



BIOGAS FORUM INDIA
(BigFIN)
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From The Editor's Desk...



Biogas Forum India's (BigFIN) journey entered into 9th year with a lot of new beginnings and exchange of ideas with promotion of biogas in the country. The motto of publication of this newsletter is to keep the BigFIN members updated with latest news about different segments of biogas research and development sectors and new initiative taken in the country.

The importance of the biogas sector has been emphasizing because it has been found as one of the most promising technologies under the green energy corridor. India is blessed with a numerous potential of biodegradable materials. Due to the unawareness and lack of people participation, the utilization of such resources remains unutilized. Efficient utilization of these biodegradable wastes through biogas plant can be seen as an energy security for the rural India. At present about 4.8 million family size biogas plants have been installed in the rural and semi-urban areas of the country to meet the clean cooking energy inside the dwelling. The most of the biogas plants are cattle waste based. The government is also emphasizing on scale up of the biogas plants based on other feed materials like, biodegradable waste from dairy clusters, poultry houses, and locally available organic residues, so that, sustainability of the biogas plants can be ensured. On the other hand the biogas plant is calling as **ORGANIC FERTILIZER FACTORY**.

An initiative may be taken up by the young entrepreneurs to develop a model, through which biogas can be generated and supplied through pipeline network in the villages to the each household like PNG, as in urban areas. The establishment of such role model may play an important role to generate employment in the villages via engaging people in collection of raw materials from each house for biogas production and by providing technical supports to operate the plant.

On the other hand, wherever large quantity of biogas is available, it is possible to drive two wheelers, tractors and four wheelers by upgraded biogas (Bio-CNG). In the country, most of the **GAUSALA** are willing to set up a complete system of biogas to Bio-CNG also. This has a vast potential in the country which is still untapped.

I will appreciate your feedback and responses. There is a need of awareness and public participation in such programme to boost up the cleanliness of the society and to make a start-up on an entrepreneurship model in the biogas sector.

Virendra Kumar Vijay

General Secretary, Biogas Forum-India (BigFIN)

President's Column

Biogas- Fertilizer Sector continue to look for a Workable Business Model

Despite the fact that 'Biogas-Fertilizer Plants' are unavoidable tool for treating wet biomass waste, generating gaseous fuel, producing organic fertilizer and reducing pollution adequate attention has not been paid by the government. It continues to fall short of investments from all the four stakeholders getting benefitted from biogas-fertilizer plants. The integrated approach for this sector could not be put in place and looking it only as gas generating plants and providing support has been highly insufficient to make it commercially viable and sustainable business.

Financial provisions are made in different govt. Ministries/ Departments, namely Ministries of New and Renewable Energy (MNRE), Urban Development, Agriculture, Rural Development, Chemicals and Fertilizer and Petroleum and Natural Gas directly or indirectly. Individually these are insufficient and no simple mechanism to consolidate the financial provisions of different Ministries and make is available for the biogas-fertilizer promoters.

The efforts have been made by different Ministries. The Sub-Group for the 12th Plan for MNRE recommended installation of biogas-fertilizer plants mandatory by the producers of wet biomass waste. The Ministry of Environment and Forests issued notification for mandatory provisions and now action on Municipality level is being initiated. But co-ordinate action of Centre and State Government are still lacking. The efforts of MNRE for preparing '**Biogas- Fertilizer Mission**' have yet not seen light of the day. Till today we continue to remain at the place from where we started in 1960s and that these plants are economically unviable.

The GST provisions have kept it in the category of conventional fuels. This sector requires huge investments from National and State exchequer in the form of innovative and bold policy and easy finances to make the biogas- fertilizer sector commercially viable, similar to the provisions of 'National Solar Mission'. The fertilizer component and waste treatment aspect needs to be recognized and paid for in the overall scheme of provisions.

