# Workshop Report

***International Support to promote technology transfer and deployment, for renewable energy and energy efficiency in Ghana.***

**Summary of discussions during the workshop in Accra, Ghana on April 8, 2009.**

**William Gboney**
International Institute of Infrastructural Economics and Management (I3EM)
Accra, Ghana

**April 27, 2009**

## Summary

This report summarizes discussions on climate change impact, and international support for renewable energy and energy efficiency technology transfer, at the workshop in Accra, Ghana, on April 8, 2009.

A. **Climate change and impact on Ghana**
B. **Achieving emission reduction: Stakeholder perspectives**
C. **International support for domestic climate policy and technology transfer, including barriers and drivers, as well as stakeholder perspectives**
D. **Performance Indicators**

The report would also serve as an input for the phase II country case study on Ghana.

## Introduction

There is no doubt that the adverse effects of climate change pose a fundamental threat to sustainable development of countries. The energy sector which is so vital to the socio-economic development of countries is also responsible for a greater share of anthropogenic greenhouse gas (GHG) emissions, through the combustion of carbon intensive fossil-fuels. One way to reverse this situation is to shift the energy sector onto a sustainable track to include renewable energy (RE) and energy efficiency (EE) activities.

Despite the increasing global level of investment in RE and EE, the level of investment in developing countries has generally been low, due to a number of barriers. This compelled the Bali Action Plan and other international conferences on climate change, to emphasise the crucial role of technology transfer to scale up transfer of technology in developing and low income countries. It is in this light that the workshop was convened on April 8, 2009 to explore how Ghana can create the enabling environmental and take advantage of international support to scale up deployment, diffusion and transfer of RE and EE technologies, and assist in global mitigation of climate change impact.

To ensure effective stakeholder feedback, participants at the workshop were carefully chosen from institutions and agencies, which play important roles in Ghana's climate policy and the energy sector. The list of participants is annexed as Appendix 1. The discussions focused on the following presentations, annexed as Appendix 2, which also form the basis for this report.

(i) Climate Change Impact in Ghana, by Oppong – Boadi Kyekyeku, of Environmental Protection Agency, Ghana.

(ii) Climate Change Mitigation: The Role of Renewable Energy, by Wisdom Ahiataku Togobo, of Ministry of Energy, Ghana.

(iii) International Support for Domestic Policy: Karsten Neuhoff, University of Cambridge, UK

(iv) International Support to Promote Technology Transfer and Deployment for Renewable Energy and Energy Efficiency in Ghana: William Gboney, I3EM, Ghana.

## A. Climate Change and Impact on Ghana

Climate change is linked to the development process of countries, and even though Ghana and other least developing countries have contributed least to global greenhouse gas (GHG) emissions, these countries are affected most by the negative impact of climate change, because they lack the appropriate institutional, economic and financial capacities to adapt to the consequences of climate change.

The workshop therefore decided to explore inter alia, the negative impacts of climate change on Ghana's agricultural sector, the continuous land degradation and deforestation, desertification, drying of water resources and gradual erosion of the country's coastal lands. The first two presentations by Messrs Oppong-Boadi Kyekyeku (Environmental Protection Agency) and Wisdom Ahiataku-Togobo (Ministry of Energy), provided enough evidence of the environmental consequences of climate change in Ghana.

The discussions sought to explore the linkage between climate change and the country's development. Participants agreed that effective adaptive policies can be formulated and implemented, if they are "mainstreamed" into the country's wider developmental objectives. One important issue which came up for discussion was the urgent need for a comprehensive climate change policy to be developed for Ghana. Participants were also of the view that more public awareness and outreach programmes must be undertaken, to explain EPA's role vis-à-vis impact of global climate change on Ghana's development efforts. The workshop also discussed what actions should be put in place to enhance the country's adaptive capacity to the negative impact of climate change.

The first two presentations also brought to the fore, the need to put the issue of climate change in a much broader context of the government's policy objectives, such as increasing access to electricity, ensuring security of energy supply and preventing degradation and deforestation of land. Effective climate policy requires both emissions reduction and adaptation, as complementary actions. The negative consequences of climate change on Ghana's agricultural and energy sector generated a great deal of interest among the stakeholders. For instance, the revelation that inability to stabilize concentrations of GHGs and limit the global temperature increase to a maximum of $2^0$C, has the potential to curtail Ghana's cocoa production, one of the country's main foreign exchange earner, by 2080.

## B. Achieving emission reduction: Stakeholder Perspectives

The workshop further explored the options which can be used by Ghana to contribute to global emissions reduction. These options are briefly discussed below**:**

- **Energy Efficiency Intensification**

  Participants identified energy efficiency activities as key to achieving emission reduction. The attempt by the Energy Commission and the Energy Foundation to implement labeling standards for refrigerators and air conditioners in Ghana is a step in the right direction.

