

# Proceedings

## Stakeholder Consultation Workshop to Strengthen Local Manufacturing of Biomass Gasifier Focusing Thermal Energy Needs of MSME Sector



**May 22, 2014**

**Addis Ababa, Ethiopia**

## **Stakeholder Consultation to Strengthen Local Manufacturing of Biomass Gasifier Focusing Thermal Energy Needs of MSME Sector**

The stakeholder consultation workshop on “Strengthening local manufacture of biomass gasifier, focusing thermal energy needs of MSME sector” was organized by TERI along with HOAREC&N supported by SDC, at the centre of HOAREC&N, Gulele Botanical Gardens, Addis Ababa, Ethiopia on 22<sup>nd</sup> May 2014. The objective of the workshop was to disseminate TERI’s biomass gasifier technology in the MSME sector of Ethiopia by strengthening local manufacturing and capacity building through private/public partnership. The workshop was content with the participation of 44 representatives from different fields comprising of ministries, sheet metal fabricators and various industries.

### ***Inaugural Session***

Workshop began with welcome address of **Mr. Amit Kumar, Director, Energy and Environment Technology Development Division, TERI and Adjunct Faculty, TERI University**. Mr. Kumar mentioned that in order to have rapid economic growth industrial growth is required and for industrial growth energy is one of the essential factors. As the conventional fossil fuels are not infinite, there is a need to look into alternative sources of energy like biomass, solar, wind etc. He indicated that, as biomass is being traditionally utilizing for many years there is a perception that the consumption of biomass for energy conversion is not innovative. But there are some new technologies available, which can use biomass for efficient energy conversion, he added to the point. These technologies can convert solid biomass into fuels for furnaces etc. Mr. Kumar conveyed that, TERI intends to introduce one of such technologies there, named biomass gasification. He mentioned that biomass based gaseous fuels are just like Compressed Natural Gas (CNG) and it can be applied for several thermal energy applications.



Mr. Kumar enlightened that TERI is working with SDC for last two decades in the area of rural electrification and energy solutions for MSMEs. He emphasized that as these two are the most neglected areas, TERI – SDC decided to work in these areas. In general, large industries have capacities to access cleaner technologies but MSMEs are facing challenges to access these kinds of technologies. TERI works with large industries also but wants to support MSMEs

by providing alternative resources

Mr. Kumar highlighted that TERI's experience on biomass utilization to provide energy solutions for the MSMEs in India would be shared and that experience could be replicated in Ethiopia. He mentioned that aim of this workshop is to discuss about biomass gasification technology and to get the feedback from the participants



**Mr. Manfred Kaufmann, Deputy Director of Cooperation/Programme Manager, Global Programme Water Initiative SDC,** delivered the opening remarks. Mr. Kaufmann mentioned about TERI – SDC partnership since 1999 in the area of biomass gasifier development for rural electrification and to provide energy solutions for MSMEs in India. He indicated about TERI – SDC Biomass Project (TSBP), which was started in 2012 for the dissemination and technology transfer of biomass gasifiers in developing

countries through South – South Knowledge Transfer (SSKT). He indicated that Ethiopia is one of the focus countries of this project and this knowledge sharing and technology transfer will provide local solution for local problems.

On behalf of Dr. Araya Asfaw, Executive Director, **Dr. Almaz Tadesse, Deputy Director of Social and Ecological Partnership Programme, HoA-REC&N** delivered the inaugural address. Dr. Tadesse mentioned that south- south linkages are very important for knowledge transfer. She added that, this project can contribute significantly to deal with the growing energy demand of the country. She expressed HoA-REC&N's interest to continue the collaboration with TERI for the success of this project.



## Technical Session



After the inaugural session, a background presentation to set the theme of “TERI biomass gasification technology, an energy solution for MSME sector” was given by **Mr. N K Ram, Fellow, TERI**. He started the presentation by giving a brief introduction about biomass gasification technology and its potential advantages. He has give an overview of TERI’s R&D activities on biomass gasification. Mr. Ram has shared a few case studies on TERI’s biomass gasifier for industrial applications. He

explained TERI’s experience on providing thermal energy solution for industries like textile dyeing, rubber industries and foundries across India.

He extended the presentation explaining TERI’s experience on rural electrification through biomass gasifiers. He also mentioned about TERI’s experience on developing biomass gasifiers for cold storage. Mr. Ram detailed about TERI – SDC Biomass Project (TSBP) and discussed the expected outcomes of the project.

The background presentation was followed by question and answer session.

Mr. Amare Seifu Bedassa, Director for Technology Transfer and Business Development, Food Beverage and Pharmaceuticals Industry Development Institute, enquired about the key disadvantages of the gasification technology (if any). By addressing this question **Mr. Sunil Dhingra, Senior Fellow and Internal Resource Advisor, TERI** explained that, generally it is very difficult to convince the people about this technology and hence difficulty in getting operator acceptance is one of the disadvantage. Mr. Dhingra added that moisture content in the biomass is also a critical factor in this technology and if the moisture content is more than 15%, the system cannot produce combustible gases. He indicated that density of the feedstock is also critical for the successful operation of the system. He also explained the major challenges in the gasifier based power generation systems such as waste water generation, production of tar and particulate matter. He pointed out that TERI’s new biomass gasifier technology, which is a two stage system, successfully overcame the problem of waste water generation.

