



# BIOGAS FORUM - INDIA (BiGFIN)

(A Registered Society for Promotion of Biogas Technology in India)

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## E-Newsletter

January, 2011, Vol. II, No. 1



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## ***From the Editorial Desk***

It is both pleasure and privilege to be able to put this newsletter, earlier we covered biogas forum introduction, schemes and related articles. The newsletter is being an informal journal or periodical covering a different segment of biogas research and development and naturally has the advantage of taking a closer look of all events and activities on quarterly basis. The biogas forum newsletter is quarterly edition that propose to cover in some detail of biogas technology, Indian developments and forum events and activities. This edition of the newsletter is being taken out with the hope and conviction that people interested in biogas will enjoy reading it, remain connected to, and be well informed about the happenings about biogas research through this newsletter. In this issue the main concentration is on status of biogas in India, “Biomethanation – Upscaling, Challenges and Opportunities” workshop in Delhi International Renewable Energy Conference (DIREC) 2010, International Training Programme on Biogas Production, Purification and Power Generation for Commercial Technology Packages” organized at IIT Delhi during 25-29 October, 2010. We hope the newsletter still in its stage of infancy and will help to keep the biogas forum in close touch with their eventful life. We once again invite suggestions for further enhancement of the quality and standard of this newsletter in any area that has scope for improvement.

Yours own

Dr V. K. Vijay  
Gen. Secretary and Editor

### **NOTE:**

**1) Biogas Forum is in the process of preparation of database in India related to biogas consultants, biogas plant manufacturers, equipment suppliers, technology providers, implementing companies etc. It is requested to send detailed information with profile to be included in the data base which will be published in the Forum news letter.**

**2) A special issue of the newsletter will be brought out on various Indian publications related to biogas technology i.e., books, monograms, technical reports, booklets, leaflets, extension materials, brochures etc. Kindly send a copy of these materials alongwith a brief abstracts of the publications to the undersigned by 28<sup>th</sup> February, 2011.**

## Status of Biogas Programmes in India

Dr. A.R. Shukla, Advisor (Bioenergy) and Mr. A.K. Dhussa, Director  
Ministry of New and Renewable Energy, Government of India, New Delhi

### Introduction

For promotion of indigenously developed simple-to-construct and easy-to-operate family type biogas (gobar gas) plants, a Centrally Sponsored Scheme -National Project on Biogas Development was launched in 1981-82. It was renamed as '**National Biogas and Manure Management Programme**' (NBMMP) in 2002-03. Since inception 4.27 million family type biogas plants have been installed in India. Dissemination of medium and large size biogas plants are being taken up through '**Biogas based Distributed/ grid Power Generation Programme**' (BPGP) and '**Energy Recovery from Urban & Industrial Wastes Programmes**' during 2005-06. During the year 2008-09, a new initiative has been taken for "*Demonstration of an Integrated Technology-package on medium size Biogas-Fertilizer Plants (BGFP) for Generation, Purification/ Enrichment, Bottling and Piped distribution of Biogas towards harnessing 'Near Total Potential of suitable Biomass in Rural Areas'*". In addition, Ministry continues to support R&D and technology development projects on all aspects of biogas generation and applications, bio-fertilizer production and its application since 1981-82. Various Programmes for Biogas and fertilizer generation and its utilization initiated by this Ministry are as follows:-

1. National Biogas and Manure Management Programme (NBMMP)
2. Biogas Based Distributed/ Grid Power Generation Programme (BPGP)
3. Recovery of Energy from Industrial Wastes
4. Recovery of Energy from Urban Wastes
5. Demonstration of Integrated Technology Package on Biogas-Fertilizer Plants (BGFP) for Generation, Purification/ Enrichment, Bottling and Piped Distribution of Biogas
6. Establishment of Business Model for Demonstration of an Integrated Technology Package for creation of smokeless villages using biogas/ bio-energy systems and meeting 'Life-line Energy' envisaged in 'Integrated Energy Policy'
7. R&D and technology development in biogas, bio-fertilizer and bio-energy refinery

### Energy Recovery from Urban and Industrial Wastes

The increasing industrialization, urbanization and changes in the pattern of life, which accompany the process of economic growth, give rise to generation of increasing quantities of wastes leading to increased threats to the environment. Biomethanation technology has evolved as a robust and viable technology for not only treatment of organic fraction of wastes generated in urban and industrial sectors for safe disposal but also for recovery of energy in environmentally benign manner besides producing organic manure. In view of this, biogas plants based on livestock waste, urban & industrial wastes as well as agricultural residues or co-digestion of a mix of these wastes are being promoted by the Ministry of New and Renewable Energy.

### Progress

Some of the notable biogas projects based on urban wastes installed in the country include a 1 MW project based on cattle dung at Ludhiana; 3.5 MW installations for generation of power from biogas at sewage treatment plant at Surat; a 150 kW plant for vegetable market and slaughterhouse wastes at Vijayawada, and a 250 kW plant for

vegetable market wastes at Chennai. Besides, about 65 projects for recovery of energy through biomethanation of a variety of industrial wastes with an aggregate capacity of about 86 MW have so far been installed. Out of these, projects with an aggregate capacity of 65 MW have been set up for the generation of power from waste generated by various industries such as distilleries, pulp & paper, starch, poultrys, food processing, whereas the remaining projects with an aggregate capacity of about 20 MW<sub>eq</sub> have been set up for generation of biogas from liquid and solid wastes generated in various industries. The biogas, so generated, is being utilized for meeting heat / steam requirements by the industries for their captive use. In addition, about 15 projects for the recovery of energy from various wastes are under installation. Notable among these are the two projects of 8 MW capacity based on agricultural wastes/residues.

