Empowered lives.
Resilient nations.

GHANA INVESTMENT PROMOTION CENTRE

PRIVATE ENTERPRISE FEDERATION

This NAMA Investor Guide was prepared by the government of Ghana to promote opportunities to invest in low-carbon initiatives in the country. Preparation of the Guide was made possible by funding from UNDP Ghana and through the UNDP Low Emission Capacity Building (LECB) Programme, in which Ghana participates. The LECB Programme is generously funded by the European Commission and the governments of Germany and Australia.

The Guide was authored by an expert working group comprising representatives from the Ghana Investment Promotion Centre, the Private Enterprise Foundation, the Environmental Protection Agency, the Ministry of Environment, Science, Technology and Innovation and University of Ghana (Business School and the Economics Department). The Guide has benefitted from two rounds of national stakeholder consultations, as well as a technical review by Catherine Bealin that was organized by the UNDP LECB Programme Global Support Unit.

LOW EMISSION CAPACITY BUILDING PROGRAMME

Supported by:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the German Bundestag

Australian Government

Cover image: Men collect banana leaves for the first stage in the cocoa bean drying process at Rainforest Alliance-certified cocoa farms in Ghana. The cocoa is used for Magnum ice-creams.

Photography credit: Fjona Hill.

Contents

List of Acronyms

CDM	Clean Development Mechanism
CFL	Compact Fluorescent Lamp
CNG	Compressed Natural Gas
CO2	Carbon Dioxide
DNA	Designated National Authority
EPA	Environmental Protection Agency
ESP	Environmental Sanitation Policy
FASDEP	Food & Agricultural Sector Policy
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIPC	Ghana Investment Promotion Centre
GPRS	Ghana Poverty Reduction Strategy
GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Service
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPCC	Inter-governmental Panel on Climate Change
LRT	Light Rail Transit
MESTI	Ministry of Environment, Science, Technology and Innovation
MLGRD	Ministry of Local Government and Rural Development
MMDAs	Metropolitan, Municipal and District Assemblies
MRV	Measuring, Reporting and Verification
NAMAs	Nationally Appropriate Mitigation Actions
NMT	Non-Motorized Transport
NSSC	National Self-Screening Committee
REDD+	Reducing Emissions from Deforestation and Forest Degradation
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank

1 Executive Summary

NATIONAL VISION

Stable economic growth in Ghana has translated into a considerable reduction in poverty and improvements in other sustainable development indicators. Ghana will be the first Sub-Saharan African country to meet the UN's Millennium Development Goal of halving its poverty measured by the headcount ratio by 2015. However, depletion and degradation of natural resources and environmental pollution pose a major challenge to Ghana's sustainable development. Climate change significantly impacts Ghana's economy, the achievements of businesses, and the gains it has made on its Millennium Development Goals. In this regard, green growth that encompasses environmental sustainability, low carbon emissions, job creation and a sustainable energy pathway is imperative. The Government of Ghana's commitment to sustainability is evidenced by continued integration of environmental and climate change issues into its development frameworks. In particular, governmental action plans focus on the mitigation of greenhouse gas (GHG) emissions and increased resilience to the impacts of climate change even though the country is yet to have an emission target.

NAMAS IN GHANA

Originating from the 2007 Bali Action Plan, Nationally Appropriate Mitigation Actions (NAMAs) refer to any voluntary action that reduces emissions in developing countries under the umbrella of a national government initiative. NAMA initiatives lead to lower GHG emissions to a level acceptable by the individual developing country and within the context of the nation's capacity and sustainable development plan. The Government of Ghana has identified a pipeline of 55 potential NAMAs in the areas of energy, waste, agriculture, forestry and industrial processes. These emission-reduction projects include solar and wind power, waste-to-energy projects, sustainable urban transport systems and the establishment/management of forests, among others.

INVESTMENT OPPORTUNITIES

The Government of Ghana is seeking public and private sector partners for the design, implementation and financing of these NAMAs. Opportunities exist either through partnership with the government or via independent investment in Ghana's nascent NAMA initiatives on profitable, secure, creditworthy terms. Private sector partners may include industry/technology companies, commercial banks and private funds (thematic green, venture capital, pension, social, etc.), whether local, regional or global. Public sector partners may include international development banks, public agencies and bilateral/multilateral institutions/programmes/funds. Efforts to make Ghana's business climate competitive, transparent and accountable include both policy reforms and government-managed financial tools to reduce costs and enhance the attractiveness of Ghana's investment climate. The Government of Ghana enhances the investment climate with full or partial government guarantees, debt and equity options, beneficial tax and insurance schemes, equipment and concession financing, guaranteed grid access, among other instruments.

OBJECTIVES OF THIS GUIDE

This *Guide to NAMA Investment Opportunities* is part of Ghana's efforts to enhance mitigation and adaptation actions. The guide endeavors to:

- Identify the purpose and potential project pipeline of NAMAs in Ghana;
- Invite public and private partners to open a dialogue with the Government of Ghana regarding the design, implementation and financing of NAMA initiatives;
- Provide a step-by-step flow of the development procedures for NAMAs;
- Synthesize information on national climate change mitigation actions into a one-stop resource;
- Facilitate information sharing among key players on the NAMA mechanisms;
- Contribute to building Ghana's climate finance readiness by strengthening the capacity of actors regarding NAMAs; and
- Provide a one-stop-shop on NAMA investment opportunities in Ghana.

Public and private sector partners interested in the design, implementation or financing of emissions-reduction projects on competitive, bankable terms in Ghana are encouraged to contact:

The Climate Change Focal Person (Daniel Tutu Benefor)
Ghana Environmental Protection Agency
P.O. Box M326,
91 Starlets Road,
Accra, Ghana
Tel: 0302-664697/8
Email: dbenefor2000@yahoo.com

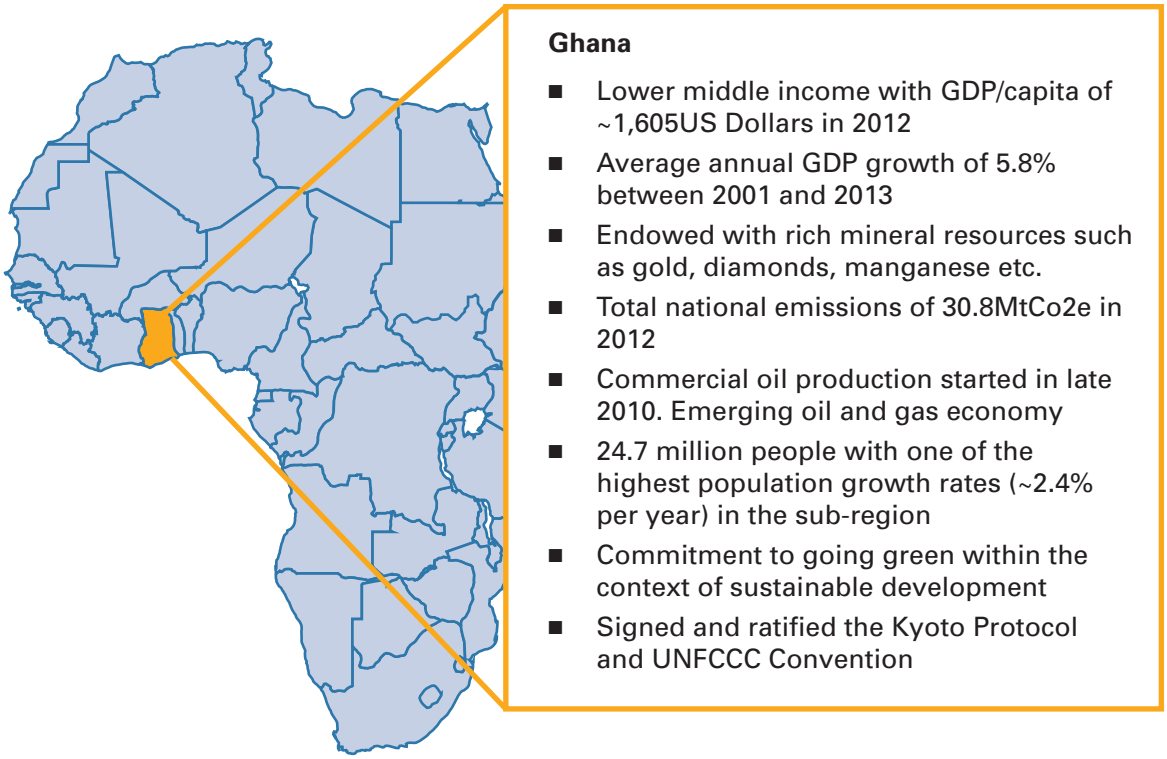
Ghana: An Overview

2

Location and People

Ghana is located along the coast of the Gulf of Guinea in West Africa, about 750 km north of the equator. The nation shares boundaries with Burkina Faso to the north, Cote D'Ivôire to the west, Togo to the east and the Gulf of Guinea to the south. One of the first African countries to gain independence from the British Empire in 1957, Ghana has been a democratic secular state for over two decades and has been lauded as a "model for democracy" in Africa. The 2010 population census puts Ghana's population at 24.7 million of which 71% is economically active. There are about 56 Ghanaian dialects in addition to the official language of English.

FIGURE 1: BASIC INFORMATION ON GHANA



Natural resources of Ghana

Formerly referred to as the Gold Coast, Ghana is endowed with very rich mineral resources including gold, diamonds, manganese, limestone, bauxite, iron, salt, clays and granite deposits. Agricultural production, such as of cocoa, has also contributed to consistent economic growth. In 2007 oil was discovered in commercial quantities and since 2010, oil is being exported making Ghana an emerging oil and gas economy.

Renewable energy resource opportunities, such as solar, hydro, biomass and wind, are abundant. Ghana's forest resources support various fauna, flora and ecosystems, and inland and marine water resources support various biodiversity and tourism industries.

Socio-Economic-Political Environment

A stable political environment over the past three decades has translated into continuous economic growth. The average annual Gross Domestic Product (GDP) growth rate has improved from about 2.2 % between 1981-1990 to about 5.8% between 2001-2010 (GSS, 2011). The discovery of crude oil in commercial quantities in July 2007 and subsequent investments in the energy sector led GDP to grow to a remarkable 13.6% in 2011 (GSS, 2012). Cocoa, gold and oil are the three largest sources of foreign exchange. Ghana was classified as a Lower Middle Income Country in 2010 (GSS, 2011). The service sector of the economy, which is made up of subsectors such as Trade, repairs of vehicles, household goods; Hotel and restaurants; Transport and storage; Information and communication; Financial intermediation; Education; Health and social work; Business, real estate and other services activities, among others has overtaken agriculture as the biggest GDP contributor. Over the medium term (2014-2017), average growth of oil and non-oil GDP is projected to grow at about 8.8 % and 10 % respectively.

National Development Process

Since 1996, the government has re-oriented all development policies around the three pillars of sustainable development, i.e., economic, social and environmental development, with a specific focus on sustained poverty reduction. From the early 1980s, Ghana has undertaken a number of development strategies with the support of the World Bank (WB) and the International Monetary Fund (IMF)[1]. The most recent is the Ghana Shared Growth and Development Agenda II (GSGDA II) which was formulated to ensure continued pursuit of macroeconomic stability and the sustainable exploitation of Ghana's natural resource endowments that will enable the country attain full middle income status by 2020 with a per capita income of US$ 3,000. These objectives are to be achieved through:

- Sustained macroeconomic stability;
- Enhanced competitiveness in Ghana's private sector;
- Accelerated agriculture transformation and sustainable natural resource management;
- Oil and gas development;
- Infrastructure and human settlements development;
- Human development, productivity and employment;
- Transparent and accountable governance.

National development initiatives and investments, alongside consistent economic growth, have contributed to Ghana becoming the first sub-Saharan African country to meet the UN's Millennium Development Goal of halving its poverty rate by 2015.

1 These programs include the Structural Adjustment Programme (1983-1999), Medium Term Development Plan (1996-2000), Interim Poverty Reduction Strategy Paper (IPRSP) (2000-2002), Ghana Poverty Reduction Strategy I (GPRS I) (2003-2005), Growth and Poverty Reduction Strategy Paper (GPRS II) (2006-2009), Ghana Shared Growth and Development Agenda I (GSGDA I) (2010-2013) and the Ghana Shared Growth and Development Agenda II (GSGDA II) 2014-2017.

BUSINESS CLIMATE

Policy Reform and Financial Mechanisms

Recognizing that the private sector is the engine of growth, the Government of Ghana has invested in both policy reforms and financial initiatives in order to reduce market barriers and mitigate business risks. Market barriers, political uncertainties, lack of transparency and regulatory delays, among other things, contribute to the risk profile of capital projects, thus reducing the financial attractiveness of investments. Efforts to make Ghana's business climate competitive, transparent and accountable include both policy reforms and government-managed financial tools to reduce costs and enhance the attractiveness of Ghana's investment climate.

The country is a signatory to the WB Multilateral Investment Guarantee Agency Convention and the Investment Promotion Protection Agreements that compels the country to provide investment guarantees for investors. Several international organizations, including the WB, IMF and the International Finance Corporation (IFC), have commended Ghana's efforts in doing business and her commitment to providing incentives and guarantees for all investors. The government's combination of policy reforms, programs and financial mechanisms has helped to create a relatively safe and investment-friendly environment in the sub-region.

