



BIOGAS FORUM INDIA

(BigFIN)

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Corresponding Address: Biogas Forum India, Centre for Rural Development and Technology

Indian Institute of Technology Delhi, Hauz Khas, New Delhi 110016 INDIA

Phone: 011-26596351 (O), Fax: 011-26596351, 26591121 Email: bigfin.india@gmail.com

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From The Editor's Desk...



Biogas Forum India's (BigFIN) journey entered into 11th year with a lot of new beginnings and exchange of ideas with the promotion of biogas and its entrepreneurship in the country. The motto of publication of this newsletter is to keep the BigFIN members updated with the latest news about different segments of biogas R&D, and new initiatives. Biogas Forum aims to spread awareness of the values of sustainability as well as the innovative ways in which India continue to meet the challenges and conquer the inadequate energy supply situation. In this perspective, it is important to learn from the other parts of the world as well for our latest edition which discuss the same with various stakeholders throughout the world.

The governing principles behind biogas forum towards energy sustainability include the democratization and finding a balance of energy mix with the special focus on biogas. *Currently, there are five ongoing programs on biogas viz. a) New National Biogas and Organic Manure Program (NNBOMP), b) Biogas based Power Generation (Off-grid) and Thermal Energy Application Program (BPGTP), c) Energy recovery from urban, industrial, and Agricultural Wastes/ residues, d) Galvanising Organic Bio Agro Resources-Dhan (GOBARDHAN), and e) Sustainable Alternative Towards Affordable Transportation (SATAT) to strengthen the country's green energy mix.*

Under the New National Biogas and Organic Manure Program (NNBOMP), more than 5 million biogas plants have been installed in the country. Earlier, the subsidy for 1-6 m³ size plants was available. Now, NNBOMP providing financial support upto 1-25 m³ size biogas plants. MNRE is also encouraging power production of 3-250 kW (30-2500 m³ per day) biogas for thermal application under BPGTP. A cumulative total of 387 numbers of Biogas Power Projects with a power generation capacity of about 8.753 MW and total biogas generation of 86,595 m³ per day capacity have been set up under BPGTP by the end of 2018. The program *Energy recovery from urban, industrial, and Agricultural Wastes/ residues* is aims to produce Biogas/ CBG/ Power from the waste. So far, 317.03 MWeq is achieved under this program. The programs GOBARDHAN aims to utilize cow dung available in the rural areas and to produce biogas & manure. SATAT program was launched on 1st October 2018. The programme is encouraging to install 5000 CBG plants in the country by the end of 2025 with market revenue of 1,70,000 crore.

We hope that you find this issue both interesting and inspiring, your inputs to grow this sector will always be welcome.

Thank you.

Virendra Kumar Vijay

General Secretary, Biogas Forum-India (BigFIN)

SOME INITIATIVES/ACTIVITIES HELD AT CRDT, IIT DELHI DURING LAST

SIX MONTHS

1. A meeting of Prof. VK Vijay with Acharya Balkrishnaji, Patanjali, Haridwar

The biogas is entered in every sector as a source of energy from the waste. Centre for Rural Development and Technology has always been a leader in technical support for any type of biogas plant. Prof. VK Vijay from IIT Delhi visited the site in January 2019 and had a meeting with chairman of the consumer goods company Patanjali Ayurved Acharya Balkrishanaji. He discussed to start a Biogas and bio-fertilizer vertical in Patanjali Business for the benefit of rural areas.



Fig. 1 Meeting of Prof VK Vijay, CRDT, IITD with Acharya Balkrishnaji.

2. Compressed Biogas (CBG) Project evaluation of TDB, DST

Prof. VK Vijay along with Dr HN Chanakya, IISc Bangalore and Dr A Lali, ICT Mumbai visited for the evaluation of a Compressed Biogas (CBG) Project based on Sewage Treatment Plant on 17.01.2019.



Fig. 2 A Visit to Compressed Biogas Plant based on STP for its inspection and evaluation.

3. Biogas distribution through pipe-line in villages- A lecture in Natural Gas Conclave 2019

To transform India into a gas economy, the supply side of the natural gas sector requires strategic focus and attention. Prof VK Vijay from CRDT, IIT Delhi delivered an invited lecture on Biogas distribution through the pipeline in villages- in Natural Gas Conclave 2019 organised by PHD Chamber of Commerce New Delhi. Prof. Vijay convinced all the companies and leaders to make a paradigm shift in their business and thinking about sustainability and environmental issues to go green naturally, reducing fossils use.



