes not just reports submitted to USAID by contracting agencies but also annual financial reports of such activities by USAID/WA to enable a clearer understanding at the outset of how to evaluate programs in terms of relevance, efficiency and effectiveness, impact, and sustainability.

## 4. CONCLUSIONS

USAID's 2009-2014 energy portfolio has achieved success in pursuing the goals of ECOWAS, Power Africa, and the Global Climate Change Initiative. Moving forward, the team note a series of observations and recommendations that flow from this evaluation.

- First, there is a need for a dynamic market-oriented strategy at ECOWAS and in which USAID's energy portfolio does not replicate past activities and instead implements moves to institutionalize sustainable achievements in terms of capacity building, infrastructure development and leveraged investments in clean energy technologies within ECOWAS institutions themselves. Unbundling of transmission and distribution services represents an important next step in this process. It will depend on the extent to which ECOWAS supports greater open market trading in energy beyond the contractual obligations now in place.
- Second, fragmentary approaches to the USAID West Africa energy strategy are inadequate to the need for greater economic growth in ECOWAS countries. The team advocate adoption of an integrated energy strategy built on market principles as an important next step. The team have noted this in terms of inadequacy of representation across ECOWAS implementing institutions as well as in terms of attracting prospective private investors to join in creating public-private partnerships in clean energy investments. The tendency to rely on national electricity systems to solve the problem of access poses a significant constraint on public finance for which a move to greater use of public-private partnerships may be essential.
- Third, USAID should work with ECOWAS to draft a more inclusive planning framework that better integrates the roles of its implementing stakeholder institutions while at the same time, providing clearer information to donor agencies and prospective private investors as to how a harmonized strategy can best work in moving forward toward the underlying goals of ECOWAS.
- Fourth, while individual implementing partner reporting on activities is an essential tool for a performance evaluation, incorporation of standardized benchmarks that can be traced directly to investment expenditures in capacity building, infrastructure development and leveraged investments needs to be done on a systematic basis so that greater coherence may be achieved in helping ECOWAS to succeed in its goals of expanding access rates to clean energy technologies. Such standardized benchmarks also should be incorporated into all USAID energy portfolio contract mechanisms that permit ready comparisons across implementing institutions to beneficiary ones.
- Fifth, USAID should work with ECOWAS to see what measures may be needed for regional Centers of Excellence to perform basic training services for managers, technicians, and operators of electric utility systems at the national and regional levels. With this, USAID can define more strategic advanced training as subject needs arise but which built on skills and knowledge already transmitted through previously administered training programs, and around which the recommended performance and budgeting benchmarks can be used for purposes of evaluation and revised programming decisions.
- Sixth, from this review, the team emphasize the need for USAID to concentrate efforts to work not just with ECOWAS implementing institutions but also with the ECOWAS secretariat toward a more coherent planning and budgeting process. Thus far, there is neither a direct role for USAID's energy portfolio in terms of the ECOWAS secretariat, nor measures that integrate the respective mandates of ECOWAS implementing institutions. USAID should spearhead planning efforts in support of ECOWAS to achieve this framework while continuing to work with public and private institutions to bringing about suitable leveraged funding to realize the goals of the ECOWAS regional energy market.

# ANNEXES

## A.I Team Composition

For this evaluation as in others, ASSESS leveraged its pool of expertise from the partner Universities in the USA and Ghana for the assignment. The evaluation team members possess proven experience in Africa and have the technical qualification in carrying out their respective roles and for ensuring the conduct of a high quality evaluation. The evaluation team was supported by the ASSESS technical staff including the COP, Activity Manager, M&E and GIS Specialists. A summary of the expertise of the evaluation team in relation to their respective roles on the evaluation is provided below:

