

Success Stories of Advanced Biofuels for Transport

IOC: BIOMETHANATION OF ORGANIC WASTE

Year of plant start-up:	2018-19
Location:	India
Technology:	Waste to Energy Conversion of various organic wastes such as food waste, municipal solid waste and crop residues to biogas
Plant capacity:	5 Ton biomass/day
Operational experience achieved:	4500 hr; total accumulated volume of fuel produced
Total Capital Expenditure:	0.4 Million USD
Principle feedstocks:	Food waste, municipal solid waste and crop residues
Feedstock Capacity:	1500 T/y
Products/markets:	Transport fuel, electricity, fertilizers
Technology Readiness Level (TRL):	TRL 8 – system complete and qualified

DESCRIPTION

Biomethanation also called as anaerobic digestion is a process of environmentally benign disposal of various organic wastes such as food waste, municipal solid waste and crop residue. In this process, organic waste is converted into biogas in presence of microorganisms under anaerobic conditions. Biogas mainly consists of methane, carbon dioxide and small amount of other impurities. Biomethanation plant also gives a by-product called organic manure which is used as soil conditioner. Biomethanation plants benefit the environment by reduction of GHG, pathogen control and odour reduction.

Applications of biogas:

- Cooking in place of LPG
- Electrical power generation using gas engines
- For lighting purposes in gas fired lanterns
- Bio-CNG as transport fuel in automobiles
- For space heating applications

IOC's biomethanation technology is a two-stage anaerobic process:

- Primary digester: organic fraction present in waste gets extracted into liquid form
- Second stage: organic matter is converted into biogas in the presence of indigenously developed inoculum

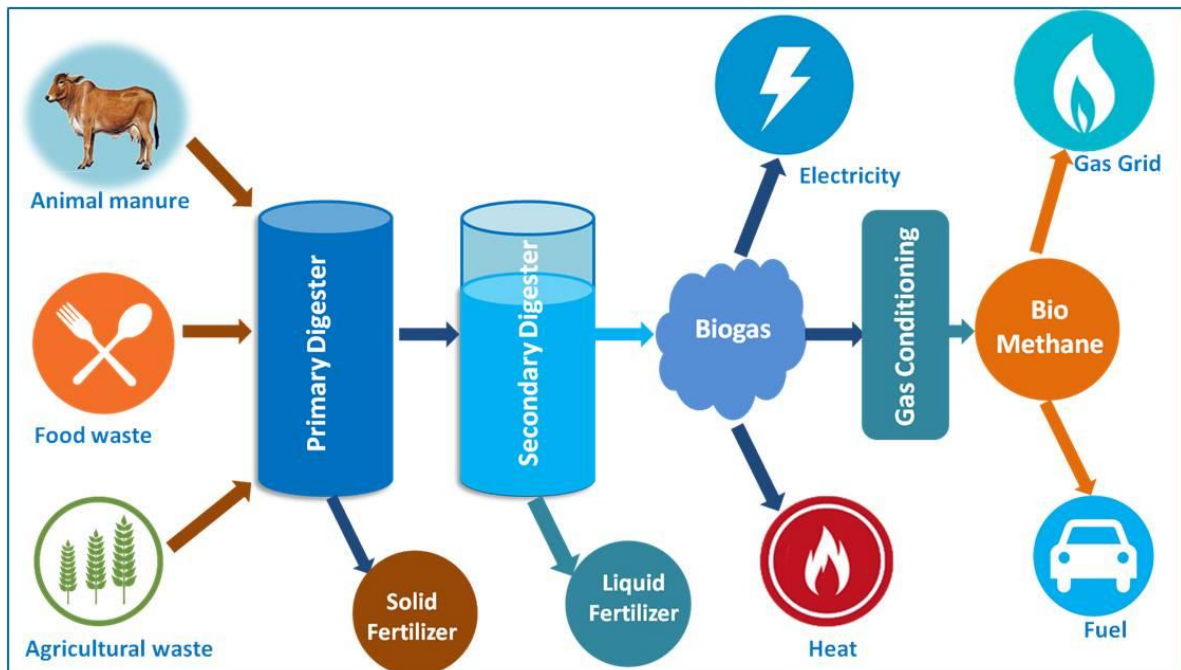
Benefits of IOC's technology:

- Higher methane content (>80%) in the biogas: Leading to better heating value and burning efficiency
- Better control on seasonal variations in gas generation rate
- Well studied and validated process backed up by sound technical inputs
- Compact and cost effective plant engineering and design

The following is the typical yield and composition of biogas generated in 500 kg/day biomethanation plant:

Feedstock load kg/day	500
Expected biogas production Nm ³ /day	30
Expected bio-manure kg/day	50
Biogas Composition (vol%)	
CH ₄	80-85
CO ₂	11-13
N ₂	3-5

Developed technology has been evaluated at IOC R&D Centre in a small 50 kg/day, 250 Kg/day and 5 T/day biomethanation plant. Towards supporting Government of India's initiative on Swachh Bharat Abhiyaan, a 5 TPD biomethanation plant is being set up in FY 2018-19 in Municipal Corporation of Faridabad based on IOC's biomethanation technology. It is also envisaged to convert generated biogas into bio-CNG in the proposed plant.



Block diagram of bio-methanation of organic waste

Stakeholders involved:	Finance: Indian Oil Feedstock: Local Civil bodies
Financing Support:	Finance: Indian Oil
Contribution to Sustainable Development Goals:	Through utilization of waste this project enables local production of energy in the form of BioCNG, Electricity, cooking gas etc. It also helps in keeping the environmental clean and provides organic fertilizers for crops.
Contribution to GHG emission reduction in transports:	This technology for controlled disposal of household and industrial waste, crop waste and kitchen waste etc) will significantly reduce the un-intentional release of CH ₄ to environment.
Employment:	10
Replicability and scale-up potential:	Further several plants are in the pipeline in the country
Success factors:	It is important to have a supportive legislative and financial landscape for successful projects to replicate. Technology neutral policy and broad decarbonisation targets will support deployment of new facilities, as it will create a stable marketplace and create confidence for investors to finance more projects.
Constraints:	Technology neutral policy is not global today, but the language is changing to

include new technologies such as gas fermentation of waste emissions. There are some countries today, where there isn't a level playing field for incentives (tax credits or mandates). In such cases, where new approaches such as recycled carbon fuels are ineligible, this is a constraint.

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More information:

<https://iocl.com/>

<https://bioenergyinternational.com/biofuels-oils/indianoil-unveils-two-innovative-technologies-during-world-biofuel-day>



The ART Fuels Forum brings together 100 experts and leaders representing the alternative transportation fuels industry to facilitate discussions, elaborate common positions on policy issues and identify market penetration opportunities and barriers for these fuels. The Forum is established and financed by the European Commission under the project name "Support for alternative and renewable liquid and gaseous fuels forum (policy and market issues)".

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