



**KAASHYAP ENVERGY INFRASTRUCTURES PRIVATE LIMITED**

*.....Creating Infrastructures in the realms of Environment and Energy*

**WELCOME**

# **Greenco Summit 2024**

**Chennai**



**Kiran KK ; Managing Director  
Sriram Kashyap ; Director**

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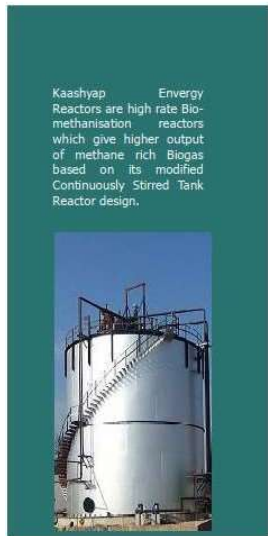
### **Kaashyap specializes in**

- ✓ Production of BioCNG from organic waste
- ✓ Production of New water from waste water

### **Kaashyap Operates from**

- ✓ Hyderabad ; India
- ✓ Kuala Lumpur ; Malaysia

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Kaashyap Envergy Reactors are high rate Bio-methanisation reactors which give higher output of methane rich Biogas based on its modified Continuously Stirred Tank Reactor design.

Kaashyap Envergy Infrastructures Pvt. Ltd.

Kaashyap Envergy provides solutions for Biogas and Bio-CNG

Kaashyap Envergy provides services to its clients and creates Infrastructure by means of Design, Detailed Engineering, Procurement, Construction, Commissioning, Operation and Maintenance of special projects catering to Environment protection combined with generation of non-conventional and Renewable Energy.

**Contact Us**

Kiran KK

INDIA  
+916304254968  
+919440065912

kiran.kk@kaashyapenvergy.com  
kaashyap.envergy.infra@gmail.com

www.kaashyapenvergy.com

Kaashyap Envergy Infrastructures Pvt. Ltd.



Kaashyap Envergy creates infrastructures in the realms of Environment and Energy (ENERGY)



Kaashyap Envergy Infrastructures Pvt. Ltd.

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**Research & Development**

The promoters of Kaashyap Envergy are actively involved in Research & Development in these chosen areas of Environment & Energy and work jointly in collaboration with leading Engineering/Technical institutes in India such as Indian Institute of Technology, Hyderabad; Jawaharlal Nehru Technological University, Hyderabad; University of Petroleum and Energy Studies, Dehradun.

**Energy and Water**

Kaashyap Envergy provides solutions to capture Energy as well as Crystal clear water from the high strength organic wastewaters generated in agro process industries such as sugar, distillery, starch, palm oil mill etc.

**Projects**

Mr. Kiran KK, promoter-director was involved in projects as Project Director/ Project Manager during his dedicated career exclusively in the fields of Environment & Energy (ENERGY).

**Sugar Factory Effluent**

Vijaynagar Sugars Pvt Ltd | Shiraguppi Sugars Ltd.

**Distillery Spentwash**

Terna SSK Ltd | Sriram SSK Ltd | Srirama Distilleries | Andhra Sugars Ltd | Gauri Industries Ltd | Welcome Distilleries Ltd | Chamundi Distilleries | Kolhapur Sugar Mills Ltd | Karamchand Thaper Group | Jeypore Sugars Ltd

**Palm oil Mill Effluent (POME) to Power**

Green & Smart Sdn Bhd ; Malaysia

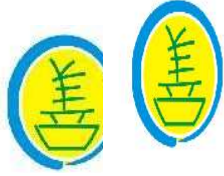
**Wastewater to Crystal Clear Water**

Bhabha Atomic Research Centre | Synthite Group



2.0 MW CAPACITY WASTEWATER TO POWER PLANT

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### Technical Collaboration



Indian Institute  
of Technology  
- Hyderabad



Indian Institute of  
Chemical Technology;  
Hyderabad



Department of Atomic  
Energy; Govt of India



BITSPILANI  
- Hyderabad



Indian Institute of  
Technology; Roorkee



IIIT Hyderabad - Indian  
Institute of Information  
Technology, Hyderabad

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### Technologies Developed

- HRCM (High Rate Complete Mix) Anaerobic Digester
- EGSB (Expanded Granular Sludge Bed) Anaerobic Digester
- IITH-Kaashyap-ABT (Algal Bacterial Tower)
- IITH-Kaashyap-n SBR (Novel Sequential Bio Reactor)
- IITH-Kaashyap-CBME (Continuous Bi-Polar Mode Electrocoagulation)

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GOVERNMENT OF INDIA  
DEPARTMENT OF ATOMIC ENERGY  
TECHNOLOGY TRANSFER & COLLABORATION DIVISION

Dear KAASHYAP ENVERGY INFRASTRUCTURES PRIVATE LIMITED

Congratulations on a new License Agreement signed!! .