- **Prof. Phillip LeBel, Team Leader.** Prof. LeBel is an Energy Economist with years of significant evaluation experience across the globe. He was responsible technically for the overall performance evaluation, ensuring the timely completion of all deliverables including the initial management of the final report of the evaluation in accordance with the scope of work and USAID's evaluation policy. The team leader provided technical advice on the evaluation methodology including sampling techniques, data collection methods and tools as well as methods and techniques for economic analysis including cost effectiveness analysis of energy portfolio, SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the different programs and partners involved. He additionally provided technical assistance to the team in the assessment of mechanisms put in place to ensure sustainability of energy program achievements as well as analyzing their potential for sustaining program gains in the medium to long term.
- **Dr. Emmanuel Wendsongre Ramde, Team Member.** Dr. Ramde is a renewable energy specialist and a performance evaluation expert. He provided technical input in the assessment of the relevance of the Energy program to regional partners, and the extent to which the program has contributed to the objectives of the regional Power Africa initiative for West Africa. Dr. Ramde assisted the team to establish the extent to which the energy program has been achieved, provided information on factors influencing the achievement and non-achievement of the objectives and recommended approaches and corrective actions for achieving programmatic improvements. Additionally, he provided technical input in the assessment of the quality, effectiveness and efficiency of the energy program's strategies and activities.

### Provision of Technical Support by ASSESS Accra Staff

The ASSESS technical staff provided coordination, supervision and technical and administrative backstopping. The ASSESS Chief of Party joined the evaluation team for field work, whilst the Activity Manager, M&E & GIS Specialists provided technical coordination and reinforcement in the quality of data collection and analysis thus helping to ensure high quality deliverables.

- The Chief of Party, **Abdourahmane BA** was responsible for the overall technical coordination and supervision of the evaluation as well as communication among the key stakeholders including the USAID/WA, RTIO, WAPP, ERERA, NEXANT, ECREEE and government agencies in the beneficiary countries.

- The M&E Specialist, **Barbara Arthur**, provided technical assistance to the evaluation team with respect to the development and administration of evaluation data collection tools and technical analysis.
- The Activity Manager, **Emmanuel Fletcher** coordinated and facilitated field visits of the evaluation team by scheduling appointments with the stakeholders to be reached for information via discussions, interviews, brainstorming sessions and remote consultations.
- The GIS Specialist, **Seyram Loh** conducted desk reviews and supported the team with relevant secondary information in addition to providing data collection assistance in the field.

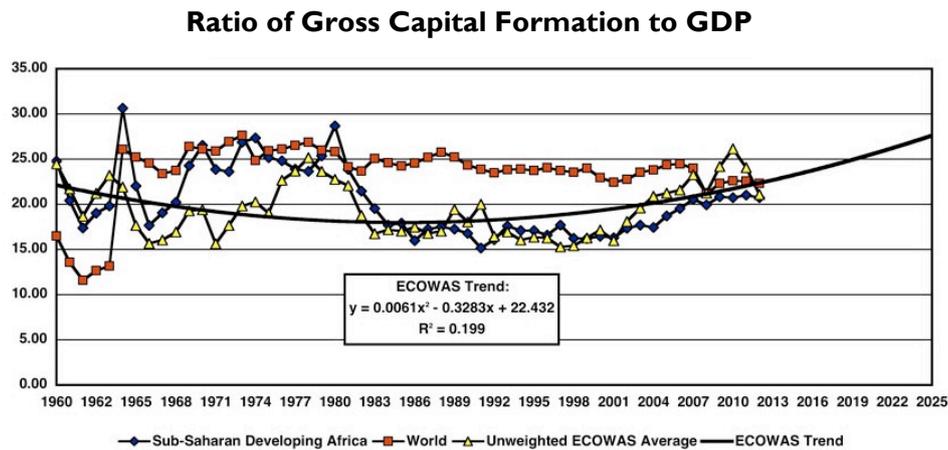
## A.2 Additional Evaluation Tables and Graphs

