



AIDE MEMOIRE

Scaling-up Renewable Energy Program in Ghana

Joint Mission



9th to 17th February 2015

Accra

Ghana

INTRODUCTION AND BACKGROUND

1. Ghana is one of fourteen new pilot countries selected to benefit from the Scaling-Up Renewable Energy Program (SREP) in Low Income Countries. SREP operates under the Climate Investment Funds (CIF). The objective of the SREP is to pilot and demonstrate the economic, social and environmental viability of low carbon development pathways in the energy sector by creating new economic opportunities and increasing energy access through the use of renewable energy. The Government of Ghana (GoG) is supported by multilateral development banks (MDBs) including the African Development Bank (AfDB) and the World Bank Group (WBG) to prepare and implement the SREP program in Ghana. The AfDB is the lead MDB for SREP Ghana.

2. Since Ghana was selected as a new SREP pilot country, the GoG, supported by the MDBs, has undertaken a number of preparatory activities, including: (i) the organization of a Scoping Mission in December 2014 during which the responsible agency for SREP programming was identified; a Task Force and a Consultative Group for the preparation of the SREP investment plan (IP) were respectively formed; and consultations with national stakeholders were initiated; (ii) the participation in the ‘Investment Planning Toward Low Emissions Development’ on-line course delivered by the World Bank Institute and the CIF; (iii) the organization of working sessions for the SREP National Task Force (NTF) to develop the SREP Ghana IP.

3. The GoG prepared an early draft of the IP for the MDBs to review on 1st February 2015, and subsequently the MDB Joint Mission (“the Mission”) visited Ghana from 9th to 17th February 2015. The objective of the Joint Mission was to prepare, with the GoG, development partners, civil society and private sector representatives, the SREP Investment Plan. More precisely, the Mission was to (i) review and validate the suggested investment priorities; (ii) collect all the necessary elements to ensure the finalization of an advanced draft of the Investment Plan; and (iii) develop investment concept briefs of the projects that will enable the implementation of the Investment Plan.

4. The Mission was led by the SREP National Focal Point, Mr. Seth Mahu, Deputy Director Renewable Energy, at the Ministry of Power (MoP), with support from the AfDB as lead MDB. The SREP National Task Force contributed actively to all meetings and to the write up of the investment plan during the mission. The World Bank and the International Finance Corporation (IFC) actively participated in the Mission, while the United States Agency for International Development (USAID) participated as an observer. Annex 1 provides the names of the Mission members and observers, while Annex 2 provides the list of stakeholders met during the mission. Annex 3 presents the mission’s agenda.

5. This Aide Memoire records the Mission’s findings and recommendations. They were discussed at the wrap-up meetings at the Ministry of Power, chaired by Honorable Deputy Minister John Jinapor, and the Ministry of Finance, chaired by Dr. John Kofi Baffoe, Technical Advisor to the Minister, on Tuesday 17th February 2015.

6. The Mission expresses its appreciation for the courtesies received and for the support and cooperation accorded to it by the management and staff of the agencies with whom the Mission interacted. The Mission wishes to thank the GoG and all parties consulted (national institutions, organizations representing civil society, private sector representatives, development partners, etc.) for their interest, availability, and the high quality of discussions.

MISSIONS ACTIVITIES

7. In accordance with its ToRs, the Mission undertook the following key activities:
- Validation of the investment priorities with the GoG SREP National Task Force;
 - Consultations with national institutions, private sector, civil society organizations and development partners;
 - Support to the GoG in drafting an advanced draft of the IP;
 - Development of Investment Concept Briefs; and
 - Field visits.

Validation of the Investment Priorities

8. Two sets of criteria have been used to identify the priority strategic investments areas for the Ghana SREP IP, including SREP criteria as well as criteria which reflect national priorities, in order to ensure that SREP investments focus strategically on areas where they will have maximum transformational impact.

9. The first set of criteria relates to the SREP priorities, which are :
- a. Potential for scale up - increased installed capacity from renewable energy
 - b. Potential for new direct beneficiaries - increased access to energy through renewable energy
 - c. Contribution to low emissions development
 - d. Cost effectiveness - affordability and competitiveness
 - e. Productive use of energy
 - f. Economic, social, and environmental benefits
 - g. Economic and financial viability
 - h. Leveraging of additional resources
 - i. Gender equity
 - j. Co-benefits of RE scale-up
10. A few other criteria pertaining to GoG's policy priorities were defined. These are:
- k. Contribution to achieving 10% of renewables in the energy mix by 2020 (target set by GoG);
 - l. Contribution to achieving universal access (at least 90%) by 2016 (target set by GoG);
 - m. Contribution to peak load;
 - n. Project implementation readiness.

11. The NTF and MDBs worked together in applying these criteria to Renewable Energy (RE) technologies identified as having potential in Ghana, namely: (i) grid-connected: Tidal Wave, Solar, Wind, Mini-hydro, Biomass, as well as (ii) RE-based Mini-grids and Standalone PV, and finally (iii) Net Metering. Table 1 below provides the scores for the RE technologies considered for SREP, while the detailed results of the evaluation are presented in Annex 4.

Table 1 - Ranking of SREP Priority Renewable-Energy Technologies

Criteria	Tidal Wave	Solar	Wind	Small hydro	Biomass	Mini grid and standalone PV	Net metering
SREP	19	21	21	19	26	28	25
GoG	7	9	9	5	10	11	10
Grand total	26	30	30	24	36	39	35

Consultations

12. Consultations were held with key stakeholders in the country, including national institutions, private sector, civil society organizations and development partners. During those consultations, the NTF presented the draft IP and the proposed investment priorities.

National Institutions

13. All the key national institutions are represented in the NTF and had the opportunity to express their support and suggestions for the SREP investment plan.

Private Sector

14. The Mission met with various representatives from the private sector renewable energy community in Ghana to get an overview of the current situation from a private stakeholder angle, as well as their views and thoughts on the enabling environment for the renewable energy market in Ghana. The participants agreed on the need for improvement in the implementation of the RE regulatory framework.

