

**Sardar Swaran Singh National Institute of Bio-Energy (SSS-NIBE)
Kapurthala, Punjab**

Subject: Minutes of Meeting of “Brainstorming Consultation Experts Meeting on Bio-energy Development: Technology Demonstration, Validation, Testing and Evaluation for Wide spread deployment” held on 23rd June, 2017 at Sardar Swaran Singh National Institute of Bio-energy (SSS-NIBE), Kapurthala.

Sardar Swaran Singh National Institute of Bio-Energy (NIBE) organized a day long “Brainstorming Consultation Experts Meeting on Bio-energy Development: Technology Demonstration, Validation, Testing and Evaluation for Widespread Deployment” on 23rd June, 2017 at NIBE, Kapurthala under the Chairmanship of Dr. B.S.Negi, Director General, SSS-NIBE, Kapurthala & Advisor, MNRE as per programme annexed at Annexure-I. The meeting commenced at 9.30 AM and continued till 5.30 PM. The theme of the “Brainstorming Meeting” was to prepare action plan for resource assessment, technology validation, testing, standardization and certification for making bio-energy an organized sector. Twenty eminent scientists, academicians & industrialists engaged in bio-energy research, technology development, promotion & business participated in the meeting. The list of participants is annexed at Annexure-II. The meeting preceded by visits to biofuel R&D and Testing Labs and Biomass Cookstove Test Lab where exchange of information in the areas took place.

Dr. Negi welcomed the experts and in his introductory address mentioned that the purpose of the meeting is to share experiences in R&D, technology, development and demonstration of Bio-energy technologies/systems and identify the ways and means for addressing the gaps including collaboration. He mentioned that MNRE has initiated the process of review of RD&D programmes for continuation in 13th Plan period and present meeting is an attempt toward focusing effort on strengthening RD&D programme including NIBE as a world class Institute for R&D, technology demonstration, technology validation, Testing & Standardization in Bio-Energy. In the context of biomass, Dr. Negi mentioned that around 8 GW biomass power has been installed in the country. In biogas, he mentioned that only 50 Lakh family sized biogas plants and around 400 biogas power (off-grid) projects with aggregate power generation capacity of 6 MW have been deployed in various parts of the country. The introductory address by DG, NIBE was followed by a brief presentation on “Role and Functions” of NIBE including the issues for Brainstorming Consultation Meeting by Dr. A.K. Sarma, Scientist ‘E’, SSS-NIBE, Kapurthala.

In technical session-I, Dr. H. N. Chanakya, IISc, Bangalore gave a presentation on “Biogas technology development for sustainable energy and agriculture development - Current Trends and Way Forward”. In his presentation Dr. Chanakya highlighted the technologies on Biogas production from various feed stocks and their utilization for heat and power

generation for rural applications. He also emphasized different drivers to promote the biogas technology in an economic way, including biogas spent slurry as bio-fertilizer and developing value added product such as lignin derivatives plant repellents and fibers, etc.

Prof V.K. Vijay, IIT, Delhi made a presentation on biogas technology development and evaluation for bottling and Bio-CNG applications. Prof. Vijay in his presentation described the advancement of technology for Bio-CNG Generation, biogas cleaning technologies, Standards on bio CNG and their practical applications. He highlighted the development and experiences of PSA, water scrubber and membrane technologies. He also showed some experience on field performance of a few technology demonstration projects on biogas purification supported by MNRE and highlighted the need of development and standardization of biogas purification systems for promotion of biogas for Bio-CNG generation. Sh. V.K. Jain, Adviser, MNRE shared the experience of MNRE on biogas generation and applications from waste to energy projects and concerns for performance measurements. Sh. G.L. Meena, Adviser, MNRE shared the experience in biogas developments and concerns for technology validation. Dr. S.P. Singh, DAVV, Indore mentioned that R&D in bio-energy should be supported in a big way so that the local energy requirements could be met utilizing local biomass resources. He also suggested that bio-energy resource assessment should be updated regularly and made available at one place.

Shri Hetalkumar T. Devmurari Kirloskar, Pune, made a presentation on Challenges in biogas engines for power generation. He showed some results of the success stories of Kirloskar made 100% Biogas Engine and integrated scrubbers in the ranges 2-4 KVA and 15-50 KVA for power generation. He also showed some performance data of power generation. It was discussed that performance evaluation of biogas plants and power projects is essential for biogas generation and power generation and also for scrubber and engine performance.

In technical session-II, Prof S. Dasappa, IISc, Bangalore made a presentation on developments in biomass resource assessment and thermochemical conversion: Current status and challenges. Prof. Dasappa presented how and why different Chemical, Bio-Chemical and Thermo-Chemical technology integration are so important for economic conversion of biomass to bio-energy. Prof. Dasappa in his presentation showed that CGPL in 2004-05 had prepared biomass resource atlas, which estimated biomass power potential of 19500 MW. He explained the need of updation of biomass resource assessment and documentation. He highlighted the gasification technology for conversion of biomass to bio-energy and mentioned that the gasification technology is highly useful for meeting thermal and power generation applications at local level. In the context of biomass resources available in Punjab, Prof. Dasappa explained that biomass gasifier based on paddy straw offers an attractive option for thermal and power generation applications at such locations in Punjab. Sh. G.P. Nagori, M/s Ankur Scientific Energy Technologies,

Vadodara shared the industrial experience on gasifiers manufactured by them. He informed that they are supplying gasifier of 2 MW capacity in domestic market and also exporting to the various countries. As regards testing, he mentioned that gasifiers are tested in their industry in the presence of buyers. He suggested that proper testing and standardization is needed for gasifier development.