### **Programme for Promotion of Biogas Projects**

The Ministry of New and Renewable Energy is promoting biogas plants under the Programmes on Energy Recovery from Urban and Industrial Wastes. The quantum of financial assistance being provided by the Ministry and other support measures being extended for setting up projects on energy recovery from a variety of urban waste is as under:

#### **Financial Support for Various Types of Biogas Projects**

- Power Generation from Urban Wastes and Agricultural Wastes: **Financial assistance @ 50% of project cost subject to upper limit of Rs. 3 crore per MW is provided for projects based on biomethanation technology for power generation from cattle dung, vegetable market waste, slaughterhouse wastes, night soil and any other urban or agricultural waste. In case of the projects for generation of only biogas for thermal application, the financial assistance is limited to Rs. 1.0 crore / MWeq (i.e. biogas production of 12000 cu.m / day).**
- Power Generation from Urban and Agricultural Wastes: **Financial assistance @ 30% of project cost subject to upper limit of Rs. 3.0 crore / MW for projects based on biomethanation technology for power generation from a mix of cattle dung, vegetable market and slaughterhouse wastes along with agricultural residues and wastes.**
- Biomethanation of Industrial Wastes: **Rs. 1.0 crore / MWeq. (12000 Cu.m. biogas per day) for low energy density and difficult industrial wastes (i.e. dairy, tannery, slaughterhouse, sugar industry, bagasse wash, textile, paper and pharmaceutical industry waste. The rate of assistance is Rs. 0.50 crore/ MWeq. for other industrial wastes.**
- Power Generation from Biogas Generated at Sewage Treatment Plants: **Financial assistance @ 40% of the project cost subject to a maximum of Rs 2.0 crore/MW for projects for generation of power from biogas being produced at Sewage Treatment Plants.**
- Power Generation from Biogas Generated from Industrial Wastes: **Rs. 0.20 crore / MW for boiler and steam turbine configuration and Rs. 1.00 crore / MW for biogas engine / turbine configuration**  
**Some of the other support measures taken for promotion of biogas-based projects are given below:**
- **Fiscal Incentives and Concessions:** Biogas projects installed for power generation are eligible for the exemption from payment of customs duty on import of equipment, and

excise duty for procurement of indigenous goods and equipment. Concessions in payment of Income Tax are also extended for such projects.

- **Provisions in the Electricity Act 2003:** Some of the provisions contained in this act for promotion of renewable energy projects including biogas based projects are given below:
  - Open access to grid
  - Preferential tariffs by State Electricity Regulatory Commissions
  - Targets for Renewable Energy power
  - Captive generation decontrolled

In addition to the above, for enlarging the biogas programme, the Ministry of New and Renewable Energy is also getting

- Preparation of best practices brochures for dissemination of information about success stories, technology and equipment for different waste sectors
- Thrust on co-digestion of mix of various waste streams

### **A Few Success Stories on Biogas in India**

A number of biogas projects have been installed for a variety of waste substrates over the last few years for demonstrating the applicability of biogas technology for energy recovery from wastes and treatment thereof. Brief write-ups on some of the path breaking projects are given below:

#### ➤ *1 MW Power Plant Based on Biogas Generation from Cattle Dung at Ludhiana*

The project owned by Punjab Energy Development Agency (PEDA), Chandigarh, commissioned in the year 2005, continues to be one of the trend setting projects in the country. This is the first project in the country where a state-of-the-art technology for biogas generation from such wastes has been demonstrated at a large scale. The excellent performance of the project is leading development of a number of initiatives in various parts of the country for setting up similar projects. This project was adjudged as the 'best green project' by Asia Power at Bangkok in the year 2007.



➤ *Bio-methanation for Treatment of Solid Waste at Slaughter House in Andhra Pradesh*

The project was set up for biogas generation from about 60 tpd of solid waste produced in a slaughter house handling about 1500 buffaloes and sheep per day in the year 2002. About 2600 m<sup>3</sup> biogas is generated per day besides about 7 tpd of rich organic manure. Biogas generated from the project, set up at a total cost of about Rs.3.75 crore has provided a means of slaughterhouse waste disposal in economically viable and environmentally benign manner.



➤ *Biomethanation Plant for Treatment of Bagasse Wash Water in Tamil Nadu*

The first ever projects of its kind, set up for treatment of wastewater generated from washing of bagasse, has turned out to be a money spinner for Tamil Nadu Newsprints and Papers Ltd., Karur. The project with a capacity of generating about 16000 m<sup>3</sup> biogas per day replaces about 8000 litres of furnace oil a day against the consumption of sizeable quantum of energy for treatment of this wastewater in the past. The success of this project has been a revolution for the entire paper industry based on bagasse and wheat/paddy straw. While this paper mill has expanded the capacity of their bagasse wash water treatment plant by adding another unit, several other paper mills are setting up projects for biogas generation from bagasse and wheat/paddy straw wash water.



## **Biogas Based Distributed/ Grid Power Generation Programme (BGP)**

Realizing that Biogas based power units are a reliable decentralize power generation option, the Ministry has launched another programme on **Biogas based Distributed/ Grid Power Generation** from 3 KW to 250 KW in January 2006.

It aims at providing electricity to individual/ community/ grid. The projects are taken up by any village level organization, institutions and private entrepreneurs in rural areas for sale of electricity to individual/ community/ grid etc. on mutually agreeable terms. The programme is implemented through State Nodal Departments/ Agencies of the states/ UTs, KVIC, institutions and others.

Pattern of Central Financial Assistance for Biogas Based Distributed/Grid Power Generation Programme is given below:-

<b>Power generating capacity</b>	<b>Biogas plant capacity</b>	<b>CFA/subsidy limited to the following ceiling or 40% of the cost of the system whichever is less</b>
3 -20 kW	25 cu. m to 85 cu. m	Rs.40,000 per kW
>20 kW to 100 kW	Any combination of above plants or alternate capacity /design	Rs.35,000 per kW
>100 kW to 250 kW	Any combination of above plants or alternate capacity / design	Rs.30,000 per kW

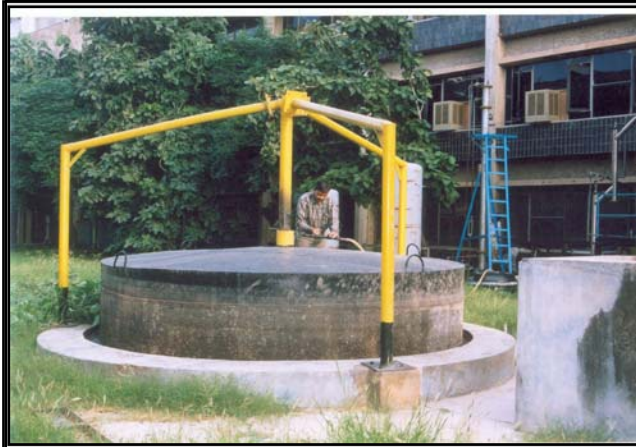
Since inception 210 nos. of projects with aggregated power generation capacity of 2.34 MW having cumulative biogas generation capacity of 22797 m<sup>3</sup> have been sanctioned. 74 nos. of these plants with 0.512 MW aggregated power generation capacity have been installed upto March 2008.