A new License signed for the Technology NISARGRUNA Biogas plant Based on Biodegradable waste resource by a renowned Organization KAASHYAP ENVERGY INFRASTRUCTURES PRIVATE LIMITED ; HYDERABAD on 27-10-2020 11:00.

Technology Transfer and Collaboration Division thank all members who supported in achieving the new agreement and making the transfer and the event a smooth and laudable experience.

We wish all the very best and successful projects to our collaborator and Licensee KAASHYAP ENVERGY INFRASTRUCTURES PRIVATE LIMITED; HYDERABAD.

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1.Vijay Nagar Sugars Ltd ; Gadag –Karnataka- Digester & ETP-Turnkey Project

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**2. Shiraguppi Sugars Ltd , Miraj , Maharashtra: Digester & ETP: Turnkey project**

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**SSWL- Two stage Diffused Aeration : A new process launched at that time**

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3.Synthite Industries Ltd , Harihar Karnataka: Digester for A new Feed stock – Marigold Flower Waste 10

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NSL GROUP- New Algal technology developed Jointly with IIT Hyderabad launched

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Siddhasiri ; Chincholi Karnataka – Digester –EGSB Technology

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### Expanded Granular Sludge Bed (EGSB) Reactors

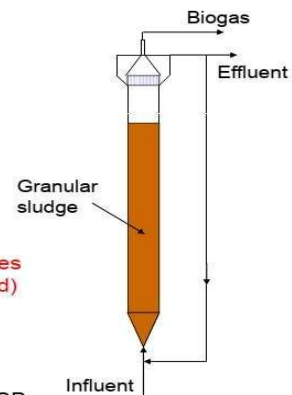
#### Effective use of granular sludge !!

##### Main Features

- High upflow velocities ( $> 8$  m/h)
- High concentration of bio-catalyst
- Extreme loading rates ( $20-40$  kg/m<sup>3</sup>.d)
- Virtually no mass transfer limitation
- Very small footprint

##### Application:

- cost effective alternative for UASB (2-3 times higher load)
- Cold wastewaters ( $< 20^{\circ}\text{C}$ )
- Dilute wastewaters ( $< 1$  g COD/l)
- Presence of degradable toxic compounds
- LCFA containing wastewaters
- Wastewaters with foaming problems in UASB



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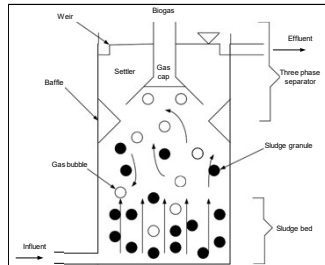




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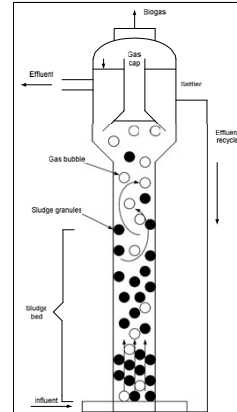
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## (EGSB) Extended Granular Sludge Bed



UASBR

- High Rate Anaerobic Reactors
- Solid Retention Time  $\gg$  Hydraulic Retention Time
- Cell Immobilization achieved through self-granulation