Ghana Investment Promotion Centre

In order to facilitate investment, Ghana has established a one-stop centre – the Ghana Investment Promotion Centre (GIPC) – to facilitate, encourage, promote and support the manufacturing and services sectors (except mining and petroleum, which are regulated by the Minerals Commission, and the Ghana National Petroleum Corporation respectively.) Through the GIPC and other stakeholders, key government policies that have been put in place to attract investments include:

- customs import duty exemptions;
- tax holidays;
- free transfer of capital, dividends and net profits;
- generous capital allowance;
- locational incentives;
- quota-free access to United States and European Union markets;
- membership in the World Trade Organization for settlement of investment disputes;
- duty free export trade zones;
- preferential access to 15 other markets in the Economic Community of West African States; and
- demonstrated commitment to additional market liberalization.

Other important incentives include: high safety standards and precautionary measures by the Ghana Standard Authority, the Environmental Protection Agency (EPA) and other regulatory agencies; access to good roads and physical infrastructure; improvements in information, communication and technology; and a well-qualified and educated labour force of about six million, among others.

Business Security

The business environment in Ghana also benefits from various other characteristics:

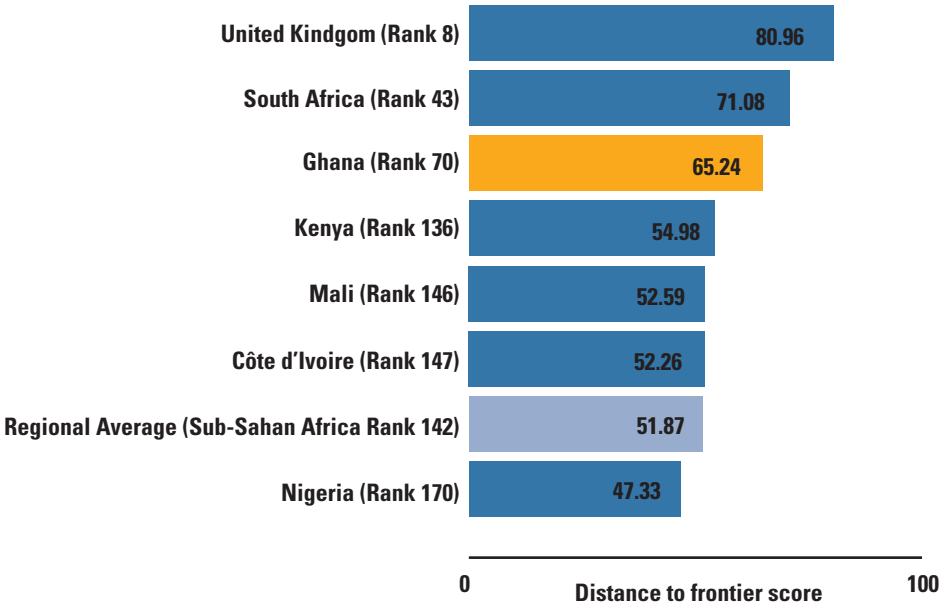
Stable Political Track Record – Ghana practices a multiparty democracy that entrenches the separation of powers between the Executive, Legislature and Judiciary. The country has peacefully conducted six elections from 1992 to 2012 that have ensured the smooth transition of power from one government to another.

Governance Indicators – The World Bank's worldwide governance indicators confirm that Ghana is increasingly well placed to ensure the safety of business assets. In 2012, Ghana ranked at about 50% for political stability and absence of violence in its governance system, 52% for governance effectiveness, 54% in the rule of law, 56% in the control of corruption and 56% in regulatory quality. These indicators are among the best in the sub-region.

Improved Transparency and Accountability – Transparency International's Corruption Perception Index for 2013 ranked Ghana at the 63rd position (out of 177 countries and territories) and the 2nd position in Sub Saharan Africa.

Liberal Investment Environment – Affirming Ghana's liberal and competitive investment environment, the IFC and WB Ease of Doing Business Report rates Ghana 70th out of 189 countries in 2014 in terms of protecting investors, enforcing contracts and ease of starting a business compared to other countries in the sub-region (see Figure 2). Furthermore, the business environment survey by IFC and the WB indicates that Ghana's business climate is friendlier than many economies in the sub-region.

FIGURE 2: HOW GHANA AND COMPARATOR ECONOMIES RANK ON THE EASE OF DOING BUSINESS



Nationally Appropriate Mitigation Actions

3

Function of NAMAs

Originating from the 2007 Bali Action Plan, NAMAs constitute a voluntary mechanism for developing countries to participate in architecture of international climate policy. NAMAs refer to any action that reduces emissions in developing countries under the umbrella of a national government initiative. NAMAs aim to achieve a reduction in emissions relative to "business as usual" emissions by 2020. NAMA activities lead to lower GHG emissions to a level acceptable by the individual developing country and within the context of the nation's capacity and sustainable development plan.

A NAMA can take the form of a policy, programme, project, or measure that is proposed by public or private entities that has the potential to reduce greenhouse gas (GHG) emissions and forms an integral part of the low emission development strategies of the country. NAMA activities can target a change in one economic sector or across sectors to meet a broad national mandate. Technology, financing and capacity building are supported and enabled. NAMAs can be implemented with or without international support and are subject to agreed methods of Measuring, Reporting and Verification (MRV) to ensure transparency and accountability.

NAMA Registry Procedures

The United Nations Framework Convention on Climate Change (UNFCCC) manages a NAMA Registry, which records NAMAs as they are identified and submitted by developing countries. This public online platform is intended to facilitate information sharing and to create opportunities for the matching of financial, capacity building and technology partners with project requirements. Both "recognition" NAMAs (those already implemented with domestic support) and NAMAs that are seeking development or implementation support may be recorded in the Registry. Potential NAMAs are approved and uploaded to the Registry by a formally nominated focal point within the respective developing country. Additional information on the UNFCCC NAMA Registry can be found at http://www4.unfccc.int/sites/nama/SitePages/Home.aspx.

Regional Capacity Building Workshops

Numerous regional technical workshops aimed at capacity building in the preparation, submission and implementation of NAMAs are ongoing, organized by the UNFCCC and other development and bilateral partners, including UNDP. The long-term likelihood of successful NAMA initiatives and opportunities is strengthened by key workshop benefits including, inter alia:[2]

2 UNFCCC

- Showcasing of NAMAs and innovative financing options;
- Exchange of best practices and lessons learned;
- Collaboration with international partners conducting the workshops;
- Networking with experts from developing countries and international organizations/donors;
- Communication with partners on the capacity building needs of developing countries.

Additionally, Ghana is one of 25 countries participating in the UNDP Low Emission Capacity Building Programme (2011-2016), which is funded by the European Commission and the governments of Germany and Australia. Through this programme, national experts are being capacitated to prepare Low Emission Development Strategies and NAMAs, along with the associated MRV and national GHG inventory systems.

Young boy recharging a Sunlife solar panel at Green Crop Farming Ghana Ltd, an agricultural farm 45km from the Ghanaian seaport city of Tema. The farm supports the 38 families of farm employees with sustainable energy. Credit: Bestnet-blog.com

Governance Structure for NAMA Administration in Ghana

4

National Self-Screening Committee

Management of the NAMA mechanism in Ghana is undertaken by the National Self-Screening Committee (NSSC). Committee members include Ministry of Environment, Science, Technology and Innovation (MESTI), which is also the Clean Development Mechanism/Designated National Authority (CDM/DNA); Environmental Protection Agency (EPA), which is also the UNFCCC Focal Point; Ministry of Transport, Ministry of Finance and Economic Planning, Ghana Real Estate Developers Association, Ministry of Energy, Ghana Gas Company, Energy Commission, Petroleum Commission, Forestry Commission, Ministry of Lands and Natural Resources, Ministry of Local Government and Rural Development, Minerals Commission, Volta River Authority, Private Enterprise Federation (PEF), Ghana Chamber of Telecommunication, Ghana Chamber of Commerce and Industry, Association of Ghana Industries, Ghana Chamber of Mines, Ghana Investment Promotion Centre (GIPC), Ghana Association of Bankers, Ghana Shippers Authority, civil society organizations and academia.

The NSSC is co-chaired by public (MESTI/EPA) and private (PEF/GIPC) sector representatives. Many administrative and operational synergies are derived from the existing administrative structures of the CDM, especially the DNA and the Carbon Trading Committee. The NSSC's scope of work includes:

- screen proposed or identified NAMAs,
- review concept notes from the business community,
- support the development of NAMA proposals, and
- approve submission of NAMAs to the global UNFCCC NAMA registry for support.

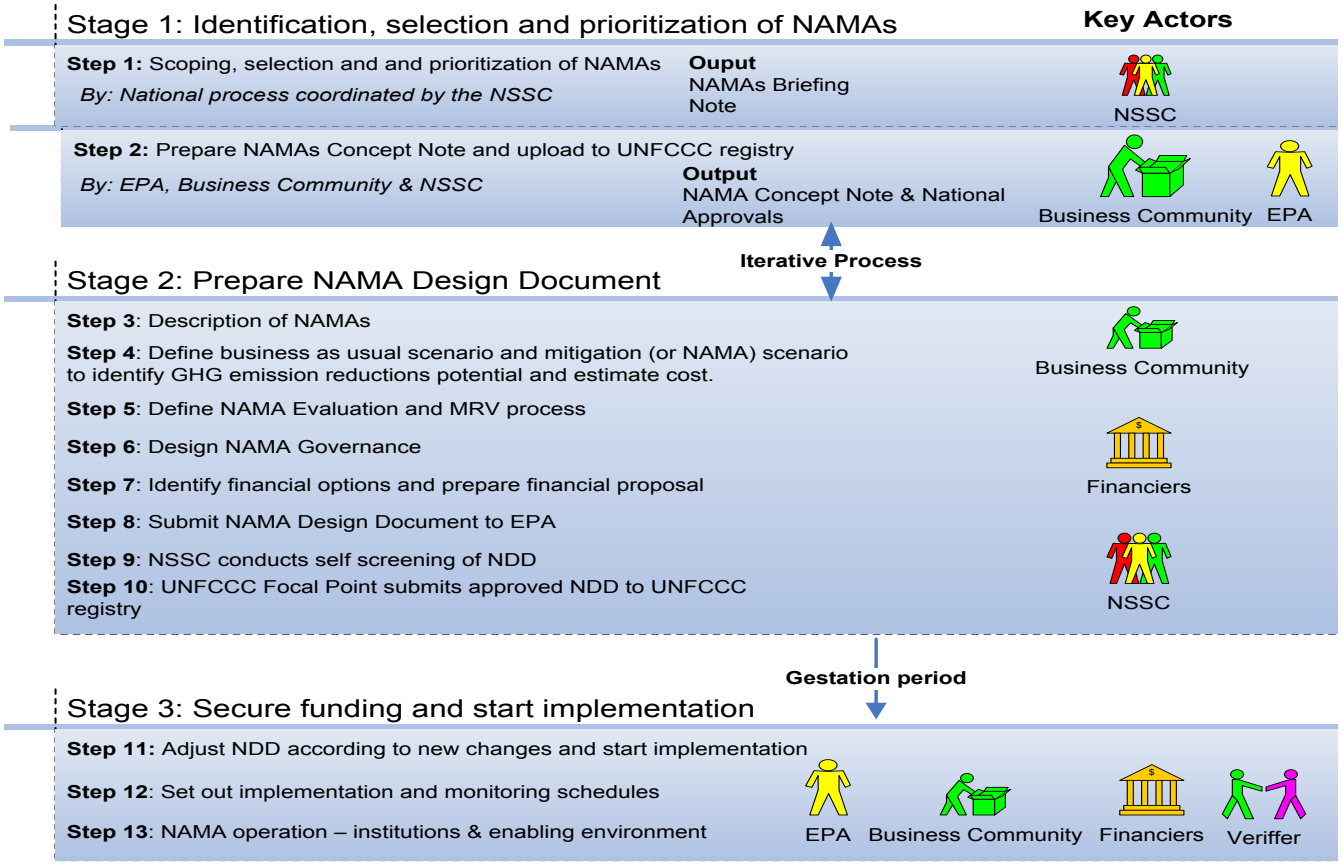
The NAMAs may emerge from either public or private entities or through a public-private partnership. The roles, responsibilities, and contacts of key stakeholders are presented as Appendix 2.

- **A National Self-Screening Committee (NSSC) which is composed of 24 members from private and public institutions.**
- **Screen proposed NAMA projects, submit acceptable NAMAs to UNFCC NAMA Registry for support; also implement/monitor NAMAs.**
- **A project investor may prepare a NAMA concept for submission to the NSSC. Following approval, the project investor prepares a Description Document to be recorded in the UNFCCC NAMA Registry.**

NAMA Development Cycle

The NSSC has established three stages and a 13-step process to complete the development cycle of NAMAs, as outlined in Figure 3. Model NAMA Briefing Notes[3] and Concept Notes[4] have been attached as appendices 3 and 4 respectively. The final document is the NAMA Design Document[5], whose key components have been presented as appendix 5.

FIGURE 3: DEVELOPMENT CYCLE OF NAMAS



3 A NAMA briefing note is a brief summary of facts pertaining to the NAMA.

4 A NAMA concept note provides a brief summary of the NAMA idea, including basic information on the planned activities, expected costs and benefits. It is used for initial discussions with potential NAMA supporters or to contribute to national prioritisation and decision-making.