In the year 2009-10, 96 nos. of plants having aggregated capacity of 1.4385 MW have been sanctioned in 12 States. A tentative target of 4.5 MW for the year 2010-11 is envisaged. In the current year 2010-11, 40 nos. of projects with aggregated power generation capacity of 399 KW having cumulative biogas generation capacity of 3385 m<sup>3</sup> have been sanctioned upto June 2010. The plants sanctioned in 2009-10 and 2010-11 are under installation.

## **Demonstration of Integrated Technology package on Biogas-Fertilizer Plants (BGFP) for generation, Purification/ Enrichment, Bottling and Piped Distribution of Biogas under Technology Demonstration of New RDD&D policy of MNRE**

During the year 2008-09, the Ministry took up a new initiative to demonstrate an Integrated Technology-package in entrepreneurial mode on medium size (200-1000 cum/day) biogas-fertilizer plants (BGFP) for generation, purification/enrichment, bottling and piped distribution of biogas. Installation of such plants aims at meeting stationary and motive power, cooling, refrigeration and electricity needs in addition to cooking and heating requirements. There could be a huge potential of installation of medium size biogas-fertilizer plants in various villages of the country. Under the demonstration phase, the Ministry is providing at central financial assistance of 50 percent of the cost (excluding cost of land) for a limited number of such projects for implementation following an entrepreneurial mode. Balance 50% of the cost of the project is required to be invested/ mobilized by the entrepreneur/developer. However, at least 20% of the cost of the project is to be met by the

entrepreneur/ user agency in case loan is availed from banks/ financial institutions including NABARD, IREDA and KVIC.



**Biogas Plant**



**Biogas Enrichment Unit**



**Biogas High Pressure Cylinder and Compressor**



**Enriched Biogas Operated Three Wheeler Lugga Carrier**

**Biogas Enrichment and Bottling Technology Developed by IIT Delhi**





So, for 11 BGFP projects with aggregate capacity of 8700 cum/day have been sanctioned in 8 States, namely Gujarat, Karnataka, Punjab, Chhattisgarh, Haryana, Maharashtra, Rajasthan and Bihar by the MNRE for Implementation during the year 2010-11 and envisaged likely to be completed during the current year.

## **Biogas Related Activities in India**

### **a) Indian Biogas Delegation visited Sweden during 29<sup>th</sup> August-4<sup>th</sup> September, 2010**

#### **Introduction & Purpose of the Visit**

Demonstrated by the recently signed MoU on Renewable Energy, India and Sweden develops the cooperation between the countries within renewable energy in general and waste-to-energy/biogas in particular. The local conditions prevailing in the two countries have resulted in development of different kind of ideas and technologies, based on the same principles. Still a general conclusion is that great technology development potentials are available should these experiences, ideas and competences be combined.

In order to further elaborate on this conclusion, with the aim to establish a pilot plant based on such joint cooperation between the two countries, a pilot project preparation programme has been introduced. The main location for the visit was Helsingborg in southern Sweden. The programme included study visits to manufacturers, research institutes and biogas production facilities, presentations by authorities and companies in the field of biogas technology and workshops.

#### **The Main Objectives were:**

- Waste to Energy,
- Development of Biogas Technology,
- Combining Swedish and
- Indian Experiences and Competence.

## **Following Members were Part of Delegation from Indian Side for Sweden Visit:-**

1. Dr. A.R. Shukla, Advisor, MNRE, Government of India
2. Sh. A.K. Dhussa, Scientist 'F', MNRE, Government of India
3. Sh. M.L. Bamboriya, Scientist 'F', MNRE, Government of India
4. Dr. V.K. Vijay, Coordinator, BDTC, IIT Delhi
5. Sh. Balour Singh, Director, Punjab Energy Development Agency (PEDA)
6. Sh. Vishwas Gokhale, GITS Associates, Pune
7. Sh. Shesh Ram Singh, Executive engineer, Delhi Jal Board (DJB)
8. Sh. T.R. Thomas, Joint Chief Controller of Exposures, Petroleum, Explosive and Safety Organization (PESO), Nagpur
9. Sh. Sanjay Sharma, PSA Nitrogen Limited, New Delhi
10. Sh. N.C. Majumdar, Ashoka Biogreen, Nasik
11. Sh. Ashim Batra, Vice President, Indraprastha Limited (IGL)

## **Main Partners Involved**

- MNRE (Indian Ministry of New and Renewable Energy)
- Swedish Waste Management Association,
- Swedish Embassy to India
- Swedish Development Cooperation Agency

The study trip was planned and managed by Mr Eric Rönnols of the Swedish Waste Management Association in close cooperation with Mikael Kullman at the Swedish Embassy to India.

## **Study Visits and Presentations**

The programme involved visits at biogas plants, meetings with potential Swedish partners, including technology providers, and universities, as well as workshops and presentations by a number of Swedish biogas stakeholders.

## **Outcome and Conclusions**

In general the programme was appreciated by both parties and a number of relevant contacts for potential partnering were established. The follow up visit by Swedish representatives to India will allow for further elaboration of certain cooperation, including preparation of the pilot project proposal.

The final day's workshop focussed on the Indian and Swedish experience in terms of technology development, institutional aspects and experiences, environmental conditions etc. to identify areas where collaboration would give mutual advantages. Some general conclusions from this discussion were as follows (see also attached power point presentation from this discussion);

- India has extensive experience in smaller, farm size units for domestic purposes and consequently systems available adapted to Indian conditions. Within this field Sweden could gain from Indian experience
- Potential technical development cooperation where India could benefit from Swedish experience may be found in middle sized and large sized plants, including optimisation of biogas generation/efficiency improvement.

