

Harnessing Bio Carbon Opportunities in Ethiopia: showcasing best practice and viable carbon investment prospects, 11 March 2011, United Nations Conference Centre, UNECA

Background

A Knowledge Sharing Forum titled *“Harnessing Bio Carbon Opportunities in Ethiopia: showcasing best practice and viable carbon investment prospects”* was held on 11th March 2011. The forum was aimed at presenting best practices on partial fuel switching from fossil fuel to biomass in the cement sector. Moreover, the forum served for launching and showcasing related knowledge products that came out of similar research studies and experts discussions. UNDP attaches great importance to facilitating the scaling-up of best practice through South-South exchange of knowledge and experience. In relation to this, the Uganda-based Hima Cement industry experience on the utilization of alternative fuel energy and the practical lessons that are relevant to the Ethiopian case were presented by members of a mission who visited that particular plant. The mission was drawn from two major Ethiopian Cement industries, Ministry of Water and Energy, a private consulting firm and UNDP CDM team.

The forum was attended by heads of relevant federal and regional government organizations; public and private cement factory owners, academic institutions, researchers, NGOs, donor communities and private sector representatives.

The program of the forum covered the following topics:

Session one: Launching knowledge products

1. Two knowledge products titled *“Biomass Energy for Cement Production: Opportunities in Ethiopia”* and *“Bio-Carbon opportunities in Eastern and Southern Africa”* were launched by the guest of honors HE Dr. Tewoldebirhan Gebre Egziabher, Director General of the Environmental Authority of Ethiopia and Mr Shimelis Wolde, Director of Chemical Industry Development Directorate at the Ministry of Industry. The launching was followed by a brief introduction and highlights of the contents of the products presented by Mr Mulugeta Adamu, Freelance Consultant

Session two: Panel discussion on experience sharing

2. **Carbon financing and private sector involvement in CDM projects development:** by Mr Ababu Anage, National Climate Change Specialist, UNDP
3. **Reports on experience sharing visit to Hima plant in Uganda:**
 - o Brief introduction of the visit and highlights of main findings and good practice: by Mr Mulugeta Adamu
 - o Reflection on the Hima experience and possible areas in replicating good practices at Messobo Cement Factory in Ethiopia : by Mr Yohannes G/Kidan, Quality Control Manager , Messobo Cement Factory
 - o Reflection on the Hima experience and possible areas in replicating good practices at Mughher Cement Enterprise in Ethiopia: by Mr Daniel Alemayehu, Engineering Sub-process Leader Head, Mughher Cement Factory

Session three: review draft knowledge products

4. **Overview of the draft “Manual for Measurement and Monitoring of Carbon Stocks in Forests and Other Land Uses in Ethiopia”** and *“Ethiopian Forest Resources: Current s*
5. **Status and future Management Options in view of access to carbon finances”:** by Dr Yitebetu Moges, Freelance Consultant

1. “Biomass Energy for Cement Production: Opportunities in Ethiopia” and “Bio-Carbon opportunities in Eastern and Southern Africa” :

The two knowledge products launched on the first session of the knowledge sharing forum are the outcome of a regional workshop and high level expert discussion forums held in Addis Ababa two years ago. This forum co-organized by six organizations namely UNDP, UNEP, UNEP RISØ Center, FAO, Farm Africa and SOS SAHEL, was on bio carbon opportunities aimed at harnessing carbon finance. The products are therefore the result of 15 high caliber research studies and papers presented during the workshop in April 2009. Resource persons who made presentations on range of similar topics were drawn from eastern and southern Africa.

The main key areas of these products include:

- Forest bio carbon (policy options and forest bio carbon methodologies);
- Domestic bio-energy and charcoal production; and
- Anaerobic digestion, bagasse cogeneration, biomass use in cement production, and biomass gasification and pyrolysis

Mr, Mulugeta , who was one of the contributors of the papers as well as a member of the team that visited the Hima cement Plant in Uganda, presented the main highlights of products and the possible interventions and suggestions made by each authors of the various research papers published as a comprehensive knowledge products. He then concluded his presentation by pointing out the overall and possible stake for Africa in particular Ethiopia.. In this regard, Ethiopia has significant opportunities in the bio-carbon business. According to the presenter, the following three important areas can contribute to the existing efforts in the climate change mitigation through the right policies:

- The replacement of fossil fuel energy with renewable bio-energy;
- The prevention of emissions by maintaining and enhancing current bio-carbon sinks and;
- The removal of carbon from the atmosphere through the establishment of new bio-carbon sinks.

