WORLD SMALL HYDROPOWER DEVELOPMENT REPORT 2013

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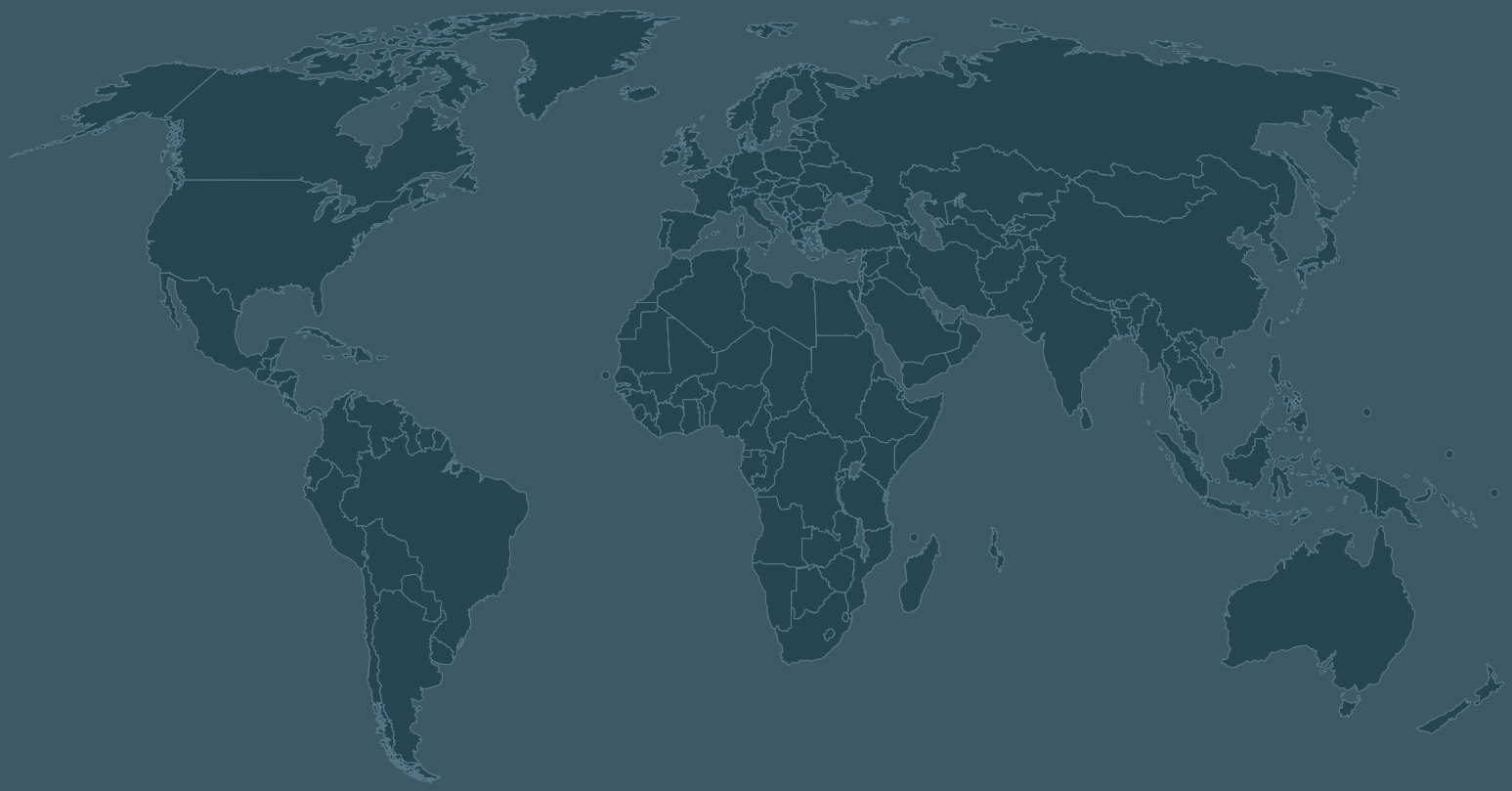
GHANA



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1 Africa
1.5 Western Africa

1.5.4. Ghana

Lara Esser, International Center on Small Hydro Power

Key Facts

Population	24,652,402[1]
Area	238,535 km^2
Climate	Tropical climate. Temperature is generally between 21°C and 32°C.
Topography	Mostly low plains with dissected plateau in south-central area[1]
Rain Pattern	Annual rainfall in the south averages 2,030 mm but varies greatly throughout the country, with the heaviest rainfall in the south western part. Two rainy seasons: March to July and September to October, separated by a short cool dry season in August and a relatively long dry season in the south from mid-October to March.