The key actions required are: making mandatory- INSTALLATION of Biogas- Fertilizer Plants MANDATORY to the wet biomass waste generators (individuals, institutions and industry), PURCHASE of biogas generated from Biogas- Fertilizer Plants MANDATORY for public and private sector Gas companies/ Gas utilities, PURCHASE of Organic fertilizer produced from Biogas- Fertilizer Plants by public and private sector FERTILIZER companies, and INVESTMENT of 30-50% of the financial provision of local bodies/ municipalities for waste handling as MANDATORY towards installation of Biogas- Fertilizer Plants. If these provisions are not made the country will continue to loose on all the aspect

of renewable gas and bio-fertilizer production and treating biomass waste in environmentally benign manner.

The biogas- Fertilizer sector requires a cohesive **Policy and action by the PMO and Niti Ayog immediately.**

Dr. Atma Ram Shukla

President, Biogas Forum-India (BigFIN)

**SOME INITIATIVES/ACTIVITIES HELD AT IIT DELHI DURING LAST
SIX MONTHS**



Prof. VK Vijay discussing the achievements of BDTC with Dr. GL Meena, Advisor, MNRE in BDTC Training programme at CRDT

Prof. VK Vijay addressing the key success of 20 m³ kitchen waste biogas plant at Micro-model, CRDT



Faculties, Research Scholars, and Biogas trainees visited to Shri Krishan Gaushala to see the importance of Indian breed cows



Prof. VK Vijay with Dr H Nagendra, Chancellor, Swami Vivekanand Yoga Anusndhan Sansthan (SVYASA deemed university) on Unnat Bharat Abhiyan work to be taken up by SVYASA at Bangalore and transforming Indian education system



CRDT celebrated Technology Day

[BIOGAS RELATED ARTICLES](#)

1. Biotech has developed different models of nano biogas plants to meet the requirement of all categories of beneficiaries in the society.

BIOTECH Bio Magic Box Fig. 1 is a working model of the floating dome model biogas plant. Plants of two different capacities are available under this project. Each plant consists of one floating dome model biogas plant with its digester, gas collector, biogas stove or experimental lamp. This plant can be activated like any other biogas digester.

Technical Specification :-

- ✚ **Model 1:** Volume including digester and gas collector 45 L.
- ✚ **Model 2:** Volume including digester and gas collector 160 L.



Figure 1. Nano biogas plant

Technical Specifications

Model	Digester			Gas collector			Total Volume (L)	Packing size	Packing specifications (cm ³)
	Diameter (cm)	Height (cm)	Volume (L)	Diameter (cm)	Height (cm)	Vol (L)			
1	29	50	32	26	25	13	45	2 CFT	30×30×60
2	48	65	110	45	30	50	160	9 CFT	50×50×75

[\[Read more\]](#)

[\(Biotech India\)](#)

2. Production of Biogas in low temperature environment at Canada

A team of researchers from Concordia's Department of Building, Civil and Environmental Engineering (BCEE) in partnership with Bio-Terre Systems Inc. are keen on tackling global warming in colder climates. The authors demonstrate the viability of using anaerobic digestion in a low-temperature (20°C) environment to convert solid food waste into renewable energy and organic fertilizer. Psychrophilic bacteria's are employed, which thrive in relatively low temperatures, to break down food waste in a specially designed bioreactor. In doing so, a specific methane yield has been produced comparable to that of more energy-intensive anaerobic digestion processes. The aim of this research was to improve the anaerobic digestion (AD) of food waste (FW) with or without animal manure in a low-cost psychrophilic anaerobic digestion in sequencing batch reactor (PADSBR) at 20°C as shown in Fig. 2. Feed solid content was varied from 37% to 13%, mainly to validate the stability of digestion process suitable for different scenarios and OLR was increased from 0.8 to a maximum of 4.2 kg VS/m³ d. Results showed that methane production from FW mixture was feasible at low-temperature and specific methane yield of 0.401 ± 0.01 m³ CH₄/kg VS_{fed} was observed even at high OLR. When loading rates applied to bioreactors were increased by 225%, methane conversion rates decreased only by 10%, while maintaining the operational stability (e.g. no foaming, no acidification). Methane content was constantly in the range of 64–69%, which shows the quality of biogas is excellent and remained almost steady. The results suggest that PADSBR at 20°C is comparatively efficient in saving the heat energy and at the same time obtains the CH₄ values close to mesophilic/thermophilic conditions. This concept is particularly vital for cold countries facing energy constrains.