Finally he suggested the following main areas of interventions which are relevant for Ethiopia:

- To revisit all existing policies that affect the carbon market and as appropriate, develop or amend policy instruments;
- Enhance Aforestation/Reforestation activities
- Improve house hold energy efficiency;
- Enhance Anaerobic digestion – (biogas programs);
- Promote cogeneration –particularly bagass cogeneration;
- Promote Landfill bio-energy and
- Promote partial fuel switching in cement industries:

2. Experience sharing visit to Hima plant in Uganda

The specific objectives of the visit to the Hima Cement plant located at Kasese- Uganda included the following:

- to raise the awareness of leaders of energy-intensive industries like cement on the ways and means of attaining energy efficiency and reduction of greenhouse gas emissions by acquiring first hand information on alternative fuels switching;
- to promote CDM projects in industries such as the cement ; and
- to raise awareness of policy makers about CDM.

Based on hands of experience sharing visit and the existing practice as well as the interest of the two (Mugher and Messobo) cement industries in Ethiopia, the following were some of the lessons learnt, recommendations and way forward made by the three presenters:

Lesson learnt:

- There is few practical experience in Ethiopia with alternative fuel use in the cement industry, (only Messobo Cement made attempts on sesame husk as secondary fuel);
- Biomass, such as coffee husk, rice husk, etc, can be used as secondary fuel with reasonable capital outlay;
- The technology used for fuel switching is simple in design and is often similar to those used in the cement industry;
- Diverse alternative fuels, such as energy crops, maize cobs, saw dusts, wood chips can be used as secondary fuel there by alleviating alternative fuels shortage.
- In addition, dedicated energy forestry can be developed by each cement plant in relatively degraded and non agricultural lands to sustain the supply of biomass fuels

Recommendations and way forward:

- The experience of Hima Cement Ltd demonstrates that switching to biomass fuels, particularly coffee and rice husk- with 50% ratio is quiet possible in cement plants in Ethiopia;
- All the major cement factories, particularly Mugher and Messobo should start to study the possibility of using alternative fuels in their respective factories.
- Mugher can consider coffee husk and urban waste from Addis Ababa because of the plant's proximity to these sources. Messobo can consider cotton stalk, sesame and rice husks.
- Both cement plants need to start to develop their own energy forestry in degraded and non-agricultural land including old quarries for sustained supply of biomass fuels thereby developing and rehabilitating the abandoned quarries.
- Fuel switching initiatives could be attractive if financially and economically feasible. To augment such an outcome, they must start to develop CDM projects and try to get it registered so that their efforts to reduce CO2 emission can be properly compensated from CDM opportunities.
- In the case of Messobo, with the existing system 10% substitution is possible. To invest on the remaining equipment and store is advisable to achieve more substitution

3. Key points from Q & A session on bio mass for cement industry and the experience of Hima cement plant

a. Rationale for using bio- mass versus hydropower

Question was posed about rationale being considered to encourage Ethiopia, a country often considered as the water tower of Africa and with huge potential for hydro power, to use biomass energy for its cement industry. The presenters responded to the question by emphasizing that fuel switch is done for the energy component that will not intrinsically be covered by electricity. Currently, the industry is using two sources of energy, namely fossil fuel and electrical energies. The study is therefore proposing to replace mainly fossil fuel while still keeping the electricity. In this regard, the presenters emphasized that whatever level of potentials we have in hydropower, we should work towards diversifying energy mix and exploit potentials.

b. Sustainable supply chain of bio mass energy and sustainable land management issues/efforts

Concern was raised by participants of the forum about the use of biomass in a country like Ethiopia which is affected by a serious land degradation related problems, particularly deforestation. People in the rural areas are facing serious problems in terms of full filling their wood demand for household energy. These people are forced in some areas to shift to cow's dung that would have gone to the farm to enhance soil productivity. The presenters responded to this concern by saying that the attempt is to use the coffee husks which are being dumped by the river side in most of the coffee producing regions in the country. It was, therefore, very well noted that the coffee husks is not only dumped for no use but also when simply discarded it is producing methane. It not only causing air pollution but also killing fish and other organisms in many rivers.

