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Annex IX

of the Commission Implementing Decision on the Annual Action Programme 2017 part III for Environment and Climate Change under the Global Public Goods and Challenges (GPGC) thematic programme

Action Document for GCCA+, the scaling up of solar and biogas mitigation actions under the Ghana Nationally Determined Contribution (NDC)

1. Title/basic act/ CRIS number	<u>Scaling up of solar and biogas mitigation actions under the Ghana Nationally Determined Contribution (NDC) - CRIS number: ENV/2017/040-496</u> financed under the Development Cooperation Instrument			
2. Zone benefiting from the action/location	African, Caribbean and Pacific Region, Ghana The action shall be carried out in four Regions i.e. Greater Accra, Ashanti, Eastern and Western regions.			
3. Programming document	Global public Goods and Challenges – GPGC, Multiannual Indicative Programme 2014-2017			
4. Sector of concentration/ thematic area	Environment and Climate Change (mitigation)	DEV. Aid: YES		
5. Amounts concerned	Total estimated cost: EUR 5 000 000			
6. Aid modality(ies) and implementation modality(ies)	Project Modality Direct management: service and works contracts			
7 a) DAC code(s)	23230 Solar energy and 410 General Environmental Protection (41020 Biosphere protection)			
b) Main Delivery Channel	Recipient Government – 12 000			
8. Markers (from CRIS DAC form)	General policy objective	Not targeted	Significant objective	Main objective
	Participation development/good governance	<input type="checkbox"/>	X	<input type="checkbox"/>
	Aid to environment	<input type="checkbox"/>	<input type="checkbox"/>	X
	Gender equality (including Women In Development)	<input type="checkbox"/>	X	<input type="checkbox"/>
	Trade Development	X	<input type="checkbox"/>	<input type="checkbox"/>
	Reproductive, Maternal, New born and child health	X	<input type="checkbox"/>	<input type="checkbox"/>
	RIO Convention markers	Not targeted	Significant objective	Main objective

	Biological diversity	X	<input type="checkbox"/>	<input type="checkbox"/>
	Combat desertification	X	<input type="checkbox"/>	<input type="checkbox"/>
	Climate change mitigation	<input type="checkbox"/>	<input type="checkbox"/>	X
	Climate change adaptation		X	<input type="checkbox"/>
9. Global Public Goods and Challenges (GPGC) thematic flagships	GCCA+, under GPGC for Environment and Climate Change			
10. SDGs	Goal 7: Affordable and clean energy Goal 13: Climate action			

SUMMARY

Ghana seeks to pursue economic development and realize the Agenda 2030 vision without creating additional burdens on natural resources thereby preserving ecosystems that are critical to maintaining the quality of life and providing environmental services to society.

In 2010 the Government published “Ghana Goes for Green Growth: National Engagement on Climate Change”. It paved the way for the adoption of the 2011 Renewable Energy Act and the National Climate Change Policy (NCCP), approved by the Cabinet in 2013. The Ghana's Shared Growth and Development Agenda II serves as the umbrella policy for the NCCP vision: “to ensure a climate-resilient and climate compatible economy while achieving sustainable development through equitable low-carbon economic growth for Ghana”. The NCCP aims to promote a low carbon development, increase policy coherence on climate change, and increase Ghana’s attractiveness to funding for mitigation strategies. Its five priority areas are: agriculture and food security; disaster preparedness and response; natural resource management; equitable social development; and energy, industrial and infrastructural development. The Renewable Energy Act mandates an increase in renewable energy capacity for generation of heat and power.

Ghana, as a signatory to the UN Climate Change Convention, in September 2015 submitted its Intended Nationally Determined Contribution (INDC) in advance of the new climate change agreement reached at the UN climate conference in Paris in December. Ghana ratified the Paris Agreement on August 2016. Ghana’s NDC includes one component on mitigation and one on adaptation. Greenhouse gases emissions increased 107% between 1990 and 2006, although representing only about 0.05% of the global emissions. Climate change is being mainstreamed into the national development framework, particularly through Ghana's Shared Growth and Development Agenda II. The Environmental Protection Agency (EPA) under the Ministry of Environment, Science, Technology and Innovation (MESTI) is responsible for co-ordinating the climate change activities.

The EU has identified Ghana as one of the priority countries to be supported under the Global Climate Change Alliance (GCCA+) flagship initiative mitigation component in 2017. The activity is embedded in the Ghana NDCs plan and has been officially endorsed by the Government of Ghana as a flagship programme. EUR 5 million have been provisionally earmarked for this purpose. In line with the Ghana's NDC, NCCP and with the EU policy priorities, this action aims at: 1. Improve access to sustainable energy and waste management validated by the scaling up of solar PV and biogas solutions in at least 32 sites in Accra, Ashanti, Western and Eastern Regions as sustainable and inclusive business models, 2. Strengthen capacity of Ghana to deploy renewable energy, ensuring the replicability of the actions and in line with the implementation of the Climate Change commitments, 3. Increase awareness of Climate Change challenges of the Ghanaian public.

1 CONTEXT

1.1 Sector/Country/Regional context/Thematic area

Climate change is manifested in Ghana through: (i) rising temperatures, (ii) declining rainfall totals and increased variability, (iii) rising sea levels and (iv) high incidence of weather extremes and disasters. The average annual temperature has increased 1°C in the last 30 years. The basic goal of the Ghana's National Climate Change Adaptation Strategy 2010-2020 (NCCAS) is to increase Ghana's resilience to climate change impacts. This will be done by building Ghana's capacity in the area of infrastructure, knowledge to deal with climate change impacts and reduce vulnerability in key sectors, ecosystems, districts and regions of the country. Ghana's vulnerability to climate change is in large part defined by its exposure to the various impacts with droughts, floods, and sea erosion as the main drivers. The most affected sectors in Ghana include the economic, social and infrastructural groups. In the economic sectors, agriculture which is the largest employer within the Ghanaian economy suffers the most from climate change. The next important sector with wide implications for other sectors is water. This is important for agriculture, energy, health, sanitation, manufacturing and domestic uses. Climate change is said to impact on natural resources negatively both directly and indirectly. The electricity supply is currently vulnerable to climate change. About 67% of electricity generation in the country is from hydropower and 33% is from thermal generation using diesel. The health and sanitation sectors have already been affected by climate change and will experience further stress in the future. Climate change impacts on infrastructure such as roads, dams, power distribution lines, homes, drains and all structures that life revolves around. Coastal erosion aided by rising sea levels will destroy a substantial portion of the east coast of Ghana. Migration and urban vulnerability constitute important dimensions of climate change in Ghana.

This solar and biogas project for selected schools and hospitals is well aligned to the objectives of the Programme 10.5 of the National Climate Change Policy (NCCP), National Environment Policy (NEP), Renewable Energy Act (2011), Sustainable Energy for All (SE4ALL) Action Agenda and the Bioenergy Strategy. Moreover, the new Industrial Policy Framework promotes compliance towards low-carbon processes such as the regulation for the importation of overaged machinery, energy and water efficiency and environmental sustainability, green initiatives such as the adoption of clean production technologies and improved manufacturing processes. Environmental Impact Assessments have been institutionalised as from 2014 for all industrial sectors.

Ghana's growing population, especially in urban centres, has translated into the generation of large amounts of solid waste. General Waste Management in Ghana is the responsibility of the new Ministry of Sanitation and Water Resources. However, regulatory authority is vested in the Environmental Protection Agency (EPA). The National Environment Policy (NEP) recognizes the adverse effect of indiscriminate disposal of waste on development of the country and look at how best solid and liquid wastes can be disposed of in an environmentally friendly manner. It also encourages the management of waste aimed at minimizing the generation and disposal to the landfill and waste-to-energy practices. The Bioenergy Strategy proposes to i) Legislate and create incentives for the sorting and use of municipal and industrial wastes for energy and ii) Create incentives for logging offcuts and wood processing residues, municipal and agricultural wastes to be used for energy; iii) Develop regulations for efficient and effective disposal of logging offcuts and wood processing residues, municipal and agricultural wastes to be used for energy purposes; iv) Compel by legislation all future housing estates to be developed to have a centralized sewage system to enable the production

of biogas; and v) Compel by legislation both private and public institutions such as second cycle institutions, tertiary, hospitals, housing estates to convert liquid waste into energy.

1.1.1 Public Policy Assessment and EU Policy Framework

Further to the 21st Conference of Parties (CoP) of the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris in December 2015, climate remains a global challenge which will put at risk not only the environment but also economic growth if it is not addressed by each party irrespective of their development status. Furthermore, in September 2015, the United Nations General Assembly has defined 17 Sustainable Development Goals among which the goal Nr.13 is on urgent action to tackle climate change. The EU through the present Action, aims to contribute to achieve this goal and others.

Ghana has adhered to the UNFCCC principles which are promoting economic growth through low carbon economy pathway, sustainable use of the natural resources and climate adaptation. The targets on greenhouse gas (GHG) emissions were published in the Nationally Determined Contribution (NDC) and will come into force as from 2020. Under the UN Climate Agenda, Ghana produced the National Communications (NCs) to UNFCCC (Third National Communication presented in 2016), Biennial Update Reports (BURs), and its second GHG Inventory report.