- Biogas upgrading on a large scale level is yet to be introduced in India, requiring both technology development as well as development of a market for biogas with CNG quality. Swedish experience is of great interest.
- Research and academic cooperation in the field of biogas would result in mutual benefits, collaboration between universities/research institutes to be encouraged.
- The Indian partners expressed great interest in Swedish experiences regarding regulatory framework, standards and legislation, especially with respect to utilisation of upgraded biogas.
- Main constraint identified is the price level of Swedish technology. Partnering should involve adaptation of Swedish technology to Indian conditions, including price reduction elements through both partnering and production in India as well as frugal technology development.
- Partnering/joint ventures between Swedish and Indian companies to establish local production in India is likely to be the path to success in terms of Swedish technology transfer to India.



**Biogas for Vehicles in Sweden**

**b) Delhi International Renewable Energy Conference (DIREC) 2010, 27 October 2010 a Parallel Workshop on “Biomethanation – Upscaling, Challenges and Opportunities”**

In ‘*Delhi International Renewable Energy Conference*’ (DIREC), 27 October 2010 a parallel workshop on “Biomethanation – Upscaling, Challenges and Opportunities” organized by Ministry of New and Renewable Energy Government of India and the Swedish Embassy, New Delhi, Government of Sweden in collaboration with SIDA and IIT Delhi as knowledge partner.

The overall objective of the workshop was to further develop the knowledge and understanding of challenges and opportunities (technical, financial, institutional and political) related to mainstream and upscale waste to energy success stories. The workshop focused on developing and emerging technologies, barriers and challenges for large-scale promotion of biogas production and usage. Thus we offered a session filled with presentations on recent advances in the field and relevant case studies/best practices and give plenty of opportunities combined discussions and panel debates.

The event was coordinated by the MNRE and the Government of Sweden, bring together the various stakeholders involved in developing biogas infrastructure in various countries. This is in line with the two countries' decision to cooperate more closely. In April 2010, the Governments of India and Sweden signed a Memorandum of Understanding about exchange of experiences and ideas within the field of energy technology and renewable energy. Since then a number of activities have been initiated of which this event is a concrete example - involving joint development of experiences. The programme schedule followed is mentioned below:-

<p><b>Session I: Opening Session</b>  <i>Time: 11:00 – 11:45</i></p>
<ul style="list-style-type: none"> <li>✓ Welcome Address: Dr. A. R. Shukla, Adviser (Bio-energy), MNRE, Govt. of India (5 mins)</li> <li>✓ Presidential address: Hon’ble Shri Sukhbir Singh Badal, Deputy Chief Minister, Government of Punjab (10 mins).</li> <li>✓ Inaugural address: Dr. Tomas Kåberger, Swedish Energy Agency &amp; Mr. A. K. Dhussa, Director, MNRE (10 mins.)</li> <li>✓ Vote of thanks: Mikael Kullman, Counsellor, Embassy of Sweden, New Delhi (5 mins)</li> </ul>
<p><b>Session II: Recent Advances in Biogas Generation and Utilization Technology</b>  <i>Time: 11:45 – 12:30 and 14:00 – 15:00 hrs.</i>  <i>Co-chairs: Dr. A. R. Shukla, Adviser (Bio-energy) &amp; Dr. V. B. Manilal, NIIST, India</i></p>
<ul style="list-style-type: none"> <li>✓ Address :Hon’ble Ms. Maud Olofsson, Minister for Energy, Enterprise and Industry, Govt. of Sweden</li> <li>✓ Technology development and adaptation to the Indian context – Mr. K. Krishan, Malavali Power Project India Ltd.</li> <li>➤ <b>Case Studies (10 minutes each)</b></li> <li>✓ Adaptation of Swedish Technology to Indian conditions – main findings from pilot project development – Mr. Eric Rönnols, Swedish Waste Management Association and Mr. N. C. Majumdar, Ashoka Biogreen.</li> <li>✓ the M2M program and the current status of manure biogas plants in the US – Mr. Chris Voell, USEPA</li> <li>✓ Technology Development for Biogas generation, purification, bottling and power generation – Dr. R.V. Kumar, Scalene Greenenergy Corporation Ltd.</li> <li>✓ Biogas purification and bottling at the <i>gaushala</i> (cattle farm) – Dr. V.K. Vijay, IIT Delhi</li> <li>✓ Biochemical Purification technology for H<sub>2</sub>S removal from biogas – Mr. Chandan Gadgil, Innovative Environmental Technologies.</li> <li>➤ <b>Questions and Discussions</b></li> </ul>
<p><b>Session III: Policy and Financing Aspects of Biogas Up-Scaling; Barriers and Challenges Ahead</b>  <i>Time 15:00 – 16:30</i>  <i>Co-chairs: Dr. Tomas Kåberger, Swedish Energy Agency &amp; Mr. A. K. Dhussa, Director, MNRE</i></p>
<ul style="list-style-type: none"> <li>✓ Policy development requirements for biogas upscaling in India: Dr. A. R. Shukla &amp; Mr. A. K. Dhussa</li> <li>✓ The Swedish path to a sustainable development of biogas production and usage – Ms. Michelle Ekman, Swedish Gas Association</li> <li>✓ Biogas Infrastructure in Sweden and Europe, today and in the future: a private sector perspective – Mr. Anders Wijkman, Board of Directors, Scandinavian Biogas (former member of the European Parliament)</li> <li>✓ Upscaling biogas in European Context – Dr. Hans Kopetz, AEBIOM</li> <li>➤ Required policy framework for financing and marketing in biogas sector – Dr. Daniel Weisser, Chairman, IOT Mabagas</li> <li>➤ <b>Questions and Discussions</b></li> </ul>

**Session-IV: Panel discussion; Developing and Emerging Countries' Barriers and Challenges to Reach Wide and Large Scale Introduction of Biomethane Production and Usage**

*Time 17:00 – 18:30*

*Co-chairs: Dr. Tomas Kåberger, Swedish Energy Agency & Dr. N. P. Singh, Adviser, MNRE*