Fig. 3 Natural Gas Conclave 2019 at PHD House, New Delhi.

4. Training program on Biogas Production, Purification and Power Generation

Biogas Development and Training Centre, IIT Delhi organised a training programme on Biogas Production, Purification and Power generation during 14-16th March 2019. The main objective of the programme was to deliver the key ideas on biogas technologies to the biogas stakeholder, users, and college students. Around 40-45 participants from different states of the country participated in the training program. The programme was ended up with a visit to Mukhmelpur Village in Haryana to see biogas plant and its applications.



Fig.4 The BDTS's Training Programme.

5. A lecture on *Gram Urja Swaraj* in GD Goenka University Gurugram

Prof. VK Vijay delivered a lecture on “*Gram Urja Swaraj: Bioenergy- reliable energy sources for self-sufficiency in rural areas*” to the students of School of Basic and Applied Science, GD Goenka University Gurgugram on 5th April 2019. The key outline of the lecture was to utilise the locally available resources for energy generation through biogas production.



Fig.5 A lecture by Prof. VK Vijay at the School of Basic and Applied Science, GD Goenka University Gurgugram.

6. A meeting with Director, IISc, Bangalore

Prof. Vijay had a meeting with Prof Arun Kumar, Director, IISc Bangalore on 11.6.2019. The major discussion was about the joint role of CST IISc, CRDT IIT Delhi and CTARA IIT Bombay in rural technologies development, joint PhD supervision, joint mega project initiation under IOE and involvement of IISc Bangalore in Unnat Bharat Abhiyan as a Regional Coordinating Institute for the state of Karnataka. The meeting was very encouraging to all these issues of rural development.



Fig. 6 The meeting of Prof VK Vijay with Prof Arun Kumar, Director, IISc Bangalore.

BIOGAS RELATED ARTICLES

1. Compressed Biogas (CBG) and It's Potential as a Source of Green Energy in India

Currently, 32 billion tonnes of CBG potential is estimated in the country; though, of the total estimated potential, only 0.06% CBG is being produced on an annual basis. The research on biogas purification and its utilization as a vehicular fuel and power production are getting more concern from the government bodies. Huge scope of setting up of CBG plants is available in India. This scope can be met through the Sustainable Alternatives Towards Affordable Transportation (SATAT) scheme launched on 1st October 2018.



Fig. 7 A 25 m³/h capacity CBG plant at Biogas production and Enrichment Lab, CRDT, IIT Delhi.

(Kumar et al., 2019, Akshay Urja; 12(5):42-45)

2. Evaluation of biogas upgrading technologies and future perspectives: a review

Biogas is acknowledged as one of the foremost bioenergy to address the current environmental and energy challenges being faced by the world. Commonly, biogas is used for applications like cooking, lighting, heat and power production. To widen the scope of biogas application, like transportation, natural gas grid injection and substrate for the production of chemicals and fuel cells, mainly CO₂, H₂S

and other impurities need to be removed by various upgrading technologies. It is an important process to produce biomethane with above 90% methane. There are various physicochemical (adsorption, absorption, cryogenic and membrane separations) and biological (in situ and ex-situ) processes for biogas upgradation, and each process is site and case specific. The present paper aims to evaluate the existing and emerging biogas upgrading technologies thoroughly. Analysis of each technology with respect to the basis of operations, energy requirement, methane purity and recovery and cost economics has been carried out. A thorough analysis has been done on the major hurdles and the research gaps in this sector. For a wider and successful implementation of the biogas upgradation technology, the trends in research and development (R&D) such as the development of efficient biogas upgrading technologies, adsorbents, reduction in cost and methane loss have been thoroughly evaluated. [Read More...](#)

(Kapoor et al., 2019, *Environmental Science and Pollution Research*; 26 (12): 11631–11661)