15. The key aspects highlighted by the stakeholders included:

(i) *issues related to the implementation of the regulatory framework for RE*: while the regulatory framework is appropriate in theory, it lacks consistent and clear implementation mechanisms. The renewable energy act is not being clearly and efficiently enforced and implemented. Inconsistencies include confusion on the tariff available to developers, the conditions of PPAs, the time and red tape necessary to obtain various licenses and permits, and the discretion exercised by officials on implementation of the import duty relief policy;

(ii) *issues related to communities' perception*: potential end-users are reluctant to accept decentralized renewable energy solutions and prefer grid-connected solutions, sometimes preferring to wait for the latter arguing that it is more reliable. This reflects a lack of information to end-users, and constitutes initial non-commercial barriers to implement, for example, solar home systems. Beneficiaries would have to better understand RE benefits, so sensitizing people about the value proposition of RE could remove a critical barrier for the development of RE off-grid solutions;

(iii) *issues related to financing constraints*: there was a common understanding that current financing cost on the local Ghanaian commercial banking market is too high to make RE projects viable. With interest rates of around 30% p.a., payback periods cannot exceed 8 years for solar home systems for example. In addition, appropriate long term financing is not available in Ghana;

(iv) *issues related to inefficient administrative processes*: potential investors who are willing to invest in RE IPPs have to undergo a quite cumbersome application procedure, often involving various ministerial departments in order to get the various clearances and agreements. A more streamlined approach would be helpful, which could translate into the creation of a “one-stop shop” for investors;

(v) *availability of data*: participants stated that, according to their knowledge, RE resource data such as hydrological data is available, but not routinely disclosed by Ministries in an appropriate and transparent manner. Further discussions with the GoG clarified that gaps exist in RE resource data, particularly for wind and biomass resources.

16. The Mission met with National Investment Bank (NIB), a majority state-owned commercial bank (MoF 53%, Bank of Ghana 44%). One of its activities relates to the promotion of private sector firms in the area of renewable energy. The senior management has been investing time to educate itself and explore the wider markets outside the region in the view of better understanding the dynamics of the sector. Current financing offered by NIB can have a tenor of up to 5 years; however, they see the need for longer-term financing going up to 10 years in particular for IPPs. NIB has set up an Energy Desk (mainly oil & gas) and wants to introduce a Renewable Energy Unit. NIB thinks there is also an opportunity for mining companies to potentially off-take, provided that there are reliable and bankable suppliers/partners in front of them. NIB itself is a potential customer as it pays more than USD 3,500/day to run diesel gensets as back-up solution for day-to-day operations.

17. The mission also met with the Ecobank Group, which has been showing great interest in renewables for some time, and has engaged with the AfDB, including SEFA, to support the materialization of their ambition in this arena. Ecobank is struggling to find bankable projects of meaningful size (USD 20 - 30 million or more) with strong sponsors as opposed to basic imports of solar PV components and kits. In this context, the technical assistance component which will complement the SREP investments could include a “commercial bank component” to assist them in playing a more important role in this sector. The net-metering program, which is being considered under SREP, could be one area of involvement for commercial banks, since credit

appraisal, implementation and monitoring will be needed, and this is clearly their area of expertise.

Civil Society Organizations

18. Civil Society Organizations were consulted by the Mission and included active participation of SNV (Netherlands Development Organisation) and Climate Action Network. These NGOs confirmed their interest in participating in the proposed Ghana SREP activities and indicated willingness to coordinate activities in order to maximize synergy.

19. SNV is involved in a wide range of renewable energy activities including nation-wide programs on biogas and improved cook-stoves. It expressed interest in the proposed SREP Ghana initiative on PV-based net-metering, and was already keen to procure net-meters to deploy on a pilot basis. Key barriers to renewable energy development mentioned by NGOs include: limited awareness among the general public, and limited availability of adequate financing options for renewables. NGOs also underlined the need for additional capacity building to expand existing Ghanaian renewable energy expertise.

20. Several NGOs such as SNV and Kumasi Institute of Technology, Energy and Environment (KITE) are already active partners in Ministry of Power renewable energy initiatives, such as the World Bank-funded GEDAP project. The SREP Ghana program will build on this growing collaborative effort to further expand civil society participation in renewable energy activities in Ghana.

21. All consulted stakeholders welcomed the SREP program, the array of activities included in the draft IP, and generally validated the proposed investment priorities. The National Task Force has reviewed all the comments received and will take them into consideration in finalizing the IP.

Development Partners

22. Many development partners, including the African Development Bank, State Secretariat for Economic Affairs (SECO) of Switzerland, and the World Bank are supporting the Ghana Energy Development and Access Project (GEDAP) under which, one component focuses on promoting a mix of renewable-energy-based models, including 4 pilot hybrid mini-grids to serve nearly 10,000 people in some deprived communities. Therefore, the Mission met with the Planning Engineer of GEDAP at the Ministry of Power to draw lessons from the ongoing initiatives and understand the challenges within the existing frameworks. Also, the Mission tried to identify how the SREP intervention may leverage resources and contribute to scaling up these pilot initiatives.

23. The Mission met with the Coordinator of the SE4ALL Secretariat, in order to discuss potential synergies between SREP and SE4All in Ghana. It was confirmed that the SE4All Investment Prospectus is currently being prepared and a draft version should be available in April 2015 to share with the SREP team. The Mission presented the investments that are being proposed under the SREP IP. Both teams agreed that the proposed SREP off-grid program,

including both mini-grids and solar home systems, would nicely synergize with the SE4All investment prospectus which will focus on energy access. It is therefore expected that the SREP program will successfully contribute to the implementation of the SE4All agenda in Ghana.