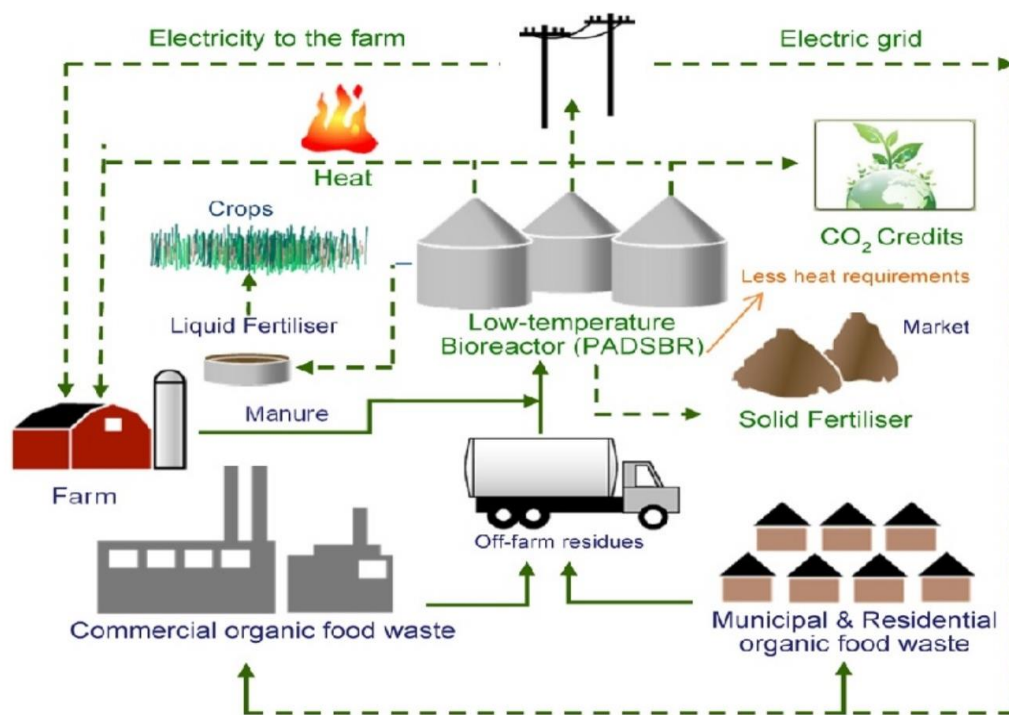


Figure 2. Psychrophilic anaerobic digestion system in sequencing batch reactor (PADSBR)

[\[Read more\]](#)

(Rajagopal et al., January, 2017, Process Safety and Environmental Protection)

3. Utilization of biogas from local feedstock for internal reforming of Solid Oxide Fuel Cell

Fuel-flexible solid oxide fuel cell (SOFC) technologies are presently under study in a Vietnam-Japan international joint research project. The region is rich in unutilized biomass resources such as sludge discharged from shrimp and catfish culture and residue of sugar production (bagasse and molasses), which have the potential to satisfy the local energy demand. Although many projects are focused on biofuel production from these biomass resources, not much attention has been paid to developing an efficient utilization technology. The project selected a shrimp farm in the Mekong Delta region, where stable power supply is needed and sludge accumulation has become crucial problem, as the demonstration site for the fuel cell-incorporated energy circulation system. The purpose of this project is to develop and demonstrate an SOFC-incorporated energy circulation system for the sustainable development of the Mekong Delta region. Lab-scale methane fermentation experiments in this study with a mixture of biomass feedstock collected in the Mekong Delta (shrimp pond sludge, bagasse, and molasses from sugar production) recorded biogas production yield over 400 L kgVS⁻¹ with H₂S concentration below 50 ppm level. This real biogas was directly supplied to an SOFC without any fuel processing such as desulfurization, methane enrichment and pre-reforming, and stable power generation was achieved by applying paper-structured catalyst (PSC) technology.