Ghana's commitments towards the objectives set up at the Paris Climate Conference comes from a general trend laid down in several major strategic documents i.e. the Ghana Shared Growth Development Agenda II, the 40 years national development plan (under preparation) and other short-term development policy action plans. The Government of Ghana recognizes that sound environmental management and sustained healthy ecosystems are pivotal to the country's socio-economic development and the need to reverse environmental deterioration and increase resilience to climate change is a priority. In this regard, the National Climate Change Policy (MESTI 2014) has been prepared and designed within the context of national sustainable development priorities and provides a clearly defined pathway for dealing with the challenges of climate change within the current socio-economic context of Ghana. This major policy framework has integrated the most urgent environmental concerns to provide clear strategies for overcoming the existing hurdles. Hence, adaptation and mitigation to climate change as well as social development have been considered as essential issues to be addressed. All the above public policies are in line with the Policy Coherence for Development (PCD) tools for which environment and climate change sectors are monitored. The new (2017) EU's Consensus on Development, Agenda 2030 and more specifically for Ghana, the Joint Programming exercise recognize the importance of the social aspects ("social economy as a footprint") behind the economic development and climate change.

In line with the GCCA+ key priorities, this proposed GCCA+ mitigation/NDC action is aligned to Ghana's development context and planning frameworks and it is already identified as a flagship initiative by the Government. Among the aspirations of the vision is achievement of sustainable economic growth with a clean environment, in the context of sustainable development and poverty eradication. Climate change and sustainable utilization of the natural resources are recognised as major constraints to achievement of the sustainable development goals.

This proposed Action is also aligned with the NDC .The priority sectors on mitigation in the NDC are: energy, transport, Agriculture, Forestry, and Other Land Use (AFOLU), waste and industry. In order to sustain poverty reduction efforts to deliver low-emission climate-resilient sustainable development, support in the implementation of NDCs, NAPs and related plans as

envisaged under the UNFCCC is also crucial. Ghana’s NDC includes cross-cutting considerations for gender responsive actions on climate change.

At EU level, the Action is aligned with the objective 20 of the EU Gender Equality Policy (GAP II) and the European Consensus on Development (2017) that frames the implementation of the 2030 Agenda (key themes of the 2030 Agenda: People, Planet, Prosperity, Peace and Partnership) in partnership with all developing countries, taking due account of the framework provided by the Lisbon Treaty. The purpose of this Consensus is to provide the framework for a common approach to development policy that will be applied by the EU institutions and the Member States while fully respecting each other’s distinct roles and competences. It will guide the actions of EU institutions and Member States in their cooperation with all developing countries in a coordinated fashion to ensure complementarity and impact.

These actions include the promotion of national strategies that reduce climate risk and contribute to emission reduction, consistent with the implementation of NDCs. Those NDCs also have the potential to foster national development planning in the context of the 2030 Agenda. In the Communication "The Road to Paris" it is acknowledged the need to assist developing countries in delivering on their climate plans (NDCs) by strengthened support programmes such as the Global Climate Change Alliance+. This intervention under the enhanced GCCA+ Mitigation/NDC totally follows this approach.

The Action will also give a role to public and private finance for scaling up investments in NDCs, as mentioned in both the new European Consensus on development and the October 2016 conclusions from the Economic and Financial Affairs Council.

This proposed action falls under the GCCA+ flagship initiative mitigation/NDC implementation component and will be included into its Annual Action Programme (AAP) Macro Action "Climate Change and Environment: Boosting Adaptation and Resilience" foreseen for adoption in 2017. The recently adopted cluster approach for thematic AAPs provide scope for this proposed action i.e. to help achieving sustainable development through specific climate change activities contributing to the in-country efforts towards reaching progress in the implementation of the Paris climate Agreement and the Agenda 2030, the Sustainable Development Goals (SDGs), and the Sendai Framework for Disaster Risk Reduction (DRR).

1.1.2 Stakeholder analysis

Government and several partners are engaged in climate change. Government is focused on formulating policies, coordinating climate change activities, mobilizing funds, there are other partners, private sector, CSO and the academia that also engaged climate change at all levels.

With the implementation of the NDCs several stakeholders are involved at various levels. The Ministry of Environment, Science, Technology and Innovation (MESTI) is responsible for the overall high level coordination of the implementation of the NDCs with the Environmental Protection Agency (EPA) being in-charge of the technical coordination. The table below specifies the key institutions and their roles in Ghana’s NDC implementation.

NDC Institution	Area
Ministry of Energy	Policies and measures of renewable energy and energy efficiency actions for NDCs implementation
Energy Commission	Renewable energy and energy efficiency actions for NDCs implementation

NDC Institution	Area
Ministry of Food and Agriculture	Adaptation and mitigation actions of the NDC implementation
Ministry of Sanitation and Water Resources	Waste management
Ministry of Local Government and Rural Development	Adaptation and mitigation actions of the NDC implementation at the local levels
Forestry Commission	Mitigation actions especially REDD+ issues of the NDCs
Ministry of Transportation	Mitigation actions of the NDCs especially on the BRT system
Ministry of Health/Ghana Health Service	Mitigation and Adaptation actions of the NDCs implementation
National Disaster Management Organization	Adaptation actions of the implementation of the NDCs
National Development Planning Commission	Data, MRV systems of the NDCs implementation
Ghana Statistical Service	Data, MRV systems of the NDCs implementation
Ministry of Finance	Data, MRV systems of the NDCs implementation
Ministry of Gender, Children and Social Protection	Adaptation and other cross-cutting actions of the NDCs implementation
Academia and Research Institutions	Research for scientific baselines and analysis for the NDCs implementation

Each of these institutions mentioned above have specific roles to play in the implementation of the NDCs as indicated above. It is important to indicate that these key institutions will be working with several other institutions at various levels for the implementation of the NDC actions.

The Civil Society Organizations have been involved in the design of the Ghana NDC plan. As from the starting point, CSOs have contributed to the preparatory thematic working groups ahead of the Paris Climate conference. CSOs play key advocacy role to make sure that the interests of the grassroots are taken into consideration in the NDC plan. They also disseminate knowledge and information sharing about the NDCs to the various interest groups. For instance, the KASA coalition on environment, natural resources and climate has been engaged in advocacy actions on themes cross-cutting the different “sectors” regarding climate change, as well in providing support (resources, technical assistance, etc.) to the coalition members. In this regard, KASA has been involved throughout the various topics i.e. energy, oil and gas, water and sanitation, environment and natural resources management, and represented the local interests in the international such as the events organized under the Covenant of Mayors in Sub-Saharan Africa.

1.1.3 Priority areas for support/problem analysis

Despite Ghana’s negligible contribution to global GHG emission, it is among countries in Africa that are most vulnerable to climate change. Nevertheless, Ghana has taken on ambitious commitments to tackle climate change under the Paris Climate Agreement in its nationally determined contribution (NDCs). Ghana signed the Paris Agreement in December 2015 and later ratified and acceded to it a year after (September 2016). Following the ratification, a multisector team was tasked to develop an implementation plan for the NDCs. There are 20 mitigation and 11 adaptation actions in the NDCs covering seven sectors and

implementation of which starts immediately. The 20 mitigation actions are expected to lead to 45% reduction of projected business-as-usual greenhouse gas emission by 2030 if adequate international supports are made available to Ghana. Eighteen (18) out of the twenty (20) mitigation actions are conditional and so the GCCA+ action will contribute to the achievement of the conditional mitigation target of Ghana's NDC.

The impacts from implementing the mitigation actions will include GHG emissions reduction, create benefits to socio-economic opportunities (including gender), improve health and contribute to attaining sustainable development.

Adoption of solar PV and biogas technologies are included in the 20 mitigation actions in the NDC. The Solar initiative is already part government programme to increase renewable energy share of the energy mix to 10% by 2020. In the past few years, government has focused on creating enabling policy environment for promotion of renewables. In this regard, government promulgated Renewable Energy Act from which Feed-in-tariff (FIT) was put in place, renewable energy master plan and renewable energy funds are established. A 20-MW solar plant is under construction in Central Region, 2 solar plants are under construction in Upper West for 12MW, VRA established another 2.5MW Solar Power plant in Navrongo¹. Recently the government launched a 200,000 solar PV rooftop programme. Furthermore, government has taken steps promote biogas technology, through the Scale-up 200 institutional biogas programme (SE4ALL Action Plan) and the UNIDO biogas programme, in homes, hospital and schools. These policy initiatives and efforts provide a good basis for scaling up under the country's NDC. Thus, under this GCCA+ action Ghana proposes to focus on deploying solar and biogas technologies in public buildings. In this proposal, we have highlighted the importance of focus on promoting adoption of solar and biogas in selected schools and hospitals. It will also open economic opportunities for small businesses that offer services.

Great efforts are being made by the government to promote solar PVs and biogas nationally, but the uptake by the schools and hospitals has remained a challenge due to technical, financial, business and social barriers. There are nearly 570 public senior high schools and 110 hospitals in Ghana, the majority of which rely on grid-connected electricity. According to the Accra Regional Manager of the Public Utilities Regulatory Commission (PURC), many of the schools and hospitals are unable to pay for the electricity bills and some have to be cut off.