24. The Mission met with KfW which provided details on the 12 MW solar PV project under preparation with VRA (Ghana's state-owned power generation company). VRA will own and manage the solar plant, which is expected to be constructed by the end of 2015, or early 2016 at the latest. This solar PV plant will be the biggest in Ghana so far. KfW mentioned their interest in continuing investing in the RE Sector in the coming years, as their new programming cycle starts in 2017. In terms of challenges for the development of the sector, KfW confirmed that there is a need to improve the information which is made available to sector stakeholders in order to scale up RE investments in the country. In addition, updating the sector policy framework would be useful, as well as providing a vision for the development of the sector through some planning fully taking into account the RE potential.

25. The Mission met with GiZ, which confirmed that their work in the RE sector focuses on the productive use of energy for on-grid operations, as well as provision of financing for smaller scale projects with successful result-base-evidence schemes, such as: (1) energy & agriculture: grid electrification for irrigation, and smaller solar-PV pumping systems; (2) cook stoves in partnership with SNV NGO; and (3) advisory services to build capacity for successful implementation of the RE Act with EndeV. GiZ welcomed the pre-identified SREP investment areas, particularly the technical assistance project. GiZ recommended that independent advisory services to integrate RE in the systems of the various utilities (GRIDCo, VRA & ECG) and study the different off-grid options, should be provided to GoG under the SREP program. Capacity building to ECG on procurement for planning and international bidding process should also be considered.

Advanced Draft IP

26. The Mission working sessions supported the NTF in the drafting of an advanced version of the IP. During those sessions, the NTF together with the Mission critically reviewed the early draft IP prepared by GoG and suggested amendments. Those sessions were also an opportunity for the Mission to stress the importance of the expected transformational impact of SREP and its expected leveraging effect. SREP funds should be used to mitigate additional risks associated with renewable energy technologies and to remove financial and institutional barriers, unlocking the potential of those technologies for scaling up.

Strategic Investment Areas

27. The approach adopted by the Mission was to prioritize three (3) flagship investments in the priority renewable energy areas identified in Table 1. The identified flagship investment areas are:

1. Mini-grids and stand-alone renewable energy based electrification.
2. Distributed energy generation using photovoltaic systems with net-metering.
3. Biomass power projects: grid-connected utility-scale and/or small-scale-community biomass power plants.

28. To ensure successful implementation and scaling-up of the three (3) aforementioned flagship renewable energy investments, the IP will include a parallel capacity building and policy support initiative. The capacity building initiative will be aimed at: first, mobilizing and motivating existing skilled Ghanaian personnel to ensure their effective and committed participation in Ghana's SREP program; secondly, expanding the talent pipeline of Ghanaian renewable energy experts to address the twin-challenge of future scale-up of identified investments and the high-turnover of skilled staff that bedevils many renewable energy development projects. The policy support initiative of SREP will be primarily designed to enhance more effective and streamlined implementation of existing policy and regulatory instruments that support renewable energy investments in Ghana, with a view to scaling up private sector participation. Where necessary, the policy support initiative would complement GoG's efforts to bring on board additional policy, regulatory and institutional instruments that would facilitate scale-up of renewable energy deployment in partnership with the private sector across the country.

29. It should be noted that other technologies such as centralized solar PV and wind plants ranked high, and therefore have good potential for further development. However, given the interest that has already been shown by the private sector in investing in those technologies and the limitations of the same with regards to its intermittent nature, it was agreed that SREP funding would not have a significant transformational impact in those area. It was however agreed that the final IP would, in addition to the three flagship investments, consider capacity building and policy support in the area of solar and wind. The inclusion of these technologies in the capacity building component will increase the prospect of harnessing financial support and technical assistance for their future development.

Field Visits

30. The Mission visited two solar PV sites. The first site located in Tema is a solar PV panels manufacturing facility that is under construction. Owned by Strategic Security Systems International Limited (3SiL), the manufacturing facility is in the final stages of assembly. According to its Chairman, all the major machinery is on site awaiting final assembly and testing by machinery suppliers from Japan. 3SiL is a conglomerate comprising of a Ghanaian general procurement firm as the parent company, and specializes in solar lighting systems, solar products and bespoke substrate (customized security printing paper and holographic material). Other activities of 3SiL activities include freight forwarding and clearing, as well as corporate and personal property development services.

31. 3SiL indicated that it plans to target the high quality and high reliability solar PV market segment and be the lead player in transforming Ghana's PV industry that is currently marketed across the country. It also plans to target not only the national PV market in Ghana but also the regional PV market that is growing - with Senegal perceived as an important and growing PV market in West Africa. 3SiL expressed interest in tapping development finance as it is keen to access lower-cost sources of finance. It indicated interest in approaching IFC to initiate discussion on possible support, as well as securing support from AfDB SEFA facility. The Mission identified opportunities to provide technical assistance through SEFA to the GoG that

would be targeted to support such manufacturing initiatives that contributes to building the capacity of national and regional players.

32. The second site is a 715kW net-metered solar PV plant at the University of Legon, Ghana financed by the Japanese Government and implemented by the Ministry of Power. It is one of the largest solar PV installations in Ghana. Expected to generate over 1GWh of electricity annually to supply reliable power to run the research laboratory of the university and to reduce the energy bills, the facility has faced difficulties in the current load-shedding regime that is afflicting the country. Configured to sell power directly to the local grid and with no battery/storage capability, the solar PV plant can only work when the grid is functioning. With frequent load shedding, the installation is working well below its capacity and is unable to provide electricity to the University of Legon Noguchi Research institution during blackouts.

33. The difficulty faced by the net-metered installation at the University of Legon demonstrated in a vivid fashion the problems of a net-metered solar facility with no storage/battery facility. It is thus proposed that any future net-metering solar facility in Ghana should seriously assess the possibility of incorporating storage/battery capability to ensure that it can cope with current (as well as any future) power supply problems.