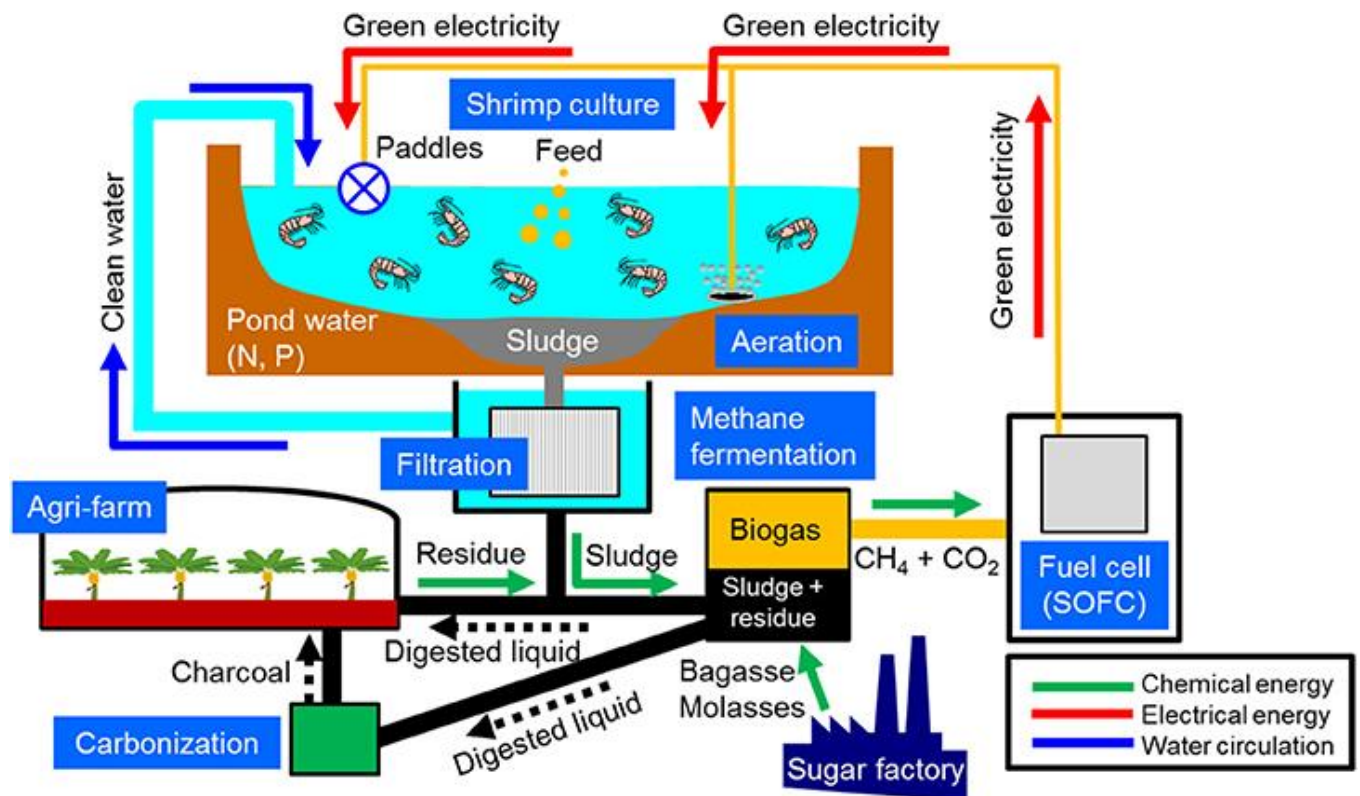


Figure 3. Fuel cell-incorporated energy circulation system

[\[Read more\]](#)

(Siratori et al., May 26, 2017, *Frontiers Environmental Science*)

4. Introduction of Liquid Enzymes to improve biogas productivity from agricultural waste

Enzymes are found in the cells of every living thing. Their purpose is to help catalyze, or speed up, certain biochemical reactions. Enzymes are used today in many industrial applications such as animal nutrition, detergents, and biofuels. The enzymes developed by DuPont for biogas production break down plant fibers (carbohydrates such as cellulose and hemicellulose) and protein-rich materials, resulting in sugars and amino acids more suitable for biogas-producing microorganisms. Any organic material that contains cellulosic fibers, including agricultural materials, as well as farm, animal, paper and food wastes. This includes enabling safe use of non-food feedstocks such as straw and deep litter muck. Additionally, enzymes can also help break down protein-rich materials such as food waste and manure.