There was an argument with regards to taking back the agricultural residues such as the coffee husks to the field/farm. Currently, coffee husks is not going back to the field and until a new initiative come to take the husks back to the field, the presenters suggested to make use of these biomass energy resources. However, the main suggestion is to use woody bio mass for the cement industries by establishing dedicated plantation which is a win-win solution through rehabilitating the degraded lands and ensuring sustainable supply of biomass for cement industries.

In relation to the concern on the source of bio mass, coffee husk is not the only sources of bio mass but other sources of agricultural residues such as cotton, rice, sesame etc, were also suggested. Another suggestion made particularly for Mughher cement factory is to use urban wastes of Addis Ababa. Mughher is one of the oldest cement factories based in the Mughher town which is very near to the main city, Addis Ababa.

c. Urban wastes collection management system

In response to the question of how to collect urban wastes, the presenters explained that urban wastes can be collected from every Kebele (sub-district) in organized fashion. The urban waste collectors can collect and segregate waste stream such as biomass, metal and glass and etc and deliver to the cement factories at a certain price. Pricing will be more refined when interested cement factories conduct their respective feasibility studies.

d. Viability of switching existing energy to bio mass in cement industry

For the concern on the viability of partial switching from the existing energy use to bio mass, the presenters explained that the study is not recommending any specific undertaking but only suggests the potential. Any undertaking should be preceded by further feasibility study, considering all the issues rose including cost- benefit analysis

e. Bio mass production and resource conflict

Most of the participants were agreed to the idea of developing woody bio mass energy for the cement industry rather than using the coffee husks. It is expected that given the job creation potential, small scale enterprises will be interested in producing charcoal and briquettes. Participants explained that t this is particularly the case in the capital and other big towns in the country, where these small scale enterprises are sprouting. It was noted that this might arise resource conflict. Further, the idea of developing woody bio mass by the cement industry is more preferred than using the biomass from the coffee husks, due to the fact that establishing woody bio mass is possible as the country owns a lot of bare lands for afforestation and reforestation activities. The presenters concurred with the resource conflict issue and further explained that experience of the Hima cement factory also suggest the same. That's why Hima is shifting to establishing its own woody bio mass instead of coffee husks. Hence, suggestion was made for cement factories in Ethiopia to establish their own forestry plantation in quarries and abandoned areas. However, the presenters also suggested to try the coffee husk which is being dumped as an interim and starting point.

During the discussion, participants reflected on some of the ongoing research activities on the use of coffee husks and these are:

- for making ethanol, which is considered as the second generation of bio fuel;
- for local consumption of producing biogas, which is currently growing and
- for building construction materials.

4. Carbon financing and private sector involvement in CDM projects development:

The presenter started his presentation by giving country context on the climate change agenda. Ethiopia envisions becoming carbon neutral and middle income country by 2025. The presenter also highlighted activities by EPA including the initiation of the preparation of Climate Resilient Green Economy (CRGE) Mission Statement and climate change adaption plans in seventeen sectors and all national regional states and city administrations. Sectoral and regional climate change adaptation plans are instrumental to mainstream climate change adaptation issues in the sectors development plans and strategies.

The tasks associated with Green Economy part of CRGE is handled by McKinsey & CO (consulting firm) in the Prime Minister Office. The green economy study focus on seven pillars, namely Reduction of Emission from Deforestation and Degradation; Livestock; Soil based emissions, Power supply, Buildings and green cities; transport; Industry and Health .

Clean energy (development of renewable energy and use of biomass residues for energy generation); waste management; bio carbon are mentioned as high potential areas for carbon finance in the country. However, Ethiopia, like other Sub Saharan African Countries is the least beneficiary from CDM. To date, the country owns one registered CDM project.