Further, Mr. Bedassa was interested to know about the possibility of attaining a temperature of 1400° C by using this technology and the type of material required for the manufacture of such systems to provide high temperature. Mr. Dhingra replied that, in order to attain

high temperature like 1400° C the system can be either operated in dual fuel mode or co firing also can be considered. Regarding the material for the manufacturing of the gasifier system, Mr. Dhingra indicated that, the local availability of potential material has to be assessed and based on that, decisions can be taken.



Participants raised the question about quantity of biomass required for the power generation for 100 households using biomass gasifier. Mr. Dhingra clarified that in order to produce one unit of electricity, only 2 Kg of biomass would be required. There were questions about advantages of gasifier technology in comparison with other renewable energy technologies

such as biomethanation , solar, wind etc. and affordability of this technology in household and community level. Mr. Dhingra elaborated that for individual households this technology would not be feasible and in such cases solar energy would be viable. At the same time at community level like in industrial clusters biomass gasifiers have potential viability.

Mr. Dhingra addressed the question about adverse environmental effects of biomass consumption in this technology, by explaining the fact that this technology would be a device to reduce the pressure on available biomass which has been utilizing very inefficiently in the existing situation. He detailed that, for this technology, first choice of feedstock would be agricultural residues like coffee husks. Apart from that, waste lands in the country can be utilized for energy plantations. Mr. Amit Kumar added to this point that species like *prosopis* could be utilized for this technology in a manageable fashion as the invasion of *prosopis* is a challenge in the country.

By responding to the question about, required inputs for the implementation of this technology Mr. Dhingra elaborated that moisture content and density of the biomass are two critical factors for the implementation of this technology. The density of the biomass could be increased by briquetting.

The participants were also interested to know about the cost of this technology. On considering Indian scenario Mr. Dhingra quoted that for the installation of a 10 kW plant, it would cost around 1 million rupees.

Followed by this question and answer session, **Mr. Asres W/Giorgis, Director Alternative Energy Technology Promotion Development and Dissemination, Ministry of Water & Energy**, has given a presentation on “Some Highlights of Bio-Energy Policy”. He shared all the renewable and non renewable resource potential of Ethiopia including hydropower, wind, geothermal, solar, biomass, coal and natural gas. Mr. Giorgis



highlighted that there are around 1120 million tons of exploitable forest residues and 15 – 20 million tons of agro-residues are available in the country. He mentioned that bio energy consumption in the country accounts for 89% of total energy consumption and among the bio energy resources fuel wood accounts for 67% of the total.

He highlighted key bioenergy issues in the country, which are;

- High Degree of Dependence on Biomass
- Unsustainable use of Biomass
- Difficulties in biomass production, transportation and utilization
- Lack of regulations and standards
- Lack of reliable and up dated data
- Lack of distribution system
- Low technological transfer and localization
- Low participation of investors
- Lack of access to financing

He also shared the main energy policy goal of the country to ensure the availability, accessibility, affordability, safety and reliability of energy services in order to support accelerated and sustainable social and economic development and transformation of the country.

He has shared three basic objectives and instruments of bio energy policy in the country. For the first objective, ensuring sustainable forest management, the policy instruments like, promotion of integrated management of forest resources, encouragement of plantations by

private owners and communities, promotion of multi-purpose tree planting around homesteads in rural areas, strengthen R&D for fast growing energy trees like Bamboo etc., are being implemented. In order to meet the second objective, enhancing diverse and efficient bio-energy, the policy is supporting promotion of improved bio-energy conversion technologies such as utilization of agro-industrial waste for thermal and power applications, biogas production from urban and poultry wastes. The policy is also offering favorable environment for private investors working in bio-energy production by providing supports like land, infrastructure, security, and tax relaxation. The policy is encouraging development of local capacities for the manufacture of bio energy equipment. The third objective is to ensure bio energy supply security.

Mr. Giorgis put forward some opinions and recommendations in terms of biomass supply and bio energy technologies. He suggested that programs for biomass resource enhancement can be implemented. He recommended that efforts should be made to change the traditional way of bio-energy utilization by promoting innovative and efficient technologies for biomass utilization.

Ms. Tsige Meried, Director, SME Mainstreaming Unit, Ministry of Water & Energy, has



given presentation on “thermal Energy Requirements of MSME Sector in Ethiopia. She has shared MSE development strategy of Ethiopia. Major objectives of MSE development in the country are;

- Bringing balanced development by improving income of the society and ensure an even distribution of wealth and poverty reduction
- Enabling the sector to be competent, facilitate economic growth and lays foundation for industrial development
- Expanding the sector’s development in urban areas by creating developmental investors

She has shared the MSE definition of the country. The focus sectors of MSE in the country are manufacturing, construction, trade, service and agriculture. Among manufacturing sector, textile, leather, food processing and beverage, metal works and engineering, wood works and agro-processing are major areas.