Many of the public schools and hospitals still rely on traditional charcoal and firewood and LPG for their cooking. Health problems may arise from indoor air pollution as well as black carbon emissions. The use of fuelwood is also a driver for deforestation and land degradation. Furthermore, some of the traditional sanitation and waste management systems are not functioning well and the need for de-sludging the septic waste can be costly. Uncontrolled disposal of untreated sewage could also pose serious local environmental pollution of water as well as a source of fugitive methane emissions.

This project offers a timely opportunity to overcome the technical, financial, business and social barriers for the scaling up of solar PV and biogas at schools and hospitals. This will bring many economic, environment and social benefits: improve access to clean solar energy and clean biogas for cooking and thermal heat; improve access to modern sanitation and waste management systems; promote cleaner and healthier environments and well-being

¹ There are solar PV panels assembly plants on Ghana: SPS is located in Kpone area on the way to Somanya and Halo International, and a Chinese assembly plant located in Tema.

especially for women, girls and youth; reduce bills related to access to energy (including for cooking), and sanitation (including de-sludging); and reduce GHG emissions whilst offering the opportunity to create new value chains in the use of the organic bio-sludge for crop cultivation, thereby supporting local employment.

1.2

N/A

2 RISKS AND ASSUMPTIONS

Risks	Risk level (H/M/L)	Mitigating measures
No buy-in from board of selected schools and hospitals.	M	<ul style="list-style-type: none"> • Secure official approvals through Ghana Education Service and Ghana Health Service. • Sign management contracts with selected schools and hospitals spelling out terms of the scheme • Appoint middle-level operational contact person to oversee individual scheme.
Poor methane gas yields due to poor technical design of biogas system.	H	<ul style="list-style-type: none"> • Select recognised biogas installers with proven track records to install biogas to meet the specific of selected school or hospital.
Inadequate technical capacity to offer appropriate maintenance services.	M	<ul style="list-style-type: none"> • Provide continuous technical and maintenance training for biogas installers. • Facilitate design and signing of maintenance contracts between artisans and project schools/hospitals • Local training of value chain actors (including artisans, masons and end users).
Lack of technical capacities	M	<ul style="list-style-type: none"> • Close linkages with relevant public and private stakeholders and existing projects, like "Scale up 200 Institutional biogas" and "Rooftop Solar Programme"
Poor institutional capacity to coordinate and implement activities	M	<ul style="list-style-type: none"> • Possibility to mobilise technical assistance and implementation partners

Assumptions

- Ghana Education Service, Ghana Health Service, Ministry of Energy and Energy Commission show strong buy in and willingness to participate in the project.
- Value chain actors (Artisans and installers) available to provide service to schools and hospitals.
- Peer to peer training is in place
- Energy Management Systems work well to monitor and report on energy and biogas performance and GHG tracking.

3 LESSONS LEARNT, COMPLEMENTARITY AND CROSS-CUTTING ISSUES

3.1 Lessons learnt

It is critical that similar Government actions seeking to scale up improved access to solar PV and biogas and sanitation solutions and social service delivery take the following issues into account:

A strong robust exit strategy: Some of the 400 biogas plants in Ghana are not working properly due mainly to the lack of after sales services and poor maintenance and failing into disrepair (See Technical Annexes for detail). To avoid repeating the same mistakes, strong exit strategy must be developed whereby the owners will be able to pay for the cost to operate and maintain the biogas plants (OPEX). One such proposal is the ESCO BOOT model². The tenders could be designed as a call for Inclusive Business Plan Competition to attract the most viable and cost effective proposals with strong inclusive business case.

Leveraging private sector resources: Although some solar PV and biogas roll-out programmes are showcased as a success, creating sustainable after sale services and maintenance to ensure long-term financial sustainability remains a key challenge. This is particularly relevant for public services buildings like schools or hospitals. There is a need to develop viable business models involving strong private sector participation and investment, together with civil society (end-users) involvement.

Fit-for-purpose and demand driven solutions with no unintended consequences: Grant-based methods could lead to perverse incentives and unforeseen outcomes such as oversized equipment and no focus on energy efficiency. Simple measures and activities, including the monitoring of consumption and usage-patterns, realistic estimations of the energy demand (based on number of users and equipment consumption) and energy efficiency and saving actions, are required to minimize these risks. On the other hand, including appropriate solutions such as water pumps could make great impact in addressing hygiene and health in the buildings.

Transparent selection of project beneficiaries: there is a need to select in an open and transparent manner the beneficiary schools and hospitals for the project; the selection process will be based on the following indicative criteria;

- i. Deprived nature and poverty conditions of the community for consideration
- ii. Schools and hospitals in communities with degraded environments
- iii. Communities with low quality education
- iv. Communities with poor health delivery system especially for women and children

² Also presented in the technical annexes

A large part of the urban population, especially those living in vulnerable communities in low lying areas, is directly exposed to the effects of climate change and pollution. They are likely to engage in initiatives to improve their living standards.

The above will ensure that the project design will factor effective engagement with local communities to generate buy-in and project ownership. The project will also partner with local community based organisations to improve local governance systems and mutual accountability. The creation of economic opportunities for the population, especially for the most vulnerable, is crucial to ensure buy-in from the public and sustainability in the long run. Recycling presents good opportunities as another mean of increasing income for urban and peri-urban dwellers.

The GCCA+ action, when selecting schools and hospitals, will take into consideration the absorptive and implementation capacity of the local authority and the stakeholders. As well as the grid constraints and development plans, including possibilities for future grid-connection if off-grid (or mini-grid development in the area).

Integrated sectoral programmatic approach: Ghana's NDC is designed in line with sector policies, plans and programmes making it inter-sectoral. The NDC is also incorporated into Ghana's medium term development plan. The GCCA+ Action will document lessons learned to ensure future replication in other schools, hospitals and public buildings in Ghana.

Capacity building: Training and capacity building in energy management, waste management and maintenance of related installations and empowering value chain actors are key step to ensure project sustainability. The GGCA+ Action will dedicate enough means to train and enhanced skills and capabilities. The embryonic development of waste to energy needs a learning-by-doing approach. Specific secondary schools are already able to demonstrate the benefits of sustainable waste to energy by using biogas energy for cooking and lighting (St. John Secondary, Presbyterian Boys High School and Odogonor Senior High School in the Great Accra Region) under the support of the Scale-up 200 institutional biogas programme (SE4ALL Action Plan) and the UNIDO biogas programme. In the case of the private sector, one company³ uses its dry palm bunches to fire their boiler to generate steam for production. The company further uses their power turbine to also transform the steam that they generate to electricity that the company uses on site. However, these initiatives remain marginal and needs to be developed by other similar or complementary actions which will contribute to increase the share of biogas within the renewable energy production. Lessons learned from these baseline projects will be adopted and improved in the GCCA+ Action.

Community Based Enterprises The GCCA+ action will work closely with CBEs on energy management systems, ESCO companies, maintenance and reparation of systems, waste collection and management and on how to make use of the excess solar electricity if not feed-it into the grid, or biogas for productive use and to create new value chains (e.g. organic fertiliser, recycling).

Communication and outreach activities: to showcase the GCCA+ projects to demonstrate on how to generate clean energy from solar PV and biogas as viable business model whilst protecting the environment, promoting and avoid local pollution.

Communication and outreach activities to visit pilot demonstration sites to learn on how to generate clean energy from solar PV and biogas as viable business model whilst protecting the environment and avoid local pollution.

³ Benso Oil Palm Plantation (BOPP)

3.2 Complementarity, synergy and donor coordination

The Ghana Energy Commission is implementing the national "200,000 Rooftop Solar PVs" programme. Under this Action, the Government offers capital subsidies to households that are willing to install solar PV in their homes. Interested households support the cost of balance of system (BOS) while government's capital subsidy covers the maximum cost of 500W of solar panel. Banks provide loans for households to cover the cost of the BOS. Valley View University has been the first institution to achieve 100% renewable power as part of its ecological commitments. As part of the Valley View Renewable Energy programme, electricity is generated from rooftop solar panels and kitchen waste that is converted to energy at the on-campus biogas plant. The success factors in both are: (a) sustained public awareness; (b) transparent modalities to sign on; (c) technical and fiduciary standards, (d) buy-in of key stakeholders and (e) stimulate involvement of private sector. Finally, it is more and more often encountered that micro, small medium enterprises (MSMEs) as well as individuals are pledging and acting at the grass root levels to combat climate change through citizenry actions (hygiene and sanitation, campaign for rubbish collection, oxo-bio-degradable additive for water sachets).