Electricity sector overview

In 1989, the Ministry of Energy instituted the national electrification scheme (NES) as a principal policy to reach all parts of the country between 1990 and 2020. In 2010-2011, the national electricity access was 72 per cent and was expected to continue to increase.[2] Another report said that electricity access increased from 25 per cent in 1989 to 66 per cent in 2011, while rural access has increased from 5-40 per cent.[3]

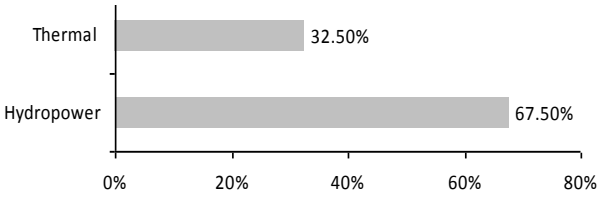

Figure 1 **Electricity generation in Ghana**
Source: Ghana Energy Commission[4]

In 2011, the total grid or public electricity generated in the country was 11,200 GWh. Two-third of electricity generated in Ghana comes from hydropower (figure 1).[5] There are two main large hydropower plants, Akosombo (1,020 MW) and Kpong (160 MW). For its dual-fuelled thermal plants, Ghana imports natural gas via the West Africa Gas Pipeline, for example, from Nigeria.[4]

The Energy Commission in 2006 published the Strategic National Energy Plan for Ghana (SNEP) for the period of 2006-2020. The Commission has been preparing annual energy demand and supply forecasts to provide a guide to the energy sector operators and potential investors.[4]

Small hydropower sector overview and potential

Ghana's definition of small-scale hydro is up to 1 MW, medium scale lies in the range of 1 MW to 10 MW and large-scale is 10 MW to 100 MW. There are no existing small hydropower plants in Ghana. The *Baseline Report for Small-Scale Hydropower* in the Economic Community of West *African States Region* reports a total of 85 potential sites of up to 30 MW, with a total potential capacity of 110 MW.[6] When considering only those up to 10 MW capacity, the 17.42 MW small hydropower potential comprises two sources: the Hydrological Service Department of Ministry of Works and Housing points out that this includes 69 sites (< 2MW) with a total potential of about 15.18 MW; and by the Energy Foundation, 12 sites (<1 MW) with a total potential of 2.24 MW.[6] [7]

The feasibility study of the Randall Falls site (160 kW potential capacity) has been completed.[8] The Energy Commission has initiated actions to develop the country's renewable energy resources; particularly mini hydropower (table 2). The Energy Policy mentions that the mini hydropower potential is limited – 21 potential sites with generating capacities ranging between 4 kW and 325 kW.[8]

The Government has recognized the advantages of a more sustainable approach to agriculture, as a result, it created a policy to develop small hydropower and small scale irrigation facilities in order to boost agriculture in the rural areas. There are numerous rivers which have the potential for small hydropower development which could generate electricity with an installed capacity of between 4.5 MW to 42 MW (e.g. River Ankobra, Pra and Oti).[9]

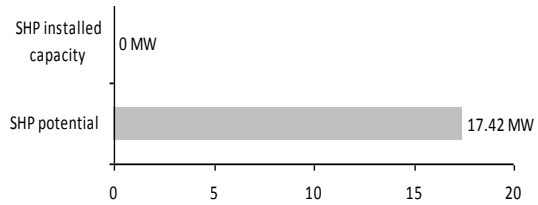

Figure 2 **Small hydropower capacities in Ghana**

Renewable energy policy

Ghana is endowed with abundant renewable energy resources such as solar energy, biomass, wind and small hydro. Therefore, it has a huge potential for electricity generation from these sources.[5] The Ghana Energy Commission has the mandate to ensure the adequate development and use of the country's indigenous energy sources. Since 2011, Ghana has a Renewable

Energy Law, Act 832, which should create an enabling environment for the private sector to invest in renewable energies.[4] The 2010 Energy Policy mentions mini hydropower in its policy direction and cites actions i.e. to create an appropriate fiscal and regulatory framework and to provide pricing incentives for small hydropower projects.[10]

Barriers to small hydropower development

Large hydropower plants are seen as cheap energy generators in Ghana. Most communities within the proximity of potential small hydropower sites are grid connected and therefore small hydropower deployment is not cost competitive. This is especially due to high capital costs (US$0.5million to US$2.0 million). In-adequate financing of civil works has already proven to lead to project abandonment (e.g. Likpe-Kukrantumi) which increases investment risks, especially in the case of unfavourable flow duration curves. In some cases, a particular site could be used to stimulate socio-economic activities other than power generation, for example irrigation, tourism, ecological education, religion which would avoid the displacement of people, animals and flooding.[11]

Another key issue is the absence of a regulatory and legal framework for development and use of renewable energy sources with little or no economic incentives in place to attract investors to small hydropower, although feed-in tariffs for renewables have been planned for 2013.[12] Another barrier is the limited local technical expertise.