5 A NAMA Design Document is the completed NAMA proposal. It provides a detailed picture of the proposed NAMA, including the national context, the rationale for activities, estimate of GHG emission reductions, details of implementation, and the finance and MRV plans.

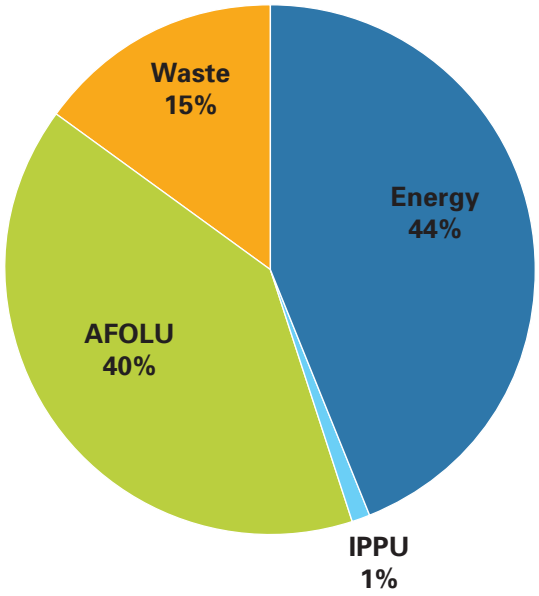
NAMA Opportunities in Ghana

5

Climate Change in Ghana

Ghana's GHG emissions have risen from approximately 13.9MtCO2e in 1990 to 30.8MtCO2e in 2012. Emissions are projected to rise to about 115.49 MtCO2e in 2040 if no action is taken. Emissions growth is driven mainly by rising carbon dioxide (CO2), although methane and nitrous oxide account for the highest absolute emissions. Ghana's energy sector is the largest contributor to emissions, accounting for 44% of total emissions in 2012 (Figure 4).

FIGURE 4: SECTORAL DISTRIBUTION OF EMISSIONS IN 2012



Source: National GHG Inventory Report, 2014

The impacts of climate change are becoming more evident – especially for vulnerable regions such as Africa. The Intergovernmental Panel on Climate Change (IPCC)'s most recent assessment report states that the warming of the climate system is unequivocal. Several studies have shown that the temperature in Ghana has been increasing, while the pattern and intensity of rainfall is alternating across parts of the country in an erratic and unpredictable manner. Climate change is not only a threat to the achievements of businesses, but also has the potential to erode the gains Ghana has made on its Millennium Development Goals. Changes in climate will have significant impacts on the economy as a whole – risks of droughts and floods on food production; potential for sea-level rise; and increasing incidences of some diseases such as malaria – will negatively impact most businesses. For example, it is estimated that the cost to insurance companies from the 2011 flooding in Accra approximated US$20 million.

National Vision on GHG Emissions

The continuous increase in GHG emissions suggests that Ghana must respond to the international call for low carbon development. The government's sustainable development vision includes transitioning to a green economy by mitigating GHG emissions and increasing resilience to the impacts of climate change.

Ghana has formulated a draft Low Carbon Development Strategy. Under the Low Emission Capacity Building project, work is underway to capture all GHG inventory data in one database and design two energy NAMAs, along with the associated MRV systems. The country has mainstreamed climate change into the current development framework, known as the Ghana Shared Growth and Development Agenda (GSGDAII) (2014-2017). This enjoins all Ministries, Departments and Agencies to mainstream climate change considerations into their policy development and implementation. In 2010, the Ministry of Environment, Science, Technology and Innovation (MESTI) established the Ghana Environmental Conventions Coordinating Authority to develop the institutional framework and capacity to coordinate national efforts. In addition, Ghana has submitted its first and second National Communications to the UNFCCC (in 2001 and 2011) and is currently preparing its third Communication along with its first Biennial Update Report. Furthermore, a National Climate Change Policy was approved by the Cabinet in 2014. The main focus areas aim to:

- Increase climate-resilient Agriculture and Food Security Systems
- Build Climate-resilient Infrastructure
- Increase Resilience of Vulnerable Communities to Climate-related Risks
- Increase Carbon Sinks
- Improve Management and Resilience of Terrestrial, Aquatic and Marine Ecosystems
- Address Impacts of Climate Change on Human Health
- Minimize Impacts of Climate Change on Access to Water and Sanitation
- Address Climate Change and Migration
- Minimize Greenhouse Gas Emissions

NAMA Pipeline

In response to the Copenhagen Accord, which invited developing countries to submit their mitigation actions for the period up to 2020, the Government of Ghana identified a pipeline of 55 potential NAMAs in the areas of energy, waste, agriculture, forestry and industrial processes as shown in table 1.

TABLE 1: LIST OF NATIONALLY APPROPRIATE MITIGATION ACTIONS FOR GHANA

Sub-sector	Category	Business As Usual Situation	List of Mitigation Actions
Electricity	Supply	Thermal generation using light crude oil	Switch to natural gas (Combined cycle)
		Hydro generation	Retrofit existing hydro dams
			Build more hydro dams
		Off-grid/ independent generation using diesel and gasoline	Improve reliability of electricity supply by improved maintenance, timely expansion and upgrading
			Expand grid access to discourage the need for off-grid generation
		Generation from conventional sources	Promote electricity generation from renewable energy sources to increase the share of renewable to 10-20 percent by 2020
	Transmission	Transmission Losses (5% – 6%)	Reinforce transmission systems to reduce transmission losses to 3%
			Balance the generation and transmission system
	Distribution	Total distribution system losses (26%)	Standardise transformers
			Expand and maintain distribution systems timely basis
	End-Use	Inefficient appliances and practices	Develop and enforce standards and labels for appliances
			Intensify public education on energy conservation
		Use of kerosene for lighting and cooking	Promote and support Solar PV Lighting
			Increase rate of rural electrification

Sub-sector	Category	Business As Usual Situation	List of Mitigation Actions
Transport	Infrastructure/ Modes	Inadequate transport network	Expand road, and develop infrastructure for and promote rail, maritime, air, and inland water transportation systems
		Poor road conditions	Improve road conditions by increasing the percent of paved road.
		Limited infrastructure for non- motorised transport	Expand infrastructure for non-motorised transport
	Services	Inefficient public transport system	Develop and improve facilities for public transport system
		High preference for use of private vehicles	Incentivise the use of public transport and promote car pooling
	Fuel Use	Poor maintenance Practice	Enforce road worthiness certification requirements.
			Retrofit existing refinery infrastructure and ensure that new refinery produce non-metallic based gasoline
		High proportion of vehicles use metallic-based gasoline	Substitute the use of gasoline with CNG, LPG, and electricity for public transport
		Predominant use of gasoline and diesel fuels	Promote the production and use of bio-fuels as transport fuel
	Vehicle Technology	Predominant use of Conventional - Euro II vehicles (manufactured before 2004)	Promote the use of Euro III and above as well as use of Flexi Vehicles. Institute measures to promote and switch from the use of gasoline and diesel fuels to use of CNG, LPG, and electricity for public transport
Residential	Cooking	High percentage of wood fuel (Charcoal and firewood) use	Promote the use of LPG
		Use of inefficient cooking device	Promote the use of energy efficient cooking devices
		Inefficient carbonisation technology	Promote the use of efficient and clean carbonisation technologies
		Unsustainable harvesting of wood	Establish more woodlots
			Promote the re-use of wood residues
Industrial	Manufacturing industries	Low power factor and inefficient energy and other resource utilization	Improve power factor correction across industries and institute energy efficient measures in industrial operations
			Improve on resource efficiency in industries to promote sustainable production and consumption
Liquid and gaseous Fuels	Oil and Gas production	Fugitive and other greenhouse gas emissions associated with oil and gas production and utilization	Promote zero fugitive emissions
			Assess, promote and incorporate carbon capture and storage in oil and gas production and utilization

Sub-sector	Category	Business As Usual Situation	List of Mitigation Actions
Metal Production	Aluminium Production	Carbon dioxide is generated in association with aluminium smelting as a result of anode paste used as reducing agent	Reduce carbon dioxide emissions from anode reactions
Crop Production	Land Preparation	Uncontrolled burning	Promote spot and zero burning practices
		Mechanised land preparation	Promote minimum tillage
			Incentivise use of bio-fuels for mechanised agriculture
	Cultivation	Use of nitrogen-based fertilizers	Promote the use of organic fertilizers
			Promote integrated use of plant nutrients
		Predominant cultivation of rice in low lands	Promote the cultivation of high yielding upland rice cultivation
	Harvest to post-harvest	Burning of crop residues	Promote the recycling of crop residues
		High post-harvest losses	Improve storage facilities and promote the use of post-harvest technologies
Forestry	Land Conversions	High decline in natural forest estates	Promote sustainable forest management
			Implement REDD++ mechanism
			Implement various forest governance initiatives (Voluntary Partnership Agreement and Forest Law Enforcement Governance and Trade, Non-legally binding Instrument)
			Rehabilitate degraded wetlands
			Develop and enforce land use plans
	Degraded forest lands	Low rate of rehabilitation of degraded forest lands	Enhance rehabilitation of degraded forest lands
			Promote Small Afforestation/reforestation activities at the community level
			Establish commercial plantations
Solid Waste Disposal	Landfill	Net methane emission due to improper management of waste	Promote waste separation and composting
			Support waste-to-energy initiatives (sawdust, oil palm waste and other agricultural waste / residue)
			Capture and utilise methane gas from landfill sites
			Institute measures to minimise waste generation
Waste water handling	Domestic and industrial	Inadequate and poorly maintained waste water treatment plants	Build, operate and maintain waste water treatment plants
		Improper disposal of sludge	
		Irregular operation and maintenance	

Ghana's NAMAs list was submitted in 2010 to the UNFCCC. Some of these are being implemented under the various policies and programmes.[6]

Table 2 enumerates the challenges that exist in the various sectors of the economy in terms of NAMAs that can be undertaken. These challenges are being addressed through policies, strategies and measures that are being undertaken under the various sectors.

TABLE 2: SECTOR-SPECIFIC CHALLENGES AND BARRIERS

Sector	Challenge
Energy	• Unwillingness of communities to offer land for landfills • Unavailability of raw materials for biomass plants • Poor collection and segregation of waste for landfills • Inadequate experience in regulating power export to the grid and implementation of feed in tariff system • Unavailability of wind and other technologies • Inadequate countrywide data on wind speed • Unavailability of regulations and code of installation and operation of some technologies • Inadequate skilled technicians to manage renewable technologies
Agriculture	• Competing interest of the same land space for agricultural and other purposes. • Economic viability of practicing manure management with small livestock population to reduce emissions due to the requirement of special techniques. • Management requirement of Agro-forestry systems • Problem of competition for space, light, water and nutrients by trees and crops • Difficulty of weed control with zero tillage in the initial 2-3 years
Transport	• Lack of adequate legislation and policy on NMT operations • Inadequate technical experience and regulation on retrofitting cars with gas component
Waste	• Non-segregation of solid waste at source. • Lack of explicit legislation to prevent indiscriminate disposal of waste • Difficulty in acquiring land for waste projects • Possible contamination of water bodies and underground water
Buildings and home appliance	• Non-availability of solar throughout the day • Bulbs being less bright compared to incandescent lights. • Importation of counterfeit CFLs since there is no international standard on CFL • Inadequate policy direction on energy efficiency • Low cost of woodfuels offers little incentive for investment in efficient stoves

6 The Agroforestry Policy (1986), the Food and Agriculture Sector Development Policy and the Medium Term Agriculture Sector Investment Plan currently being implemented include measures on sustainable land use management. Energy efficient NAMAs being undertaken currently include energy efficient cooking devices, power factor improvements through installation of banks in industrial and commercial buildings, and increased penetration of efficient lighting /refrigeration systems.

NAMA Opportunities for Private and Public Sector Partners

In light of Ghana's commitment to the NAMA mechanism and its national emissions strategy, project opportunities exist either through (i) partnership with the government or (ii) independent investment in activities that reduce GHGs in the following sectors:

- solar and wind power,
- waste-to-energy projects,
- sustainable urban transport systems,
- establishment and management of forests to increase carbon absorption, among others.

The Government of Ghana is seeking public and private sector partners for the design, implementation and financing of NAMA activities in these sectors. The NAMAs will be designed, financed and implemented on a case-by-case basis reflecting risk characteristics, sector profiles, market conditions, financing requirements, etc. Complexity and transaction costs can be minimized by opportunities to aggregate a portfolio of projects.

Private and public sector partners have an opportunity to invest in Ghana's nascent NAMA activities on profitable, secure and creditworthy terms. The Government of Ghana enhances the investment climate with full or partial government guarantees, debt and equity options, beneficial tax and insurance schemes, equipment and concession financing, guaranteed grid access, among others.

Globally, the private business sector is the major source of investment for climate change mitigation. Private sector partners may include industry/technology companies, commercial banks and private funds (thematic green, venture capital, pension, social, etc.), whether local, regional or global. At the local level, banks such as ECOBANK Ghana Limited, Agricultural Development Bank, and Standard Chartered Bank are already active in lending support for mitigation activities. For example, the Forestry Commission is in partnership with ECOBANK to fund afforestation projects on concessionary terms.