MISSION OUTCOMES

Investment Concept Briefs

34. The concept briefs of the flagship investments identified in the earlier chapter are being presented below:

35. **Mini-grids** : The demand requirements for the entire mini-grid sector has been estimated to be about 350,000 people in 400 communities, concerning mainly the islands and lakeside communities which are the most difficult and uneconomical to electrify through the national grid electrification scheme. Many barriers preventing electrification of these populations have been identified. Those are mainly: the high cost of extending electricity through either submarine or overpass transmission and distribution infrastructure; the lack of adequate and sustainable financing to unlock the investment opportunities in off-grid electrification; and the high upfront cost of renewable energy technologies and high cost of capital from the financial local market.

36. As a result, the Ministry of Power with the support of many development partners, including the African Development Bank, State Secretariat for Economic Affairs (SECO) of Switzerland and the World Bank, promotes a mix of renewable energy based solutions to accelerate rural electrification.

37. SREP funding is expected to unlock the investment potential of off-grid electrification and create sustainable socioeconomic development in rural areas by promoting the development of isolated RE-based mini-grids; promoting standalone solar home systems; and building sustainable human and institutional capacities especially in training technicians and beneficiaries.

38. **Photovoltaic systems with net-metering:** Due to a growing demand in electricity at an average rate of 10% per annum and given the lack of investment in generation infrastructure (250 MW addition is necessary every year), it has become necessary to look for alternative sources of energy such as solar PV. Solar power has the potential to contribute tremendously to the energy mix, given Ghana's abundant solar resource.

39. GoG has been creating the requisite legislative and social framework in order to exponentially increase the use of renewables within the country. In that view, and in line with the Renewable Energy Law (Act 832), the Government of Ghana has implemented various interventions promoting solar energy which include the deployment of 38,200 solar home systems and lanterns in 120 rural communities; and the distribution of 2 million high quality solar lanterns in remote/off-grid communities by 2020 through various subsidy schemes. However, the current efforts to explore funding mechanisms for solar systems need to be expanded. While Ghana has registered substantial progress in off-grid solar development, grid-connected PV development is still in its early stages but the pilot schemes, in place, show promise. As at the end of 2014, 25 grid-connected PV units with a total capacity of 7MW have been installed. These pilot plants have demonstrated the viability of grid-connected PV as well as its potential for rapid scale-up.

40. SREP is therefore seen as an opportunity to leverage funds and scale up pilot initiatives to promote distributed power generation using solar systems with net-metering. This project shall enable GoG to analyze and segment the demand to characterize conditions under which net-metering could be beneficial to the system. Of special interest, would be the small and medium scale commercial, service and institutional sector that has already invested or plans to invest in back-up power supply options. It should also enable GoG to set up a financial mechanism to effectively mobilize the banking sector's support for RE projects. Considering the high upfront cost of solar systems with net-metering vis-à-vis diesel gen-sets, financial institutions need to develop attractive financing packages to be accessed by project owners. In formulating these packages, financial institutions need to understand the basics of the net-metering project. The possibility of leveraging the electricity billing system as a reliable credit mechanism that can finance the high-up front costs of net-metered PV systems will also be investigated. Other incentives from government, for instance, relaxation in import duties on components of net-metering projects should be introduced to attract high deployment of net-metering across the distribution grids. SREP support will then help to build the capacity to the relevant stakeholders to assure successful implementation of the net-metering project.

41. **Biomass power project:** Potential biomass resources include supply from agricultural residues (maize, sorghum, rice etc.) and also from agro-based industries (shea butter, cocoa, rubber, sugar, bio-ethanol plants, saw mills and palm oil), as well as dedicated plantations.

42. Currently, the some agricultural waste is burnt as a form of disposal and constitutes a fire hazard and source of greenhouse emissions. There are already several agro-industries (e.g. palm oil) that use biomass residues for generating heat and electricity for captive use with in-house engineering expertise. A new sugar factory at Komenda that is under construction will be generating 3 MW from its cogeneration plant to drive the sugar factory with an extra of 1 MW that could be sold to the grid. A recent installed rice mill in Tamale zone plans to use its rice

husks by-products for power generation. At the moment, there is no donor financed biomass power plant in both the medium and small sized sectors.

43. SREP funds are considered to finance innovative biomass-based power plants and provide proof of concept that will lay the ground for larger scale MDB finance in the biomass sector. SREP will also assist in providing support for biomass resources assessments to ensure security of feedstock for planned biomass power generation units. SREP will provide support for capacity building to develop a critical mass of Ghanaian biomass experts and associated regulatory/policy instruments. The SREP will also catalyze investments in the sector and leverage funds from other financiers.

44. **Technical assistance project:** The Government of Ghana has shown strong commitment towards RE by approving a new National Energy Policy in 2010, the Energy Sector Strategy and Development Plan, and enacting the Renewable Energy Act in 2011 to create a conducive environment to attract investment. One important objective is to scale-up the contribution of RE in the energy mix to 10% by 2020 from the current 0.4% weak level. Ghana is currently experiencing a long period of economic growth, with access to modern energy a key input for sustaining the economic transformation required to improve the lives of the population. Ghana's population is growing rapidly, the economy is developing and increasingly diversifying, but for this to be sustained will require massive investments in the energy sector. The country has however the ability and potential to use its indigenous renewable resources to fuel a substantial part of its future growth. Doing so can be economically competitive with other solutions and potentially unlock economies of scale, while offering considerable benefits in terms of local economic activity, job creation and energy security. All stakeholders agree that the country's public resources and current channels of aid will not be able to respond to these needs. Investment costs for energy supply infrastructure are high and compete with other sectors, which are essential to attaining the country's development goals (health, education). Therefore, much of it expected to flow from private sources. Private sector engagement is therefore an imperative to mobilize the large amounts of finance as well as to transfer the know-how and technologies required to provide modern, affordable and clean energy to the ghanaians. Indeed, the power sector is now open to private sector participation, and additional power generating capacity is being installed in new ways. However, since the adoption of the strategic and regulatory frameworks, private developers have struggled to implement RE projects. In fact, many gaps underpinning the RE Act have been identified, namely the questions of what is technically feasible, economically desirable and fiscally responsible for the integration of RE into the national grid under the current context and in the future.