- **Renewable Energy Utilization**

  Use of renewable energy sources can reduce the country's dependence on fossil fuels, and provide electricity to the rural communities. If RE energy sources are used for productive purposes, these can assist in job creation in the rural areas. The main RE sources identified includes:

- Bioenergy, including production of biofuel from Jatropha, biogas municipal and animal waste
- Mini-hydro systems for electricity production
- Wind power and wind pumps
- Solar dryers and cookers

- Reducing deforestation: Stakeholders discussed how deforestation and land degradation, can impact on reducing the concentration of GHGs in the atmosphere. Participants were of the view that there was the need for a comprehensive reforestation (i.e. planting new trees and vegetation) to serve as "carbon sinks"

- **Use of Natural Gas as fuel substitute for thermal plants**

The participants were unanimous in supporting the use of natural gas as a fuel for thermal plants in a combined cycle mode, instead of continuing to rely on light crude oil, since the $CO_2$ emission from natural gas is lower than LCO. The lower heat rate (i.e. higher efficiency) of combined cycle plants means that less fuel is used to produce a unit of electrical output. Furthermore, the emission factor, which measures the amount of $CO_2$ produced per unit of energy content of fuel consumed, is lower for natural gas, compared to light crude or diesel oil.

## C. International Support for domestic climate policy and technology transfer

The two presentations by Karsten Neuhoff and William Gboney, highlighted the key findings from Phase I and outlined the objectives for Phase II of the project. These presentations are annexed as Appendices 2(c) and 2 (d). The presentations also highlighted the climate co-benefits, challenges, metrics and scope for international cooperation from the five country case studies, during phase 1 of the project.

One technology transfer, though international support and cooperation can intervene at any stage of the technology innovation chain, it was noted that the level and kind of support are country specific. For instance high income countries have the capacity to innovate and regulate, middle income countries tend to possess the capacity to adopt and replicate, while low – income countries have the capacity to operate and maintain.

### Drivers and Barriers for technology transfer: Stakeholder Perspectives

It emerged during discussions that many of the numerous opportunities which exist for RE and EE in Ghana, have not been fully utilized because of the following barriers**:**

(a) Inability to link grid extensions and off-grid options to expand access to electricity, as part of government's rural electrification policy. For instance, some RE projects have failed and could not be sustained because some solar home systems were installed in rural areas, only for grid extension to immediately arrive in these communities, under the government's Self-Help Electrification Programme (SHEP)
(b) Lack of regulatory and appropriate market mandated policy and pricing framework for RE
(c) High front-end capital costs. Even though RE technologies possess low operating costs which make them cost-competitive on a life-cycle basis, the high up-front cost on US$/KW, has led to a higher cost of capital from financing institutions.
(d) Lack of credit. Even if the banks are willing to give credit, the loan terms are too short, relative to the project life-time.
(e) Absence of technical and financing skills. Currently, the country does not possess the right number of skilled personnel who can maintain RE technologies. Participants agreed that building the human and institutional capacities is crucial for the country's ability to understand, absorb and diffuse RE and EE technologies.

In the light of above barriers, the workshop identified the following as the key drivers which can unlock domestic policy, and provide a conducive environment for technology transfer.

(a) Creation of appropriate regulatory and legal frameworks to incentivise the private sector to invest in RE and EE projects.
(b) Development of standards for technology performance. Workshop recommended the development of codes, standards and certification to provide end-users with performance awareness.
(c) Development of innovative financing mechanism, which would permit bundling of small projects to enhance their financial viability
(d) Intensification of public awareness programmes and establishment of information centres, to provide potential users with information and data on equipment costs and performance

(e) Capacity building, especially training in technical, regulatory economics, financing and management.

(f) Use of South-South cooperation to enhance technology transfer.

**Linkage between research and policy-making: Stakeholder Perspectives**

The workshop identified the barrier between research and policy as an important issue which should be addressed. It has been observed that the universities are generally viewed as places of intellectual contemplation, with weak ties to government. There is the need to reduce the gap so that researchers and policy-makers can interact and communicate more frequently. This would enable and research findings to be factored into government policy-making. It was agreed that similar workshops should be organized to facilitate effective relationship between researchers and policy-makers and bridge the gap between the two groups.

The University of Ghana located in Accra, was identified as a suitable place to serve as a focal centre or centre of excellence, which could provide education, design tools, data and information for evaluating technological options. The center can also be used to provide technical training in the operation and maintenance of RE and EE technologies. It is also envisaged that the centre of excellence can serve as a platform where policy-makers and other stakeholders can meet periodically, to discuss climate change issues and enhance information dissemination among stakeholders.