Public sector partners may include international development banks, public agencies and bilateral/multilateral institutions and their programmes. Examples include the Swedish International Development Agency, Canadian International Development Agency, United States Agency for International Development, World Bank, African Development Bank, European Investment Bank, European Investment Fund, European Bank for Reconstruction and Development, United Nations Development Programme, United Nations Environment Programme, and IFC. Funding opportunities include Climate Investment Funds, CDM, Bio Carbon Fund, the Green Climate Fund and Prototype Carbon Fund, among others. A full list of international financing options is provided as Appendix 1. In addition, EPA and the Energy Commission have established funds and MESTI is in the process of establishing an Ecological Fund. Resources from all these Funds can be explored for climate change financing.

6 Sector Overviews

ENERGY

Our Vision: *"Ensure availability of, and universal access to energy services and for export by 2020"*

Snapshot

- **Demand for electricity currently stands at 1400MW and increases at 10% p.a.**
- **Grid reserve margin stands at 8% of installed capacity, against desirable level of 15%-30%.**
- **Government plans to increase installed generation capacity from 2170 MW to 5,000 MW by 2020 with 10% being renewable energy.**
- **Feed-In-Tariff Scheme and rate developed.**
- **Renewable Energy Fund established.**
- **National Solar and Wind Resource Potentials Assessment and Mapping undertaken.**
- **Adequate policies and regulations in place.**

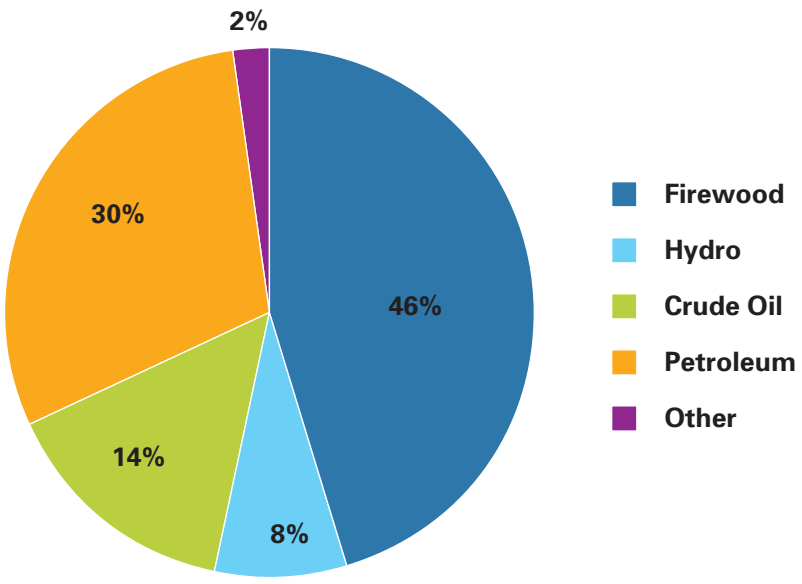
Overview of the Sector

The energy sector is vital to the growth and development of Ghana. It supports three key sectors whose average contribution to GDP are significant namely agriculture (30% of GDP), industry (19% of GDP) and transport (11% of GDP). Its importance is expected to grow as commercial oil production increases. Information from the Energy Commission indicates that total primary energy supply in 2012 was about 9488 Ktoe and is primarily composed of firewood (46%) and petroleum (30%), in addition to crude oil and hydro power (Figure 5). In terms of final energy consumption, households account for about 42% of the country's energy consumption. This is made up of fuelwood and charcoal that account for about 83% of household energy consumption.

Firewood constitutes the largest composition of primary energy supply in Ghana. It is estimated that about 500,000 metric tonnes of charcoal and fuel wood is consumed annually. This represents about 3.6 million tonnes of wood extraction each year from the forest sector (EC, 2010). The Energy Commission also estimates that the demand for fuelwood will increase from about 42 million tonnes in 2015, and to about 60 million tonnes by 2020 leading to significant deforestation.

Net imports of energy was about 4202.2 Ktoe, comprising about 61% petroleum products and about 29% crude oil, with the rest being natural gas and electricity. The demand for petroleum is expected to increase from about 3 million tonnes in 2015 to 4.5 million tonnes in 2020. With the production of oil in 2011, significant investment is being made in the gas sector to capture flared gas for energy, for combine cycle production of electricity, and to address household and industrial energy needs for cooking and heating respectively.

FIGURE 5: SHARE OF PRIMARY ENERGY SUPPLY



The sector is also the biggest contributor to overall GHG emissions, accounting for 44% of Ghana's total GHG emissions. GHG emissions from the energy sector primarily arise from the use of biomas for fuel and fossil fuel for electricity generation.

Sector Polices and Regulations

Several policies and programmes have been put in place to ensure efficient production and distribution of all renewable energy sources. The Bioenergy Policy, Renewable Energy Law, Strategic National Energy Plan 2006-2020, Energy Generation Master Plan, Ghana Energy Sector Strategy and Development Plan, National Waste Management Policy and Implementation Plan, National Environmental Sanitation Strategy/Policy and Action Plan, among others, focus on the efficient development of renewable energy. The Renewable Energy Fund under the National Energy Fund has also been established.

Examples of such policies are the Renewable Energy Law and the Feed-in Tariff policy which provide incentives for grid connected wind generated electricity. Taxes on solar energy products have been waived to encourage usage and an automatic utility and petroleum price formulae are in place to ensure that consumers pay the right price. The Energy Foundation and Ghana Standards Board are also developing energy efficiency labels and standards for both renewable and non-renewable energies. Examples are the Household Refrigerating Appliances Regulation, LI 1958 (2009), which enforces minimum energy efficiency for household refrigerating appliances and labeling of household refrigerating appliances; LI 1932, which bans the sale and use of used refrigerators; LI 1932 (2008), which prohibits the manufacture/sale of incandescent filament/lamps and the importation, distribution and sale of used air-conditioners and LI 1815, which ensures the labelling of the efficiency level of air conditioners, Compact Fluorescent Lamps and refrigerators on sale on the market, among others.

Since the discovery of oil, the country has enacted the Petroleum Revenue Management Act, developed a Local Content Policy, and is in the process of passing a Legislative Instrument (Petroleum Local Content and Local Participation Regulation) to give legal backing and enforceability to the Policy.

Potential Emission Reduction Opportunities

Box 1 identifies potential emission reduction opportunities based on various key technologies.

BOX 1: ENERGY TECHNOLOGIES REQUIRED

- Steel kilns charcoal production
- Biomass power plants
- Biogas power plants
- Combined cycle power plants
- Wind power
- Solar photovoltaic
- Below 100MW hydro-electricity
- Large municipal landfills
- Improved cook stoves such as the Ahibensu
- LPG stoves

Since fuelwood and charcoal are the largest energy sources and account for significant deforestation and GHG emissions, technologies to reduce these effects are important. The best strategy is to increase access to gas use by most households through LPG stoves and piped gas to homes. The demand for LPG for cooking in Ghana is very high, since only about 10% of the market has been satisfied.

Since all the demand for energy by households cannot be met by gas due to technical and other social reasons, there will still be the need for strategies and technologies including afforestation for fuelwood (addressed in Agriculture and Forestry sector section of this Guide), use of efficient cooking stoves and steel kiln charcoal production. The main technique for charcoal production is traditional earth mounds with a very low conversion efficiency of about 12.5%. Deployment of steel kilns and other efficient technologies with conversion efficiencies up to 36% will result in significant biomass savings.

Biomass power plants depend on organic (plant) based resources and other wastes. Biomass use reduces GHG emissions if the rate of replanting exceeds use. Combine cycle plants generate more power without any additional fuel relative to single cycle thermal plants, thus contributing to reduced emissions. In situations where flared gas is used as fuel, there are additional benefits in terms of reduced methane pollution.

Wind energy technology emits no GHG or other gaseous pollutants during operation. Onshore wind energy can prevent the emission of roughly 2,000 tonnes of CO^2 per megawatt annually of installed wind capacity. Like wind, solar technologies do not emit any GHG and have a large potential to contribute to reductions in carbon emissions. A hydropower plant also operates with no GHG emissions. Landfill technology generally has enormous emission reduction potential since the capture and use of methane gas for electricity will reduce the emissions of methane, which has an even higher global warming potential than CO_2.

Cost, Financial Requirements and Market Intelligence

The attractiveness of small-scale combustion units depends heavily on their efficiency and relative prices of diesel fuel. For industrial scale installations, economies of scale are very important. Investment cost is about 3,500 Euro/kWe for a 5 MWe plant, but goes down to about 2,000 Euro/kWe for a 25 MWe plant. Co-generation has been shown to reduce the cost of power production by 40-60% for stand-alone plants in the range 1-30 MWe (IEA, 2009).

The Biogas for Africa initiative estimates the cost of a small household unit at about 600-800 Euro per unit (Biogas for Africa, 2007). For larger plants producing electricity from biogas, a rough estimate of capital costs of a digester and an engine of 0.3-10MW is between 3500 and 5500 US$/kWe (IEA Bioenergy, 2009). The cost may be higher in Africa due to unavailability of manufacturing capacity.

There has been a large decrease in the cost of solar PV systems in recent years. The average global PV module price dropped from about 22 US$/W in 1980 to less than 4 US$/W in 2009, while for larger grid connected applications, prices have dropped to roughly 2 US$/W in 2009 (IPCC, 2010). The costs of Solar Home Systems in developing countries have been shown to be higher than conventional ones. Wamukonya (2007) presents costs of Solar Home Systems ranging from 1.51 to 1.75 US$/kWh in African countries using favourable discount rates and PV lifetimes. A study by the Energy Commission also shows that conventional household energy systems are still cheaper than solar photovoltaic.

The generation costs for small hydro power are between 0.02 and 0.06 US$/kWh (IEA, 2008).

A woman sells improved cookstoves in her store in Ghana. Replacing traditional wood-burning fires with cleaner stoves may help fight climate change and reduce poverty by lowering cooking costs. Credit: Global Alliance for Clean Cookstoves.

FOOD, AGRICULTURE, AND FORESTRY

Agriculture Vision: *"Modernized agriculture culminating in a structurally transformed economy and evident in food security, employment opportunities and reduced poverty."*

Lands and Forestry Vision: *"To ensure the sustainable management and utilization of Ghana's lands, forests, wildlife and mineral resources for socio-economic growth and development."*

Overview of the Sector

Snapshot

- **Agriculture contributes about 22.7% to GDP in 2012 and employs about 42% of the labour force.**
- **Huge demand for woodfuel.**
- **Existence of tree crop plantation programmes that can be enhanced and expanded.**
- **Existence of efficient charcoal production and cooking technologies to be expanded.**
- **Existence of private-public afforestation financing mechanisms.**
- **Serious commitment from the Forestry Commission.**
- **Availability of international financing through REDD+**

The agriculture sector is one of the most important sectors of the economy, contributing about 22.7% to GDP in 2012 and employing about 42% of the labour force. The sector is made up of the crops, livestock, fisheries and forestry sub-sectors. Agricultural GHG emissions are the second largest contributor to Ghana's total emissions, representing 40% of overall emissions. Emissions come from several sources such as:

- Nitrous oxide and methane emissions produced as part of the normal digestive processes in animals,
- Anaerobic (without oxygen) decomposition of manure,
- Slash and burn methods of farming.

A major sub-sector in terms of climate change mitigation potential is forestry, which contributes about 4% to agricultural GDP. The sector is important because forests can serve as "sinks" that absorb carbon dioxide. However, Ghana has seen high deforestation resulting from timber and woodfuel extraction as indicated in the energy sector chapter. It is estimated that charcoal and woodfuel consumption represent about 3.6 million tonnes of wood extraction each year from Ghana's forests. This deforestation trend is expected to continue in the medium to long term. It is for this reason that efforts aimed at increasing forest coverage and sustainable conservation and harvesting practices are imperative.

Sector Policies and Regulations

The Agroforestry Policy (1986) drives agroforestry activities in Ghana. The Food and Agriculture Sector Development Policy, which embodies the country's vision for the agriculture sector, has been ensuring environmental sustainability as one of its objectives, while the Medium Term Agriculture Sector Investment Plan also supports this objective. The National Plantation Programme also aims at applying the modified taungya system as a means of ensuring food security while replanting lost forests.

The Energy Sector Strategy and Development Plan (2010), which is the main document driving energy development, promotes the establishment of woodlots for woodfuel production and the use of improved and more efficient woodfuel utilization technologies. In line with this objective, the draft Bioenergy policy has measures to ensure sustainable supply of woodfuel. Ghana is also currently developing a National Woodfuel Conservation Policy which will provide the guidelines and strategies for sustainable woodfuel development and use.

Potential Emission Reduction Opportunities

Manure management practices can reduce the amount of methane and nitrous oxide emitted from animal manure, while improved fodder that can be given to animals to reduce methane levels from enteric fermentation. The fodder can also increase soil carbon storage. Agro-forestry practices generally have high emission reduction potential because of the relatively high carbon absorption potentials of the tree component. Zero/minimum/conservation tillage in agriculture and improved land management practices on grazing land can reduce deforestation and land degradation and hence help to mitigate GHG emissions.