Growth and Transformation Plan of the country emphasizes on the need to enhance the private sector involvement to promote sustainable development in the country. CDM is designed to assist sustainable development effort of developing countries and in this context the involvement of the private sector has got paramount importance. The private sector can participate as CDM project developer, e.g, Ethan Bio fuel; Project Participant, e.g, African Power Initiative in Messobo Cement Factory-Partial fuel switching CDM Project. Cement factories in the country have huge potential to participate as CDM project developers.

The presenter discussed on the critical challenges of Ethiopia for the promotion of carbon finance and response measures to address the following challenges.

- Lack of upfront financing
- Policy barrier
- Limited technical capacity and
- Global uncertainty of CDM to continue as a carbon finance mechanism in the context of compliance market

As response measures to alleviate capacity building related challenges, the presenter highlighted some of the activities of CDM National Capacity Building Project office in the UNDP-Ethiopia as follows:

The first phase of the project was dedicated mainly in awareness raising activities about CDM while the second phase is focusing on assisting stakeholders to develop concrete CDM projects. To date, the project produced various knowledge products, built the capacity of Designated National Authority through the development of website. There are also various efforts of developing concrete CDM Projects of which Repi-Methnae capturing CDM project is the most advanced one.

In his concluding remark the presenter pointed out that even though we are not clear on the future direction of carbon finance market under the compliance market, there is high potential in voluntary market such as European Carbon finance Scheme. Therefore, we need to continue our capacity building efforts and make use of the existing clean investment endeavors of the country for attracting carbon finance by encouraging the private sector through various incentive mechanism and putting in place required policies such as feed in tariff.

5. Re view of the draft products titled *“Manual for Measurement and Monitoring of Carbon Stocks in Forests and Other Land Uses in Ethiopia”* and *“Ethiopian Forest Resources: Current Status and Future Management Options in view of Access to Carbon finances”*:

The presenter explained the main purpose of the study which was to develop a user friendly manual for carbon measuring and to appraise current knowledge on forest resource base, forest resources management status, and to explore options for promoting multiple objectives of forest management through the intermarriage of innovative forest management approaches and emerging carbon finances. The presenter discussed about the forest resources of the country in relation to carbon trading and enumerated the following relevant facts:

- The carbon potential of Ethiopia is estimated at 2.76 million tones. This has proven to some people who considered Ethiopia as the carbon tower in the Horn of Africa. In this regard, about 80% of the total carbon stock of the country is found in the low and bush lands while 20% in the high forests.
- Though Ethiopia used to own large forest resources, currently, it is experiencing high scale of deforestation and has been losing about 55.2 million tones of carbon from woody vegetation annually.

- Through REDD, Ethiopia could generate close to 660 million USD annually if the country decides to stop deforestation. This is nearly the same amount to what Ethiopia generates from the coffee export.
- Ethiopia has vast land which is close to 36 million hectares for CDM AR projects. It was therefore convincing that the country has very good prospects for generating carbon finance in the forestry sector.

The manual was therefore developed to:

- help in estimating the national carbon stocks which is important for promoting carbon financing including REDD;
- serve as a tool which is nationally appropriate and user friendly tool which also takes into account local capacity with lower transactions costs;
- have accurate, reliable and verifiable carbon estimates that meet international standards; and be applicable to sustainable forest management.

The presenter further demonstrate what and how to measure carbon through carbon pools and the steps carried out in carbon inventory. In order to tap into carbon finances, the followings have to be put in place:

- Strong forestry institutional arrangement with adequate capacity
- Proper policy and legislation
- Access to finance
- technical capacity including:
 - Hardware and software e.g GIS and Remote Sensing Centre , high speed Computers, GPS, other forest inventory equipment and
 - Critical mass of skilled human power

This particular presentation was concluded by explaining the current challenges in the area of forest and related issues:

- **Biomass fuel vs forest conservation challenge:** There is a concern that demand and supply of biomass does not much. Ethiopian household energy is predominantly derived from biomass, which put tremendous pressure on the biomass resource of the country
- **Investment and settlement vs forest development policies:** Both investment and settlement are developed in the forest and wood land areas. These emerging opportunities decrease the value of forests including attracting of carbon financing from REDD and CDM.
- **Absence of institution in the forestry sector:** Even though there are some efforts by the National Regional States to put in place institution for the Sector, there is an urgent need to establish strong institutional set up for the forestry sector both at the Federal and Regional level in order to make use of the carbon finance opportunity in the country

6. Key points from Q & A session on carbon measurement and monitoring in forest

- As described in the draft products, participants commented on the definition of REDD and the forest itself. They requested clarification how REDD is considered in the manual- - REDD+ or REDD ++ or REDD only. The researcher clarified that the manual considered REDD in general. With regards to the definition of forest,. The presenter recommended that concerned institutions should give clear definition of forest.