**Table 8.** General information on ECOWAS Member Countries

	Area, Km <sup>2</sup>	Population, 2013	Currency	PPP GDP, in U.S., 2012	GDP Per Capita, U.S. \$2005, in 2013	2011 PPP GDP Per Capita, U.S., 2012	Life Expectancy Total, in Years
Benin	115,000	10,323,474	CFA	\$17,893,774,518	\$583	\$1,733	59.29
Burkina Faso	274,200	16,934,839	CFA	\$27,611,315,051	\$522	\$1,630	56.28
Cote d'Ivoire	322,463	20,316,086	CFA	\$63,131,605,161	\$1,079	\$3,107	50.76
Guinea	94,927	11,745,189	FNG	\$14,245,600,356	\$307	\$1,213	56.09
Mali	1,240,000	15,301,650	CFA	\$24,316,882,552	\$476	\$1,589	55.01
Niger	1,270,000	17,831,270	CFA	\$15,812,941,617	\$291	\$887	58.44
Senegal	197,000	14,133,280	CFA	\$30,670,308,788	\$796	\$2,170	63.35
Togo	57,000	6,816,982	CFA	\$9,175,073,395	\$424	\$1,346	56.49
Gambia, The	10,689	1,849,285	Dalassi	\$2,973,886,987	\$450	\$1,608	58.83
Ghana	238,535	25,904,598	Cedi	\$100,096,164,243	\$769	\$3,864	61.10
Liberia	111,369	4,294,077	LRD	\$3,649,239,426	\$290	\$850	60.53
Nigeria	923,768	173,615,345	Naira	\$941,462,775,527	\$1,056	\$5,423	52.50
Sierra Leone	71,740	6,092,075	SLL	\$9,105,511,055	\$410	\$1,495	45.55
Cabo Verde	4,000	498,897	Escudo	\$3,098,396,304	\$2,739	\$6,210	74.87
Guinea-Bissau	36,125	1,704,255	CFA	\$2,321,010,944	\$433	\$1,362	54.27
ECOWAS	4,966,816	327,361,302		\$1,265,564,485,923	\$843	\$3,866	54.66
ECOWAS Francophone	3,570,590	113,402,770		\$202,857,501,438	\$591	\$1,789	56.61
ECOWAS Anglophone	1,356,101	211,755,380		\$1,057,287,577,237	\$976	\$4,993	53.06
ECOWAS Lusophone	40,125	2,203,152		\$5,419,407,247	\$955	\$2,460	58.94
Sub-Saharan Africa (developing only)	24,654,811	936,257,332		\$3,107,021,125,834	\$1,019	\$3,319	56.91
World	148,940,000	7,125,096,708		\$99,470,839,281,199	\$7,934	\$13,961	70.95

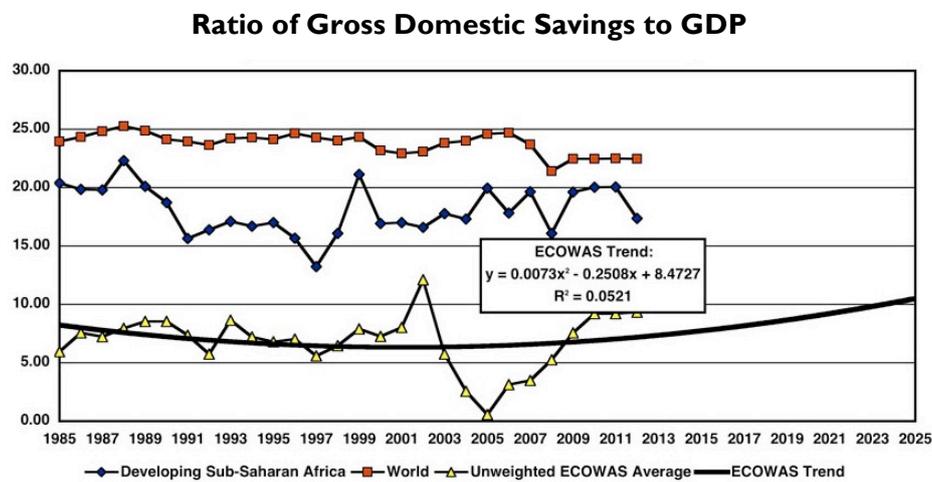
**Source:** The World Bank, *World Development Indicators*