BOX 2: TECHNOLOGIES REQUIRED

- Manure management practices
- Improve fodder for livestock
- Afforestation and agroforestry
- Development of woodlots
- Zero/Conservation/minimum tillage
- Efficient charcoal production (see Energy Sector)
- Land management - grazing land

Cost, Financial Requirement and Market Intelligence

Agro-forestry provides an excellent opportunity to promote sustainable forest management while improving income-generating opportunities for local communities. With agro-forestry, economic risks are reduced when systems produce multiple products. Farmers in the USA are moving into no-tillage agriculture as the US Department of Agriculture is providing grants to increase adoption of no or zero tillage (http://www.extension.org/). The International Institute for Tropical Agriculture in Ibadan University developed the Rotary Punch Planter for zero tillage, which was tested in a demonstration in Aprotech Farm Complex Limited in Kumasi in the 1980s

The Howard G. Buffet Foundation, University of Wisconsin, and FAO, among others, have developed technologies for zero tillage that have been tested in Tanzania and Congo and can be introduced in Ghana. Also, John Deere and Clean Seed Capital are introducing no-till technologies into Africa. While current costs in Ghana are being assessed, international costs show that no tillage is a profitable venture.

The modified taungya system, which has been used to replant many forests in Ghana, works through tree planting and the provision of food and cash crops for communities. There is the potential to increase these practices throughout Ghana. The tree crops programme being handled by the Ministry of Food and Agriculture (MoFA) currently focuses on palm oil and rubber, providing raw materials for the large external market and there is potential for scaling up.

TRANSPORT

Our Vision: *"To provide and maintain an integrated, efficient, cost-effective and sustainable transportation system responsive to the needs of society, supporting growth and poverty reduction, and capable of establishing and maintaining Ghana as a transportation hub of West Africa"*

Snapshot

- **Huge demand for efficient transport system – rail, water, BRT.**
- **Passenger traffic growing at 8% p. a.**
- **Road networks increasing at about 12% p.a.**
- **Existence of legislation to promote emissions reduction from road transport.**
- **Potential for developing gas to be used in vehicles.**

Overview of the Sector

GHG emissions in the transport sector primarily arise from the combustion of fuels. In Ghana, the transport sector accounts for approximately 12% of total GHG emissions excluding emissions from agriculture, forestry and land-use (EPA, 2012).

The modes of transport in Ghana are road, marine, inland water, air and rail. Of these modes, road transport is dominant, conveying over 97% and 94% of freight and passengers respectively. Ghana's road network was about 38,000 kilometers in 2000 and increased to about 60,000 kilometers by the end of 2005. Road passenger traffic has been growing at 8% per annum in the last five years. The Volta Lake transport system spans about 450 kilometers from the south to northern Ghana and currently provides limited freight and passenger transport services far lower than its potentials. Of the about 950 kilometers railway network, less than a tenth is functional and located in the Southern part of the country. Kotoka International Airport handles about 800,000 passengers and 50,000 tons of freight annually. Even though local flight services are gradually picking up, the potential for the sector is quite high.

Sector Policies and Regulations

The National Transport Policy (2008) provides the blue print for the use of aviation, maritime and inland-water, railways, roads, pipeline, non-motorized transport as well as inter-modalism. The Policy aims at promoting fuel efficiency, conservation and pollution control measures. The LI 2180 also touches on reducing emissions from road transport, though it does not set standards on level of emissions. It also seeks to regulate the use of Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) in cars, which hitherto was not the case.

In line with the policy, a Sector Medium-Term Development Plan: 2012 – 2014 has been developed to guide implementation. The policy and plan provide vivid information on all transport modes together with implementation and cost-based action plans. The Urban Transport Policy developed out of the National Road Sector Policy is the main driver of mass transit in Ghana. An urban transport project, which includes a Bus Rapid Transit component that aims at developing a 6 Km dedicated lane, is being implemented with the support of the WB in Accra. In addition, the Driver and Vehicle Licensing Authority is improving its standards for testing vehicles while the Ministry of Transport is undertaking a project aimed at modernizing the commercial vehicular fleet in addition to the imposition of a penalty on imported over-aged vehicles.

Emission Reduction Opportunities

Box 3 shows technologies that will reduce emissions and assist the sustainable development of the country. Information on emission reduction potential of the various transport modes will depend on the nature of the system, type of fuel used, capacity, efficiency and frequency. However, it has been established that rail systems have higher emission reduction potential compared to bus systems, while non-motorised transport would be optimal since it does not consume any type of fuel. Natural gas vehicles show an average reduction in ozone-depleting emissions of 80% compared to gasoline vehicles, while CNG vehicles emit 5-10% less CO_2 compared to gasoline powered vehicles.

BOX 3: TRANSPORT TECHNOLOGIES REQUIRED

- Bus Rapid Transit (BRT)
- Conventional bus systems
- Light rail transit (LRT)
- Rail systems
- Water transport
- Measures to promote non-motorized transport, such as walking and cycling
- Measures to switch from the use of petroleum to LPG/CNG in vehicles
- Efficient traffic management systems

Cost, Financial Requirements and Market Intelligence

Most new modes of transport, such as rail and trams, have international costing methodologies for investors in heavy modes of transport to use. There is a significant demand for improved mass transport systems. Investments in this sector can yield the needed returns with the right policies and implementation of best practices. Running vehicles on gas is cheaper than gasoline. The shift to the use of gas in vehicles is possible once the technical challenge of retrofitting is resolved, more efficient cars are introduced and the regulatory framework streamlined. Also, a legislative instrument that seeks to regulate the switch from gasoline to gas, together with the gas infrastructure, is being developed.

Road is the dominant form of transport in Ghana, conveying over 97% and 94% of freight and passengers respectively. There is high demand for a more efficient transport system that includes rail, bus, and boats.

WASTE

Our Vision: *"Develop and maintain a clean, safe and pleasant physical and natural environment in all human settlements and promote the socio-cultural, economic and physical well-being of all sections of the population"*

Overview of Sector

Snapshot

- **Waste generation bound to increase with population growth and urbanization.**
- **Five largest cities in Ghana generate about 3,200 tonnes of solid waste per day with organic component of between 60-65%.**
- **Solid and liquid waste collection and proper disposal a major challenge.**
- **Government moving towards polluter pays system of waste collection that can ensure good returns for investors.**

GHG emissions from the waste sector arise primarily from organic waste decomposition in landfills and wastewater treatment plants. The waste sector is estimated to account for 15% of Ghana's total emissions.

Waste generation in urban areas and in Ghana in general will continue to increase with population growth and urbanization. The Environmental Sanitation Policy (2010) indicate that Ghana's five largest cities (Accra, Kumasi, Sekondi-Takoradi, Tamale and Tema), which account for about 19% of the total population, generate an estimated 3,200 tonnes of solid waste per day. There are also about 105 other urban localities, each with populations above 15,000, that generate in excess of 5,000 tonnes of solid waste in total each day. The organic component of solid waste from various studies is known to be between 60-65%. The Ministry of Local Government and Rural Development (MLGRD) is in charge of waste management issues through the Metropolitan, Municipal and District Assemblies (MMDAs). Various privately owned environmental service providers are engaged by the MMDAs to collect and dispose waste in an efficient manner.

Waste collection and disposal in the country, especially in the cities, is a major challenge. From the baseline environmental sanitation data gathered in 2007/8 by MMDAs, close to 76% of households still rely on improper waste disposal methods, with less than 5% relying on house-to-house collection. The Multiple Cluster Survey (2006) indicated that 61% of the population is using improved varieties of household latrines, ranging from flush toilets connected to sewer or septic tanks, to Kumasi Ventilation Improvement Pit latrines and pit latrines with slabs. There are about 44 waste treatment plants in Ghana; some functioning, while others are not. Development of sustainable waste management practices is therefore urgent.

Sector Policies and Regulations

The Environmental Sanitation Policy (ESP), revised in 2010, is the main policy that drives waste management in Ghana. The policy advocates for proper disposal of waste. The National Environmental Sanitation Strategy and Action Plan, developed as part of the revised ESP, points to the relevance of waste-to-compost technologies in Ghana for curbing environmental pollution and creating jobs while meeting Millennium Development Goal 7 (Ensure Environmental Integrity). A Strategic Environmental Sanitation Investment Plan is also being developed by the MLGRD to ensure sustainable finance for waste management.

Potential Emission Reduction Sources

Well-established waste management practices and proven technologies can effectively mitigate GHG emissions. The emission reduction potential of waste depends on the quantity of waste being managed and the technology employed (Box 4). With population growth, GHG emissions in the form of methane and nitrous oxide will increase if technologies are not employed to capture, recover, or use the gases being emitted. Climate friendly technologies that are relevant to waste management include composting and anaerobic biological treatment. Landfills and biogas technologies have been discussed under energy sector above. There is a double win with such efficient methods since the output can be used for cooking or for the production of fertilizers.

BOX 4: WASTE MANAGEMENT TECHNOLOGIES REQUIRED

- Biogas power plants
- Large municipal landfills
- Composting plants
- Waste water treatment

Cost, Financial Requirements and Market Intelligence

The initial investments for a composting operation can be low, especially when local equipment and facilities are used. This is often the case in small rural communities. However, when the volume of material is large, purchase of dedicated composting equipment may be required. Depending on the composting method selected and the characteristics of the waste stream, costs can be high. However, the benefits of composting which include waste reduction and its associated positive health impacts on energy and fertilizer production necessitates incentive policies to promote the technology.

Ghana is a Party to the Global Methane Initiative and Climate and Clean Air Coalition. These groups support initiatives and projects that seek to capture, reduce, recycle and re-use methane. Investors can tap into this resource in the form of finance, technology or expertise.

Compost usage is low in Ghana as few farmers have the capacity to produce it. Farmers are well aware of the benefits of compost. A small investment that makes the technology cheaper will encourage composting. Also, Ghana's five largest cities generate about 3,200 tonnes of solid waste per day. This presents a significant raw material base for composting. Liquid waste disposal is also a major challenge and the development of composting facilities will enable the treatment of these wastes into valuable products.

INDUSTRY, BUILDING AND HOME APPLIANCES

Our Vision: *"Formulate and co-ordinate policies and programmes for the systematic development of the country's infrastructure requirements in respect of Works, Housing, Water Supply and Sanitation."*

Overview of the Sector

Snapshot

- **Housing deficit is estimated at 200,000 units/year.**
- **Government committed to reduce housing deficit with cleaner technology and energy-efficient housing construction.**
- **Plans to increase LPG for cooking from 6% in 2009 to 50% in 2015.**
- **High demand for energy efficient appliances in homes and industries.**
- **High demand for climate-friendly cook stoves that use LPG.**
- **Regulations on the sale, use and labeling of energy efficient household appliances.**
- **High demand for pre-paid meters in public buildings.**
- **Opportunities for recycling industrial waste.**
- **The National Energy Policy (2010) recognizes the need to improve end-use energy efficiency.**

GHG emissions in the building infrastructure sector primarily arise from low energy efficiency in building construction, heating, cooking and electric lighting.

Ghana's housing deficit is estimated at 200,000 units per year. Under the GSGDA and the Technology Needs Assessment, Ghana has prioritized its development agenda by using science, technology and innovation to determine new ways of building and construction that will reduce the housing deficit, making homes more accessible to middle-income earners, while also more efficient in terms of energy consumption.

In Ghana, about 67% of power demand comes from public, households and industrial buildings that are inefficient in terms of energy use, including the appliances used. There exist several technologies that can be used to directly generate power for some household appliances or to improve efficiency in power use in homes and industry.

Sector Policies and Regulations

Building infrastructure and efficient household appliances play a major role in sustainable energy development. This is even more crucial as Ghana aspires to transform into a green economy. Several policies and strategies in the energy sector directly or indirectly support energy efficiency in buildings. The National Energy Policy (2010) recognizes the need to improve on energy efficiency in the end-use and aims at implementing programmes and projects that will help improve energy efficiency, including outlining steps to achieve the goal of metering all buildings.

To effectively implement energy efficiency programmes, several legislations have been enacted as discussed in the energy section. In addition, the Energy Strategy and Development Plan aims at increasing the use of LPG for cooking from 6% in 2009 to 50% in 2015 through infrastructure development and pricing incentives.

Potential Emission Reduction Sources

In the building sector, new green design codes/ efficiency standards, the metering of public buildings, and the installation of capacitor banks to improve energy efficiency are required. Household efficiency technologies include improved cook stoves such as the Ahibensu, solar refrigerators, lamps, and water heaters, Compact Fluorescent Lamps (CFLs), as well as the use of LPG, CNG and efficient air-conditioners, etc. (Box 5)

BOX 5: ENERGY EFFICIENT HOUSEHOLD/ INDUSTRY TECHNOLOGIES REQUIRED

- Building Energy Management System
- Energy efficient appliances (air conditioners, solar refrigerators, lamps, water heaters, etc)
- Installation of pre-paid meters in public buildings
- Penetration of efficient lighting/ refrigeration in industry
- Power factor improvement-capacitor banks
- Scrap pre-heating for iron and steel
- Load management and time of use metering

Solar technologies related to lamps, water heaters and refrigerators have high emission reduction potential if their use is scaled up. CFLs have energy savings of more than 50% compared to incandescent bulbs. A single CFL could contribute to CO2 emission reductions of 0.5 tonnes over the lifetime of the bulb. Estimates by IEA (2008) indicate that with proper implementation of minimum energy efficiency standards, electricity consumption by air conditioners in Ghana would have been reduced by 3TWh between 2005 and 2011, which corresponds to a possible CO2 emissions reduction of about 3 Mt. About 65% of the overall energy consumption in Ghana is from biomass, and therefore shifting to the use of LPG and CNG for cooking will greatly reduce GHG emissions.