She indicated that the MSE development strategy of the country providing support for human capacity development, technology development, market development and loan and finance services.

Ms. Meried mentioned that the Country has high potential for alternative energy sources (Biomass, Biogas, Bio-fuel, Solar, Wind and Hydro) and for the efficient utilization of these resources, conversion technologies need to be improved.

### **Panel Discussion**

Panelists:

1. Mr. Sunil Dhingra, Senior Fellow, TERI – Moderator
2. Mr. Asres W/Giorgis, Director Alternative Energy Technology Promotion Development and Dissemination, Ministry of Water & Energy
3. Ms. Tsige Meried, Director, SME Mainstreaming Unit, Ministry of Water & Energy
4. Mr. Amare Seifu Bedassa, Director for Technology Transfer and Business Development, Food Beverage and Pharmaceuticals Industry Development Institute, Addis Ababa



Mr. Dhingra started the discussion by putting forward three important points for discussion, which are availability of biomass resources, energy need assessment and policy/regulation



in the country for bio energy. He mentioned that it is necessary to understand the types and sources of biomass available in Ethiopia such as forest residues, agricultural residues etc. Biomass resource potential from waste lands also needs to be identified. He pointed that type of biomass consumption in different sectors (both commercial and industrial) also have to be discussed. Mr. Dhingra indicated that the issue of biomass management in the country and status of biomass briquetting are also should be discussed.

Mr. Dhingra emphasized that current energy requirements of the MSE and commercial sectors of the country are to be understood. He mentioned that the role of renewable energy, in particular bio-energy in Ethiopia also to be discussed.

Mr. Sunil Dhingra put forward the question about the prospects of manufacturing industries of the country to take biomass gasifier manufacturing, deployment, service and support. He highlighted that the existing biomass gasifier experience and current manufacturing capacities of the country are also need to be discussed.

Mr. Asres W/Giorgis detailed that Ethiopia has adequate biomass resources. He mentioned that coffee husks can be contributed significantly towards resources. Agro residues are also available in huge quantity as this sector is growing fast in the country. By products from bamboo based furniture manufacturing also can be considered as potential biomass resource. Mr. Giorgis emphasized that serious actions has to be taken for the popularization of innovative technologies like biomass gasification. From the government side, land, tax exemptions etc. can be provided for the promotion of these kinds of technologies. Presently Ethiopian government promotes the transformation from cultural sector to industrial sector and hence it is the right time for the dissemination of these kinds of technologies, he added.

Ms. Ms. Tsige Meried mentioned that energy demand of MSE sector in the country is growing fast and most of the MSEs consume high percentage of biomass. Mr. Dhingra enquired that whether MSE development program of Ethiopia could support and biomass gasifier demonstration project in the country and by answering to this question Ms. Tsige conveyed that ministry is ready to support these kinds of activities.

Mr. Amare Seifu Bedassa shared the problem of difficulty in attaining temperature of 1400 °C for the manufacturing of ceramic material called *terracotta* and expressed his expectations to solve this problem using gasification technology. Mr. Dhingra conveyed that generally the temperature resistance of the material used for biomass gasifiers is 1000 °C and further research activities are underway to enhance the temperature resistance.

By answering to the question about gasifiers efficiency in wood consumption, Mr. Dhingra explained that by installing biomass gasifiers , at least 50% of the fuel wood consumption can be reduced. Participants were asked about possibility to develop any prototype for the demonstration of this technology in Ethiopia. Mr. Dhingra stated that TERI does not have

the resources to demonstrate the technology over there and in this situation, only design can be shared. If the government can support by providing resources, the demonstration also can be done, he added.

One of the participant enquired about the affordability of this technology by MSEs as most of them started enterprises by taking loans from banks etc. Mr. Dhingra responded that this technology is really affordable as it can reduce the fuel cost up to 70 – 80% by replacing fossil fuels and hence payback period of this technology is very short. Apart from that it can reduce 50% of fuel wood consumption. By reducing the energy cost and improving efficiency, this technology is highly affordable.

There were suggestion like, in case of difficulties in affordability of this technology by MSEs; they can be linked with financial institutions for the initial support.

### ***Way Forward***

After the workshop, a round table meeting was conducted in order to discuss the way forward. It was decided that, a clear agenda on activities for the next six months needs to be prepared. It was recommended that, as a first step, a need based assessment at ground level has to be conducted. There were suggestions for technology demonstration in the country beyond sharing the experience from India. As resources are not available for the hardware cost for technology demonstration, it was decided that a full - fledged proposal will be prepared in order to get fund and support from the Ethiopian government. It has been planned, after the need assessment, capacity building programmes and technology demonstration will be organised in parallel.

### List of Participants

| Sl.No | Full name               | Sex<br>M/<br>F | Organization   | Position/<br>Profession                           | Address<br>(Mobile/email)  |
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