45. Consequently, the national public stakeholders (MoP, EC, ECG, GridCo, NedCo, PURC) with the advisory support of development partners, mainly GiZ, have taken some measures to addressing issues towards the swift implementation of the RE Act. Though, many gaps still need to be tackled in relation to the rules and procedures of the FiT, PPA obligations, grid connexion modalities, credit support to investors, capacity of the commercial banks, technical capacity of local service providers... Furthermore, a Renewable Energy Authority has been created as a "one-stop-shop" and would be empowered to ensure consistent and timely implementation of all aspects of the Renewable Energy Act and related policies. REA requires considerable capacity support in order to execute successfully its mandate. Last, there is a

national Net-Metering programme - at pilot stage - which ranks high in the priorities of the Government of Ghana and for which support is critically needed to overcome the various technical and strategic design challenges, to structure the financing and to refine the regulatory framework.

46. SREP funding will be instrumental in the energy sector in mobilizing the development partners, the key stakeholders and the investors and finance community interested in realizing investment opportunities in the RE space and addressing the various obstacles (e.g. risk perception, regulatory uncertainty, technology risk, financing challenges, etc.) as to crowd-in more private sector investment. It is expected to increase the number of IPPs successfully reaching financial close and construction phase, as well as the total RE capacity installed, so as to attain the objectives outlined in the RE Act. It is positioned to (i) unlock more sustainable sources of local financing for the RE sector – one that is gradually less dependent on public finance and uses available domestic funds to support local currency revenue-generation in RE systems, (ii) provide financing solutions for viable and professionally managed RE systems, (iii) reinforce a virtuous cycle of performance, viability and service delivery.

Monitoring and Evaluation

47. The SREP Monitoring and Evaluation (M&E) system is a key tool to plan and monitor the Program's activities. It is essentially aimed at:

- Defining how transformational impacts will be measured before, during and after the life of the program,
- Ensuring that data collected, processed and analyzed at the level of the three investment projects harmoniously feed into the programmatic M&E system,
- Supporting the knowledge management and sharing initiatives of the Program, by highlighting successful outcomes and lessons learned and recommending ways to improve programme implementation and its transformational impact.

48. Based on a set of SREP core indicators, the SREP M&E system will, to the extent possible, be integrated into the existing national M&E system of the energy sector - while solving some of its main constraints and bottlenecks, through capacity building initiatives. Therefore, its design will avoid the development of parallel structures or processes for monitoring and evaluation.

49. The main purpose of the SREP IP Ghana results framework is to establish a basis for future monitoring and evaluation of the impact, outcomes and outputs of SREP-funded activities. In addition, the results framework is designed to guide Ghana and MDBs in further developing SREP-funded projects' results frameworks.

50. More broadly, the program's development outcomes are expected to encompass many dimensions beyond those required for monitoring under the SREP guidelines. Amongst others, these include improved reliability of electricity; economic savings to the nation and financial savings to consumers from lower-cost electricity; high-value jobs created in new energy subsectors; less volatile electricity supply; and an improved enabling environment resulting from

the positive experiences of the SREP interventions, which will create the conditions for transformative change in how energy is supplied to the nation.

Knowledge Management

51. The Mission identified areas for strengthening knowledge management and information and lessons sharing (ILS). The sections below describe the complementary programme and project level activities targeted for SREP implementation.

52. ***Programme Level*** : Raising awareness amongst national and local stakeholders about Ghana's energy-sector challenges and opportunities for developing the potential of renewable energy is a key element of the SREP. The efficient management of knowledge is needed to measure the outputs obtained and share what has been learned with stakeholders at all levels (national and local, other pilot countries, and other countries in the sub-region). To strengthen the Ghanaian government's knowledge management and ILS capacity, the SREP will fund some dedicated activities which will be managed by the MoP. The communication team of the MoP will be mobilized to carry out the following activities in coordination with the Renewable Energy Directorate:

- Support the development and maintenance of an efficient internal energy-information system;
- Support the development of a dedicated on-line RE portal to improve the availability of RE information for interested stakeholders;
- Promote efficient knowledge management and exchange of best practices between projects and with other African countries;
- Raise the SREP profile in order to raise additional funds and foster large-scale replication of activities countrywide and in the sub-region;
- Support the management of renewable energy knowledge (i.e., approaches, methods, and lessons) acquired by the SREP.

53. Because knowledge management is closely linked to monitoring and reporting on programme results and outcomes, the ILS and M&E teams should work closely together.

54. ***Project Level*** : Knowledge-management and capacity-building activities will also be developed at the project level. Specific capacity-building activities have been identified during IP preparation; on this basis, the MDBs and national task force have worked together to prepare a technical assistance project (see the section above on technical assistance) to be submitted to SEFA, a trust fund managed by the AfDB, which will complement the SREP-funded activities. Additional capacity-building activities may be included in the investment projects as need be.

55. The ILS component will help to draw lessons from the new business models and innovative activities to be adopted in the SREP-supported pilot projects so that similar models and activities can be replicated in other regions of Ghana and/or other countries. Lessons from project implementation should cover such aspects as assessing the key factors that contributed to success or failure, quantifying some of the co-benefits of renewable-energy development, and identifying areas of the project implementation phase that could be improved.

Environmental and Social Aspects

56. Under the SREP Program, preparation of E&S studies will have to adhere to Ghanaian laws and regulations, as well as the E&S policies, guidelines, and standards of the MDBs. The lead implementing entity for the SREP public sector projects - the Ministry of Power - has undertaken numerous projects with the AfDB and other MDBs. As such, it has policies and procedures in place to ensure compliance with the GoG and MDBs social and environmental safeguards.

