

## Country Profile for GHANA

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## 1. Introduction

This report is one of a set of Country Profiles produced by **SETatWork**. The global society is faced with a huge challenge in order to meet the threat given by global warming. The project **SETatWork - Sustainable Energy Technologies at Work** aims to meet this challenge through the collaboration and partnerships between organisations in EU, Asia and South America, supported by the EU's Seventh Framework Programme (FP7). The activities take place over two years from 1 September 2008 to 31 August 2010.

The aim of this country profile, is to provide an overview of the carbon market in Ghana with a focus on RTD needs, implementation options and perspectives associated with energy efficiency and savings in the carbon market (short term and medium-long term).

The main target groups for this country profile are companies (financial investors, project developers, technology providers, ESCOs, consultants, etc.), organisations and administrations that are interested in a short overview of relevant information in the development of carbon projects and markets in Ghana. This information may also be of relevance to readers from other countries that are interested in an overview of Ghana as well as for national readers that need to have information on their national developments.

SETatWork Country Profiles can be found online at: <http://www.setatwork.eu/countries.htm>

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## 2. General Country Overview

### 2.1 The Energy Situation

In Ghana wood fuel is the predominant energy source and it accounts for about 60 percent of the total energy consumption among others in the form of charcoal. Electricity and Petroleum products account for the remaining 11 and 29 percent respectively. Rural households depend on wood for cooking whilst about 60 percent of the urban household rely mostly on charcoal, however there is no fuel wood plantation reserved for the production of wood to be used as fuel. Electricity generation is primarily obtained from hydropower generation at Akosombo and Kpong Dam located in the Eastern Region of Ghana and another two thermal power plants using light crude oil at Aboadze near Second/Takoradi in the western Region of Ghana. However electricity is also obtained from other sources, for instance solar energy which is off grid is mostly used in the Northern Part of Ghana where the heat from the sun is intensive and other rural communities also in northern Ghana. Wind energy is yet to be harnessed along the costal areas and other areas where wind velocities are above average. The demand for energy especially electricity has been increasing at an average annual rate of 12 percent since the last 10 years. This has created an energy and capacity deficit crises which has necessitated regular power import from neighboring countries such as Cote D'Ivoire and Burkina Faso to supplement power generation at peak periods. Ghana relies solely on imported petroleum product in the form of crude oil from Middle East and Nigeria. There is new discovery of quality crude oil in the costal areas in the Western region of Ghana. This new oil discovery is about to be drilled from the year 2012. Preparatory works are still underway.

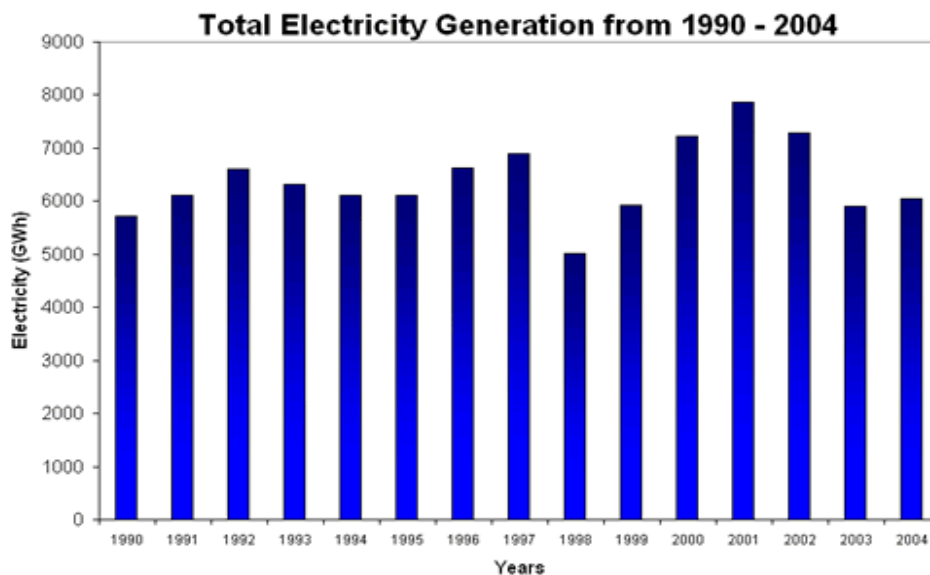
Figure 1 shows the map of Ghana and the three neighboring countries namely Cote D'Ivoire to the west, Togo to the east and Burkina Faso to the north, where electricity is normally imported to supplement Ghana energy (electricity) at peak period.