## D. Performance Indicators

The session on performance indicators emphasized the significance of indicators in policy analysis. Indicators are used across many levels/sectors of the economy such as: Key policy performance metrics, agric-environmental metrics, science and technology metrics. Indicators are used for**:**

- benchmarking and to serve as a source of feed back for performance improvement
- to measure a programme's progress towards short- and long-term objectives
- increase domestic accountability and indicate the direction in which a policy is moving

- facilitate evidence based (international) dialogue and understanding of a programme to stakeholders or external audience

Performance indicators may be quantitative or qualitative, and are generally classified as:

- Output-based indicators
- Outcome-based indicators: Intermediate or impact indicators.

A good performance indicator should meet the ***"SMART"*** Indicator Litmus test as defined below**:**

**S:** Specific; **M:** Measurable; **A:** Achievable; **R:** Reliable; **T:** Time-bound

In addition to the above, the indicators should be robust to gaming, generate self reporting interest, and it should be cost-effective to generate data.

The session on indicators discussed the merits of the use of intermediate indicators. It emerged during discussions that the EPA in consultation with the Energy Ministry and other public agencies, had developed indicators for Ghana's energy sector The Climate Strategies Research Collaborator (William Gboney) was therefore tasked by workshop, to liaise with the experts from the EPA, and make further consultations to ensure that the final set of indicators are comprehensive enough to cover both the RE and EE sectors. The final set of indicator would from part of the main report for the phase II country case study on Ghana.

## E. Starting points for domestic action.

The following constitute the starting points for domestic action**:**

- Efforts should be made to finalize the climate policy document for Ghana. This would place the country in a much better position to deal with climate change mitigation. Any further delay in finalizing the policy could have very serious implications for the country socio- economic development, due to Ghana's reliance on climate sensitive economic sectors such agriculture and hydroelectricity.

- The country should move from the current reactive adaptation approach to a pro-active type.
- Renewable energy technologies and energy efficiency activities are crucial for achieving emissions reduction. International support and cooperation, especially human and institutional capacity building are needed to increase the country's absorption and adaptive capacity.
- There is the need to accelerate the pace of work on the policy, legal and regulatory frameworks for grid-connected, mini- grid and stand-alone RE systems.
- Existing crude oil-fired thermal plants should be converted to natural gas fired plants. The single cycle plants should be converted to combined cycle plants to enhance plant efficiency and reduce emission.
- Efforts should be made to bridge the gap between researchers and policy-makers to ensure more frequent interactions. This action would make it possible for independent research results to be taken into account, during government policy formulation on climate change and the energy sector.
- There is the need to develop innovative financing mechanisms to assist project developers to overcome the high up-front cost associated with RE and EE.
- Ghana should endeavour to take advantage of south-south cooperation and international support, to accelerate the pace of technology transfer and diffusion.

**APPENDIX 1: LIST OF PARTICIPANTS**

| | Name | Organization | Type |
|---|---|---|---|
| 1 | Darlington Ahuble | Volta River Authority | Power Utility Company- Generation |
| 2 | Oppong – Boadi Kyekyeku | Environmental Protection Agency | Regulatory Agency |
| 3 | Antwi – Bosiako Amoah | Environmental Protection Agency | Regulatory Agency |
| 4 | Daniel Azu | Electricity Company of Ghana | Power Utility Company– Distribution |
| 5 | Eric Moite Brown | Electricity Company of Ghana | Power Utility Company – Distribution |
| 6 | Belinda Yebuah – Dwamena | Electricity Company of Ghana | Power Utility Company– Distribution |
| 7 | William K. Kyeremateng | Electricity Company of Ghana | Power Utility Company – Distribution |
| 8 | Millicent Cobblah | University of Ghana – Ghana Science Association | Academic |
| 9 | Wisdom S. Sebuava | University of Ghana – Ghana Science Association | Academic |
| 10 | Wisdom Ahiataku Togobo | Ministry of Energy | Policy-making |
| 11 | Karsten Neuhoff | University of Cambridge, EPIG | Research and policy |
| 12 | William Gboney | International. Institute of Infrastructural Economics and Management | Research and Consulting |
| 13 | Joana Ama Essah | International Institute of Infrastructural Econ and Management | Research and Consulting |
| 14 | V. K. M. Ababio | Harford Chambers | Legal Practitioner and industry expert |
| 15 | Kofi Agyarko | Energy Commission | Regulatory Agency |

## APPENDIX 2: LIST OF PRESENTATIONS ATTACHED

a. Climate Change Impact in Ghana: Oppong-Boadi Kyekyeku
b. Climate Change Mitigation: The Role of Renewable Energy: Wisdom Ahiataku-Togobo
c. International Support for Domestic Climate Policy: Karsten Neuhoff
d. International Support to Promote Technology Transfer and Deployment, for Renewable Energy and Energy Efficiency in Ghana: William Gboney

**Acknowledgement:**

The International Institute of Infrastructural Economics and Management (I3EM) would like to express its sincere thanks to all the workshop participants for their invaluable contributions. We also thank Karsten Neuhoff for his support at the workshop. Many thanks to Climate Strategies and its sponsors, for funding the workshop.