Mini-grid Investment

57. For this investment, and since specific locations of investments will be determined during project design, an Environmental and Social Management Framework (ESMF) will be prepared. It will define the environmental and social (E&S) planning, review, and clearing processes that follow national and MDB guidelines. The ESMF will ensure that energy is produced and utilized in an environmentally sound manner; and provide a corporate environmental and social safeguard policy framework, institutional arrangements and capacity available to identify and mitigate potential safeguard issues and impacts of RE projects. The ESMF will be prepared in compliance with national guidelines and MDB safeguard policies. Through its Energy Sector Strategy, the Government of Ghana is fully committed to support and actively participate in international efforts and cooperate with international organizations that seek to ensure sustainable delivery of energy to mitigate negative environmental impacts and climate change. By adopting mechanisms and procedures defined by the EPA and the MDBs, the ESMF will include the following components:

- ***Environmental and Social Impact Assessment (ESIA)*** to identify key environmental and social impacts and corrective measures for each subproject once exact intervention locations are known.
- ***Environmental and Social Management Plan (ESMP)*** to translate the ESIA into coordinated activities at local level, with detailed checklists and mitigation measures in order to address expected environmental and social impacts.
- ***Resettlement Policy Framework (RPF)*** followed by Resettlement Action Plans (RAP), to present legal and institutional framework, eligibility criteria, methodology for asset valuations and mechanisms for stakeholder consultations and grievance redress.

58. For each mini-grid subproject to be undertaken, separate, comprehensive E&S assessments must be conducted including an ESIA, and ESMP, and a RAP. Additional specialised E&S management plans and/or initiatives may be required to better address the impacts associated with a given subproject.

Net Metering and Biomass Investments

59. For these investments, the MDBs social and environmental safeguards will be appropriately applied. For both SREP projects, separate, comprehensive E&S assessments must be conducted. These must include detailed studies aimed at uncovering the particular E&S

impacts of each project. The studies include an Environmental and Social Impact Assessment (ESIA), an Environmental and Social Management Plan (ESMP), and a full or abbreviated RAP.¹ Adequate stakeholder consultations must be undertaken and guide the development of the E&S studies.

60. In preparing the required detailed E&S studies (e.g., ESIA, ESMP, and RAP), the investments must adhere to the requirements for ensuring that participatory stakeholder consultations are captured in the E&S policies, guidelines, and standards of the MDBs. Participatory consultations will be held with all stakeholders (including ministerial officials, representatives of local governments, the private sector and associations of civil society, including women associations) in order to:

- provide adequate information about the nature, timing, and scope of the relevant subproject impacts and mitigation measures;
- highlight gender issues (in order to improve women's access to lower-cost and cleaner energy while reducing the time that women and girls spend on fire wood collection and improving income-generating opportunities);
- guide study development.

61. The Ministry of Power (MoP) will have overall responsibility for supervising, reviewing and approving social and environmental studies and assessments, implementing the environmental and social frameworks and any specialized management plans and/or initiatives. Moreover, the MoP will organize capacity building initiatives for technical staff, including those of selected operators on issues related to social and environmental management and control. It is expected that these improved capacities will facilitate the implementation of safeguards instruments under the SREP.

62. Investment beneficiaries will be responsible, in compliance with national law and regulations and the MDB safeguard policies, guidelines and standards, for conducting the required detailed E&S studies (e.g., ESIA, ESMP, and RAP), obtaining clearances and licenses from relevant authorities, organizing stakeholder consultations, implementing all required mitigation measures, and conducting monitoring activities. The costs of all these activities will be integrated into the budget of each project (or sub-project in the case of the mini-grid program).

63. The detailed E&S studies must be submitted to both the EPA and the MDBs for review and approval. EPA approval is based on Ghanaian laws and regulations, while that of the MDB is based on its E&S policies, guidelines, and standards. The EPA will be responsible for the review and clearance of ESIA's and ESMP's for subprojects. It provides a one-stop clearance process by involving all other key governmental agencies in the approval process.

¹ The type of RAP will depend on the number of persons affected by resettlement effects experienced as a result of the project.

I. Way Forward and Next Steps

64. **Agreement on the timing for the finalization of the IP.** It was agreed that the draft final version of the IP would be issued by mid-March, after a three day retreat of the NTF that will be organized during the week of March 9th. The draft final version should be made available on the MoP website for two weeks for public consultations, and provided to the independent reviewer as per the SREP requirements. The schedule for SREP IP submission is as follows:

Activities	Activity Duration (Weeks)	Start Date	Finish Date	Responsible Party/Personnel
Joint Mission	2	09-Feb-15	17-Feb-15	All
SREP IP Finalization	2	17-Feb-15	02-Mar-15	NTF
NTF Retreat	1	09-Mar-15	11-Mar-15	NTF
Disclosure of IP for public consultations	2	13-Mar-15	27-Mar-15	MoP
Independent technical review of the IP	2	13-Mar-15	27-Mar-15	CIF Admin Unit
Revision of the IP based on comments received	1	30-Mar-15	03-Apr-15	MoP
MDB internal quality review of the IP and Government validation	2	06-Apr-15	17-Apr-15	MDBs
Submission of the IP to CIF Admin Unit	3	20-Apr-15		MoP
Endorsement of IP by SREP sub-committee	0	11-May-15		CIF Admin Unit

Mission Members

African Development Bank (AfDB)

1. Thierno Bah, Principal Energy Specialist, Task Manager
2. Florence Richard, Senior Climate Change Specialist, SREP Coordinator
3. Cherif Seye, Sustainable Energy Fund for Africa Expert
4. Oliver Walter, Private Sector- Infrastructure Expert
5. Komal Hassamal, Economist
6. Djamali Ibrahime, Senior Financial Analyst
7. Stephen Karekezi, Renewable Energy Expert Consultant

IFC

8. Brunno Maradei, Blended Climate Finance

World Bank

9. Richard H Hosier, Senior Energy Specialist

USAID (Observer)

10. Waqar Haider, Renewable Energy Specialist

List of Stakeholders Consulted

Monday 9th February 2015

Kick-Off Meeting with the Focal Point of the SREP Ministry of Power (MoP)