EGSBR

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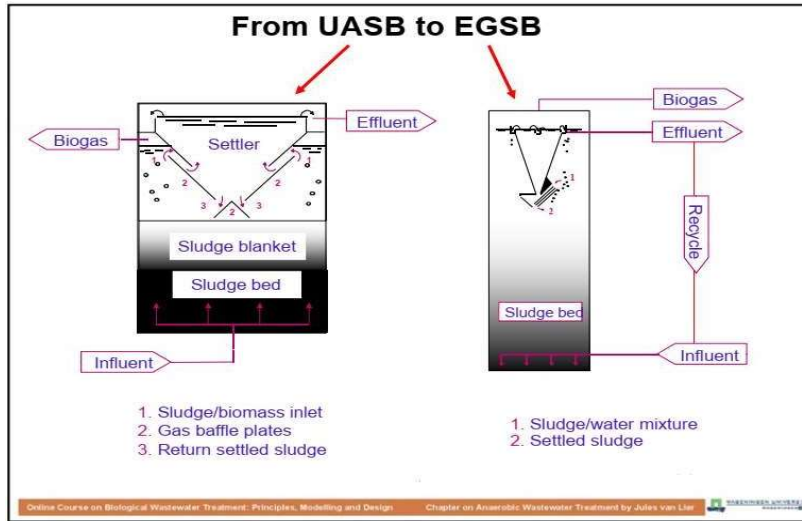
- High Rate Anaerobic Reactors
  - Organic Loading Rate for granular sludge: 12-18 kg COD/cu.m reactor volume per day
  - OLR for granular sludge  $>$  OLR in conventional CFSTR with flocculent sludge (3-5 kg COD/cu.m reactor volume per day)
  - Therefore, volume of EGSB reactor  $<$  volume of conventional CFSTR for same degree of treatment
- Solid Retention Time  $\gg$  Hydraulic Retention Time
- Cell Immobilization achieved through self-granulation

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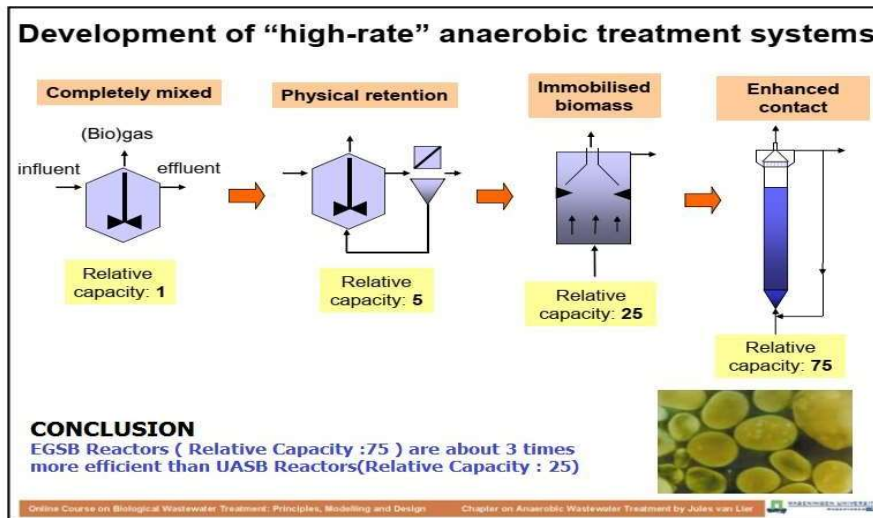


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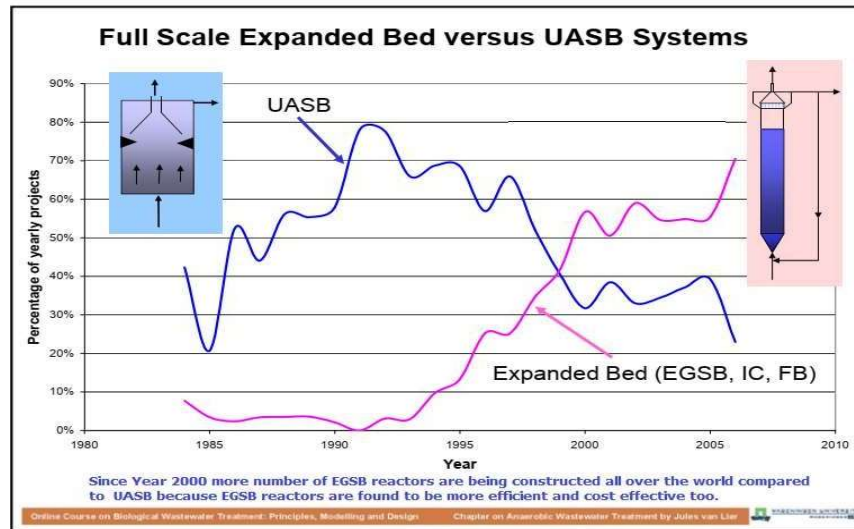


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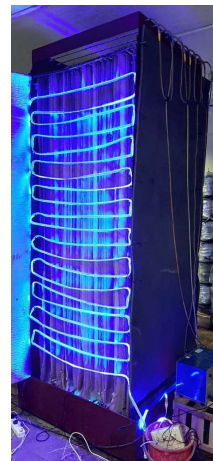