➤ **Short opening remarks by each of nine panel members, as follows;**

- |                                       |                        |
|---------------------------------------|------------------------|
| ✓ MNRE representative                 | Dr. A. R. Shukla       |
| ✓ Swedish Gas Association             | Ms. Michelle Ekman     |
| ✓ Swedfund International              | Mr. Hans Mideus        |
| ✓ Scandinavian Biogas representative: | Mr. Anders Wijkman     |
| ✓ GAIL representative                 | Mr. Mohan R. Hingnikar |
| ✓ IGL representative                  | Mr. Asim Batra         |
| ✓ KRIBHCO representative              | Mr. Arvinder Awwal     |

➤ **Discussions**

**Session V: Conclusions Reached – Wrap Up Session**

*Time 18:30 – 19:00*

- Welcome address, Dr. A.R. Shukla, Adviser (Bio-energy), MNRE.
- Summary of session; proceedings and conclusions drawn from presentations and panel discussions – Dr. Tomas Kaberger, G. D., Swedish Energy Agency and Dr. A. R. Shukla, Adviser (Bio-enrgy), MNRE.
- Vote of thanks: Mr. A. K. Dhussa, MNRE



### **c) International Training Programme on Biogas Production, Purification and Power Generation for Commercial Technology Packages**

An “**International Training Programme on Biogas Production, Purification and Power Generation for Commercial Technology Packages**” was organized at IIT Delhi during 25-29 October, 2010. The training was organized by ‘Biogas Development and Training Centre’, IIT Delhi. 80 participants from 14 countries had participated in this training programme which was sponsored by MNRE.

#### **The objectives of the training programme were:**

- ❖ Disseminating new knowledge and technology developed through research in the field of biogas production, purification and power generation.
- ❖ To make entrepreneurs aware about opportunities in the field of biogas in the developing countries.
- ❖ Exposure of working biogas technologies in the field.

This was a 5 days course in which lectures were delivered on various aspects of biogas technology i.e. biogas production technology, biogas analysis, biogas purification and upgradation practical techniques, compression, biogas engines and dual fuel engines for power generation, marketing and entrepreneurship. Participants got an exposure to the requirements of the project formulation and implementation of the project, maintaining supply chain of raw materials, monitoring and project financing mechanisms etc. Besides this, a field visit was organized for demonstration of working systems.

#### **Following lectures were presented in the training:**

- Government Programmes & Schemes on Biogas in India by Dr. A.R. Shukla, MNRE, GoI
- Advances and Modern Concepts in Anaerobic digestion and Biogas Technology by Dr. H.N. Chanakya, IISc Bangalore
- Various Types of Biogas Plants (Small and Large Capacities by Mr. Sanjay Patel, SP Renewable Energy Sources Pvt. Ltd.
- Biogas Purification using Water Scrubbing Systems by Dr. V.K. Vijay, IIT Delhi
- Biogas Purification and Methane-Enrichment for Industrial/Vehicular Use by Mr. Sanjay Sharma, PSA
- Techno-economic Feasibility of Municipal Solid Waste based Biomethanation and Landfill Gas Power Projects by Dr. K.C. Khandelwal, Jaipur
- Power Generation from Biogas through Gas Engines by Pawan K Mehendiratta, GE Energy
- The Future of Green Energy by Mr. P A Backer, Scalene Greenenergy Co. Ltd.
- Clean Development Mechanism and Biogas by Dr. P.C. Maithani, MNRE, GoI
- Sweden-Waste Management by Mr. Eric Ronnols
- Small Biogas Engine Conversion Kit Rural Application by Dr. G.P. Govil, Ideal Institute
- Financial Aspects of Biogas Purification and Bottling Projects by Mr. Om Prakash, IREDA
- CNG Experience in Delhi by Mr. P.K. Pandey, Indraprastha Gas Limited
- Biogas Slurry Handling, Packing and Marketing by Dr. D.s.Bhandari, Rajasthan Go Sewa Sangh, Rajasthan
- The New Renaissance by Mr. N C Majumdar, Ashoka Biogreen Pvt. Ltd.
- Policy Framework and Support for Biogas Commercial Technology Packages by Mr. Nitant Mate, Kirloskar Integrated Technologies Limited
- Biogas Enrichment and Bottling by Mr. Devendra Dalmia, Indian Compressors Limited

**All these presentations are available on <http://web.iitd.ac.in/~vkvijay/>**

❖ **Upcoming National Training Programme on “Biogas Production, Purification and Power Generation” during 14-16 February, 2011 at IIT Delhi**

A 3<sup>rd</sup> National Training Programme on “**Biogas Production, Purification and Bottling Technology and Power Generation**” is scheduled during 14-16 February, 2011 at IIT Delhi. 2 trainings were organized earlier in the months of January and February 2010 at IIT Delhi. This training is meant for BDTCs, consultants, entrepreneurs, field workers etc. working in the area of biogas technology to disseminate this technology in India. Travel, boarding and lodging charges will be borne by the participants themselves or by their sponsoring agency. However there is no registration fee. Training is sponsored by MNRE.

## **REGISTRATION FORM**

### **3<sup>rd</sup> National Training Programme**

*On*

### **Biogas Production, Purification and Bottling Technology and Power Generation**

**14-16 February, 2011**

**Biogas Development and Training Centre**

**Centre for Rural Development and Technology**

**Indian Institute of Technology Delhi, Hauz Khas, New Delhi, INDIA**

**Email: [bdtciitd@gmail.com](mailto:bdtciitd@gmail.com)**

**Date:** \_\_\_\_\_

**Name in Capital Letters:** \_\_\_\_\_

**Designation:** \_\_\_\_\_

**Organization:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Res. Address:** \_\_\_\_\_

**Phone No.:** \_\_\_\_\_ **Residence No.:** \_\_\_\_\_

**Office No.:** \_\_\_\_\_ **Fax No.:** \_\_\_\_\_

**Mobile No.:** \_\_\_\_\_

**E-mail:** \_\_\_\_\_

**Qualification:** \_\_\_\_\_

**Experience:** \_\_\_\_\_

**Would like to avail IIT Accommodation?** \_\_\_\_\_ (Yes/No)

**Signature of the Applicant**

**NOTE: Last date for application is 31<sup>st</sup> January, 2011.**

Paste your  
recent  
passport size  
photograph

## **Development of Projects on Demonstration of ‘Integrated Technology Package on Biogas-Fertilizer Plants (BGFP) for Generation, Purification, Bottling and Piped Distribution of Biogas in the Capacity Range of 1,100–20,000 m<sup>3</sup> and Above**

Ministry of New and Renewable Energy, Government of India launched a scheme on “Demonstration of Integrated Technology Package on medium size biogas-fertilizer plants (BGFP) for Generation, Purification, Enrichment, Bottling and Piped distribution of biogas towards harnessing ‘Near Total Potential of suitable Biomass in Rural Areas’ was taken up for biogas plants upto the capacity of 1000 m<sup>3</sup> biogas generation per day. The Ministry has sanctioned 11 numbers of such projects in 8 States of the country.