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Inception Meeting with Ministry of Finance (MoF)

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Tuesday 10th February 2015

SREP National Task Force meeting

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Wednesday 11th February 2015

Meeting with the Private Sector

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Meeting with CSO and NGOs

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Meeting with Development Partners

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Thursday 12th February

Meeting with NTF – prioritize projects

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Friday 13th February with Angelo (E&S and M&E)

Meeting with Angelo E&S and M&E consultants

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Meeting with Ministry of Power for the Ghana Energy Development & Access Project

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Meeting with National Investment Bank

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Wrap-up meeting with Deputy Minister of Power

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Wrap-up meeting with Ministry of Finance

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SREP Ghana - Joint Mission Program

	Monday 9th February	Tuesday 10th February	Wednesday 11th February	Thursday 12th February	Friday 13th February	Saturday 14th February	Sunday 15th February
AM 8:30 to 12:30	9:00am: MDBs Internal meeting 11:30am: Inception meeting with MoP, MoF, NTF	8:30am – 12am : Meeting with NTF/MoP on draft SREP IP Presentation of new structure of IP Assignment of roles and responsibilities among the NTF members (Venue: MoP)	9:00am – 11:30am Meeting with private Sector Private investors + commercial banks (Ecobank + ARB Apex + Fidelity) (Venue: AfDB) 13:00 – 14:30 Meeting with CSO/NGO (Venue: AfDB) Meeting with Biomass Private sector	8:30am – 11:30am Meeting with NTF SREP IP validation work in progress - including priority investments suggested – Drafting of the IP (Venue: MoP)	9:00am – 11:00am SREP IP validation work in progress – including environmental and social aspects and M&E work – with consultants (Venue: AfDB) 11 :30 Meeting with KfW Meeting with GEDAP Task manager at the MoP Meeting with private sector solar plant Meeting with a private developer	Field visits 8:00 (3SiL solar manufacturing in Tema + University of Ghana Solar Plant installed grid connected)	
PM 14:30 to 17:00	Finalization of JM schedule and logistics for the Mission, including the workshop Review of draft IP and assign roles for each Mission member Meeting with EcoBank	14:30am – 17am : Meeting with NTF/MoP on draft SREP IP Continued (Venue: MoP)	3:30pm – 5:00pm Meeting with Development Partners Briefing on work made so far (barriers / mitigation action / priority investments) and demonstrate value addition of SREP to donors activities / 5:30 meeting with private sector	1:30pm – 4:30pm Meeting with NTF SREP IP validation work in progress - including key institutional aspects and priority investments suggested Drafting of IP (Venue: MoP) 5 :00 pm : meeting with SE4ALL	2:00pm – 4:00pm SREP IP validation work in progress – including knowledge management and capacity building (Venue: AfDB)		
	Monday 16th February	Tuesday 17th February					

<p>AM 8:30 to 12:30</p>	<p>8:30am – 11:30am SREP IP validation work in progress – including investment concepts (write up groups mixing NTF and MDBs) Present the PCN (Venue : MoP)</p> <p>Finalise AM</p>	<p>Wrap of JM (Venue: MoP)</p> <p>10:30 : Wrap up with MoP (confirmed) Director</p>	
<p>14:30 to 17:00</p>	<p>16h30: GiZ</p>	<p>15:30 Wrap up with MoF Deputy Minister</p>	

Rationale for Ranking and Selecting Priorities for SREP Support

Criteria	Technologies						
	Tidal Wave	Solar	Wind	Small Hydro	Biomass / Waste Power	Mini-grid and standalone PV	Net metering
SREP Criteria							
Increased installed capacity from renewable energy	Low. Technology yet to be proven. The resource potential could be high but is yet to be assessed.	High. Irradiation level ranging from 4 to 6 kWh / m ² but constrained by diffused radiation and absorbable capacity due to intermittency. Policy target of 150 MW vs. 8 MW today.	Moderate. Concentrated along the coast (5 to 6 m/s at 50m mast height, 2,000 MW exploitable potential) and constrained by absorbable capacity due to intermittency. Policy target of 300 MW vs. 0 MW today	Low. Potential estimated at 4 MW.	Moderate. Exploitable potential estimated at above 100 MW.	Moderate. Approximately 2,000 lake side and 200 islands to be electrified. About 70 MW load .	Low. Large number of potential users, but small unit capacities (maximum 50 W)
Increased access to energy through renewable energy	Low. Same as above.	Moderate. Helps access but supply intermittent.	Moderate. Helps access but supply intermittent.	Low. Helps access to lesser extent due to seasonality.	Moderate. Helps access with dispatchable power.	High. Directly increases access to millions in hard-to-reach areas.	High. Directly increases access to millions in hard-to-reach areas and can be used as a back-up option in urban areas.
Contribution to low emissions development	High. No global-warming emissions.	High. No global-warming emissions.	High. No global-warming emissions.	High. No global-warming emissions.	High. No global-warming emissions.	Moderate. Hybrid systems would result in some	High. No global-warming emissions.