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## Algal Bacterial Tower

- Aerobic process to remove organic carbon (BOD) and nutrients
- Water is allowed to flow over a surface
- Works on natural aeration
- Algae performs photosynthesis, thereby, further adding dissolved oxygen in wastewater. Thus, algal bio-tower is more efficient than conventional bacteria-based bio-towers.
- Bio-towers are used to reduce the organic load on the subsequent main aerobic bioreactor so that the net aeration requirement in the latter is reduced.
- Particular design of the proposed bio-tower minimizes the clogging issues that are frequently encountered in conventional bio-towers



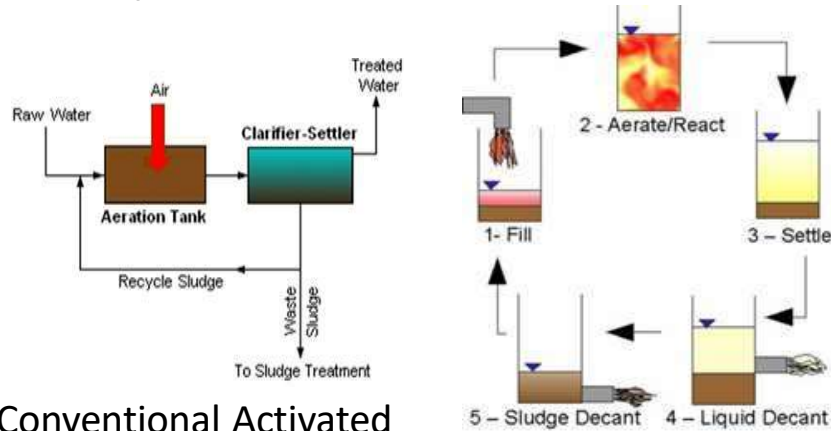
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## Sequential Batch Reactor (SBR)



- Conventional Activated Sludge Process

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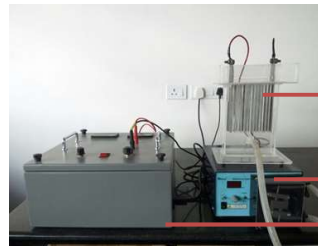
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## (CBME) Continuous Bipolar mode Electro-coagulation



**Field-scale system**



**Bench-scale system**

→ **CBME Chamber**

→ **Peristaltic pump**

→ **DC-Power supply**

- Used for removing recalcitrant pollutants which are difficult to degrade biologically
- The sacrificial electrodes release  $Fe^{++}$  ions which are subsequently oxidized to  $Fe(OH)_3$ .
- Pollutants are removed following one or more of the following mechanisms – sweep coagulation, adsorption, precipitation, and passive oxidation.
- The process may be improved by introducing aeration/ozonation into the system

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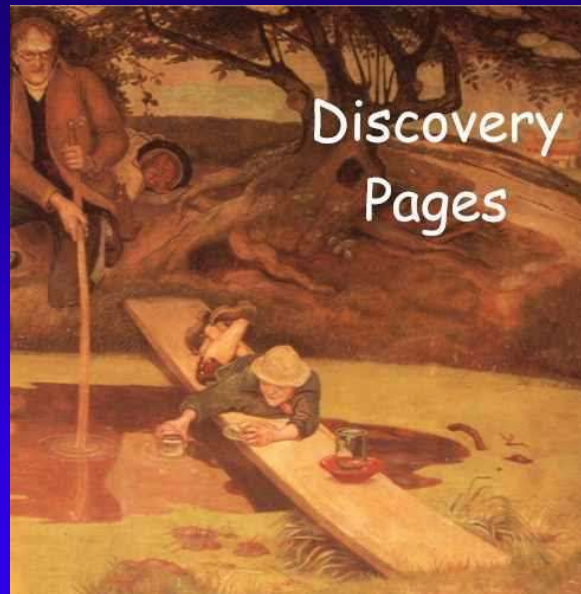
### History of Anaerobic Digestion Technologies in India

- Indian parliamentary delegation visit Europe to study Distillery spent-wash treatment technologies in 1980
- Major Technologies imported in India :-
  - UASB-Paques BV-M/s.Western Paques Ltd,Pune
  - Media Based –Structured Media-Bacardi Tecnology
  - Media Based –Random Media-SGN,France
  - Bi Phasic-Degremont-Degremont India Ltd
  - CSTR-Sulzer Brothers,Switzerland,