The Ministry has been receiving request for taking up demonstration and installation of higher capacity biogas generation, purification and bottling projects on different type of biomass wastes available at different locations including sugar mills, agro-processing plants, poultry units, etc. These projects may have biogas generation capacity of above 1000 m<sup>3</sup>. The capacity of BGFP could be 1,100 m<sup>3</sup> to 20,000 m<sup>3</sup> biogas/ day thereof depending on the availability of suitable biomass feed-materials and cattle-dung.

The Ministry of New and Renewable Energy invites ‘Expression of Interest’ (EOI) from the public and private sector companies and entrepreneurs who may be interested in partnering with the Ministry of New and Renewable Energy for installation of such a project in a few locations having suitable biomass materials in sugar mills, agro-processing plant, poultry units etc. for biogas generation, purification, bottling and/ or piped distribution and bio-fertilizer production. The MNRE support of 30-40% can be made available for taking up such technology demonstration projects as given below:-

<b>S. No.</b>	<b>Biogas Generation Capacity (m<sup>3</sup>)</b>	<b>CFA for Biogas Purification, Bottling/ Distribution Applications</b>
1.	1,100-5,000	40% of the cost of the project*
2.	5,100-10,000	35% of the cost of the project*
3.	10,100-20,000and above	30% of the cost of the project*

\* Excluding cost of land.



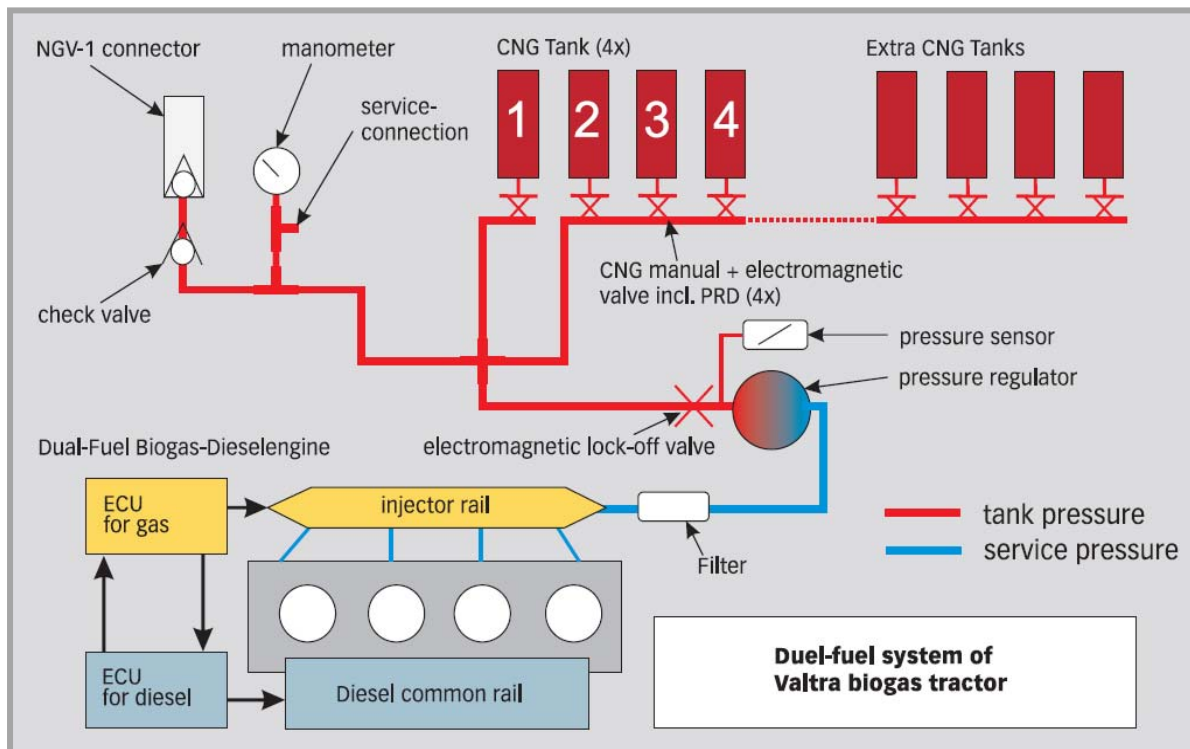
## Organizations that are involved in the Supply of Equipments, Consultancy and DPR Preparation of Biogas Enrichment and Bottling Technology