[\[Read more\]](#)

(June 28, 2017, *Meat Trades Journal*)

[NEWS HIGHLIGHTS - NATIONAL](#)

1. India's first Bio-CNG plant inaugurated in Pune, Maharashtra

India's first Bio-CNG fuel plant was inaugurated by Union Minister of surface Transport Nitin Gadkari and Union Defence Minister Manohar Parrikar, in Pune, Maharashtra. The plant has been commissioned by city-based Primove Engineering Private Limited, and will use agricultural residue to generate CNG that can be used as fuel in automobiles.

Primove's technology can produce over 100 million tonnes of crude equivalent Bio CNG per year, which is about 50 per cent of India's fuel imports. With the technology patented by Primove, biomass can be compacted and transported in situ, stored, and distributed easily. This will cut down the costs in supply chain for Bio-CNG. A typical CNG installation can distribute about 5–10 MT of CNG per day.

This daily output of 5 tonnes of AgroGas™ (Bio CNG) can power about:

- ✚ 70 buses (70 kg/fill)
- ✚ 500 cars (10 kg/fill)
- ✚ 800 auto rickshaws (6 kg/fill)

A combination of the above [[read more](#)]



Figure 4. Bio-CNG plant at Pirangut, Pune (MH)

(Akshay Urja, MNRE)

2. IIMB installs biogas plant to convert waste into wealth

Indian Institute of Management Bengaluru (IIMB), in keeping with its mission of actively adopting environment-friendly measures, has commissioned a biogas plant which turns waste into wealth. The biogas plant treats food waste generated on campus and the gas produced is being utilized for cooking at the campus canteen. The plant can produce fuel equivalent to 2 LPG cylinders a day, according to a IIMB statement here today.

The by-product of the processed waste is compost, rich in nutrients, which will be used as manure for plants on 100 acres campus. The biogas plant has been set up by GPS RENEWABLES, a firm which is headquartered in Bengaluru and whose founders are alumni of IIMB. Sreekrishna Sankar, Mainak Chakraborty and Mohit Behl founded the firm in 2012. Sreekrishna and Mainak were named 'Top Innovator under the age of 35' by MIT Technology Review in 2014.

[\[Read More\]](#)

(January 7, 2017, NEWS HOME)

3. Pitch for biogas-linked toilets in Swachh Bharat Mission

Malprabha, a biogas-linked toilet system, developed by late Suhas Vitthal Mapuskar who received the Padma Shree posthumously, could be used in Swachh Bharat Mission. Such toilets have been in use in Dehu for the past 27 years.

Under the Swachh Bharat scheme, public toilets are being built in rural areas, but the waste water is discharged in rivers or water bodies, leading to pollution. The biogas-linked system ensures appropriate treatment and reuse of waste water and an additional incentive of biogas. Mapuskar developed the new model of biogas plant for biomethanation of human nightsoil. It is eco-friendly, and self-sustaining technology, which is also cost effective. In the temple town of Dehu, nearly 75 such biogas-linked toilet plants have been installed by families for the past 27 years.

[\[Read More\]](#)

(January 28, 2017, TOI)

4. Biogas worth 375 kW wasted every month

Surplus biogas with the potential of generating power of 375kW is being burned away every month due to government complacency. The files that would approve the export of surplus power to the state electricity department is yet to move ahead. The garbage treatment plant on the Calangute-Saligao plateau has been generating electricity from biogas for the past seven months.

"The plant is generating around 873kW of power per month for its own consumption from the biogas created from biodegradable waste. Surplus power of 375kW is also being generated every month. The plant generated 1,64,766 cubic meter of biogas in January and 1,46,980 cubic meters in February. Since there is no mechanism to export the power right now, surplus power wasted. [[Read More](#)]

([March 23, 2017, TOI](#))

5. Corporation pitches for biogas in households, hotels

Apart from households, the bio digester plant can be established in hostels and hotels, farms, marriage halls, schools and colleges too. City corporation commissioner and special officer N Ravichandran said that waste management projects over the past few months had reduced waste generation in the city.