**Figure 8. ECOWAS Regional Gross Capital Formation Rate**



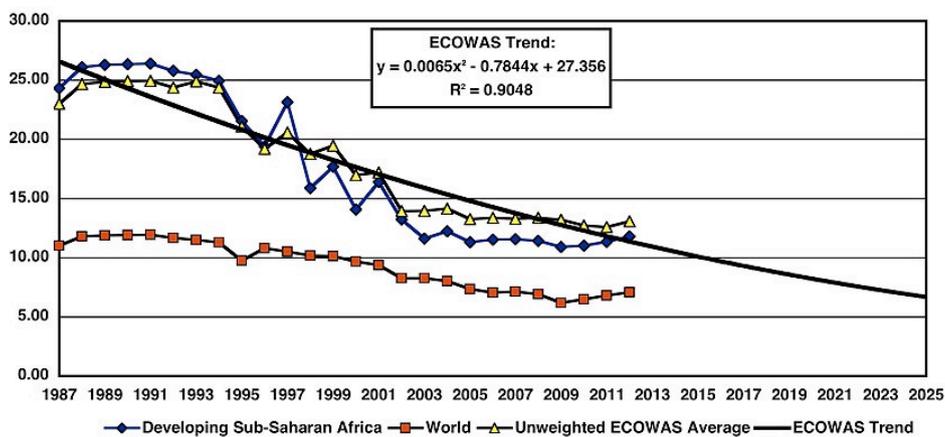
Source: The World Bank, *World Development Indicators*

**Figure 9. ECOWAS Gross Domestic Saving Rate**



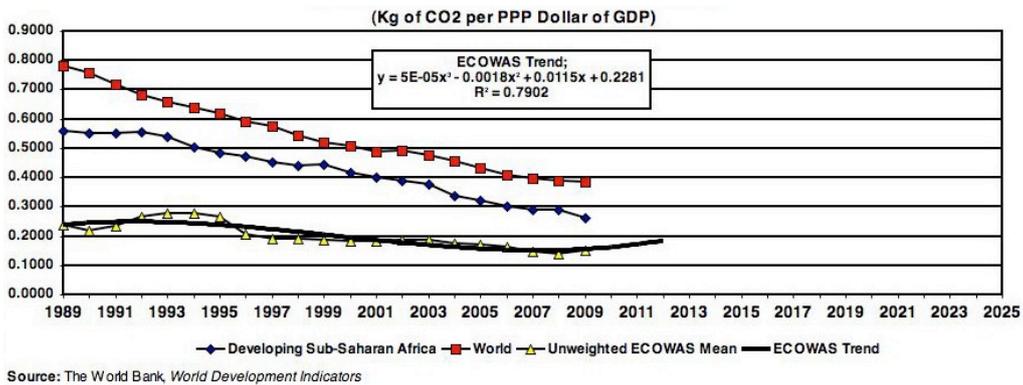
Source: The World Bank, *World Development Indicators*

**Figure 10. ECOWAS Simple Mean Tariff Rates**

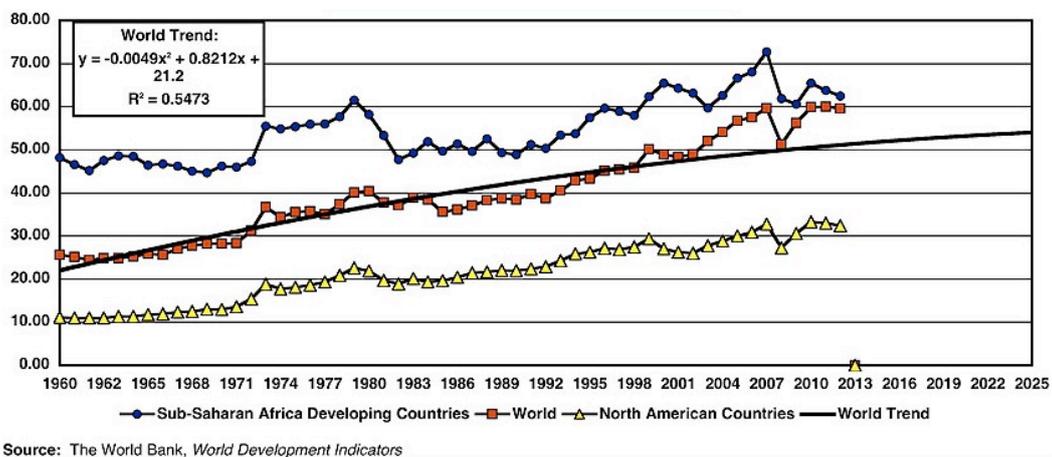


Source: The World Bank, *World Development Indicators*

**Figure 11. CO<sub>2</sub> Emission Intensity**



**Figure 12. International Trade share of GDP**



**Figure 13. Average Grant Element Share on New External Debt**