S. No	Name & Address of the Organization	S. No	Name & Address of the Organization
1.	<b>GIT Associates</b> 1034/2/B, Flat No.6, Annapurna Apts, Model Colony, Pune - 411016 Ph:-91-20-5651405 Fax: 91-20-5651405 g_vishwas@vsnl.com	2.	<b>Ashoka Biogreen Pvt. Ltd.</b> Ashoka House, Ashok Marg Nashik – 422011 ( MS) Ph: 0253-3011705 cmd@ncm.co.in
3.	<b>M/s. Excel Electricals Pvt. Ltd.</b> Excel Estate, Vashier, P.B. No. 18, Valsad – 396001, Gujarat Ph: 02632-227277, 227096, 227217/9 Fax: 91-2632-227470 ee_pl@rediffmail.com	4.	<b>M/s Raghunath Bioenergy Pvt. Ltd.</b> 147 Om Apartments Sect 14, Pocket B, Dwarka, New Delhi – 110075 Mob: 9899687423, 9871790055 raghunath_bioenergy@rediffmail.com
5.	<b>PSA Nitrogen Limited</b> D-9/6, Okhla Industrial Area, Phase-I, New Delhi, Delhi – 201301, India Ph.: 91-11- 26815336, 26816251, 55280333 Fax: 91-11-26815337 Email: ss_psa@rediffmail.com <a href="http://www.psanitrogen.net/">http://www.psanitrogen.net/</a>	6.	<b>Indian Compressors Limited</b> 35, Okhla Industrial Estate New Delhi – 110020 Ph: 91-11-26920926, 51612183-87 Fax: 91-11-26840020 mail@didwania.com www.didwania.com
7.	<b>Mail Hem Engineers Pvt. Ltd.</b> 401 Abhinav Sankul, 4 <sup>th</sup> Floor ITI Road, Aundh , Pune – 411007 Email: info@mailhem.com Phone: 020 25880302	8.	<b>Urja Bio Systems</b> 401/D Vrindavan Society, Model Colony, Pune-411016 Mob.: 91-9881149110 Email: gajananpatil29@rediffmail.com
9.	<b>Biogas Development and Training Centre</b> Indian Institute of Technology Delhi IIT Campus, Hauz Khas, New Delhi – 110016 Ph.: 011-26596351 Fax: 011-26591121 Email:bdteciitd@gmail.com, vkvijay@rdat.iitd.ac.in	10.	<b>Boumonde Technology</b> 35, Ratna Vila, P & T Colony, Raipur, Chhattisgarh Mob.: 9425214636 sanjaymishra88@yahoo.com

### Research for the Future - Valtra Biogas Tractor ([www.valtra.us](http://www.valtra.us))

The development of the biogas tractor demonstrates the desire of Valtra to create solutions that allow renewable natural resources to be utilized efficiently. Valtra presents a concept tractor that runs on biogas. Without making any changes to the original diesel engine, 70 to 80 percent of power is generated by biogas. The dual-fuel engine functions like a diesel engine. The gas is injected with the intake air, and combustion occurs when a small amount of diesel fuel is injected into the cylinder. If biogas is not available, the engine can run completely on diesel fuel.

For its demonstration model Valtra has selected the N101 tractor delivering 110 horsepower. The tractor is equipped with a front loader, front linkage and front PTO. It is intended as an all-purpose tractor for farms, municipalities and contractors that have the possibility of refuelling with biogas while working. The biogas cylinders are situated in a safe location on the right side of the chassis, and the entire installation has been designed in accordance with EC vehicle regulations. The capacity of the biogas cylinders on the first test model is 170 litres, which under 200 bar pressure corresponds to approximately 30 litres of diesel fuel. In typical use this is sufficient for three to four hours of work.



State-of-the-art technology has been employed in Valtra's biogas tractor. Both the diesel and gas injection systems have their own electronically controlled common rail, which allows the ratio between the diesel and biogas to be optimized. When runs on diesel fuel alone the tractor complies with current emission standards. For running on diesel/biogas a special Ecocat catalytic converter is fitted.

### India's Highest Biogas Plant Commissioned at Leh-Ladakh

(Balat, M. and Balat, H., *Energy Sources, Part A: Recovery, Utilization, Environ. Effects*, 2009. 31(4), 1280–1293).

Biogas, which is generated from organic digestion under anaerobic conditions by mixed population of microorganisms, is an alternative energy source, which is now being utilized both in rural and industrial areas. Biogas technology offers an attractive route to utilize certain categories of biomass for meeting partial energy needs. Unlike other forms of renewable energy, biogas does not have any geographical limitations and required technology for producing energy and it is neither complex nor monopolistic. Spearheading the effort to tap alternate sources of energy in remote areas, the Defence Institute of High

Altitude Re-search (DIHAR), a constituent laboratory of the Defence Research and Development Organisation (DRDO), has commissioned India's highest biogas plant at Leh-Ladakh at an altitude of 3500 m amsl. It has been set up in collaboration with the Bhabha Atomic Research Centre (BARC), Mumbai for various R&D purposes. It is also the world's second highest biogas plant; the world's highest biogas plant has been established by Nepal at Langtang Valley at 3850 m amsl.

The basic design of the plant is based on a dual process employing partial aerobic digestion followed by anaerobic digestion. It produces biogas and organic manure (soil conditioner) based on the process of biomethanation. The organically rich biodegradable portion of solid waste is mixed with recycled water to form a slurry. The slurry is then aerobically digested in a predigester, where organic matter is converted to organic acids. The predigestion is accentuated by the addition of hot water and intermittent aeration. Predigestion reactions are exothermic and the temperature rises to 40°C. Hot water obtained using solar energy is added to raise this temperature to 50°C. The predigested slurry is further digested under anaerobic conditions for about 15 days. The process of methanogenesis of the acidified slurry takes place in this digester. The plant is fed with cattle dung, horse and poultry manure generated at the DIHAR farm. The capacity of the biogas plant is 0.5 t/day and will generate about 35– 50 m<sup>3</sup> of biogas per day during the processing of biodegradable waste. This can be either fed to a gas engine alternator set of 25 kVA capacity to generate electricity for a period of 4–5 h everyday or can be used for cooking/boiler purposes [1.5–2.1 m<sup>3</sup> of biogas (depending on the methane content of 50–65%) is equivalent to 1 liter of diesel in terms of heat output.] Not only is biogas a fuel for producing green energy, but it also reduces greenhouse gases and may qualify for green credits (<http://www.epa.gov/agstar/resources.html>). About 25– 40 kg/day (on weight basis) high-quality organic manure will be available from the plant which is rich in nitrogen, phosphorus, potassium and iron and devoid of any heavy metals and weed seed. Therefore, the generated organic manure can be utilized in agricultural fields to improve soil fertility as well as productivity