The city corporation has about four bio-methanation plant and four micro compost units. While the Ariyamangalam dumping yard in the city used to produce 450 tonnes of average waste a day, it has come down to 300-350 tonnes now as waste is getting diverted to these bio-methanation plants and micro compost units for recycling. The corporation will be able to prevent another 100 tonnes of waste from reaching the dumping yard once 14 more micro-compost units start functioning. If waste stops coming out of commercial establishments and households, it can ensure zero dumping soon.

[[Read More](#)]

([March 24, 2017, TOI](#))

6. Tata Motors develops country's first Bio-Methane Bus

Tata Motors, India's largest Commercial Vehicles manufacturer and the No 1 Bus Brand yet again showcased a class-leading technology innovation- country's first Bio-CNG (bio-methane) bus at the Bio-energy programme, called 'Urja Utsav'. This programme was organized by the Ministry of Petroleum & Natural Gas. Present at the event were *Hon'ble Minister of MoPNG (Ministry of Petroleum and Natural Gas) Shri. Dharmendra Pradhan and Minister of State with Independent Charge for Power, Coal, New and Renewable Energy and Mines, Shri. Piyush Goyal.*

Tata Motors has designed and developed bio-methane engines (5.7 SGI & 3.8 SGI) for LCV, ICV & MCV buses. Displayed at the event were three engines, along with the lead model; Tata LPO 1613 with 5.7 SGI NA BS-IV IOBD-II compliant bus. The Tata LPO 1613, already in operation by PMPML (Pune Mahanagar Parivahan Mahamandal Limited) was showcased with bio-methane fuel at the event.



Figure 5. Minister of Petroleum and Natural Gas, Dharmendra Pradhan, flags off the country's first bio-methane bus manufactured by Tata Motors

[\[Read only\]](#)

(July 18, 2017, Webwire)

7. Filtered biogas for use at cremation facility

The gas generated from the under-construction biogas plant will be used at the crematorium along Panchaganga.

The Kolhapur Municipal Corporation (KMC) has been approached by a Gujarat firm to set up gas cremation facility free of cost, in continuation of the civic policy of past few decades. The firm is going to spend Rs 32 lacs to develop the facility in next few months. The use of gas cremation facility will not be mandatory and the KMC has decided to continue the regular cremation facility which uses wood.

At present, the KMC requires around 150 kg of wood or dung cakes to cremate each body and the amount spent on the cremation is around Rs 1,200 to Rs 1,400. Several organisations, mandals donate the dung cakes and wood to the KMC. The civic body also carries out drive to get the financial help from the rich to run the facility and provide the services free of cost.

"The space at the cremation site is limited and the gas cremation will address this problem as well. The gas cremation will reduce the generation of ash and smoke.

[\[Read More\]](#)

(April 20, 2017, TOI)

8. Major markets, bus stands in Kozhikode corporation limit to get biogas plants

City Corporation authorities are working on a proposal to set up biogas plants in all the major markets and bus stands for the disposal of generated waste in the source points itself. The proposal came under the various initiatives put forth by the civic body for the management and disposal of solid waste at the generation point itself.

The civic body is also planning to revamp the unused biogas plant at Mofussil bus stand for the disposal of the generated waste at the bus stand and its surrounding areas. Another biogas plant will come up at Palayam vegetable market.

The schemes are proposed under the annual plan programme of the corporation for the financial year 2017-2018. The civic body had entrusted Niravu for the revival of the unused biogas plant at central fish market. The agency had completed the removal all the piled up plastic waste and removed stored gas from the plant. The existing plant at central fish market has the capacity to generate 70 cubic meters of biogas per day.