Cost, Financial Requirement and Market Intelligence

The cost of energy efficient appliances for cooking, lighting, refrigerating, and heating is decreasing due to the large production capacity in Asia, especially China, coupled with increasing demand for such appliances. Even though the purchase of an efficient appliance will lead to cost savings over the lifetime of the product, well-designed programmes with subsidies and/or credit schemes to offset the higher upfront costs of CFLs and energy-efficient appliances are needed in order to successfully change consumer preferences.

Demand for LPG for cooking in Ghana is high, since only about 10% of the market has been satisfied; an additional incentive for investors is that Ghana is developing its own gas supply. The future market potential for LPG is thus very high.

Information from the Energy Commission indicates that the penetration rate of CFL bulbs increased from about 20% in 2007 to about 79% in 2009 after the distribution of about 6 million bulbs. Ghanaians have now accepted the technology and, in addition to the high demand, there may be some positive returns on investment.

Increasing income levels of Ghanaians are leading to increased use of air conditioners in homes. Consequently, energy efficient air conditioners will be needed. For instance, evaporative coolers are about half the cost of installing central air conditioners and more energy efficient (IEA, 2008).

The introduction of energy efficiency labels, public education to increase consumer awareness on the differences in energy consumption, and the costs and benefits between appliances on the market stand to benefit any producer of energy efficient products.

References

1. Wamukonya, N. (2007) Solar Home System Electrification as a Viable Technology Option for Africa's Development. Energy Policy, 35:1 (2007), 6-14.

2. Khennas, S. and Barnett, A. (2000) Best Practices for Sustainable Development of Micro-hydropower in Developing Countries. ITDG report, UK.

3. IEA (2008). From 1st - to 2nd-generation biofuel technologies – an overview of current industry and RD&D activities. International Energy Agency, IEA/OECD, Paris.

4. IEA Bioenergy (2009) Bioenergy- A Sustainable and Reliable Energy Source. Main Report

5. Intergovernmental Panel on Climate Change (2010). Special Report on Renewable Energy Sources and Climate Change Mitigation, In Press.

6. IEA (2009), *Cogeneration and District Energy – Sustainable energy technologies for today…and tomorrow*.

7. International Energy Agency (2007), *Tracking industrial energy efficiency and CO_2 emissions*, OECD/IEA, Paris, 2007. Available at http://www.iea.org/textbase/nppdf/free/2007/tracking_emissions.pdf.

8. Ministry of Local Government and Rural Development, Government of Ghana (2010) Environmental Sanitation Policy

9. IEA, 2006. Light's labours lost, OECD/International Energy Agency, Paris, France.

10. Biogas for Africa (2007): Biogas for better Life, An African Initiative, available online at http://www.biogasafrica.org/images/stories/downloads/business%20plan.pdf.

11. Energy Commission (2010) Woodfuel Use in Ghana: An Outlook For The Future?

12. Ghana Statistical Service (2012) Ghana's Economic Performance 2011.

13. CIA-World Factbook (2013). GDP Composition by Sector of Origin-Ghana https://www.cia.gov/library/publications/the-world- factbook/fields/2012.html.

14. Ghana Statistical Services (2013). Gross Domestic Product: New Series, 2013, Accra, Ghana

15. Environmental Protection Agency

List of Appendices

APPENDIX 1: INFORMATION ON INTERNATIONAL FINANCING PROGRAMMES

Name of Fund	Green Climate Fund (GCF). Website: http://gcfund.net/home.html
Proposed Life of Fund	Proposed in December 2009, will be fully operational in 2014 and proposed life has not been set.
Objectives	Contribute to the achievement of the objective of the UNFCCC; promote the paradigm shift towards low-emission and climate-resilient development pathways; strive to maximize the impact of UNFCCC funding for adaptation and mitigation, seek a balance between adaptation and mitigation while promoting environmental, social, economic and development co-benefits
Activities Supported	Projects, programmes, policies and other activities in all developing country parties to the UNFCCC in the area of adaptation, mitigation (including REDD+), technology development and transfer, capacity-building and the preparation of national reports, NAMAs, National Adaptation Plans of Action, National Adaptation Plans and others.
Eligibility Requirements and Accessing the Fund	Recipient countries can submit funding proposal through DNA. Recipient countries are allowed direct access through accredited sub-national, national and regional implementing entities they propose and set up as long as these implementing entities fulfill certain fiduciary standards. The modalities of access remain to be agreed. Funds can also be accessed through multilateral implementing entities. A private sector facility will also be established that allows direct and indirect financing for private sector activities.
Name of Fund	**Clean Technology Fund (CTF) Website: www.climateinvestmentfunds.org**
Propose life of fund	Proposed in February 2008, made operational in July 2008.
Objectives	Promote scaled-up financing for demonstration, deployment and transfer of low-carbon technologies with significant potential for long-term greenhouse gas emissions savings.
Activities Supported	Programmes within the Power Sector- renewable energy and highly efficient technologies to reduce carbon intensity; Transport Sector- efficiency and modal shifts; and Energy Efficiency: buildings, industry and agriculture.

Eligibility Requirements and Accessing the Fund	Country access requires Official Development Assistance eligibility and Existence of active multilateral development bank country programs. Clear modalities for assessing the Fund by both private and public sector developed (see website for details)
Name of Fund	**Global Environment Facility (GEF) Trust Fund Website: www.thegef.org/gef/**
Proposed Life of Fund	Fund proposed in 1991 established in 1994 to succeed Global Environment Trust Fund (GET) and replenished every 4 years. GEF 5 funding ran from 2010-14; GEF 6 funding became available from July 2014 to June 2018.
Objectives	Help developing countries and economies in transition to contribute to the overall objective of the UNFCCC to both mitigate and adapt to climate change, while enabling sustainable economic development. Covers only the incremental costs of a measure to address climate change relative to a business as usual base line.
Activities Supported	Mitigation projects are expected to achieve the following objectives: Promote innovation, technology transfer, and supportive policies and strategies; demonstrate systemic impacts of mitigation options; and foster enabling conditions to mainstream mitigation concerns into sustainable development strategies.
Eligibility Requirements and Accessing the Fund	A country is an eligible recipient of GEF grants if it is eligible to borrow from the WB or if it is an eligible recipient of UNDP technical assistance. Eligible individual or group may propose a project that meets the following criteria: Consistent with national priorities and programs and endorsed by the government; addresses one or more GEF Focal Areas, improving the global environment or advance the prospect of reducing risks to it; consistent with the GEF programming strategy; seeks GEF financing only for the agreed-on incremental costs on measures to achieve global environmental benefits; involves the public in project design and implementation.
Name of Fund	**UNEP African Renewable Energy Enterprise Development (AREED). Website: www.areed.org**
Details	Total Amount Up to USD 250,000, depending on the project. Financing Mechanisms: Equity, Loan
Decision-making structure	All AREED Programmes are partnerships between a varied group of stakeholders, yet each relies on the funding of UNEP and the assistance of energy investment NGOs
Application Procedures	Entrepreneur approaches a AREED partner with a business idea. Prospective entrepreneurs participate in an initial AREED training workshop where they are assisted to identify and access the necessary information to test the feasibility of their concept and refine it into a more complete and precise business strategy. Entrepreneurs with the most promising and refined business ideas are invited to work with AREED partners to define a program of business planning to take them from a core idea to successful implementation when AREED seed finance can be made available. Once an enterprise is operating and ready for expansion into fully commercial operation, second-stage financing from an outside investor can be sourced with AREED support.
Objectives	Enterprise development and seed financing for clean energy in small and mid-size enterprises (SMEs) in developing countries; prepare young enterprises for later growth capital from more commercial sources.

Activities Supported	Mitigation, Energy, Energy Efficiency, Infrastructures, Low-Carbon, Renewable Energy
Eligibility Requirements/ Mechanism	Projects are assessed individually by UNEP, E+Co and in-country partners for eligibility. AREED assistance can take many forms. Initial assistance may be business plan development and other "hand-holding" types of practices. Then, seed capital in the form of low-interest loans may be introduced if the project looks promising. Finally, AREED may take an equity stake in a final phase of assistance.
Name of Fund	**ClimDev-Africa Special Fund (CDSF). Website: http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/climate-for-development-in-africa-climdev-africa-initiative**
Details	Total Amount USD 136 million. Financing Mechanisms Co-financing, Grant , Other
Decision-making structure	Carried out by consensus through two main organs: the Governing Council and the Bank's governance structure. The African Union Commission provides political leadership for the CDSF by coordinating continental policy response and ensuring buy-in from African governments. The Africa Climate Policy Centre (ACPC) of UNECA host the Secretariat for the ClimDev-Africa Program and responsible for implementing national-level investments and policy-related projects.
Application Procedures	Project proposals prepared by Interested Parties using templates approved by the Governing Council are submitted to the ClimDev-Africa Program Secretariat for review. Successful proposals are submitted to the Governing Council for endorsement and clearance. Successful proposals are sent to the CDSF Coordinating Unit for approval following Bank procedures.
Objectives	Strengthen the institutional capacities of national and sub-regional bodies to formulate and implement effective climate-sensitive policies.
Activities Supported	Adaptation, Capacity Building, Mitigation, Agriculture, Climate-Resilient, Energy, Forestry, Low-Carbon, Natural Resource Management, Populations & Human Settlements, Sustainable Land Management, Water.
Name of Fund	**EIB Climate Change Technical Assistance Facility (CCTAF). Website: www.eib.org/project**
Details	Total Amount Total funding of EUR 5 million. Financing Mechanisms: Grant, Loan
Decision-making structure	Appraisal procedure launched by the Directorate General for Lending Operations on the basis of a file compiled by the promoter: The Management Committee is informed of the main features of the planned project and the principal aspects on which the appraisal will focus; An appraisal team is set up to prepare the appraisal. A site visit to the promoter is organised. Only after these steps have been taken can the Management Committee make recommendations to the Board of Directors as to whether a project ought to be accepted or rejected.
Application Procedures	No special formalities are involved for the submission of applications to the EIB for individual loans. Project promoters are required simply to provide the Bank's Operations Directorate with a detailed description of their capital investment together with the prospective financing arrangements

Objectives	Promote the development of CDM and JI projects by providing advance finance for the transaction costs and by supervising the development of the carbon asset potential of an underlying project throughout the project cycle to the carbon credit certification stage.
Activities Supported	Mitigation, Carbon Capture & Storage (CCS), Energy Efficiency, Forestry, Fuel Switching, Fugitive Methane, Renewable Energy
Eligibility Requirements/ Mechanism	Any carbon mitigation project that will be eligible for CDM or JI crediting.
Name of Fund	**EIB Post-2012 Carbon Credit Fund. Website: www.eib.org/project**
Details	Total Amount Fund assets of EUR 125 million. Financing Mechanisms : Carbon finance
Decision-making structure	Appraisal procedure launched by the Directorate General for Lending Operations, on the basis of a file compiled by the promoter, An appraisal team is set up to prepare the appraisal. A site visit to the promoter is organised. Only after these steps have been taken can the Management Committee make recommendations to the Board of Directors as to whether a project ought to be accepted or rejected.
Application Procedures	Project proponent contacts EIB to determine the project's eligibility. That eligibility is determined by staff teams on economic, financial, technical and environmental criteria. If EIB eligibility is determined. The Management Committee can then send the request to the Board of Directors for approval.
Objectives	Support future greenhouse gas mitigation projects by giving value to their post 2012 emission reductions, promote the development of the market for reductions in greenhouse gas emissions achieved after 2012.
Activities Supported	Mitigation, Carbon Capture and Storage, Energy, Energy Efficiency, Forestry, Fuel Switching, Fugitive Methane, Low-Carbon, Renewable Energy, Sustainable Land Management.
Conditions & Eligibility Requirements/ Mechanism	All CDM and JI host countries; projects generating at least 250,000 tonnes CO2e in EURs or CERs with vintages 2013-2020. The Fund is focused on purchasing Kyoto-compliant carbon credits generated after 2012, potentially up to 2020. it will enter into forward agreements with project owners for the delivery of Certified Emission Reductions and Emission Reduction Units generated under the CDM and JI of the Kyoto Protocol and will on-sell to compliance and other buyers of carbon credits as and when the shape of the post Kyoto regime emerges.
Name of Fund	**Climate and Development Knowledge Network (CDKN). Website: www.cdkn.org**
Details	Total Amount £0.5 million/project (most grants are £25,000 - £250,000). Financing Mechanisms: Co-financing, Grant, Technical assistance
Decision-making structure	Research work programme calls upon scientific experts to review applications and shape the research strategy. Governed by Network Council comprising senior level executives of its Alliance partners and its funding agencies, DfID (UK) and DGIS (Netherlands).