3. Methane enrichment of biogas produced from floral waste: A potential energy source for rural India

This research uses floral waste with alkaline pretreatment as an input substrate, for biogas production in *Deenbandhu*-type fixed-dome biogas plant, used in rural parts of India. The experimental investigation focuses on methane enrichment of biogas using chemical absorption technique. Packed column reactors arranged in series facilitate biogas purification and scrubbing process at around atmospheric pressure and temperature. The materials used for filling the purification columns include steel wool, silica gel, and different aqueous alkaline solutions of sodium hydroxide (NaOH), calcium hydroxide (Ca(OH)₂), sodium carbonate (Na₂CO₃), and monoethanolamine (MEA). A pedal-operated compressor pressurises raw biogas and forces it through a series of packed chemical absorption columns for the removal of contaminants. Content analysis of purified biogas and raw biogas contents has been done using gas chromatography. The analysis of purified biogas samples 1 and 2 shows methane enrichment up to 96.91% and 94.16% and the carbon dioxide removal efficiency of 99.85% and 98.86% while hydrogen sulfide removal efficiency of 87.5% and 62.5% for samples 1 and 2, respectively. Purification results for biogas show the potential of the purified gas for applications like running stationery engines or use as a vehicular fuel. The purification and scrubbing technique used in the present work uses low-cost commercial chemicals, and the purification columns comprise 4-in-diameter polyvinyl chloride pipes. Use of the technique on a large scale by common people can further raise the potential of biogas as an energy source with a high heating value for widespread applications. Using floral waste from temples as an input substrate provides an energy-efficient solution for soil and water pollution, arising due to the disposal of the waste into the soil or nearby water resources like a river. [Read more...](#)

(Kulkarni and Ghanegaonkar, 2019, *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*; 1-12)

4. The anaerobic digestion of waste food materials by using cow dung: A new methodology to produce biogas

The present work is an attempt to digest food waste and to produce biogas by using a novel technique which does not use the bacteria directly. In the current work, nourishment waste was gathered from various messes of National Institute of Technology Rourkela, and these were given as the feedstock to the reactor which functions as an anaerobic digester framework to deliver biogas. For the production of biogas, food waste was mixed with cow dung at different ratios and the cow dung acts as an inoculum in the current case as it contains both methanogenic and acid-forming bacteria. By using a gas analyzer, after experimentation, the composition of the gas was analyzed and the achieved composition confirms that the obtained gas is the biogas. The result shows that the rate of biogas production is influenced by the pH, temperature and solid-to-water ratio. The biogas production rate is found to be maximum at an intermediate solid-to-water ratio of 1:2 and at the neutral range of pH. Furthermore, the biogas production rate increases from 110 to 142 ml with the rising temperature from 25 to 40 °C, and with the further increment in temperature, the methane production rate declines. In addition to the above, the process behaviour at different conditions has been modelled by using response surface methodology technique and also the optimum conditions ($T=44.03$ °C, $R=0.44$ and pH 7.02) for the maximum production of biogas has been determined. [Read More...](#)

(Pati et al., 2019, Journal of The Institution of Engineers (India): Series E; 100 (1): 111-120)

5. Biogas Plant slurry dewatering and drying using the hybrid system: A Review

India is the largest milk producing country in the world as well the largest animal stock in the world. Wastes generated from animals is the challenge to society as a whole. In this paper, the slurry coming out from biogas plant is used for dewatering and drying has been discussed. The work carried out by many researchers has been collected and discussed. The tables and charts has been drawn from the collected data and comparison has been made. The solid cake after dewatering can be used as a natural fertilizers for our agricultural land and major society problem of biogas plant waste can be solved by suitable use of dewatering and drying technology. [Read More...](#)

(Kumar and Prakash, 2019, Renewable Energy and its Innovative Technologies; 117-125)

NEWS HIGHLIGHTS – NATIONAL

1. Cuttack Railway station to have a biogas plant

To make the Cuttack railway station clean and eco-friendly, the East Coast Railways (ECoR) had to install an organic waste processing plant at the station by February-end. The plant was to produce biogas after recycling dumped organic waste.

The Cuttack station generates 800 kg of waste every day. The waste materials will be segregated as biodegradable and non-biodegradable. ECoR will install plant for bio-degradable waste at the station, while Cuttack Municipal Corporation will lift the non-biodegradable waste.

The plant called Bio Box will have a capacity of converting 500 kg of biodegradable waste into biogas. It will be used for power generation or cooking at the railway station. The end part of the plant can be used as manure in the garden near the station. It will also help in organic farming and grow horticulture crops. This will result in an odour-free environment, said Sambit Sourav Nayak, senior manager, commercial division, ECoR.

The plant will be constructed at the cost of Rs 28, 56,000. A private agency has been roped in for its maintenance.

(25 January, 2019, The Times of India)

2. Banas Dairy to invest thirty two crore rupees in four biogas plants

Banas Dairy will be setting up four biogas plants at the total cost of Rs 32 crore. The dairy plant's chairman Shankar Chaudhary will lay the foundation stone for the four biogas plants at Ratnapura (Bhiladi), Dama Semen Station (Deesa), Thavar (Dhanera) and Danta Chilling Centre in Banaskantha. Banas Dairy is the Asia's largest dairy that produces 60 lakh litres of milk per day. With such rich cattle wealth the inputs for biogas-dung is available in plenty. The plants with energy generation capacity of 2,000 cubic metre will also result in farmers and cattle growers seeing rapid rise in their earnings.