[\[Read More\]](#)

(May 26, 2017, TOI)

9. Eight out of fourteen biogas plants ‘dysfunctional’ in Indian city

Most community biogas plants in Thiruvananthapuram are ‘dysfunctional’, according to an article from the Times of India. Eight out of fourteen biogas plants in the city are currently non-operational, according to a newly released report from the city’s health committee. The report also claims that the city’s corporation has failed to frame annual maintenance contracts with any of the 14 companies that installed the biogas plants. The community biogas plants in question are set up in markets, schools and other public spots, according to the Times of India article. A number of issues have taken the eight biogas plants out of action. For instance, the Times of India points out that the community biogas plant at Peroorkada is out of action due to a damaged pulveriser. At Kazhakkootam, a plant with the capacity to process 1,500 kg per day was rendered dysfunctional due to overloading, while a biogas plant at Sreekanteswaram Park with a capacity to process 1,200 kg per day is unable to process waste because of a lack of sufficient quantity of waste.

[\[Read More\]](#)

(June 15, 2017, Bioenergy insight)

[NEWS HIGHLIGHTS - INTERNATIONAL](#)

1. First African grid-connected biogas-powered electricity plant comes online in Kenya

Africa's first biogas-powered electricity producer to sell surplus electricity to a national grid has come online at a Kenyan commercial farm. The Gorge Farm Energy Park, located in the market town of Naivasha, produces 2 MW of electricity and heat to cultivate 1,740 acres of vegetables and flowers, with enough surplus power to feed 5,000-6,000 rural homes.

The plant uses anaerobic digestion (AD) to produce biogas, which is then burned in two cogeneration engines to produce the electricity and heat. According to Tropical Power, the new biogas plant reduces annual CO₂ emissions by nearly 7,300 tonnes, as the farm is not dependent on the oil-based power in the national grid. [[Read more](#)]

(January 11, 2017, Bioenergy Insight)

2. Hawaii gives green light for energy-from-waste plant

BioEnergy Hawaii plans to lease just under 15 acres at the West Hawaii Concrete Quarry to build a waste separation and anaerobic digestion facility that will produce methane and other gases, with by-products to include soil amendments and fertiliser. A smaller, closed thermal gasification unit will generate electricity, under the plan.

The methane will power garbage trucks currently run by Pacific Waste, a sister company. Pacific Waste currently hauls about 80% of the commercial waste on the west side of the Big Island. The plant is expected to be open in the summer of 2019. [[Read more](#)]

(February 6, 2017, Bioenergy Insight)

3. Incentive needed for biogas, waste-to-energy development

The Indonesian chamber of commerce and Industry (Kadin) has called on the government to provide more assistance to investors to reach the country's target of sourcing 23% of its energy from renewable.

The suggestion was to come up with biogas and waste to energy technology in Indonesia. From Energy

and Mineral Resource Ministry data, the country has 49,810 MW electric from biogas and waste-to-energy potential. [[Read more](#)]

([March 16, 2017, Pressreader](#))

4. Active iron solutions for the AD market

OMEX Environmental is supplying a new non-hazardous iron powder product to the anaerobic digestion industry for the minimisation of hydrogen sulphide levels in a plant's fermenter.

Active Fe is designed to minimise hydrogen sulphide levels in the fermenter by binding it immediately during formation. Therefore allowing the AD process to occur uninhibited resulting in optimal biogas yields and methane content.



OMEX Environmental summarises the benefits as follows:

- Easy to apply straight into the fermenter
- An effective measure in preventing acidification
- Non-hazardous compared to other iron products in the market
- Fast results [[Read more](#)]

([April 28, 2017, Envirotech Magazine](#))

5. Capstone to upgrade New York WWTP to provide biogas power

Capstone Turbine Corp., the world's leading clean technology manufacturer of micro-turbine energy systems, recently announced that it received an order for a C600 Signature Series micro-turbine to become part of an extensive upgrade for a wastewater treatment plant in upstate New York. Capstone micro-turbines were selected for their low emissions and modular design, which is ideal for biogas applications. The micro-turbine will be installed in a combined-heat-and-power (CHP) configuration at the wastewater treatment facility and be fuelled by biogas from the local municipal sewer system. [[Read more](#)]

([May 16, 2017, Biomass Magazine](#))

6. Installation of the first CApure CA70LBG

Puregas Solutions marked a significant milestone by installing their first CApure CA70LBG. The Biogas Upgrading Plant was installed at the Skogn Papermill, Norway in early June. The plant, which will upgrade up to 3,000 Nm³/h of raw biogas, will be part of the largest biogas liquefaction plant in the Nordic Countries producing fuel for public transport vehicles.