**Figure 1: The Map of Ghana**



**Source: Atlas of Ghana**

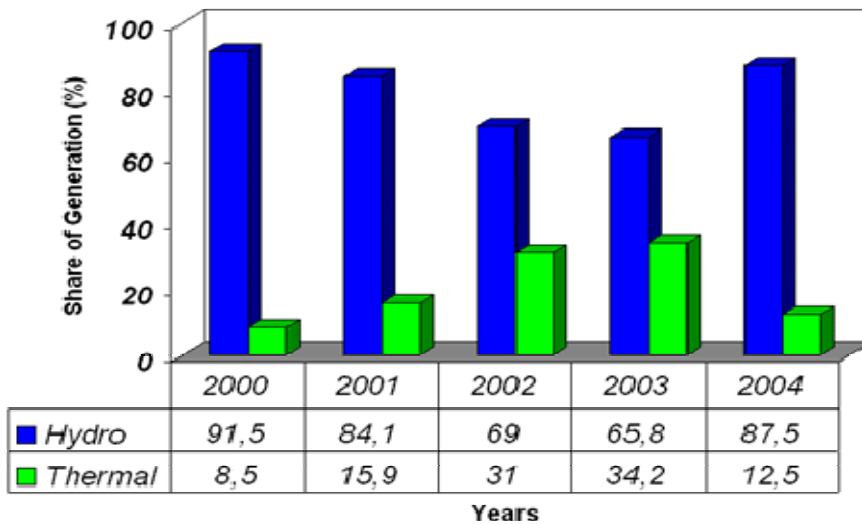
Figure 2 shows the total electricity generation in Ghana from the year 1994 to the year 2004. It can be observed that the highest electricity generation was in 2001 and the least electricity generation was in 1998, this was because of the drought in 1998 which made it impossible for enough electric power generation from the two main hydropower stations.



**Figure 2: Source: Volta River Authority (VRA), 2005**

Figure 3 shows the percentage shares of the two electricity generation sources in Ghana. In the year 2003, the percentage electric power generation from hydropower was lower and that of thermal power generation was high because there was shortage of water for hydropower generation.

**Percentage Shares of Hydro & Thermal Generation 2000 - 2004**



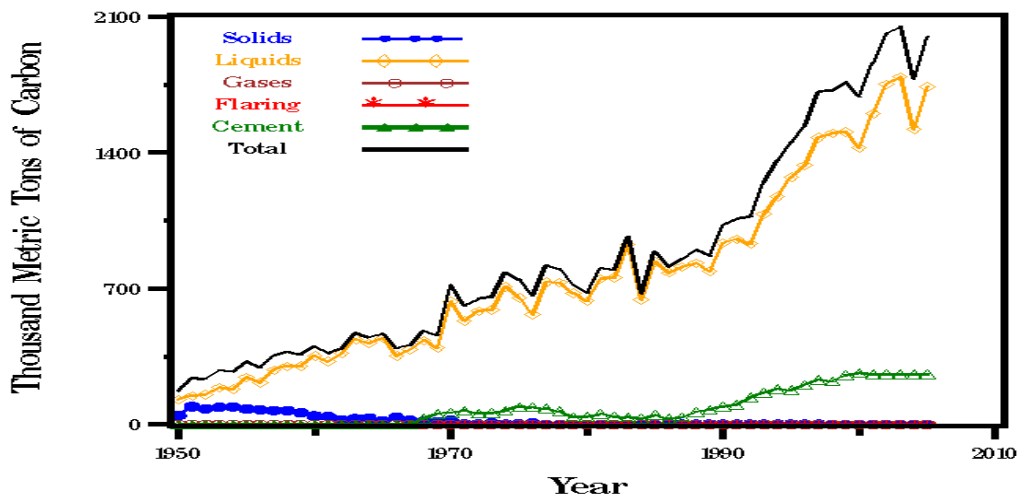
**Figure 3:** Source: Volta River Authority (VRA), 2005