Mr. Sameer Rege, Maihem IKOS Environment, Pune presented on Technology developments in Waste to Energy: A viable approach towards Swach Bharat Mission. He discussed and presented success stories of his industry in promoting potable model biogas technology from multiple feed stocks including municipal solid waste for biogas generation in varying capacities in various parts of the country. Dr. S.K. Puri, Chief Manager, IOCL shared that IOCL has set up biogas plants based on food waste at their establishment at Ludiana and the same is working satisfactorily.

Shri Snehasis Behera, Principal Scientist, CSIR (IMMT), Bhubaneswar made a presentation on Testing and evaluation of Biomass Cookstoves for clean cooking. He showed the process of testing of biomass cookstove as per BIS-2013 and emphasized requirement of standard testing laboratories for Biomass cook stove for maintaining quality. Dr. Nitin Labhsetwar of CSIR- NEERI has highlighted the benefits of improved cookstoves including the impressive returns in terms of health of environmental benefits.

In the concluding Session, detailed discussions on R&D, technology demonstration, validation, testing and standardization and training of manpower for proper installation, commissioning, operation and maintenance of bio-energy technology/systems were held. There was a strong view that bio energy needs to be given greater attention such that the same is utilized at local level to make rural/urban areas energy efficient and also fossil fuel free for their energy needs. It was extensively discussed that biogas projects need to be evaluated for their performance for validation of their capacities including power generation and also scrubber and engine performance evaluation. It was considered that a group of experts may be set up to study the characteristics of spent slurry from different feed stocks based biogas plants to bring out minimum standards in terms of slurry composition. The study will then be integrated with biogas generation technology for biogas promotion programme in the country. The following recommendations were made:-

1. Biomass resource assessment

- (i) Biomass resource assessment need to be updated and the data for each state may be updated and maintained at one plan. It was considered that this activity may be coordinated by NIBE.

2. Bio-methanation/Bio-gas technology

- (i) Technology development, validation, standardization & testing protocols for multiple feed stocks needs to be vigorously pursued at SSS-NIBE, which will help

MNRE for developing policy and programmes for wide spread deployment of bioenergy technology/systems.

- (ii) Standards and protocols are missing for all the areas of bio-energy. NIBE may take up field evaluation of biogas plants set up for Bio-CNG generation and for power generation including engines and scrubbers for developing test protocols and standardization for various applications.
- (iii) NIBE may maintain the status of technology development and cost economics and transfer of technology from R&D organization to Industry on its web.
- (iv) A collaboration between CGPL, IISc, Bangalore and Kirloskar should be taken up for development of 100% biogas engine of capacities 50-250 kW range.
- (v) NIBE may coordinate the activity on study of the characteristics of spent slurry from different feedstocks for deciding minimum standards in terms of slurry composition for bio-fertiliser.
- (vi) It was also considered that NIBE and BTDC, PAU may take up a collaborative work on paddy straw based biogas generation for comparison with gasification using paddy straw.

3. Bio-fuel (Bio-diesel, Bio-ethanol, Bio-butanol, Dimethylether)

1. Lignocellulosic Bio-mass should be studied properly for technology valorization for Bio-ethanol production.
2. Multiple routes may be adopted for Bio-mass conversion to useful fuel & chemicals production for economic pathway development.
3. Data Collection unorganized seeds, collection, storage & supply.

4. Gasification

1. Proper testing of gasification for thermal and power generation should be established.
2. CGPL, IISc Bangalore and NIBE should take up a collaboration project for development and demonstration of gasifier based on paddy straw for thermal and power generation applications.
3. Kirloskar may also manufacture scrubber and develop technology package integrating their engine with scrubber for biogas plant applications.
4. NIBE may take up projects on energy plantations at their campus.
5. It will be good idea for NIBE to send out RFP asking young students to apply for funding support to carry out bio energy applied research projects at NIBE. This could be in the form of a competition.
6. Thermal applications seem too good, but electrical applications are not found good at large.

5. Biomass Cook Store

1. Improved Biomass cookstove may be promoted.

2. Standards for biomass cook stove for PM 2.5 may be developed as presently PM 10 is measured. NIBE can coordinate this activity.
3. Field evaluations of improved cook stoves should be carried out to assess the benefits accrued in terms of emission reduction and efficiency. NIBE can coordinate this activity.

6. HRD

- (i) Exchange of visits of NIBE Scientists with other R&D/academic institutions should be done for exposure to development in the areas.
- (ii) NIBE should play vital role in trainings in bioenergy at all level.

The Meeting was ended with the vote of the thanks to the chairman and members.