CApure process is ideally suited to Liquefaction Projects and able to reduce the CO₂ content of the biomethane to below 50 ppm, making liquefaction possible.

The plant will convert the cleaned biogas from fishery waste and residual paper mill slurry into liquid bioLNG fuel. [[Read more](#)]

(12 June, 2017, Biogas World Newsletter)

7. DUREYA technologies simplifies biogas power generation for farms

Motor and engine manufacturer Duryea Technologies a Pennsylvania based company is launching the MODE Power System, a new generator set designed to handle the inherent liabilities of biogas. The product's most important feature is its separate lubrication system, sealed from acidic combustion gases, which will eliminate frequent oil changes and reduce the rate at which parts wear. It has also revealed that Duryea's substantial investment in tough surface treatments and materials like ceramics and stainless steel for engine components in contact with biogas.

The smallest installation size is 16 kW and requires 8,000 cubic feet of biogas per day, typically produced by a herd size of 100 cows. By adding modules, a system is infinitely scalable into the megawatts, but Duryea Technologies fields the most inquiries from dairy farms with 400-800 cows that require 60-200 kW. [[Read more](#)]

(24 June, 2017, Biogas World Newsletter)

8. UK biogas development to fall in 2017

The Anaerobic Digestion and Bioresources Association's (ADBA) annual market report has found hundreds of potential biogas plants might never make it off the drawing board. ADBA's report finds an 18% leap in electrical capacity from biogas plants between 2015 and 2016 could be the last surge for the sector as it is hit by "policy uncertainty", which could leave up to 437 planned plants in limbo.

As per the AD & Biogas and World Biogas Expo 2017 report, anaerobic digestion in the UK now has a capacity of 730 MW of electricity, giving it a total energy generation of 10.7 TWh annually. The report also finds that while up to 80 new biogas plants were commissioned in 2016, only 19 to 64 are likely to get off the ground in 2017. [[Read more](#)]

(July 5, 2017, Ends waste & Bioenergy)

UP-COMING EVENT

Sr. No.	International	National
1	International Conference on Renewable Energy and Resources 24-25, July, 2017 Vancouver, British Columbia, Canada Theme: Trend to conserve energy to preserve life	8 th World Renewable Energy Technology Congress International Conference and Exhibition 21-23 August, 2017 New Delhi-India
2	Inter Baltic Biogas Arena (IBBA) Workshop 2017 23-24, August, 2017 Poznan University of Technology, Poznan, Poland	Renewable Energy India Expo 20-22 September, 2017 India Expo Centre, Greater Noida
3	7 th International Congress on Biofuels and Bioenergy October 2-4, 2017 Toronto, Canada Theme: Exploring the Advancements in the Field of Biofuels & Bioenergy	A workshop on Bio-waste to Biogas at IFAT 2017 26-28, September, 2017 Bombay Exhibition Centre, Mumbai

4	15 th IWA World Conference on Anaerobic Digestion (AD-15) 17-20, October, 2017 Beijing, China	EnergyDecentral India 5 -7, December, 2017 Bombay Convention & Exhibition Centre Mumbai, India
5	US Biogas 2017 25-26, October, 2017 Hilton San Diego Mission Valley, San Diego	6 th International Conference on Advances in Energy Research 2017 12-14 December, 2017 Department of Energy Science and Engineering, IIT Bombay, Mumbai, India
6	19 th International conference on Bioenergy, Biogas and Biogas Production 2-3, November, 2017 Cape Town, South Africa	
7	Future of Biogas Europe 2017 15-16, November, 2017 London, UK	
8	Biogas Convention and Trade Fare 12- 14, December, 2017 Exhibition Centre Nuremberg NCC Mitte, Hall 9 and 10 Nuremberg, Germany	