## 2.2 Other Industries

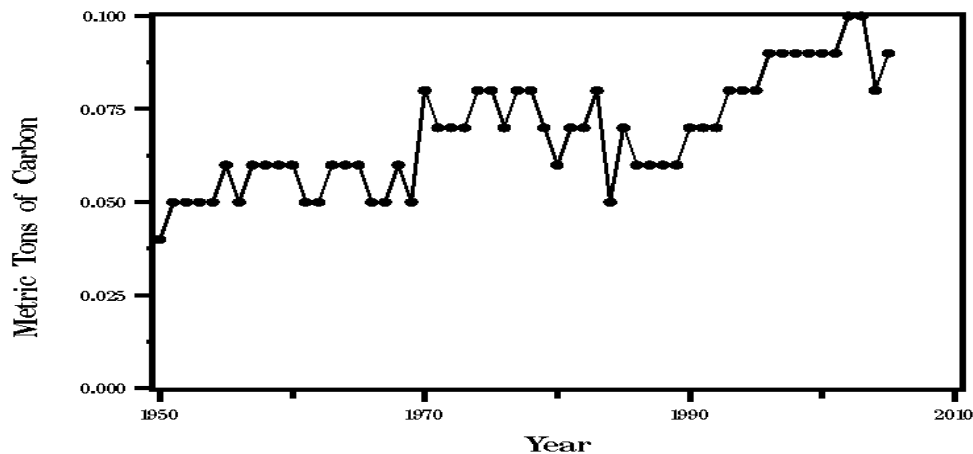
Apart from the main hydro and thermal power generation, quite a number of industries have installed their own electric power generation plants for providing electricity to their industries. Such industries include Tema Oil Refinery, Oil Palm Mills and other Gold Mines. These installed capacities are not connected to the national Grid.

## 2.3 Carbon Emissions

Carbon emissions in Ghana are mostly originating from the transport sector and other industrial firms such as oil refineries, textiles, cements, etc. Figures 4 and 5 are showing the various sources of carbon emissions and the per capita carbon emissions in Ghana.



**Figure 4:** Sources of carbon emission in Ghana. **Source:** CDIAC



**Figure 5: Per capita carbon Emission Estimates in Ghana. Source: CDIAC**

It can be observed that the per capita carbon emissions in Ghana is on the increase and it will be a good idea for everyone to get involve to address the situation of GHG emissions. This must not be the responsibility of Private organizations and Ghana Government alone.

### 3. Regulations

In 1992, Ghana signed the United Nations Framework on Convention on Climate Change and ratified it by Former President Rawlings Government in 1995. Ghana then acceded to the Kyoto Protocol in 2002, since then the country has had a lot of national and regional discussions on many issues concerning Climatic Change. Quite a number of schools have also set up clubs and societies all promoting programs concerning Climatic Change. Article 12 of Kyoto Protocol, explains the ways by which developing countries such as Ghana could develop sustainable projects that can sustain Climatic Change. The Government of Ghana as part of the measures put forward within the framework of UNFCC of Clean Development Mechanism, CDM has set up Designated National Authority (DNA) which is within the Environmental Protection Agency (EPA) for vetting and approving CDM Projects. Until now, there are no **concrete** regulations or policies for climatic change in Ghana. In the electric power delivery sector, the following reforms were made to make the sector be more competitive:

1. *Enhancement of transparency in the regulations of the power sector and increasing the management accountability in the existing public utilities in terms of operations of existing power utilities.*
2. *Causing a change in the structures, which will move the power sector away from the existing monopolistic and central structure towards a more decentralized structure that would expose the utilities to competition in both the generation and distribution of electric power?*
3. *To encourage private sector participation in terms of investment in the power sector through the establishment of independent power production Schemes and the provision of open access to the transmission system to enhance direct electricity sales by independent producers to consumers.*
4. *To minimize the extent at which GOG resources are relied upon by the power utilities to finance power generation projects thereby introducing an alternative arrangement to address specified non commercial risks to be faced by investors and to target the*

*application of available public resources to enhance the cost effectiveness of power transmission and distribution project under the NES [Source: PSRC, 1994].*

## 4. Financial Market

The general financial market in Ghana is flexible and the investment conditions are also good. This is because of the stability in the past fifteen years which facilitates Foreign Direct Investment (FDI). Most CDM projects, for example the construction of Bui hydropower station which began in 2007, is mostly Chinese investment. There are also quite a number of banks, both private and state-owned, that are ready to give out credits for good investment projects, mostly in the areas of CDM. At the moment, there are no barriers to investing in CDM projects, except that the local people living around the CDM project sites must be consulted and included in the project, especially in areas of labour.

The financial crises in the world now will slow down the developing of Carbon markets in Ghana because Ghana depends more on FDI for about 60 percent of national development projects which includes CDM.