Application Procedures	Via open research calls or via CDKN's research innovation fund.
Objectives	Supports decision-makers in designing and delivering climate compatible development, works in partnership with decision-makers in the public, private and non-governmental sectors nationally, regionally and globally.
Activities Supported	Adaptation, Capacity Building, Mitigation, Agriculture, Climate-Resilient, Energy, Energy Efficiency, Forestry, Industry, Low-Carbon, Renewable Energy, Sustainable Land Management.
Eligibility Requirements/ Mechanism	All sectors including agriculture, forestry and land use, industry and power generation, and overall climate compatible development planning.
Name of Fund	**African Carbon Asset Development Facility (ACAD). Website: www.eib.org/project**
Details	Total Amount $87.1 million. Financing Mechanisms: Carbon finance, Grant, Loan, Technical assistance
Application Procedures	Project proponents contact ACAD with the following documentation: Draft project documentation (e.g., feasibility reports, CDM project idea note), Letters of endorsement or approval from host countries Financial models/business plans. Letters of interest from potential investors, etc .
Objectives	Help overcome barriers currently prohibiting the African finance sector from playing a major role in the African carbon market. Taking a new approach towards African capacity and market development, mainstream carbon finance capacity within the African financial sector, sharing costs and risks with regional banks in realising and replicating projects.
Activities Supported	Mitigation, Energy, Energy Efficiency, Fuel Switching, Low-Carbon, Renewable Energy, Waste Management. ACAD offers three complementary Support Lines to stimulate the African carbon market: risk and transaction cost sharing, technical assistance to project developers, and targeted training and outreach for financial institutions.
Eligibility Requirements/ Mechanism	Projects must be located in sub-Saharan Africa and eligible for CDM investment.
Decision-making structure	This project is part of the International Climate Initiative. The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag. The project is a public-private partnership between BMU, UNEP, and the African financial sector.
Name of Fund	**The Global Energy Efficiency and Renewable Energy Fund (GEEREF) Website: www.geeref.com**
Date Created	Fund proposed in 2006, made operational in 2008 and expected to last for 15 years
Application procedures	Invested through private equity funds that must be approved by the Investment Committee and Board of the Fund.

Objectives	Obtain benefits from accelerated deployment of energy efficiency and renewable energy technologies; achieve high leverage of public finance by offering preferential returns to private funds; achieve high degree of financial sustainability.
Activities Supported	Support a broad mix of projects promoting energy efficiency and renewable energy technologies. It emphasizes deployment of proven technologies including Small hydro, biomass, and on-shore wind Co-firing solutions, manufacturing, energy service, and trading and micro finance ventures, photovoltaic.
Eligibility Requirements	Focus on project funding in countries that have private sector engagement in their national policies. Prioritizes small projects (less than EUR 10 million) as they are often neglected. Recipient countries must be eligible for Official Development Assistance.
Accessing the Fund	Fund management companies, financial institutions, project developers or individuals that intend to develop a clean energy investment fund or expand an existing fund into clean energy can seek finance. Developers of clean energy projects can also submit proposals for investment funds.
Name of Fund	**The Hatoyama Initiative (Japan). Website: www.mofa.go.jp/policy/economy/wef/2008/mechanism.html**
Details	Total Amount: There is no minimum or maximum amount of assistance. Financing Mechanisms Grant, Loan, ODA, Technical assistance
Decision-making structure	The Initiative is coordinated by the Japanese Ministry of Finance. Partnership governed by a five ministerial meeting. The Ministry of Foreign Affairs, Japan has established an Experts' Panel on Development Corporation in the Field of Climate Change to guide the development of the Partnership.
Application Procedures	Developing countries that have entered into direct, bilateral discussions with the Government of Japan. Disbursement of funds is dependent on bilateral policy consultations with Japan, with the intent of reaching a common understanding of policies regarding climate change
Objectives	Provide assistance to developing countries that are already making efforts to reduce greenhouse gas emissions to enable them achieving economic growth in ways that will contribute to climate stability.
Activities Supported	Adaptation, Mitigation, Agriculture, Disaster Risk Reduction, Energy Efficiency, Renewable Energy.
Eligibility Requirements/ Mechanism	Developing countries in consultation with Government of Japan. Assistance for adaptation and expanded clean energy access. Grants, technical assistance and aid through international organizations. Assistance to mitigate climate change. Financial and technical assistance, based on the needs of the requesting countries, is given on concessional basis.
Name of Fund	**DEG - Deutsche Investitions- und Entwicklungsgesellschaft mbH. Website: www.deginvest.de.**
Details	Term: usually between four and ten years; Interest rate: fixed or variable; market orientation: according to project and country risks; Collateral security: fixed assets in the country of investment, project-specific arrangement; Volume: max. 25 million EUR. Application Procedures: Depend on the product; Decision-making structure: depend on the product and project structure.

Objectives	Establish and expand private enterprise structures in developing and emerging countries, and thus create the basis for sustainable economic growth and a lasting improvement in the living conditions of the locals
Activities Supported	Mitigation, Agriculture, Energy, Energy Efficiency, Fisheries, Forestry, Industry, Infrastructures, Renewable Energy, Services, Tourism, Transport, Waste Management.
Eligibility Requirements/ Mechanism	Private sector investment in developing and emerging market countries for profitable projects that contribute to SD goals. Finances startups as well as extension and modernization investments by supporting all kinds of long-term intercompany cooperation, particularly with German and European enterprises.
Name of Fund	International Climate Initiative (Germany -ICI). Official web site: www.bmu-klimaschutzinitiative.de
Details	Total Amount €120 million per year (€693 million to date) additional funding through the Energy and Climate Fund.
Decision-making structure	ICI works with two organizations contracted by the Government of Germany to perform development cooperation tasks - Gesellschaft für Internationale Zusammenarbeit (GIZ) and KfW, a development bank. An international advisory board offers strategic support to the practical work undertaken in the ICI.
Application Procedures	Selection process based on a two-step procedure- First, evaluating the project outlines (templates are provided on the ICI website) submitted to the Programme Office. Second, applicants are informed of the evaluation result. If project outlines are promising, applicants are requested to submit a formal grant application, with detailed project plan and a financing strategy in a final review.
Objectives	Provides financial support to international projects in climate change mitigation, adaptation, REDD+ and biodiversity conservation. It also seeks projects that support a post-2012 focus.
Activities Supported	Initiative breaks down eligible project types into four main categories: climate change mitigation, climate change adaptation, conservation and sustainable use of natural carbon reservoirs/reducing emissions from deforestation and forest degradation (REDD+), and conservation of biodiversity.
Eligibility Requirements/ Mechanism	Grant recipient is expected to have project-related expertise and experience of the target region. Funding to developing countries is considered official development assistance. Funds disbursed mainly in the form of grants, though some may be provided as interest rate subsidized loans.
Name of Fund	**International Climate Fund (UK-ICF). Web site: www.decc.gov.uk/en/content/cms/tackling/international/icf/icf.aspx**
Details	Total Amount £2.9 billion. Financing Mechanisms: Grant, Loan, Loan guarantee, ODA
Decision-making structure	Disbursement is consistent with DAC definition of ODA. Results-driven both in terms of poverty reduction and climate impacts. Open and transparent to scrutiny from the Independent Commission for Aid Impact and the British taxpayer and other partners. Channeled in such a way to maximize value for money and impact.
Application Procedures	ICF funds will be programmed through global, multilaterally administered programs (CIFs, Adaptation Fund, GCF, etc) rather than towards specific country programmes or projects.

Objectives	Help developing countries tackle climate change and reduce poverty. Help developing countries adapt to the effects of climate change and to tackle deforestation. Demonstrate that low-carbon, climate resilient growth is in high demand and is also technically and financially feasible. Support international climate change negotiations. Capitalize on the opportunities for private sector partnerships, innovation and SD via climate change financing modalities
Activities Supported	Adaptation, Mitigation, Agriculture, Coastal Zone Management, Energy, Energy Efficiency, Forestry, Low-Carbon, REDD+, Renewable Energy, Urban, Water.
Eligibility Requirements/ Mechanism	ICF fund projects that display consistency with the DAC definition of ODA and ensure open and transparent project performance. Other critical eligibility factors include the choice of instrument and appropriate enabling environment. For the multilateral funds, ICF contributions take the form of concessional capital, while grants are the primary mechanism deployed for bilateral contributions.
Name of Fund	**Climate Technology Initiative (CTI) Private Financing Advisory Network (PFAN). Website: www.climatetech.net/template.cfm?FrontID=5142**
Details	Total Amount $373 million (total investment raised). Financing Mechanisms Risk management, Technical assistance
Application Procedures	Project first undergoes a rigorous review process based on an initial application that includes a detailed project description, underlying project economics and other readily available relevant information. Once accepted into the programme, a project is assigned a CTI PFAN advisor or "coach" from the Network who steers the project through further review stages that are designed to guide the project sponsors through the financing process to financial closure.
Objectives	Bridge the gap between investments and clean energy businesses, accelerate technology transfer and diffusion under the UNFCCC, reduce greenhouse gas emissions, promote low-carbon, sustainable economic development and help facilitate the transition to a low-carbon economy by increasing financing opportunities for promising clean energy projects.
Activities Supported	Mitigation, Energy, Energy Efficiency, Fugitive Methane, Low-Carbon, Renewable Energy, Transport, Urban.
Conditions & Eligibility Requirements/ Mechanism	Eligibility PFAN is technology-neutral with projects in the renewable energy and energy efficiency sectors. PFAN screens business plans, selects the most economically viable and environmentally beneficial projects, and provides extensive coaching and guidance before projects are presented to network and other investors at Clean Energy Financing Forums.

Name of Fund	Canada Fund for African Climate Resilience. Website: www.acdi-cida.gc.ca/acdi-cida/ACDI-CIDA.nsf/eng/ANN-11983223-HVT
Details	Total Amount $20m (CAN). Financing Mechanisms Co-financing, Grant
Decision-making structure	CIDA assesses all proposals submitted with all mandatory documents against the following five partnership principles: Sound governance, Support of Canadians, Relevance to CIDA's mandate and coherence with Canadian government policy, Results, Development effectiveness.
Application Procedures	Review the Canada Fund application form, application guidelines, and related documents thoroughly, create or update the lead applicant's profile through Partners@CIDA, confirm the lead applicant's eligibility for this call by performing an eligibility self-assessment, cpload the mandatory documents as listed in the supporting documentation checklist together with the application form on Partners@ CIDA
Objectives	Help African countries adapt to climate change and its impact on their economic growth and food security, support projects in up to 14 African countries that include protection of infrastructure, irrigation systems or ports. The Fund will support proposals that maximize sustainability, innovation and effective development principles to address critical climate change issues.
Activities Supported	Adaptation, Mitigation, Agriculture, Coastal Zone Management, Disaster Risk Reduction, Energy, Fisheries, Forestry, Low-Carbon, Natural Resource Management, Populations and Human Settlements, Renewable Energy, Sustainable Land Management, Water.
Eligibility Requirements/ Mechanism	Focus countries: Ethiopia, Ghana, Mali, Mozambique, Senegal, Tanzania; other eligible countries: Burkina Faso, Cameroon, Democratic Republic of the Congo, Kenya, Nigeria, Rwanda, South Africa, Zambia.

The information on financing opportunities in this Appendix has been drawn from the WB/UNDP Climate Finance Options portal: http://climatefinanceoptions.org/cfo/index.php

APPENDIX 2: ROLES, RESPONSIBILITIES AND CONTACTS OF KEY INSTITUTIONS

Institution	Roles and Responsibilities	Contact person
UNFCCC Focal Point (EPA)	Identification, selection and prioritization of NAMAs using national self-selection criteria to determine appropriateness of NAMAs. This will be contained in the "NAMA Briefing Note" using serialized numbers. Receive "NAMA Concept Note" and "NAMA Description Document" for screening and onward transmission to UNFCCC to be recorded in the NAMA Registry for the purpose of seeking "support" in collaboration with other stakeholders.	Executive Director; UNFCCC Focal Point P.O. Box M326 Accra 91 Starlets Road Tel: 0302-664697/8 Emails: support@epaghana.gov.gh koppongboadi@yahoo.com,
CDM/DNA (MESTI)	Contribute to the Identification, selection and prioritization of NAMAs using national self-selection criteria to determine appropriateness of NAMAs. Co-chair the National Self-Screening Committee and leverage synergies between the CDM, EIA and NAMA development process.	Ministry of Environment, Science, Technology and Innovation Tel: 0243 646749 Email: peterjdery@yahoo.com
National Self-Screening Committee (NSSC)	Meet regularly to undertake self-screening of proposed NAMAs before submission to the UNFCCC NAMA Registry	Executive Director, EPA P.O. Box M326 Accra 91 Starlets Road Tel: 0302-664697/8
Ghana Investment Promotion Centre	Facilitate promotion of business opportunities in the NAMAs. Create platform for potential investors to meet developers	Ghana Investment Promotion Centre Post: P. O. Box M193, Accra-Ghana Tel: +233 302 665 125-9 Fax: +233 302 663 801/663655 Email: info@gipcghana.com
Forestry Commission	Promote sustainable forestry investments and Member of the NSSC.	Chief Executive Forest Plantation Department or National REDD+ Secretariat P. O. Box MB 434 Accra-Ghana Tel: +233 302 401210 or 2401216 Email: info.hq@fcghana.org / Near GIMPA Junction, West Legon