Beyond the EU Commission support there are several developed countries (Germany, United Kingdom, Australia) that provide funds through UNEP, UNDP, GIZ, World Bank to support Ghana to implement climate change programmes. UNDP is implementing Low Emission Capacity Building (LECB) and Green Climate Fund Readiness Projects to help Ghana improve on its technical and finance MRV system, financed by the EU Commission. UNEP is also active in Ghana in the climate technology and deployment space. In addition, the EU is funding the Switch Africa Green through UNEP, which Ghana is one of the beneficiary countries. Switch Africa Green in Ghana is promoting biogas technology penetration in the commercial sector. Ghana is also benefitting from Danish funded climate technology centre. A number of CSOs are also engaged mainly at the community projects, awareness and policy advocacy (CARE, SNV, Plan, etc.). It is also important to highlight the involvement of the academia in training of manpower and generate knowledge.

The Government of Ghana intends to facilitate the diffusion of biogas technology to identifiable targets including households, institutions and communities in Ghana through the programme "Scale up 200 institutional biogas" focusing in senior high schools and prisons. The Ministry of Environment, Science, Technology and Innovation (MESTI) works in collaboration with the Ministry of Energy, the Ministry of Water and Sanitation and the Ministry of Local Government and Rural Development. Currently, about 10-20 companies in Ghana have experience with biogas. There is appreciable knowledge base with the Institute of Industrial Research (CSIR-IIR), the Kwame Nkrumah University of Science and Technology (KNUST), the Biotechnology and Nuclear Agricultural Research Institute of the Ghana Atomic Energy Commission (GAEC-BINARI) and Koforidua Polytechnic. At least two major biogas related research projects are currently rolling out in Ghana in partnership with collaborators from abroad. The first project is the Biowaste4SP (Bio-waste for Sustainable Products) project aimed at identifying and demonstrating a technical roadmap - a strategy - for efficient technological utilization of selected significant bio-wastes in five African countries - Morocco, Egypt, Ghana, South Africa, and Kenya. The second project is supported by United Nations Industrial Development Organization (UNIDO) aiming to implement a 3-year biogas industry "Supporting green industrial development in Ghana: Biogas technology and business for sustainable growth". This project is supported by the Ministry of Trade, Industry and Energy (MOTIE) of Korea, and is being implemented in coordination with the Ministry of Trade and Industry (MoTI) of Ghana and The Energy Centre, Kwame Nkrumah University of Science and Technology (KNUST).

This project will work closely with partners from the above baseline projects so as to use lessons learned to develop best practices and support the scaling up of viable solar PV and biogas projects with strong exit strategies, beyond the business-as-usual modality of “Build, Maintain and Abandon” (see Technical Annexes). A feasibility study will be conducted to map out the existing solar PV and biogas actors in Ghana and recommend an entry point to complement their works e.g. Rooftop 200,000 Solar PV programme, SE4ALL 200 Industrial biogas programme, SWITCH to Green Africa programme, Switch to Green programme, ECREEE Biogas programme, Millennium Development Authority (MiDA) and EUEI-PDF’s Energy Efficiency programme and Covenant of Mayors of Sub-Saharan Africa (CoMSSA) programme (e.g. improving demand side management and utilising their Energy Management System).

3.3 Cross-cutting issues

Gender equality - The National Gender Policy was launched in December 2015 and it is guided particularly by article 17(1) and (2) of the 1992 Constitution of Ghana which guarantees gender equality and freedom of women and men, girls and boys from discrimination on the basis of social or economic status, among others. The policy will help to address challenges, such as: i) Inequality in access to social protection by the marginalised, vulnerable and the poor; ii) Inequalities in the burden of extreme poverty, education, skilled training gaps and excess maternal mortality; iii) Unequal access to social, economic power and justice including lack of respect for and inadequate protection and promotion of human rights of women; iv) Inequalities between women and men in sharing of power and decision making at all levels and in dealing with all kinds of conflicts and insecurities and threats on women; v) Stereotyping and persistent discrimination against women that manifest in negative gender relations.

However, despite fast growing national growth and declining poverty rates in Ghana, social, cultural, economic and gender inequalities still hinder women and girls from fully participating in the solar PV and biogas sub-sectors. Women are constrained in terms of limited access to technical, financial and business training due to low literacy and lack of access to finance and credits due to lack of collateral, unaware of new technology or exposure to business opportunities, the need to take care of children at home and lack of crèche facilities. Often, women are less well represented in the District governance structure, even the use of mobile phone by women is less than that by men. As a result, women are less aware of many renewable energy business opportunities. It is essential that women and women's groups are positively prioritised in the selection of beneficiaries of activities supported by the Action. Studies from CGIAR suggest that targeting women with climate and renewable energy information is likely to result in uptake of new renewable energy best practices for local mitigation and adaptation.

Women are less well presented in the solar and biogas sector e.g. during the recent solar and biogas business dialogues held on the 14 to 16 June 2017, there were no women speakers and the number of women attendance were less than 10%. Likewise, the number of trained solar and biogas women scientists or technicians remain low.

The renewable energy sector is usually characterized by significant gendered patterns, such as men’s decision in the purchase of solar PV or biogas installation or improved cooking stoves or cooking fuels yet it is women who do most of the cooking at home, at schools and hospitals.

Consequently, in order to take the imbalance and unhealthy perspectives into consideration, it is essential to involve equally men and women and youth in the scaling up of the solar PV and biogas and sanitation solutions to be supported by the Action:

(a) The training of women and youth (and children at the schools) as value chain actors in the implementation of Output 2 of the Action offers the opportunity to re-dress the under-representation of women and youth in renewable energy and sanitation sub-sectors during the implementation period of the programme.

(b) Under Component 1,2 and 3 of the Action at least 30 % of the beneficiaries of training and other activities should be women and youth. Outreach and campaign activities under Component 3 should, among others, focus on gender equality in relation to solar PV, biogas and sanitation solutions development.

(c) The Ghana Statistical Service collects data on among others Social and demographic statistics. They have contributed to studies by EPA and EC on gender inequalities. These studies identified a lack of comprehensive information on the multiple dimensions of social and gender inequalities, particularly in the renewable energy sector. The inclusion of women and youth under Component 1, 2 and 3 of the proposed Action will contribute considerably to the knowledge base of the Ghana Statistical Service by sharing of collected data.

(d) Development and dissemination of knowledge and communication products and information on solar PV, biogas and sanitation solutions takes account of limitations and differences in access to information for women. Proposed activities and modality of interventions take due account of women's additional domestic and childcare responsibilities. Proposed activities and modalities of interventions take account of women's limited access to training, credits and finance and resources. Under-representation of women in the solar PV, biogas and sanitation sectors and services is balanced through the training of women and youth as social entrepreneurs and value chain actors (technicians, artisans, mason, plumbers).

(e) Dissemination of the knowledge and communication products and information on solar PV, biogas and sanitation solutions will utilise multiple and varied media, with cross-linkages to schools, hospitals, health centres, improved cooking stoves and savings and loan groups, where women are well represented. Raising children's awareness of climate issues will also enhance sustainability of interventions.

(f) Involvement of networks of female Heads of schools and Hospitals alongside Government's Rooftop and SE4ALL's 200 Industrial Biogas programme will help ensure engagement and involvement of women alongside men in both the development and implementation of solar PV and biogas action plans (Output 1, 2 and 3).

(g) Increasing girl pupils and family's active engagement with Schools' Alumni and School Environmental Club will provide a positive role model for girls and younger women, increasing their confidence and the likelihood of their future engagement, both as members of the community and potentially as members of District teams. Under Expected Output 2 and 3 of the programme at least 30% of beneficiaries of training, outreach and other activities should be women (e.g. Ratio of female to male trained by the training centres as social entrepreneurs - Output 2.2).

(h) The numbers of women and men trained in conservation agriculture, sustainable natural resource management and climate smart land use (Output 2.2) and the gender responsive sensitise knowledge and communication and outreach products developed, adopted and improved (Output 2.1 and 3) will also contribute to gender equality.

(i) Gender disaggregation will be required in the baseline data, monitoring data collected and final evaluation. School Alumni and Environmental Clubs will work closely with the project team to monitor the solar and biogas pilots as part of the local implementation committee to record progress with activities and budget expenditure.

Rights Based Approach – Access to Energy is becoming a fundamental right mostly when it enables to increase the performances of social infrastructures such as schools or hospitals. This GCCA+ Action will support-the most deprived to have better access to clean energy and hence improved access to social services.

Environment – Non-fossil sources of energy are reliable, environmentally sustainable and fundamental towards a low-emissions climate resilient sustainable development. This GCCA+ action will be based on the ability of the renewable energy production to benefit to social, economic and environmental welfare of all the citizens and ultimately, to limit the carbon footprint.

Sustainable approach to waste management (solid, liquid and e-waste) and waste-to-energy activities (with potential development for waste-to-agriculture) - The GCCA+ Action will work closely with EPA to ensure that the disposal, reuse or recycling of all wastes including e-wastes from the solar panels, batteries, inverters and biodigester discharge comply with all EPA waste management and environmental standards. Lessons learned from the GEF funded matching rebate scheme to replace old refrigerators with more energy efficient refrigerators and for the disposal of the refrigerants will be adopted.

4 DESCRIPTION OF THE ACTION

4.1 Objectives/results

The overall objective is aiming at having renewable energy and waste - to energy solutions in social buildings (schools and hospitals) deployed and applied as outlined in the Ghana NDC.