Banaskantha biogas plants will require 1.6 lakh kg of dung every day. Farmers will be paid for the dung which was earlier discarded.

(March 10, 2019, The Times of India)

3. Biogas Plant in Delhi first to install Net Metering

South Delhi Municipal Corporation's (SDMC) decentralised waste processing biogas plant established at Punjabi Bagh has become the first plant to install net metering. The net metering concept was successfully implemented in rooftop solar till now; this is for the first time wherein a biogas based decentralized waste to energy project is working on the same concept, it allows the plant to store the overproduced electricity in a grid and when the plant is under-producing; the stored power can be used to meet the requirement.

The plant generates approximately 800 units of electricity and around 800 kilograms organic manure per day.

Incorporation of Net-metering with decentralized waste processing technology 'Yasasu green' deployed at Punjabi Bagh and Pali Hill, Mumbai, projects gives an edge, as it will help in easy distribution of energy being produced from decentralized waste to energy plant.

Till now, four waste processing plants are operational in areas of Punjabi Bagh, Dwarka Sector 14, Roshan Arah Bagh and GTB Nagar under municipal corporations in Delhi. Further, six more plants to be operational in Delhi by June 2019.

(20th June, 2019, The Pioneer)

4. The Honourable CM of Maharashtra Approved 100 acre land for Bhandara ethanol and Biogas Plant

Hon'ble Chief Minister Devendra Fadnavis on Tuesday approved 100 acres land for a proposed project to produce ethanol and biogas gas from paddy straw at Bhandara. The project will come up at an estimated cost of Rs1,500 crore.

Guardian minister of Bhandara and Gondia districts Parinay Fuke is pursuing the project for the last one year. Considering Fuke's request, the Hon'ble CM held a meeting with the officials of various departments at Mumbai.

As per press release issued by the office of Fuke, the Hon'ble CM approved transfer of 100 acres land from the state government to MIDC for the project.

The project will benefit Bhandara and Gondia districts to a great extent. "Paddy straw of 3.84 lakh tonne is available in Bhandara district and 3.46 lakh tonne in Gondia district. The straw is burned and not used for any purpose till now. Therefore, the project will give an alternate revenue source for farmers. Ethanol and biogas will be used in vehicles for an eco-friendly atmosphere and reducing consumption of petrol and diesel. The project will come up with a new technology to be given by Bharat Petroleum.

(17th July, 2019, The Times of India)

5. Government to offer cattle, advanced biogas plants, poultry to boost rural income

In a first, the Ministry of Animal Husbandry, Dairying and Fisheries has decided to roll out a scheme to increase rural household income. Under the scheme, rural households will receive free cattle, advanced biogas plants, and poultry.

To be launched in August this year, the pilot project will see households of a village in Gujarat that do not have cattle, receive free cows or buffaloes, along with advanced biogas plants. In addition, roughly 10 houses will receive hen on a voluntary basis; the eggs produced will be bought back by the government.

(17th July, 2019, Business Standard)

[NEWS HIGHLIGHTS – INTERNATIONAL](#)

1. Future Biogas announce green energy partnership with Royal Air Force (RAF) Marham

Future Biogas has announced that an anaerobic digestion plant is to be built and ran by the company to power over 95% of the RAF Marham military base in Norfolk.

The green energy partnership signals the UK military's transition away from using fossil fuels as the Norfolk Anaerobic Digestion plant will be one of the first to power a military base. The plant will be fuelled by locally grown crops.

The plant, Redstow Renewables, will be generating 4.5 MW of electricity an hour that can power 350,000 LED bulbs. Its energy supply to RAF Marham will lead to a reduction of 14,000 tonnes of carbon dioxide for the Ministry of Defence and will also result in around £300,000 worth of annual electricity savings. [Read More...](#)

(31st January, 2019, Bioenergy Insight)

2. Biogas Filling Stations for heavy-duty vehicles in Sweden

The month May saw the opening of the first Gasum *first filling station with liquefied natural gas and biogas in Sweden*. The number of filling stations is now set to greatly increase in Sweden in the coming year.