- Question was raised about the composition, extent and variability of the forests that are considered in the study. This was asked in relation to carbon emission which differs from one type of forest to another. The researcher explained that he used forest classification by woody bio mass inventory strategic planning project which divide them into seven groups.
- Participants requested for clarification and scientific reasoning for the higher ratio of carbon stock within bushes and small shrubs than in the high forests. The explanation given by the researcher was that the study has taken this issue in terms of areal extent which is 20 to 25 million hectares as compared to 4 million hectares of high forests. The study therefore considered the potentials of these forest types to measure the national carbon stock of the country.
- Participants asked which growth model the study considered as there are no data in the country showing such model for at least major indigenous and exotic tree species. The researcher responded that he used existing and basic data resource available in the country. He also suggested that these data which is attached to the study report has to be updated and completed for future use.

7. Recommendations and participants' views

- In the context of sustainable supply of bio mass, participants recommended the need for conducting further study to identify the demand and supply of coffee husk in light of competing demands. This will help to look into other alternative energy sources besides coffee husk. Moreover, given the Growth and Transformation Plan of the government, which also aims at increasing the production of cement, the participants suggested to conduct an in-depth study on the current and future energy requirement of cement industries. Energy demand of this industry will continue to escalate. Particularly a study is needed on the amount of coffee husks and other sources of bio masses that will be needed in the coming five or ten years to satisfy the energy demand of the cement industries.
- Though Ethiopia has a huge potential in terms of hydropower, it was very well noted that developing hydropower should go hand in hand with the development of other energy resources to make the energy mix optimum. and meet the existing and the future energy demand.
- It was well noted to do a further research and cost benefit analysis on bio mass collection and carbon accounting. Some participants were skeptical on the suggestion to switch from the existing energy sources to that of biomass. In this context, recommendation made to the industries as well as UNDP to keep an eye on further research and assessment with supporting data which can be used as an evidence for negotiation..
- Based on other countries experience, participants suggested to establish coordination mechanism in the biomass sector to ensure the supply chain. This includes a massive storage areas and proper management to avoid monopolized supply. They also suggested UNDP to continue its role in the area of knowledge and experience sharing from other countries.
- Regarding the utilization of urban waste for bio-mass energy, participants appealed to consider pollution control strategies and pollution management technologies. This is because high pollutants could be generated as a result of burning urban wastes.

8. Conclusion

As indicated in the background section of this report, this forum was organized to present best practices on partial fuel switching from fossil fuel to biomass in the cement industries. In addition, the event also served as a launching and showcasing related knowledge products that came out of similar research studies and experts discussions. Setting the background for a resultant discussion on the topic ***“Harnessing Bio Carbon Opportunities in Ethiopia: showcasing best practice and viable carbon investment prospects”***. The forum presented an opportunity to debate on the theme of the meeting and benefited from the wide and experienced participants.

The forum was concluded by proposing a further E-discussion on the key issues raised during the discussion sessions. Some of the issues need a follow up actions such as conducting further and similar studies to finalize and formalize the key findings and recommendations. In her closing remarks Ms Alessandra Tisot, UNDP Resident Representative a.i, commended to pursue E-discussion using the Teamworks’ (<https://undp.unteamworks.org>) space already created for the purpose. The space will also be used as a knowledge repository of related materials in the future including these new knowledge products, the presentations and the speeches that came out of this forum.

Teamworks - a secure Web 2.0 social networking platform that enables UN organisations and their partners to leverage the collective knowledge of communities, individuals, programmes and projects.

Links to the forum materials (presentations, knowledge products and speeches)

<https://undp.unteamworks.org/node/88991>