The main objective of the programme is to contribute to better delivery of services by schools and hospitals while supporting the Ghana's low carbon and climate resilient development aspirations. This programme is relevant for the Agenda 2030. It contributes primarily to the progressive achievement of SDG Goals 7 (affordable and clean energy) and 13 (climate action), but also promotes progress towards SDG Goals 3 (good health and wellbeing), 4 (quality education), 8 (Decent work and economic growth). This does not imply a commitment by the country that is benefiting from this GCCA+ Action.

The specific objective is to support climate mitigation activities as outlined in the Ghana NDC, through the deployment of solar PV and biogas as well as improved waste management facilities, building capacity of key actors as well as creating awareness of climate challenges among the population. This GCCA+ Action will equip at least 20 high schools and 12 hospitals of four Regions (Accra, Ashanti, Western and Eastern Regions) with solar PV panels, electricity installation, biogas plants and waste management facilities, hence supplying more than 25,000 pupils and 15,000 patients each year (Figure 2). 50 social entrepreneurs with a special focus on women will be trained and certified (building on ECREEE's solar certification programme) who will be able to scale up and replicate the business models in other schools and hospitals as well as other public and private buildings (restaurants, hotels, food processing).

4.2 Main activities

Output 1: Climate change mitigation through improved access to renewable energy and waste management

Result 1: Reduced greenhouse gas emissions from solar PV and biogas and improved sanitation and waste management. This Output 1 seeks to contribute to the implementation of the NDC by complementing the national 200,000 solar PV rooftop and the SE4ALL 200 institutional biogas programme.

The result will be achieved through the following sub-outputs and their activities:

Output 1.1. Technical assistance to conduct detail feasibility studies for overcoming the regulatory, institutional, technical, financial, business and social barriers for the scaling up of solar PV and biogas solutions at the high schools and hospitals in Ghana.

Activities:

- Conduct detail feasibility studies for the scaling up of the solar PV and biogas solutions with the following indicative contents:
 - **Rationale for intervention:** Understanding the country context, needs and alignment with national development and climate policy and plan.
 - **Conduct detailed baseline surveys** (economic, socio, cultural, institutional, gender) using bottom up participatory approach, student and patient population, mapping of wealth, health, education levels, access to natural resources, baseline data on income, health and education indicators, inventory data on energy access and usage, energy consumption by equipment, energy bills, willingness and ability to pay for services, income generation activities, vulnerability to climate change and impact.
 - **Validate the criteria** by developing a tool for making informed decisions to prioritize and rank the selection of the sites based on:
 - i) **Economic factors:** Assess the expenditures of the schools and hospitals on electricity usage, cooking fuel (do parents pay a fee for LPG, charcoal, firewood) and sanitation de-sludging bills and their willingness and ability to pay these bills, assess how they would like to make use of any excess electricity from the solar and biogas for productive use (see Technical Annexes for context); assess operating and maintenance costs;
 - ii) **Environmental factors:** Assess the efficiency in the energy supply-side and demand-side management of schools and hospitals and their sanitation and waste management system (indiscriminate and open dumping of bio-sludges to landfills and pollution of water courses, enforcement and compliance with EPA's environmental discharge standards) and opportunities for improvement; indoor pollution from firewood, source of the firewood (signs of local deforestation);
 - iii) **Technical factors:** Selection of the appropriate technology and size for meeting local needs. Will both solar PV and biogas be demonstrated at each schools and hospitals or it there flexibility for stand-alone solar PV or biogas at each schools and hospitals depending on priority and local needs? Fit-for-purpose and demand driven solutions with no unintended consequences (unforeseen outcomes such as oversized equipment and no focus on energy efficiency. To include measures and activities, such as the monitoring of consumption and

usage-patterns, realistic estimations of the energy demand (based on number of users and equipment consumption) and energy efficiency and saving actions).

- iv) Socio-cultural factors:** Assess the quality of health and education services and standards (pass rates and health bill), should disadvantaged beneficiaries like blind and deaf schools be targeted, cultural taboos, acceptance and adoption of biogas for cooking; include women and girls; and include appropriate solutions such as water pumps to address hygiene and health in the buildings; and
- v) Institutional factors:** Assess local absorptive capacity and appetite for implementation at the local levels and understanding the local power and governance structure.
- **Barriers analysis and identification of key success factors:** i) Assess key success factors and best practices and suitability in national, regional and international solar and biogas technologies and businesses that could be adapted and adopted in Ghana (including currently used technologies in Ghana); ii) Identification and assessment of key barriers for solar and biogas solutions: Specific barriers, Market barriers, Economic and Financial barriers, Legal (Intellectual Property Rights), Institutional and Regulatory barriers, Human skills, Technical barrier, Information and awareness, Socio-cultural barriers and Networking barrier. There is also a need to research as to why there is poor after sale service and poor maintenance and how this could be overcome;
- **Conduct value chain and market analysis** of solar PV and biogas and sanitation sectors in Ghana: understanding the proven and tested solutions and business models, mapping of private sector landscape and how to leverage their resources, needs and capabilities of local suppliers and installers and opportunities for optimising local contents and supplies;
- **Economic and financial analysis of the pilots:** Conduct detail economic (public goods) and financial (private goods) internal rate of returns (IRR) based on accurate costing and balance sheet analysis, understand the risks and how to optimise the returns;
- **Evaluation of inclusive business and financial models:** The feasibility study will evaluate a range of cost effective and viable business (PPP, ESCO) and financial models (e.g. matching rebate, partial loan guarantee, performance-based payment) to incentivize value chain actors to reduce supply risks and create demand for solar PV and biogas solutions, generating revenues to cover for operation and maintenance costs. This will also empower and incentivise women, youth and children (at schools) as value chain actors to protect their fragile resources and productive assets.
- **Opportunities to complement existing initiatives:** Mapping of existing solar PV and biogas initiatives in Ghana and recommend how this project could compliment their works e.g. Rooftop 200,000 Solar PV programme, SE4ALL 200 Institutional biogas programme, Switch2Green programme including SWITCH Africa programme, ECREEE Biogas programme, Millennium Development Authority (MiDA) and the Energy Efficiency programme of the EU Energy Initiative partnership Dialogue Facility (EUEI-PDF) and Covenant of Mayors in Sub-Saharan Africa (CoMSSA).
- **Detail implementation, management and annual work plan:** Develop a detail work plan on needs, objectives of the pilots, expected outputs/results, activities,

detailed budget, SMART indicators, targets and deliverables and timelines. Identify any potential performance risks, likelihood and impact levels and how to mitigate them as well as assumptions and preconditions.

- **Develop a detail monitoring and evaluation plan:** Develop a monitoring plan to track progress and identify problems and how to apply adaptive management, monitoring and evaluation of budget, indicators, targets and deliverables against action plan and timelines.
- **Develop an easy-to-use and transparent Energy Management and Monitoring and Reporting (MR) System** that is accurate, reliable and credible including developing a GHG baseline and GHG emissions savings using UNFCCC approved emissions factors. This will allow the cost effectiveness and efficiency of the intervention (Euro/kW installed or m³ biogas per year and tCO₂eq saved) to be tracked and correctly reported into the national climate change systems.
- **Develop a detailed future scaling up and replication programme aligned with the energy and climate planning:** The study will assess the opportunity to scale up and replicate the solar PV and biogas solutions across Ghana with estimated costing and financial instruments. The study will also recommend opportunities to i) develop policy (e.g. fiscal incentives) and financial de-risking instruments and ii) to leverage, blend and sequence domestic with potential international finance e.g. EU EIP and blending instruments, crowdfunding and potential for carbon credits.
- **Knowledge management and sharing:** Capture lessons learned as best practices and developed as knowledge and communication products for co-learning and peer to peer learning and South-South sharing. This will be delivered under Output 2.1.

Output 1.2. Technical assistance to develop the tender dossier for the “*Design, Supply, Installation and Maintenance of Sustainable Solar and Biogas Solutions for Public High Schools and Hospitals in Ghana*” based on the detailed feasibility studies developed under Output 1.1.

Activities:

- Develop a comprehensive tender dossier according to EU’s Procedures and practical guide (PRAG)⁴ that explains contracting procedures for EU external aid contracts financed by the Global Public Goods and Challenges programme.

Output 1.3. Implementation, supervision, monitoring and reporting on the Solar and Biogas systems at high schools and hospitals in Ghana

Activities:

- Launch works contract related activities. During the early part of the Project implementation, the activities related to the promotion of output based and market mechanisms will focus on the identification of installers and suppliers and the CBOs in the different targeted schools and hospitals at the district levels. The detailed modalities and procedures will be agreed with these entities during the Project implementation. These modalities and procedures will include aspects such as:

⁴<http://ec.europa.eu/europeaid/prag/document/do>

Adequate Design of the energy and waste systems; Procedures for procurement of raw materials; Pricing of solar PV panels, waste collectors and bio digesters and related equipment (including water pumps); Payment mechanisms; Roles and responsibilities of different parties; Quality control and assurance; Content of the training programme; maintenance.