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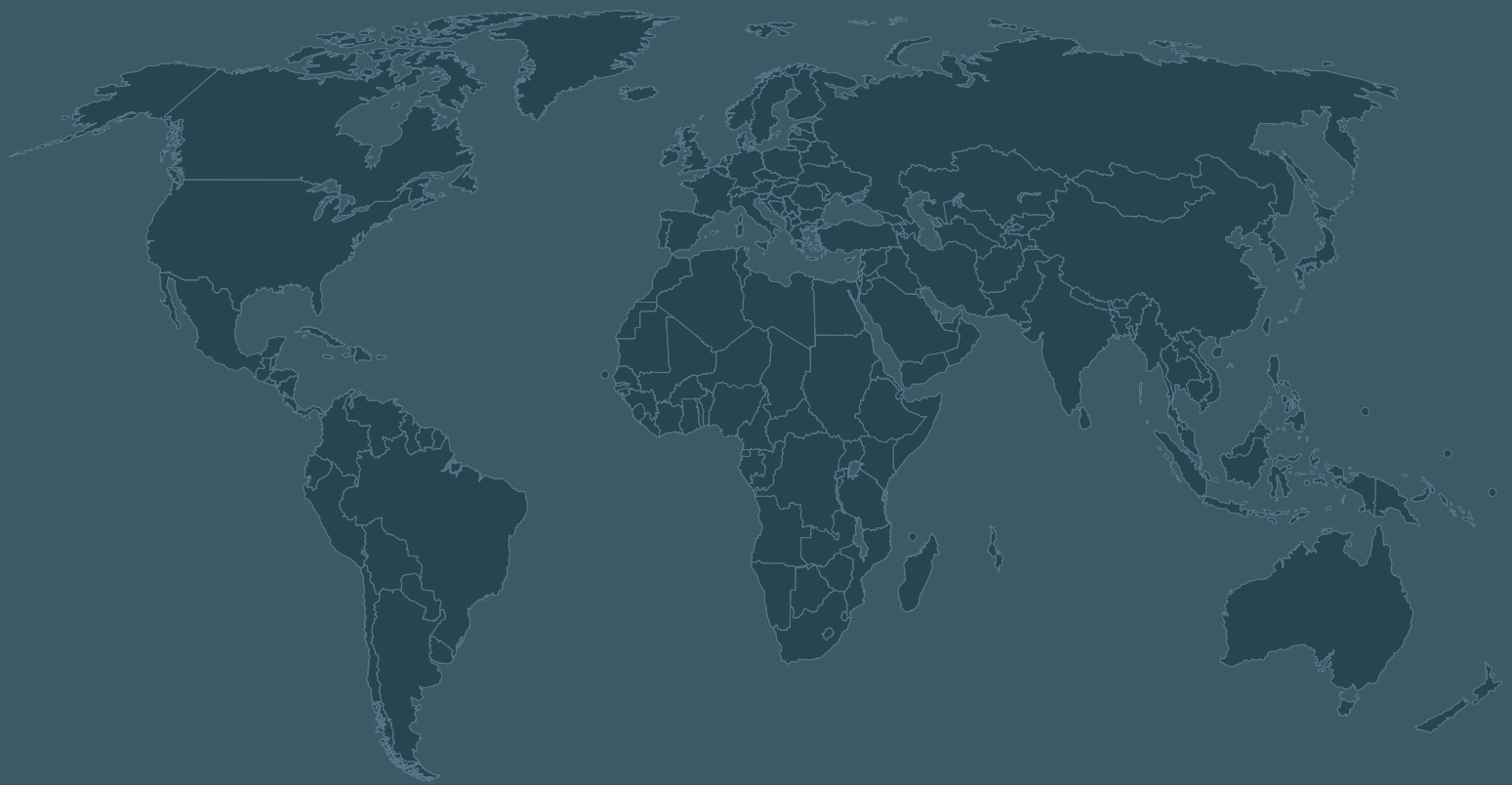

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