Criteria	Technologies						
	Tidal Wave	Solar	Wind	Small Hydro	Biomass / Waste Power	Mini-grid and standalone PV	Net metering
						level of emission.	
Affordability and competitiveness	High. If resource is confirmed, low-cost electricity.	Low. Cost remain high in Ghana despite the fact that it is coming down in the global market.	Moderate. Cost can compare favourably with conventional systems.	Moderate. More affordable than latest IPPs.	Moderate. More affordable than latest IPPs.	High. Less costly than grid connection by displacing investments into transmission and distribution networks, and reduction in fuel cost for generation.	Moderate. Less costly than diesel generation or use of kerosene and batteries. Subsidies needed for affordability.
Productive use of energy	High. Base-load, reliable power supply helps improve productive uses.	Moderate. Intermittent power must be backed up to supply reliable power needed for productive uses.	Moderate. Intermittent power must be backed-up to supply reliable power needed for productive uses.	Moderate. Seasonal intermittency must be backed up to supply reliable power needed for productive uses.	High. Base-load, reliable power supply helps improve productive uses.	High. Quality and quantity of power suitable for productive uses.	Moderate. Affordability usually limits to power levels per user; suitable for households uses, commercial and agricultural activities.
Economic, social, and environmental benefit	Moderate. Potential adverse social impacts if power plant area is restricted for fishing	Moderate. Land requirements may conflict with other uses. Must be designed to meet environmental standards.	Moderate. Land requirements may conflict with other uses. Must be designed to meet environmental standards.	High. Run of the river systems with limited environmental and social impacts.	High. Addressing sanitation issues. Economic benefits high in local communities in supplying feedstock from sustainable sources.	High. Reliable electricity brought to community sooner than possible by grid extension. Income generation potential supported by electricity supply.	Moderate. Reliable electricity brought to community sooner than possible by grid extension. Environmental impact of improper battery disposal must be

Criteria	Technologies						
	Tidal Wave	Solar	Wind	Small Hydro	Biomass / Waste Power	Mini-grid and standalone PV	Net metering
							managed.
Economic and financial viability	Moderate. Ongoing 14.5 MW phase 1 project of a larger 1,000 MW with a signed PPA with promising economic and financial viability.	Moderate. Good financial returns with current feed-in tariff policy. Forex risks related to the feed-in tariff to be mitigated.	Moderate. Good financial returns with current feed-in tariff policy. Forex risks related to the feed-in tariff to be mitigated.	Moderate. Good financial returns with current feed-in tariff policy. Forex risks related to the feed-in tariff to be mitigated.	Moderate. Good financial returns with current feed-in tariff policy. Forex risks related to the feed-in tariff to be mitigated.	High. Less costly than grid connection by displacing investments into transmission and distribution networks, and reduction in fuel cost for generation.	High. Less costly than diesel generation or use of kerosene and batteries. Subsidies needed for affordability.
Leveraging of additional resources	Low. New technology yet to be proven – high risk.	High. Many partners support solar development.	High. Many partners support wind development.	Moderate. Many partners support mini-hydro. However limited room for leveraging resources considering the limited potential.	High. Many partners support biomass development.	High. High interest from partners who are willing to consider supporting subsidy schemes.	High. High interest from partners who are willing to consider supporting subsidy schemes.
Gender equity	Low. Bulk grid electricity supplies do not target women.	Low. Bulk grid electricity supplies do not target women.	Low. Bulk grid electricity supplies do not target women.	Low. Bulk grid electricity supplies do not target women.	High. Better participation of women and additional income stream through sale of feedstock.	High. Benefits women and children as households are predominant users and benefiting from social amenities.	High. Benefits women and children as households are target users.
Co-benefits of RE scale-up	Moderate. Offsets fossil-fuel	Moderate. Offsets fossil-fuel use and	Moderate. Offsets fossil-fuel	Moderate. Offsets fossil-fuel	High. Offsets fossil-fuel use and	High. Increased energy security	High. Increased energy security

Criteria	Technologies						
	Tidal Wave	Solar	Wind	Small Hydro	Biomass / Waste Power	Mini-grid and standalone PV	Net metering
	use and improve air quality. Increased income opportunities.	improve air quality. Increased high-value employment and income opportunities.	use and improve air quality. Increased high-value employment and income opportunities.	use and improve air quality. Increased high-value employment and income opportunities.	improve air quality. Creates opportunities for farmers through sale of agricultural waste; increases income opportunities for fuelwood suppliers.	and improved air quality for vulnerable and small communities and enhanced socioeconomic conditions. Avoided risk from kerosene and candle fires.	and improved air quality for households and enhanced socioeconomic conditions. Avoided risk from kerosene and candle fires.
National Criteria							
Contribution to the 10% renewable energy mix of the GoG by 2020	Moderate. Expected capacity of 14.5 MW could contribute significantly to the target.	High. Contributes about 30% of total target (150 MW).	High. Contributes about 60% of total target (300 MW).	Low. Marginal contribution to total target	High. Contributes significantly to total target; baseload; no capacity cap.	Moderate. Expected capacity of 15 MW could contribute significantly to the target.	Low. Expected capacity of 2 MW could contribute significantly to the target.
Contribution to the universal access (at least 90%) target of the GoG by 2016	Low. Technology yet to be proven. The resource potential could be high but is yet to be assessed.	Moderate. Helps access but supply intermittent.	Moderate. Helps access but supply intermittent.	Low. Helps access to lesser extent due to seasonality.	Moderate. Helps access with dispatchable power.	High. Directly increases access to millions in hard-to-reach areas (54% of island communities to be connected through mini-grids).	High. Directly increases access to millions in hard-to-reach areas and can be used as a back-up option in urban areas.
Contribution to peak load	Moderate. May contribute to peak load subject to confirmation by ongoing	Low. May contribute to peak load if peak shifts to commercial and industrial use.	Moderate. Wind profile coincides with national peak load profile.	Moderate. May contribute to peak load.	High. Will contribute to peak load since dispatchable.	High. Will contribute to peak load at community level.	High. Will contribute to peak load at household level.

Criteria	Technologies						
	Tidal Wave	Solar	Wind	Small Hydro	Biomass / Waste Power	Mini-grid and standalone PV	Net metering
	project.						
Project implementation readiness	Moderate. One project ongoing with potential for scaling-up to 1,000 MW	High. 9 siting permits and 2 construction permits issued to solar project developers.	Moderate. 1 siting permit (for 250 MW) have been issued to NEK; VRA and Infracore are undertaking Wind Resource Assessment (WRA)	Low. Feasibility studies completed for 1 60 kW site.	Moderate. 3 siting permits issued to solar project developers.	High. Four pilot projects underway and regulatory framework being developed.	High. About 40,000 systems installed. Regulatory framework being developed.
Total	26	30	30	24	36	39	35