- Supervise, monitor and report on the implementation of the projects (for instance, through a recruited project assistant) according to the annual work plan with guidance from the Project Technical Committee. Energy Management Systems are defined and put in place to monitor and report on energy and biogas performance and GHG emissions and reported to the relevant authority.

Output 2 Gender responsive capacity development programme developed, tested and improved to strengthen the policy, regulatory, institutional, technical, financial, business and social capacity of key stakeholders

***Result 2:** Increased capacity of local stakeholders and the Government of Ghana to implement and follow up on renewable energy and waste management and to ensure the replicability of the actions, in line with the NDC and in the context of sustainable development..*

Output 2.1 Develop a long term Gender responsive Capacity Development Programme to strengthen the absorptive and implementation capacities of the public, private and CSO partners capable of “Shifting the paradigm to transform development and climate challenges into low carbon and resilient development and inclusive income generation and business opportunities as robust exit strategy beyond the one-off pilot project” by enhancing the (see Table 1 in Technical Annexes for details):

- Policy, regulatory and institutional competence
- Technical competence
- Financial competence
- Business competence
- Gender and social engagement capacity

Based on national, regional and international lessons learned and best practices, developed, test and improve the gender sensitive knowledge and communication products (guidelines, manuals, handbooks, toolkits) to train key stakeholders and value chain as green social entrepreneurs to scale up solar PV, waste management and biogas businesses, including women and youth. The gender sensitive knowledge and communication products will also be used for awareness raising, marketing and South-South knowledge exchange and sharing.

Output 2.2. Based on the capacity development programme developed under Output 2.1, participatory and gender sensitive training will be organised to train:

- **Value chain actors:** Suppliers, installers, artisans, masons plumbers, green social entrepreneurs including women & youth.
- **Training of trainers:** Complimenting local and regional programme e.g. ECREEE Biogas and solar certification programme, Kwame Nkrumah University of Science and Technology (KNUST), Koforidua Polytechnic and University of Energy and Natural Resources.

- **Project proponents** capable of designing and formulating pipelines of high quality concept notes and fundable full proposals for meeting the international funding investment criteria and ESS (e.g. EU EIP and blending facilities, GCF Investment criteria).
- Focal points responsible to appraise and select high quality concept notes and proposals for submission to donors or international funds e.g. EU EIP and blending facilities or the GCF.
- Organise capacity-building for the institutions that will deliver the roadmap, to administer and successfully implement it. This will also help with developing expertise in project implementation, project maintenance, energy management, waste management and financing.
- Develop communications and guidance that may be needed to support the implementation of the projects (e.g. marketing materials and technical guidance).

Output 3: GGCA+ in Ghana information, dissemination and outreach

Result 3: Improved understanding of climate change challenges by the general population contributes to the attainment of adaptation and mitigation actions in line with the NDC.

Output 3.1 Gender sensitive communication and outreach for general public about the threat of climate changes and promote climate-smart behaviours

- Develop easy-to-use communication products (leaflets, brochures, podcasts, radio drama), to sensitize the general public on the threats and impact of climate change and the cost of inaction
- Showcase success stories that promote and reward climate smart behaviours

Output 3.2 Organise public awareness campaign to showcase the solar PV and biogas projects and of climate change in general

- Identify and prepare project sites in each region to demonstrate how renewable energy through solar PV and biogas and improved sanitation and waste management could contribute to GHG emission reduction, avoid local pollution as well as promoting healthy environment and well-being and socio economic benefits including job creation whilst savings costs for schools and hospitals.
- Organise exchange visits to the selected GGCA+ action sites for any third party (MSMEs, CSOs, schools, universities) interested to learn from the projects;

Output 3.3 Targeted gender sensitive environmental education activities in schools and hospitals

- In partnership with the schools and their Alumni, organise and form Environmental Club and develop user friendly environmental and educational knowledge and communication products and curriculum to campaign on the 3 R - reuse, recycle, reduce - principle targeting the public and at home and families;

- Encourage the schools to use the organic bio sludge from the bio digester to locally grow sustainable vegetables

Output 3.4 Ensure communication and outreach with the Covenant of Mayors of Sub-Saharan Africa.

- Work with the Mayors of the GCCA+ action sites in the four regions to promote and raise awareness among the public on the solar PV and biogas solutions being demonstrated
- Organise and invite other Mayors to visit the GCCA+ action sites
- Share lessons learned and best practices and reach out to the Covenant of Mayors of Sub-Saharan Africa (special attention to the office in Accra).

4.3 Intervention logic

The programme is based on an overall strategy characterised by some main features:

- The programme is embedded in the Ghana NDCs plan. In this regard, the design of the Action has been officially endorsed by the Government of Ghana as a flagship programme.
- The current Action is complementary to the Energy Commission Rooftop solar programme (200,000 PVs to be installed). Schools and hospitals as social services have been preferred to be covered by the present action.
- Biogas component of the project is also embedded in Ghana's NDCs actions under the waste-to-energy initiative (and complementary to the SE4ALL's Scale-up 200 institutional biogas).

Component 1 directly supports the attainment of Ghana's NDC mitigation targets by promoting reduced GHG emissions through renewable energy, recycling and the use of waste to energy generation. It contributes to improved health, sanitation and to environmental protection. The bottom up demand driven approach also provides livelihood opportunities for women, youth and vulnerable and disadvantaged communities to be empowered and trained as RE value chain actors and hence incentivised to protect their environment. Understanding the felt needs of the schools and hospitals and how the burden of high energy, cooking fuel (polluting), sanitation and waste management costs and affordability could affect their delivery of high quality educational and health services and how this project could overcome the various barriers to meet those needs. Ensuring that the new energy generated from Solar PV and biogas could be put to good use especially to generate income to pay for the operational and maintenance cost and battery replacement for the solar and biogas system.-As a robust exit strategy beyond the one off project and 'Build, Maintain and Abandon' model, the Solar PV and biogas pilot could be scaled up as a turn key or ESCO BOOT model (Build, Own, Operate and Transfer) where the action will be used to finance the CAPEX of the biogas assets and installation cost (See Technical Annexes for details). In order to recover the OPEX operational and maintenance cost, the ESCO will sell the electricity and biogas to the schools and hospitals that must have the ability to pay for the electricity and biogas and sensitized to appreciate energy as a commodity. Extra revenues will be generated from the sale of the bio-sludge as organic fertilisers. Being of less risk with operation and maintenance of the solar PV project, the solar could be scaled up as a turn-key project with a tied in 2 years after sales service agreement.

Component 2 supports the objectives of Component 1 but with a broader scope. It promotes the necessary energy and climate change policy framework to translate climate plans into specific sector plans and concrete actions. It also supports the mainstreaming of climate change into national plans and strategies. The opportunities to integrate international climate-friendly financing (e.g. EU EIP and blending facilities or the GCF) into the annual development and budgetary system to track and tag climate-related expenditures will be developed.

Component 3 is horizontal and seeks to maximise the understanding and buy in of the general population on climate change challenges and policies, starting with school age children as agents of change in their communities. The component will also promote the association of the EU with climate change policies, creating space for visibility and policy dialogue.

5 IMPLEMENTATION

5.1 Financing agreement

In order to implement this action, it is foreseen to conclude a financing agreement with the partner country, referred to in Article 184(2)(b) of Regulation (EU, Euratom) No 966/2012.

5.2 Indicative implementation period

The indicative operational implementation period of this action, during which the activities described in section 4.1 will be carried out and the corresponding contracts and agreements implemented, is 48 months from the date of entry into force of the financing agreement.

Extensions of the implementation period may be agreed by the Commission's authorising officer responsible by amending this decision and the relevant contracts and agreements; such amendments to this decision constitute technical amendments in the sense of point (i) of Article 2(3)(c) of Regulation (EU) No 236/2014.

5.3 Implementation of the budget support component

N.A.

5.4 Implementation modalities

5.4.1 Procurement (direct management)

Subject in generic terms, if possible	Type (works, supplies, services)	Indicative number of contracts	Indicative trimester of launch of the procedure
Technical Assistance for: feasibility study*, tender dossier, supervision of works and capacity building	Services	2	T4 2017; T1 2018

To equip at least 20 high schools and 10 hospitals of four Regions (Accra, Ashanti, Western and Eastern Regions) with solar PV panels, electricity installation, biogas plants and waste management facilities	Supplies/Services Works/Services	2	T3 2018
Information, dissemination and outreach	Services	1	T4 2017

*: the pre-feasibility study (i.e. identification of the sites, pre-inspection of the sites, pre-environmental and social screenings) will be carried out by EPA and SE4ALL Team at EC before the launch of the feasibility study and not supported under the present action.

The use of the suspensive clause will apply for the service contract (for the technical assistance).

5.5 Scope of geographical eligibility for procurement and grants

The geographical eligibility in terms of place of establishment for participating in procurement and grant award procedures and in terms of origin of supplies purchased as established in the basic act and set out in the relevant contractual documents shall apply.

The Commission's authorising officer responsible may extend the geographical eligibility in accordance with Article 9(2)(b) of Regulation (EU) No 236/2014 on the basis of urgency or of unavailability of products and services in the markets of the countries concerned, or in other duly substantiated cases where the eligibility rules would make the realisation of this action impossible or exceedingly difficult.