## 5. CDM Projects opportunities

The use of RET will play a key strategic role in maintaining balance between energy supply development and demand in Ghana. CDM Project opportunities that could be developed include small scale hydropower, Solar, Natural gas turbine power plants and biomass. All these CDM projects below are possible because lots of fresh river(s) are available for small scale hydropower generation, since the completion of the West Africa Gas Pipeline (WAGP), there are a lot of opportunities for electricity generation using natural gas and biomass, which is mainly obtained from waste woods from agricultural produce. Possible CDM Project opportunities in Ghana can be grouped under three categories.

### Category 1: Renewable Energy Projects.

*Table 1: Name of Project, Project Type, Capacity and Location*

| <b>Name of Project</b> | <b>Project Type</b> | <b>Capacity</b> | <b>Location</b>       |
|------------------------|---------------------|-----------------|-----------------------|
| Bui Hydropower         | Hydropower          | 400 MW          | Bui, Brong Ahafo      |
| Hemang Hydropower      | Hydropower          | 60 MW           | Hemang, Western       |
| Juale Hydropower       | Hydropower          | 93 MW           | Juale, Western        |
| Pwalugu Hydropower     | Hydropower          | 50 MW           | Pwalugu, North        |
| Takoradi Thermal Power | Gas Turbine         | —               | Western               |
| Tema Thermal Power     | Gas Turbine         | —               | G. Accra (Tema)       |
| Kpone Thermal Power    | Gas Turbine         | —               | G. Accra (Tema)       |
| -----                  | Biomass Plant       | —               | Ashanti / Brong Ahafo |
| -----                  | Solar Plant         | ----            | Northern              |

Table 1 shows some of the CDM Projects opportunities in Ghana under category 1. The possibility of wind energy is still under serious research and few agencies are working on the situations about good locations of wind energy although some few reports have been published concerning the wind energy situations in Ghana.

**Category 2: Energy Efficiency Projects**

The table below shows some of the possible CDM Projects opportunities in Ghana under category 2

| <b>Name</b>       | <b>Project Type</b>   | <b>Location</b>              |
|-------------------|---|------------------------------|
| Energy Efficiency | Energy Savings<br>Changing all high energy consumption Bulbs to low energy consumption bulbs.   | All Over the Country (Ghana) |
| Energy Efficiency | Energy Savings<br>Changing all high energy consumption air conditioners to low energy consumption air conditioners.                           | All Over the Country (Ghana) |
| Energy Efficiency | Energy Savings<br>Changing all high energy consumption, Refrigerators, Freezers, Electric stoves into low energy Consumption electric stoves. | All over the Country (Ghana) |

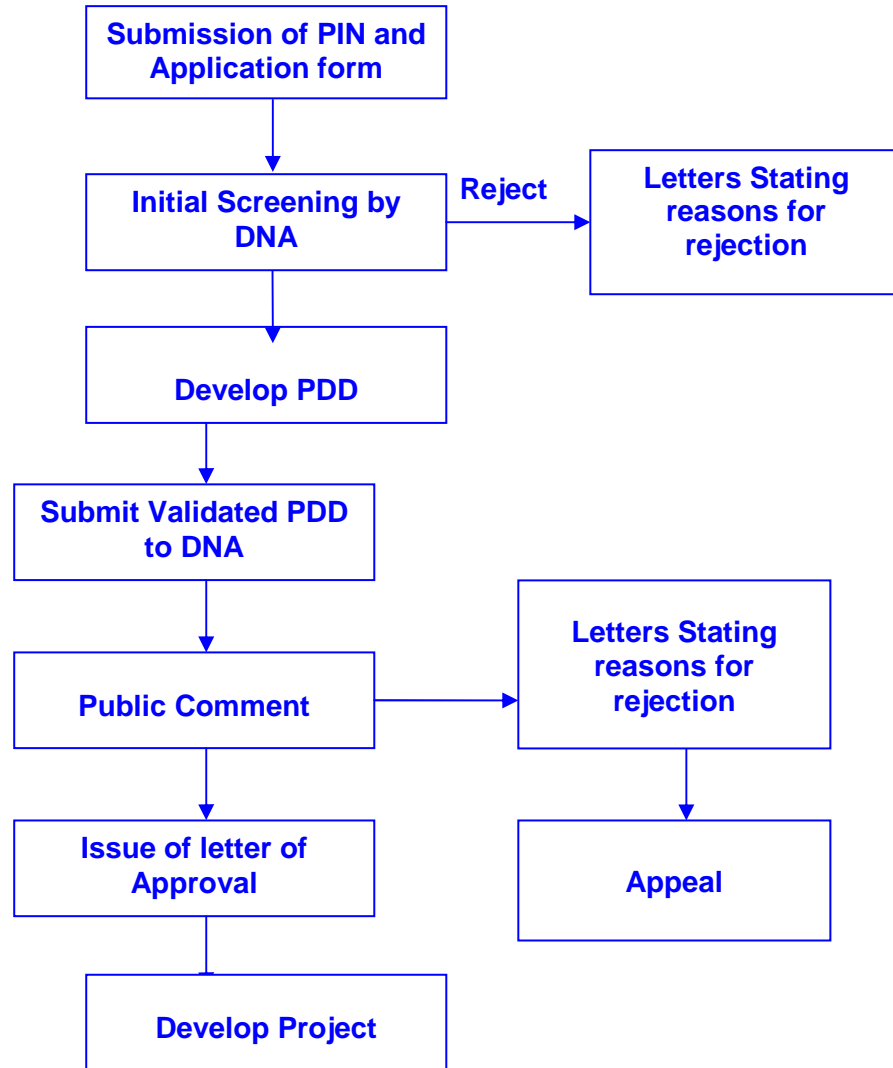
**Category 3: Other Projects (Industries)**