The filling station with liquefied natural gas and biogas that was opened in Västerås is the first of its kind in Västmanland County, Sweden. The station has been identified as an environmentally sustainable investments and therefore been partially financed through the government's climate investment program.

[Read more...](#)



Fig. 8 The Gasum first liquefied biogas filling station in Sweden.

(21st May, 2019, Bioenergy Insight)

3. The CNG fuels to open five new Bio-CNG/ CBG refuelling stations

CNG Fuels has commenced construction of two new public access renewable bio-methane compressed natural gas (Bio-CNG) refuelling stations, two of five due to open in 2019 to cater for soaring demand from Heavy Goods Vehicle (HGV) operators switching from diesel.



Fig. 9 Compressed Biogas based Heavy Goods Vehicle.

The new public access Bio-CNG stations will serve major truck routes and cities, and will be able to refuel up to 3000 HGVs a day, a near 500% increase on capacity at the company's existing stations at Leyland, Lancashire and Crewe, Cheshire, which can refuel more than 600 vehicles daily.

The 100% of the fuel supplied by CNG Fuels is renewable and sustainable bio-methane approved under the Department for Transport's Renewable Transport Fuel Obligation (RTFO) scheme. The gas is sourced from waste feed stocks such as food waste and is the most environmentally friendly and cost-effective alternative to diesel for HGVs. It cuts vehicle greenhouse gas (GHG) emissions by up to 85% and is 35 to 40% cheaper than diesel. [Read More...](#)

(23rd May, 2019, Bioenergy Insight)

4. Al Rawabi a dairy company unveils Dh50 million biogas project in Dubai

Local dairy company Al Rawabi has signed a partnership with Germany's ME-LE Biogas to launch a one-of-its-kind biogas production project in the region. The UAE's leading dairy and juice company, Rawabi has a cattle stock of 13,000 cows.

Announcing the Dh50 million joint venture, Al Rawabi CEO Dr Ahmad Al Tiqani said the project aims to reduce odour omission by 80 per cent, produce 1.3MW electricity and 1.4MW of thermal energy in addition to 10 tons of high grade fertiliser. It will also extract 150 cubic meter of water from manure daily, which will be subsequently used for farm use, saving the company around Dh500,000 annually.

Sultan Al Owais, chairman of Al Rawabi, said with the signing of the agreement, they are opening a new chapter towards enhancing sustainability across the various stages of their operations. [Read More...](#)



Fig.10 Dietrich Lehmann, CEO, ME-LE Biogas, (left) and Abdullah Sultan Al Qwais, Chairman of Al Rawabi Dairy Company, at the Biogas Project signing ceremony.

(23rd June, 2019, Gulf News, UAE)

5. North California Company works to build five biogas plants in Missouri

Renewable Energy Company GESS International plans to break ground on five biogas plant projects in the fall and complete construction by the end of 2020. *The factories will convert cattle and swine manure and agricultural residues into renewable natural gas.*

The sites are planned for northern and central Missouri. Three will be in Audrain County, near Mexico and Laddonia. Another is in Chariton County near Tripplett and the final one is planned for Miller County near Tuscumbia.

Seth Daughety, the company's grant coordinator, tells Missouri net each project will create 16 jobs. The total investment will be nearly \$185 million in Missouri. [Read More...](#)

(28th June, 2019, Missurinet)

UPCOMING EVENT

National

1. **10th World Renewable Energy Technology Congress 2019**
21-23 August, 2019
Convention Center-NDDC, Parliament Street, New Delhi, India
2. **Renewable Energy India Expo**
18-20 September, 2019
India Expo Mart, Greater Noida, India

International

1. **Biogas Upgrading and CBG Roundtable 2019**
14-15 August, 2019
Chiang Mai, Thailand
2. **European Biogas Conference, 2019**
19th September, 2019
Brussels, Belgium
3. **Biogas International – Biogas Engineering and Operating Training**
24th September – 2nd October, 2019
Stuttgart, Germany
4. **US Biogas 2019**
1-2nd October, 2019
San Diego, United State
5. **International Training Programme on “Biogas Production, Power Generation and Up-gradation for Vehicular Application**
14-25 October 2019, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016, India
6. **International Biogas Congress Expo**
22-23 October, 2019
Hotel Le Plaza
Blvd Adolphe Max 118-126
B-1000, Brussels
7. **Future of Biogas Europe 2019**
13-14th November, 2019
Amsterdam, The Netherland
8. **Biogas Convention and Trade Fair 2019**
10-13 December, 2019
Hanover Exhibition Ground, Hanover, Germany