5.6 Indicative budget

	EU contribution (amount in EUR)
5.4.1 – Procurement (direct management)	4 450 000
<i>Service Contracts TA (all outputs)</i>	<i>550 000</i>
<i>Supplies/Works contract (included in Output 1)</i>	<i>3 900 000</i>
<i>Information, dissemination and outreach</i>	400 000
5.9 – Evaluation, 5.10 – Audit	70 000
5.11 – Communication and visibility	80 000
Contingencies	N.A.
Totals	5 000 000

5.7 Organisational set-up and responsibilities

A Project Steering Committee (PSC) will be set up for the programme. The PSC will meet at least bi-annually (and more often if needed). The chair of the PSC will be the Ministry of

Science, Technology and Innovation (MESTI) and members will include, the Ministry of Agriculture, the Ministry of Energy, Ministry of Health, Ministry of Education, the Ministry of Rural Development and Ministry of Finances, representative(s) of Local Government and of Civil Society (CSO) and the European Union Delegation to Ghana as an observer. The Steering Committee will be the body responsible for the general oversight, policy guidance and monitoring of the programme. Besides the PSC, technical working group meetings will be held regularly. EPA under the MESTI will be responsible for the secretariat of the PSC.

A Project Management Unit (PMU) will be embedded within EPA offices in order to reinforce coherence, coordination and national ownership. This will strengthen the links between the three results and their contribution to the Climate Change adaptation and mitigation under EPA. The Project Assistant within the PMU will monitor and provide report on the GCCA+ Action.

5.8 Performance monitoring and reporting

The day-to-day technical and financial monitoring of the implementation of this action will be a continuous process and part of the implementing partner's responsibilities. To this aim, the implementing partner shall establish a permanent internal, technical and financial monitoring system for the action and elaborate regular progress reports (not less than annual) and final reports. Every report shall provide an accurate account of implementation of the action, difficulties encountered, changes introduced, as well as the degree of achievement of its results (outputs and direct outcomes) as measured by corresponding indicators, using as reference the logframe matrix (for project modality) or the list of result indicators (for budget support). The report shall be laid out in such a way as to allow monitoring of the means envisaged and employed and of the budget details for the action. The final report, narrative and financial, will cover the entire period of the action implementation.

The Commission may undertake additional project monitoring visits both through its own staff and through independent consultants recruited directly by the Commission for independent monitoring reviews (or recruited by the responsible agent contracted by the Commission for implementing such reviews).

The Action will also feed the GCCA+ Results Framework, keeping track of quantitative and qualitative GCCA+ achievements at country level and as performed across GCCA+ targeted countries.

5.9 Evaluation

Having regard to the nature of the action, a mid-term evaluation will be carried out for this action or its components via independent consultants contracted by the Commission.

It will be carried out for problem solving but also learning purposes, in particular with respect to the potential for further scaling up of the Action, the quality and efficiency of the running of the service contracts and coordination with authorities, as well as for accountability and learning purposes at various levels.

The Commission shall inform the implementing partner at least one month in advance of the dates foreseen for the evaluation missions. The implementing partner shall collaborate efficiently and effectively with the evaluation experts, and inter alia provide them with all necessary information and documentation, as well as access to the project premises and activities.

The evaluation reports shall be shared with the partner country and other key stakeholders. The implementing partner and the Commission shall analyse the conclusions and recommendations of the evaluations and, where appropriate, in agreement with the partner country, jointly decide on the follow-up actions to be taken and any adjustments necessary, including, if indicated, the reorientation of the project.

Reporting of project progress and results will be guided by GCCA+ Result Framework (global indicators) that are in line with EU Results Framework (EURF).

Indicatively, two contracts for evaluation services shall be concluded in 2020 and in 2022.

5.10 Audit

Without prejudice to the obligations applicable to contracts concluded for the implementation of this action, the Commission may, on the basis of a risk assessment, contract independent audits or expenditure verification assignments for one or several contracts or agreements.

Indicatively, one contract for audit services shall be concluded in 2022.

5.11 Communication and visibility

Communication and visibility of the EU is a legal obligation for all external actions funded by the EU.

This action shall contain communication and visibility measures which shall be based on a specific Communication and Visibility Plan of the Action, to be elaborated at the start of implementation and supported with the budget indicated in section 5.6 above.

In terms of legal obligations on communication and visibility, the measures shall be implemented by the Commission, the partner country, contractors, grant beneficiaries and/or entrusted entities. Appropriate contractual obligations shall be included in, respectively, the financing agreement, procurement and grant contracts, and delegation agreements.

The Communication and Visibility Manual for European Union External Action shall be used to establish the Communication and Visibility Plan of the Action and the appropriate contractual obligations.

The Communication and visibility services will be carried out via specialised and independent consultants contracted by the Commission, indicatively in T4 2017 (one contract with the use of a suspensive clause).

This GCCA+ Action will also comply with the GCCA+ Communication and Knowledge Management Strategy requirements.

APPENDIX - INDICATIVE LOGFRAME MATRIX⁵

The activities, the expected outputs and all the indicators, targets and baselines included in the logframe matrix are indicative and may be updated during the implementation of the action, no amendment being required to the financing decision. When it is not possible to determine the outputs of an action at formulation stage, intermediary outcomes should be presented and the outputs defined during inception of the overall programme and its components. The indicative logframe matrix will evolve during the lifetime of the action: new lines will be added for including the activities as well as new columns for intermediary targets (milestones) for the output and outcome indicators whenever it is relevant for monitoring and reporting purposes. Note also that indicators should be disaggregated by sex whenever relevant.

Results chain	Indicators	Baselines (incl. reference year)	Targets (incl. reference year)	Sources and means of verification	Assumptions
Overall objective: Impact Renewable energy and waste - to energy solutions in public buildings are deployed and applied as outlined in the Ghana NDC	<ul style="list-style-type: none"> ▫ 1. CO2 equivalent emissions** ▫ 2. Percentage of the hospitals and schools with access to energy services** ▫ 3. Renewable energy production as a proportion of total energy production** 	<ul style="list-style-type: none"> ▫ 1.19.53 MtCO2e in 2010 ▫ 2. To be set ▫ 3. To be set 	<ul style="list-style-type: none"> 1. Decrease of 12% in 2025 (NDC target) ▫ 2. To be set ▫ 3. To be set ▫ ▫ ▫ 	<ul style="list-style-type: none"> ▫ 1. NDC reports ▫ 2. EPA, Ministry of Education, Ministry of Health - annual reports ▫ 3. Ministry of Energy – annual report 	<ul style="list-style-type: none"> ▫

⁵ *Indicators aligned with the relevant programming document mark; ** EU Results Framework indicators; *** GCCA+ indicators.