## **Some of the Biogas Plants & Appliances Supplier**

### **All State Nodal Agencies**

#### **Khadi & Village Industries Commission, Mumbai**

### **All Biogas Development and Training Centers**

#### **Sintex Industries Limited**

Plastics Division, Kalol (N. Gujarat) 382721, India

Phone No.: 91-2764-253500

Fax: 91-2764-253800

#### **Siya Instruments**

1-ba-6; Gayatri Nagar, Hiran Magri,

Sector-5, Udaipur, Rajasthan, India

Phone No.: 91-294-2491903

## **Biogas Burner Manufacturer**

### **Unique Combustion**

487, First Floor, Chirag Delhi, New Delhi - 110017, India

Phone No.: 91-11-29251284

Fax: 91-11-29251285

**Rupak Enterprises**

1/146, Vishwas Nagar, Between Lane No.-1 & 2  
Kunti Marg, Shahdara, Delhi - 110032, India  
Phone No.: 91-11-22388730/22389791  
Fax: 91-11-22382503

**Combustion Concepts Pvt. Ltd.**

106, Marudhar Industrial Premises, Panchal Udyog Nagar  
Bhayander-E, Mira Bhayandar - 401105, Maharashtra, India  
Phone No.: 91-22-28194288  
Fax: 91-22-28185088

**Biogas Lamp Manufacturer****Envitec Biogas India Pvt. Ltd.**

Address 63 B, 13th Cross, J.P. Nagar, IIIrd Phase, Bangalore - 560078, India  
Phone No.: 91-80-26580466/3522

**Samuchit Enviro Tech Private Limited**

FlatNo.6, Ekta Park Co-Operative HSG Society Behind Nirmitee Showroom  
Law College Road, Pune-411004, India  
Phone No.: 91-20-25460138

**Biogas Engine Manufacturer****Kirloskar Integrated Technologies Private Limited**

13/A Karve Road, Kothrud, Pune - 411038, Maharashtra, India  
Phone No.: 91-20-25457940  
Fax: 91-20-25457939/24394010

**Prakash Diesels Private Limited**

Naraich Hathras Road, Agra - 282006, India  
Phone No.: 0562-2345016, 2345073, 3093597  
Fax: 0562-2346028, 2344157

# Biogas Forum India Membership Form

## MEMBERSHIP FORM

All prospective members of BiGFIN are required to duly fill up this registration form and **return** by post to **Dr. Virendra Kumar Vijay, General Secretary – BiGFIN, Centre for Rural Development and Technology, Indian Institute of Technology Delhi, IIT Campus, Hauz Khas, New Delhi – 110016** alongwith the Demand Draft in favour of “**Biogas Forum – India**” payable at New Delhi or online transfer the amount in account number 0346101060870, Canara Bank, SDA, branch Delhi.

Affix your recent passport size photograph here

<b>PERSONAL DETAILS</b>		
Name (Full):		
Title:		
Member Sex:		
Mailing Address with Pin Code:		
Email:		
Telephone/Mob. No.:		
Date of Birth:		
Nationality:		
Permanent Address:		
Email:		
Telephone/Mob. No.:		
Brief about Research/Field Activities related to Biogas:		
<b>PROFESSIONAL DETAILS</b>		
Organization Name:		
Nature of the Organization: (Please tick in appropriate box)		
<input type="checkbox"/> Public Limited	<input type="checkbox"/> Government	<input type="checkbox"/> Students
<input type="checkbox"/> Private Limited	<input type="checkbox"/> Semi Government	<input type="checkbox"/> Field Worker
<input type="checkbox"/> Consultancy	<input type="checkbox"/> Training/Educational	<input type="checkbox"/> Any Other
<input type="checkbox"/> Autonomous	<input type="checkbox"/> NGOs	
Designation:		
Organization Address:		
Telephone/Mob. No.:		

Fax Number:	
Email Address:	
Specialization:	

Brief Activities of the Organization related to Biogas:

**PAYMENT DETAILS**

Membership Type: (Please tick in appropriate box)

Corporate Membership

Life Membership (Academic/Scientific or Field Worker)

Annual Membership

Student Membership

Tick (√) whichever is applicable and also mention DD/Bank Transfer Number

<input type="checkbox"/> DD			
<input type="checkbox"/> Cash	Number:	Date:	Amount:
<input type="checkbox"/> Bank Transfer:			

Amount in Words:

Drawing Bank:

<b>UNDERTAKING TO BE SIGNED BY THE APPLICANT</b>	
I hereby certify that all Information supplied in this application for membership is true and correct and abide by the rules and regulations of the Biogas Forum – India (BiGFIN).	
Date: _____	Applicant's Signature: _____
Place: _____	_____

**IMPORTANT:** The Governing Body of the BIOGAS FORUM – INDIA has a right to accept or reject the membership proposal.

**FEE STRUCTURE**

<b>1.</b>	<b>Life Membership</b>	<b>Rs. 1,500/- (For Academic/Scientific Person)</b> <b>Rs. 1,000/- (Turnkey/Field Workers)</b>
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## CORPORATE MEMBERSHIP FORM

Dear Sir,

Please enroll us as a Corporate Member of the Biogas Forum - India (BiGFIN). The required information is as follows:-

1.	Name of the Organization	
2.	Nature of the Organization (Please tick)	Company/Body Corporate/Association/Unit/Division of a Company
3.	Address of the Head Office (with Telephone, Fax, E-mail /Website etc.)	
4.	Name, Address, Tel. No. etc. of the Chief Executive and / or Board of Director and Senior Management Staff (Please enclose on a separate sheet, if necessary)	
5.	Annual Turnover as per latest Audited Accounts (Enclose copy of the Annual Report)	Rs. _____ crores for the year 20_____
6.	Major Products/Business	
7.	List of Major technology areas of interest for information support services (Please enclose)	
8.	Name, Address/Fax/Telephone/E-mail of the contact person	
<p>We send herewith a cheque/ (payable at New Delhi/Demand Draft* No. _____ dated _____ for Rs. _____ drawn on _____ as Admission Fee and the Annual/Life Fee as fixed for the Corporate Members.</p>		

Yours

Faithfully,

*Official Seal, if any*

For and on behalf of  
(Name of the Organization)

\*Cheque/DD to be drawn in the name of “**Biogas Forum – India**” payable at New Delhi.

**IMPORTANT:** The Governing Body of the BIOGAS FORUM – INDIA has a right to accept or reject the membership proposal.

### FEE STRUCTURE

<b>1.</b>	<b>Corporate Membership (Institutional/Company)</b>	<b>Rs. 10,000/- (Annual) (Rs. 50,000/- For 10 years/Life)</b>
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