Institution	Roles and Responsibilities	Contact person
Minerals Commission	Promote sustainable investments in Mining and member of the NSSC.	#9 Switchback Road PO Box M248 Fax: 030-2773324 Tel: 030-2773053/ 030-2771318 Email: mincomghana@yahoo.co.uk
Ministry of Transportation	Promote sustainable investments in Transportation and member of the NSSC.	P.O Box M57 Accra Tel: +233-302-661782 Fax: +233-302) 681780/689654 info@mrt.gov.gh
Chamber of Mines	Promote sustainable investments in Mining and member of the NSSC.	Chief Executive No. 22 Sir Arku Korsah Road Airport Residential Area, Accra Tel: 0302 2760652/030 2761893 Email: chamber@ghanachamines.com.gh
Chamber of Telecommunication	Promote sustainable investments in Telecommuncation and member of the NSSC.	Ghana Chamber of Telecommunications F84/8 Aborlebu Crescent North Labone, Accra P.O. Box GP 453, Accra Phone: 0302 730500 Fax: 0302 776343 Email: info@telecomschamber.org
Private Enterprise Foundation	Promotion of NAMA investment benefits among its members.	Executive Director, AGI 2nd Floor, Addison House Trade Fair Centre, La-Accra P. O. Box AN-8624 Accra North – Ghana Tel: +233 (0)302 779023/4 Fax: +233 (0)302 773143; Email: agi@agighana.org
Ghana Real Estate Developers Association	Promote sustainable investments in Housing and member of the NSSC.	The Executive Director P. O. Box TF 113 Trade Fair Site Accra – Ghana Tel:+233-302-782 531/ 302-960 750 Email: info@gredaghana.org
Energy Commisssion	Promote sustainable investments in Energy Services and member of the NSSC.	Executive Director, EC Private Mail Bag, Ministries Post Office, Ministries, Accra Tel: +233-302-813764

Institution	Roles and Responsibilities	Contact person
Ministry of Finance	Ensure macro-economics stability for promotion of sustainable economic growth and development of Ghana and her people through efficient mobilisation, allocation and management of financial resources and member of the NSSC.	Post: P.O. Box M37 Ministries, Accra Tel:(+233-302)687205 Fax (+233-302) 663250 E-Mail: info@mofa.gov.gh
Ministry of Local Government and Rural Development	Promote establishment and development of a vibrant and well-resourced decentralized system of local government for the people of Ghana lo ensure good governance and balanced rural based development.	P.O.Box M50 Accra Tel: 0302 664763 / 0302 663668 / 0302 682008 Email:info@mlgrdghanagov.com

APPENDIX 3: MODEL FOR NAMA BRIEFING NOTE

a. Concept – National feed-in tariff for renewable energy in Ghana or Energy Efficiency in Prime Public Buildings

b. Relevant Domestic Policies – National development strategy, energy policy or strategy, private sector promotion strategy, renewable energy laws, energy efficiency standards in buildings.

c. State of idea – included in national energy strategy, appropriate tariff level discussion on-going, lesson from past and on-going initiatives in related areas.

d. Relevant information/data source – power purchase agreements demonstrating how current tariffs prices are being implemented; energy statistics of the current installed capacity including long-term policy objective of increasing renewable energy share of grid, domestic energy value for electricity generation, published domestic fuel or grid emission factor or from IPCC.

e. Target Groups – independent power producers, potential investors and energy service providers, bulk electricity distribution companies.

f. SD benefits – increase electricity access, permanent and temporal green job creation, improved income levels, energy security and alignment with existing development framework.

g. Potential Cost – estimates based on expected amount of renewable electricity to be delivered to the grid or total energy savings and payback period of energy efficiency installation systems

h. Indicative GHG impact: a qualitative determination of net impacts level of proposed NAMAs.

Source: *"UNFCCC's Handbook on Good practice guidance for preparation and implementation of NAMAs"*

APPENDIX 4: MODEL FOR NAMA CONCEPT NOTE

Title of Mitigation Action	Energy Efficiency in commercial building code in Ghana or installation of capacitor banks
Location	Ghana
Name of Developer	Energy Commission Ghana and Ministry of Water Resources, Works and Housing
Relevant stakeholders	Private sectors – architects, contactors, suppliers, electrical engineers, VRA, ECG
Description of Mitigation Action	Improve energy efficiency resulting in increased energy savings as well as decreased use of thermal generated electricity during peak loads.
Types of emissions	CO2
Co-benefits	Improved energy security, green jobs creation in energy efficiency sector, decreased local air pollution.
Current status	Preliminary discussions with Energy Commission to scale-up on their initial work on capacitors.
Expected start of implementation	Codes to be passed in 2013, enforcement to begin 2014. Installation of capacitor banks in 2014
Duration	12 years
Cost of preparation of NAMA	US$ 55,000
Estimated full cost of implementation	US$ 12,000,000
Estimated incremental cost of implementation	US$ 8,000,000
Support seeking to prepare NAMAs	Ghana will cover part of the cost of training for stakeholders. Part of the cost of training and technical preparation of NAMAs seeking financing support from international sources.
Sources of Funding	Domestically implemented regulation with international support for procurement and installation of capacitor banks and implement energy efficiency measures, save energy & create jobs
Estimated emission reduction	65,000MtCO2e/yr.
Indicators of implementation and how they can be MRVed	Number of building with installed capacitors or implemented EE measures, reduce electricity consumptions, number of green jobs created.
Potential Risks	Shortage of energy efficient equipment or capacitor banks in Ghana

APPENDIX 5: TEMPLATE: NAMA DESIGN DOCUMENT[7]

NAMA Design Template	Ver. 01.00 Jan2013

A. NAMA Summary

A.1 Summary		
Title of NAMA		
Purpose of NAMA		
Sector	❑ Energy ❑ Industry ❑ Buildings ❑ Transport	❑ Forestry (AR / REDD not applicable for pilots) ❑ Agriculture ❑ Waste
Category of NAMA	Domestic / Support / Mixed / Crediting / Others	
Type of NAMA	Policy / Project	
NAMA Geographical Coverage	• National / Regional / State / District / Village (select or add as appropriate) • State multiple countries if any	
Estimated GHG Emission Reductions	• Estimated Annual Average (MtCO2 / year)	
Programme Duration	• XX years	
Brief description of NAMA / programme and proposed activities	• Provide brief account of target policy, measures, relevant Ministries & Government Departments, NAMA activities (project features – technology, capacity building measures- workshops, financing – model etc.,) etc.,	
NAMA / Programme proponents	• Provide specific details of NAMA proponents and their responsibilities in implementation • Provide details of agencies involved in design, development, implementation, management and financing of the NAMA	

B. NAMA Proponent(s)

B.1 Information of NAMA Proponents	Provide details of each NAMA proponent separately by copying this Section B.
NAMA's Coordinating and Managing Entity (NCME)	
Major Responsibilities	

7 This template is reproduced from the UNDP/UNFCCC/UNEP 2013 publication, Guidance for NAMA Design: Building on Country Experiences. Download at: http://www.lowemissiondevelopment.org/docs/resources/Guidance_for_NAMA_Design_2013.pdf

Domain activities, skills and expertise	• e.g. major activity / business of agency / institution/organisation, and current skills and experience with specific reference to the proposed NAMA, motivation / rationale for leading the NAMA
Contact person and details of contact	
B.2 NAMA Collaborator(s)	Provide details of the agencies / institutions collaborating with NAMA proponent(s) in NAMA design, development, implementation and financing (domestic institutions or international Donor)
Collaborator 1	• Name of the Collaborator
	• Contact person info and contact details
	• Responsibilities
(Repeat this section for 2nd and each subsequent collaborator)	

C. NAMA Description

C.1 Policies and Regulations	Provide an overview of the prevailing policies and regulations in the sector chosen for the NAMA
Federal / Province Policies	• Name of the Policy & Year of introduction • Implementing department / agency • Policy brief • Current level of acceptance or compliance • Indicate source (web link) of policy document
Federal / Province Regulations	• Name of the Regulation & Year of introduction • Implementing department / agency • Regulation brief • Current level of acceptance or compliance • Indicate source (web link) of Regulation document
C.2 Current level of activities (Baseline)	Provide all relevant information and details of the on-going activities for establishing a credible baseline
Sector / Sub-Sector	• Provide details of the sector and or the sub-sector as applicable • Please, consider referring to sub-sectors as included to **sectorial tables** of IPCC Good Practice Guidance and/or the approach applied in **National Communications** submitted in line with the corresponding **manual for Non Annex 1** countries).
Boundary	• Provide the geographical coverage of NAMA (National / Regional / Sub-regional / Province or State / District)
GHG Emissions & Sources	• List the major sources of GHG emissions and the GHG proposed to be included in the NAMA
Target NAMA Beneficiaries	• List the target beneficiaries under the NAMA e.g. manufacturers, consumers – domestic or industrial or commercial, project developers • Provide quantitative assessment of the size of the beneficiaries under the NAMA

Inclusion Criteria	• List the criteria likely to be followed for including any beneficiary situated in the NAMA boundary to join NAMA e.g. size of the activity (MWe o MWth), current efficiency levels, technology etc.,
C.3 Baseline activity and emissions	Provide a brief of business as usual scenario of the sector / sub-sector and latest emissions data set with sources
Emissions Data Set	• Provide the latest emissions data set for the sector / sub-sector and cite sources. Indicate any limitation on the extent of availability of data
Emissions Archive (Historical)	• Provide details of the past emissions and trend for the sector / sub-sector under the NAMA
Agents and projections	• Provide a brief analysis of the agents that are influencing the emission developments
BAU scenario	• List the major assumptions and the future outlook (projections) of GHG emission levels / development pattern in the sector / sub-sector under the NAMA in the BAU scenario • Provide an outline of influence of any Federal or Provincial policy or regulations on the above emission projections
C.4 Barriers	Provide a brief description of the barriers faced by the sector / sub-sector to achieve any or additional GHG emission reductions in the absence of
Barriers	• Provide a brief summary of the barriers faced by the sector / sub-sector for achieving GHG emission reductions. Typical barriers relate to technology, investment, economic viability, lack of knowledge / skills/ training / experience, regulatory, historical failures. The guidance for various barriers can be referred from CDM (**http://cdm.unfccc.int/**) • Describe how the proposed activities under the NAMA will overcome the barriers for the sector / sub-sector.
C.5 Proposed activities	List the activities and expected outcomes with a tentative time-schedule under the NAMA

Proposed Activities	**Boundary and Expected Outcomes**	**Implementation Schedule**	
		Date of Start	Date of Completion
(a)			
(b)			
(c)			
(Add rows as required)			

C.6 Estimation of annual GHG emission reductions	Provide an approximate estimate of annual GHG emission reductions anticipated to be achieved under the NAMA from all the proposed activities on a cumulative basis. (If NAMA does not involve implementation of actual GHG mitigation projects, provide an indirect estimate of GHG emission reductions proposed to be achieved due to the NAMA activities)
Annual GHG emission reductions	**Year** / **Emission reductions (tCO2e)** yyyy 1 yyyy 2 … yyyy n Total • Attach the assumptions and detailed emission reductions calculations as relevant
C.7 Overall benefits	Describe the overall expected benefits (both quantitative and qualitative) for the stakeholders from the implementation of the proposed activities under the NAMA in the targeted sector / sub-sector.
Environmental	• List the major environmental benefits proposed to be achieved in the NAMA
Economic	• List the major economic benefits proposed to be achieved in the NAMA
Societal	• List the major social benefits proposed to be achieved in the NAMA
Others	• List other major benefits proposed to be achieved in the NAMA • (e.g. technology, transfer of IPR, skills, replication potential to scale the GHG mitigation, uptake potential of the national policy / regulation on low carbon due to NAMA etc.,)
C.8 Life time and Crediting Period	Provide the technically defined life time of project and the proposed crediting period for generation of GHG emission reductions. For crediting period more than 10 years indicate (If possible) whether the baseline will be adjusted before the start of second crediting period

Proposed Activities	**Expected Life time (years)**	**Proposed crediting period (7/10/14/21 yr) (indicate w or w/o baseline adjustment)**
(a)		
(b)		
(c)		
(Add rows as required)		

C.9 Measuring, Reporting & Verification	Provide a brief summary of MRV concept and approach for the proposed activities under the NAMA
Measuring	• Provide a description of the monitoring methodology and list key monitoring parameters as applicable for the Sector and its applicability for the sub-sector • Provide a brief summary of monitoring Infrastructure and competency available / proposed to be deployed
Reporting	• Provide a brief summary of modus operandi on reporting along with the roles and responsibilities of the team
Verification	• Summarise the proposed type of verification, approach, frequency, standards and engagement of third party including whether it is mandated by donor or as per host country requirements • Indicate the extent of anticipated overlapping with other programme like CDM, voluntary projects and also procedures to avoid how double counting of GHG emission reductions

C.10 Costs (USD)	Provide an estimate of the transaction costs for NAMA development and indicate the means of financing		
Type of Activity	**Total Cost**	**Own contribution**	**National Government / Donor / Sponsor contribution**
NAMA documentation			
Feasibility report			
Implementation			
Operation			
....			

C.11 NAMA Investment & Means of Finance (USD)	Provide an estimate of the NAMA project activity (fill up the columns as applicable)
NAMA activity	**Total cost per NAMA activity**
(a)	
(b)	
(c)	
(Add rows as required)	

D. Other relevant information and Annex

D.1 Other information	Provide details of any other information relevant to the NAMA implementation
	•
	•
	•
D.2 Annex information	List the title of the Annex here
Annex I	• Title
Annex II	• Title
Annex III	• Title