<p>Specific objective: Outcome At least, 20 schools and 12 hospitals apply renewable energy and waste management facilities and techniques in four Regions (Accra, Ashanti, Western and Eastern Regions) in Ghana.</p>	<ul style="list-style-type: none"> ▫ 1. Total solar energy generation by the project (kWh) ▫ 2. Total installed capacity of biogas digester (m3) ▫ 3. Volume of biogas gas produced (m3) ▫ 4. GHG Emissions reduced or avoided expressed on the basis of CO2 equivalent by the EU supported intervention (kt CO2 eq). *** ▫ 5. Number of students and patients beneficiaries with access to clean energy and improved sanitation, of which 50% are women ▫ 6. No. of Social entrepreneurs trained and certified in solar and biogas ▫ 7 The status of findings and lessons on the admin, management and technical aspects 	<ul style="list-style-type: none"> ▫ 1. 2018: 0 kWh ▫ 2. 2018: 0 m3 biodigester ▫ 3. 2018: 0 m3 biogas ▫ 4. 2018: 0 tCO2e saved ▫ 5. 2018: 0 ▫ 6. 2018: 0 ▫ 7. None 	<ul style="list-style-type: none"> ▫ 1. By 2022: 5,780,160kWh ▫ 2. By 2022: 3,465 m3 biodigester ▫ 3. By 2022: 19,740 m3 biogas ▫ 4. By 2022: 19,437 tCO2e saved ▫ 5. By 2022: 45,000 students and patients, of which 22,500 women ▫ 6. By 2022: 10 7. The findings of new installations are learned and concluded in a suggest practices for further replication. [26] 	<ul style="list-style-type: none"> ▫ 1. TA annual reports ▫ 2. Site visits reports ▫ 3. Metering logs ▫ 4. Service and maintenance contracts ▫ 5. Quarterly MRV reports ▫ 6. Training report ▫ 7. The lessons / findings, practices paper - discussed and agreed between the stakeholders – participants of the projects and experts, by the end of the project. 	<ul style="list-style-type: none"> ▫ Buy in and stringent selection of schools and hospitals who are willing and able to pay for the energy and sanitation services as a demonstration pilot ▫ Strong buy in and ownership from schools and hospitals ▫ Collaboration of schools and hospitals to act as demonstration sites ▫ Replication of the positive experience of the action to other projects, schools and hospitals within the state programmes <p>NA "Scaling up solar and biogas"</p>
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<p>▫ Output 1: <u>Climate mitigation through improved access to renewable energy and waste management</u> - To equip at least 20 high schools and 10 hospitals of four Regions (Accra, Ashanti, Western and Eastern Regions) with solar PV panels, electricity installation, biogas plants and waste management facilities</p>					
<p>Output 1.1. Detailed feasibility studies on the regulatory, institutional, technical, financial, business and social barriers for the scaling up of solar PV and biogas solutions at the high schools and hospitals in Ghana.</p>	<p>▫ 1.1.1. Feasibility study, barriers analysis, M and E plan, scaling up and replication programme (No)</p>	<p>▫ 1.1.1. 2018: 0</p> <p>▫ 1.2.1. N/A</p>	<p>▫ 1.1.1. By 2022: 1 detailed feasibility study conducted</p> <p>▫ 1.2.1. By 2018: 1</p>	<p>▫ 1.1.1. Feasibility study report</p> <p>▫ 1.2.1 Tender dossier</p>	<p>▫ Availability of qualified experts with renewal energy and climate financial skills to conduct a detailed feasibility study</p> <p>▫ Strong buy in from the private sector who are capable of delivering project with strong exit strategy</p>
<p>Output 1.2. Tender dossier for the “Design, Supply, Installation and Maintenance of Sustainable Solar and Biogas Solutions for Public High Schools and Hospitals in Ghana” based on Output 1.1.</p>	<p>▫ 1.2.1. Number of tender dossier</p>	<p>▫ 1.3.1. 2018: 0</p>	<p>▫ 1.3.1. By 2022: 30 solar PV & 30 biogas units in at least 20 schools and 12 hospitals</p>	<p>▫ 1.3.1 Service and maintenance on contracts</p>	<p>▫ Stringent monitoring and evaluation action plan to spot problems early and come up with adaptive solutions promptly through proactive and adaptive management</p>
<p>Output 1.3. Implementation, supervision, monitoring and reporting on the Solar and Biogas pilots at the high schools and hospitals in Ghana</p>	<p>▫ 1.3.1. Number of schools and hospitals installed with solar and biogas facilities</p> <p>▫ 1.3.2. Number of annual monitoring reports on production, maintenance, received from each sites</p>	<p>▫ 1.3.2. 2018: 0</p>	<p>▫ 1.3.2. By 2022: 4</p>	<p>▫ 1.3.2 Individual meeting logs</p> <p>▫ 1.3.2 Individual monthly reports</p> <p>▫ 1.3.2 Site visits reports</p>	<p>▫ Willingness / ability / policy framework / resources for replication of the positive experiences and a follow-up on the scaling-up and replication programme</p>

□ Output 2 Capacity development programme developed, tested and improved to strengthen the policy, regulatory, institutional, technical, financial, business and social capacity of key stakeholders					
Output 2.1 Develop a long term Capacity Development Programme to strengthen the absorptive and implementation capacities of the key stakeholders	□ 2.1.1 Number of gender responsive knowledge products (guidelines, training manuals, handbooks, toolkits) developed and published for training	□ 2.1.1 2018: 0	□	□ 2.1.1, 2.1.2 Published knowledge and communication products	□ Knowledge and communication products developed and published are relevant and easy to use and be improved over time
	□ 2.1.2 Number of gender responsive communication products (leaflets, brochures) developed and published for awareness raising and publicity	□ 2.1.2 2018: 0	□ 2.1.1. By 2022: 5	□ 2.1.1, 2.1.2, Annual Reports	

<p>Output 2.2. Based on the capacity development programme developed under Output 2.1, participatory training will be organised to train key stakeholders</p>	<ul style="list-style-type: none"> ▫ 2.2.1 Number of existing training centres delivering gender sensitive training for value chain actors (ESCOs, suppliers, artisans, masons, plumbers, end users) ▫ 2.2.2 Number of trainees certified as RE and Waste management value chain actors (ESCOs, suppliers, artisans, masons, plumbers, end users) (40% of the trainees will be women and youth) ▫ 2.2.3 Number of RE trainees from banks and MFIs ▫ 2.2.4 N° of South-South and gender sensitive knowledge exchange and sharing through workshops. ▫ 2.2.5 N° of meetings organized by the NDC technical group 	<ul style="list-style-type: none"> ▫ 2.2.1 2018: 0 ▫ 2.2.2 2018: 0 ▫ 2.2.3 2018: 0 ▫ 2.2.4 2018: 0 ▫ 2.2.5 2018: 0 	<ul style="list-style-type: none"> ▫ 2.2.1 By 2022: 5 ▫ 2.2.2 By 2022: 200 (80 are women and youth) ▫ 2.2.3 By 2022: 20 ▫ 2.2.4: by 2022: 22.2.5: by 2022: 4 	<ul style="list-style-type: none"> ▫ 2.2.1 Training report ▫ 2.2.2 Training report ▫ 2.2.3 Training report ▫ 2.2.4 Workshop report ▫ 2.2.5 Minutes of NDC technical group meeting 	<ul style="list-style-type: none"> ▫ Strong buy in, ownership and proactive participation by local R and D institutions to support the value chain actors and improve the training standards
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Output 3: Ghana Climate Change Alliance + NDC Information, dissemination and outreach

<p>Output 3.1 Communication and outreach for general public about the threat and impact of climate changes and promote climate-smart behaviours</p>	<ul style="list-style-type: none"> ▫ 3.1.1 Gender responsive Communication plan developed (document) ▫ 3.1.2 N° of gender responsive outreach programmes carried out at the pilot schools and hospitals at the pilot regions ▫ 3.1.3 N° of new gender responsive outreach programmes carried out at the schools and hospitals outside the pilot regions to promote replications ▫ 3.1.4 N° of stakeholders participating in programme ▫ 3.1.5 N° of women participated in outreach programme (at least 30% of the participants) 	<ul style="list-style-type: none"> ▫ 3.1.1 2018: 0 ▫ 3.1.2 2018: 0 ▫ 3.1.3 2018: 0 ▫ 3.1.4 2018: 0 ▫ 3.1.5 2018: 0 	<ul style="list-style-type: none"> ▫ 3.1.1 By 2022: 5 ▫ 3.1.2 By 2022: 30 3.1.3 By 2022: 5 ▫ 3.1.4 By 2022: 200 ▫ 3.1.5 By 2022: 60 	<ul style="list-style-type: none"> ▫ 3.1.1 Communication Plan and annual reports ▫ 3.1.2, 3.1.3, 3.1.4 Outreach and campaign reports ▫ 3.1.2, 3.1.3 Media highlights ▫ 3.1.2, 3.1.3, 3.1.4 Written / electronic feedback 	<ul style="list-style-type: none"> ▫ Active participation by general public and campaigners ▫ Knowledge and skills learned are put into actions to improve local development and environment
<p>Output 3.2 Organise public awareness campaign to showcase the solar PV and biogas pilots and of climate change in general</p>	<ul style="list-style-type: none"> ▫ 3.2.1 N° of participants to visit the schools and hospitals of the pilot regions 	<ul style="list-style-type: none"> ▫ 3.2.1 2018: 0 	<ul style="list-style-type: none"> ▫ 3.2.1 By 2022: 100 	<ul style="list-style-type: none"> ▫ 3.2.1 Annual Report 	<ul style="list-style-type: none"> ▫ Active participation by general public and campaigners ▫ Knowledge and skills learned are put into actions to improve local development and environment

Output 3.3 Targeted environmental education activities in schools and hospitals	<p>▫ 3.3.1 N° of active school Alumni involved in the School Environmental Club</p> <p>▫ 3.3.2 N° of school vegetable garden developed</p> <p>▫ 3.3.3 N° of gender responsive campaign organised</p>	<p>▫ 3.3.1 2018: 0</p> <p>▫ 3.3.2 2018: 0</p> <p>▫ 3.3.3 2018: 0</p>	<p>▫ 3.3.1 By 2022: 30</p> <p>▫ 3.3.2 By 2022: 20</p> <p>▫ 3.3.3 By 2022: 40</p>	<p>▫ 3.3.1, 3.3.2, 3.3.3 Alumni reports</p> <p>▫ 3.3.1, 3.3.2, 3.3.3 Annual reports</p>	<p>▫ Active participation by general public and campaigners</p> <p>▫ Knowledge and skills learned are put into actions to improve local development and environment</p>
Output 3.4 Ensure communication and outreach with the Covenant of Mayors of Sub-Sahara Africa (CoMSSA)	<p>▫ 3.4.1 N° of local Mayors participated in outreach programme</p> <p>▫ 3.4.2 N° of Mayors from Sub-Sahara participated in outreach</p>	<p>▫ 3.4.1 2018: 0</p> <p>▫ 3.4.2 2018: 0</p>	<p>▫ 3.4.1 By 2022: 20</p> <p>▫ 3.4.2 By 2022: 20</p>	<p>▫ 3.4.1, 3.4.2 Outreach reports</p> <p>▫ 3.4.1, 3.4.2 Annual report</p>	<p>▫ Active participation by local and Sub-Saharan Mayors to take climate action and appreciate the opportunity cost of climate in-action</p>