The table below shows some of the possible CDM Projects opportunities in Ghana under category 3.

| <b>Type of Industry</b>      | <b>Project</b>   |
|------------------------------|--|
| Minerals & Bottling          | Recycling of empty and waste bottles                                 |
| Oil and Refinery (Gas)       | Changing from Crude (gas from crude oil) to Ngas for local consumers |
| Wood Processing              | Processing waste wood into biofuel                                   |
| Pulp, Printing and Parkaging | Recycling of waste papers and Packaging                              |

**5.1 CDM Approval Process**

CDM projects developers must first check that if they meet the standard criteria of the developing a CDM project in Ghana. Figure 6 is showing the CDM approval process in Ghana. Project eligibility for CDM in Ghana is depending on the project meeting the three main criteria which include voluntary participation, real and measurable emissions savings.



**Figure 6: Source: Kiteonline.net.**

1. The project start with a signed document by the project proponent or sponsor and the project identification note given out by the DNA.
2. Project developers receive initial evaluation from DNA to any identified project conflicts with project approval criteria and government policies. If there are no conflicts with DNA approval criteria, a letter of NO OBJECTION is issued. Within 15 working days, results of initial evaluation of sustainable development impact of the project against the sustainable development criteria after the submission of application form and the project identification note. Comments will be submitted to the developer in the form an in informal of letter of-no-objection.
3. Submission of Project Design Document, PDD to DNA, and this must include validated Project design document in a format provided by the Executive Board, a completed application form and an Environmental Impact Assessment if necessary. DNA will conduct detail assessment on the documents submitted by the developer. Rejection or acceptance will depend on the information on the documents submitted.

4. DNA will then make the PDD available on its websites and other relevant departments for public consultation for 21 working days. Recommendation notes from DNA as well as any public comments will then be sent to the governing council of DNA for their consideration in their next meeting. The Council will then send it comment to DNA after evaluation of the PDD.
5. DNA will then make the final approval or reject base on the project approval criteria and the comment from the council of DNA. A letter will be prepared by the DNA secretariat and would be signed by the Chairman and a member Secretary of the Governing council of the DNA to the developer and Official letter would be published on the website of the DNA. A decision to approve or reject the final PDD will take 60 days.
6. Project developers have the right to appeal if DNA rejects their PDD. The appeal can be made with the Minister of Environment and Science. The Minister will verify decision by the DNA if it is within the approval process. A developer has the right to appeal the determination of the Minister before any Administrative court in Ghana.

**Source:** *www.kiteonline.net*

## 6. Links to Relevant and Related Websites

| Name | Address   | Description   |
|------|---|---|
| EPA  | <a href="http://www.epa.gov.gh">http://www.epa.gov.gh</a>         | Involves all environmental issues and house the DNA secretariat                               |
| EF   | <a href="http://www.efghana.com">www.efghana.com</a>              | Energy Foundation Ghana has been working with policy makers on a lot of projects with CDM.    |
| VRA  | <a href="http://www.vra.com">http://www.vra.com</a>               | This company is the biggest electric power generation from both hydropower and thermal power. |
| EC   | <a href="http://www.energycom.gov.gh">www.energycom.gov.gh</a>    | EC deals with the formulation of energy polices and regulations.                              |
| KITE | <a href="http://www.kiteonline.net">http://www.kiteonline.net</a> | KITE involved extensively in CDM projects.  |

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