CSTR Technology survived to be the Best Technology so far

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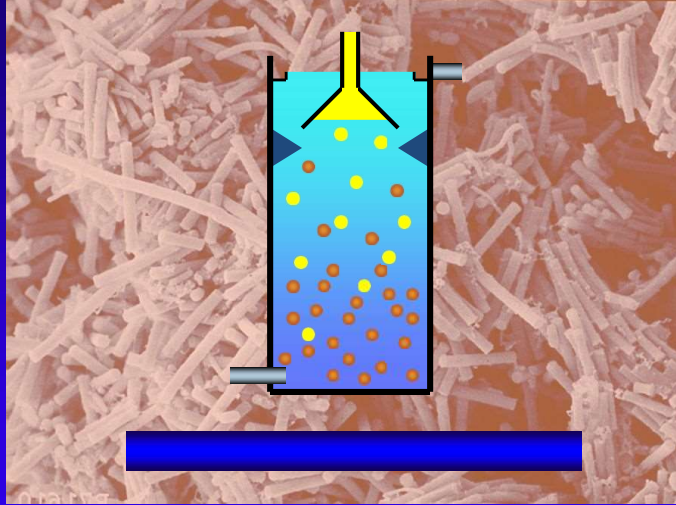
## Marsh Gas



Discovery  
Pages

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## High Rate Anaerobic Wastewater Treatment



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## What is Anaerobic Biodegradation?

Organic  
Pollution



$\text{CH}_4 + \text{CO}_2$

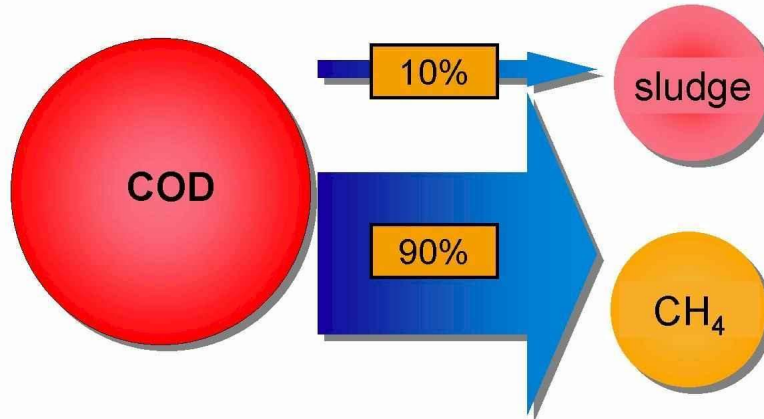
anaerobic  
microorganisms

biogas

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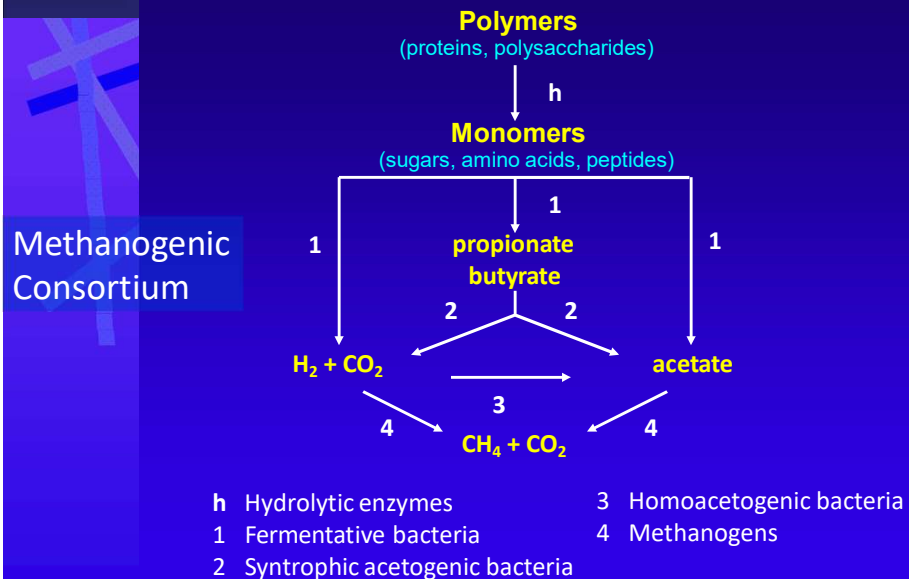
## COD Balance Anaerobic Biodegradation

### COD Balance Anaerobic

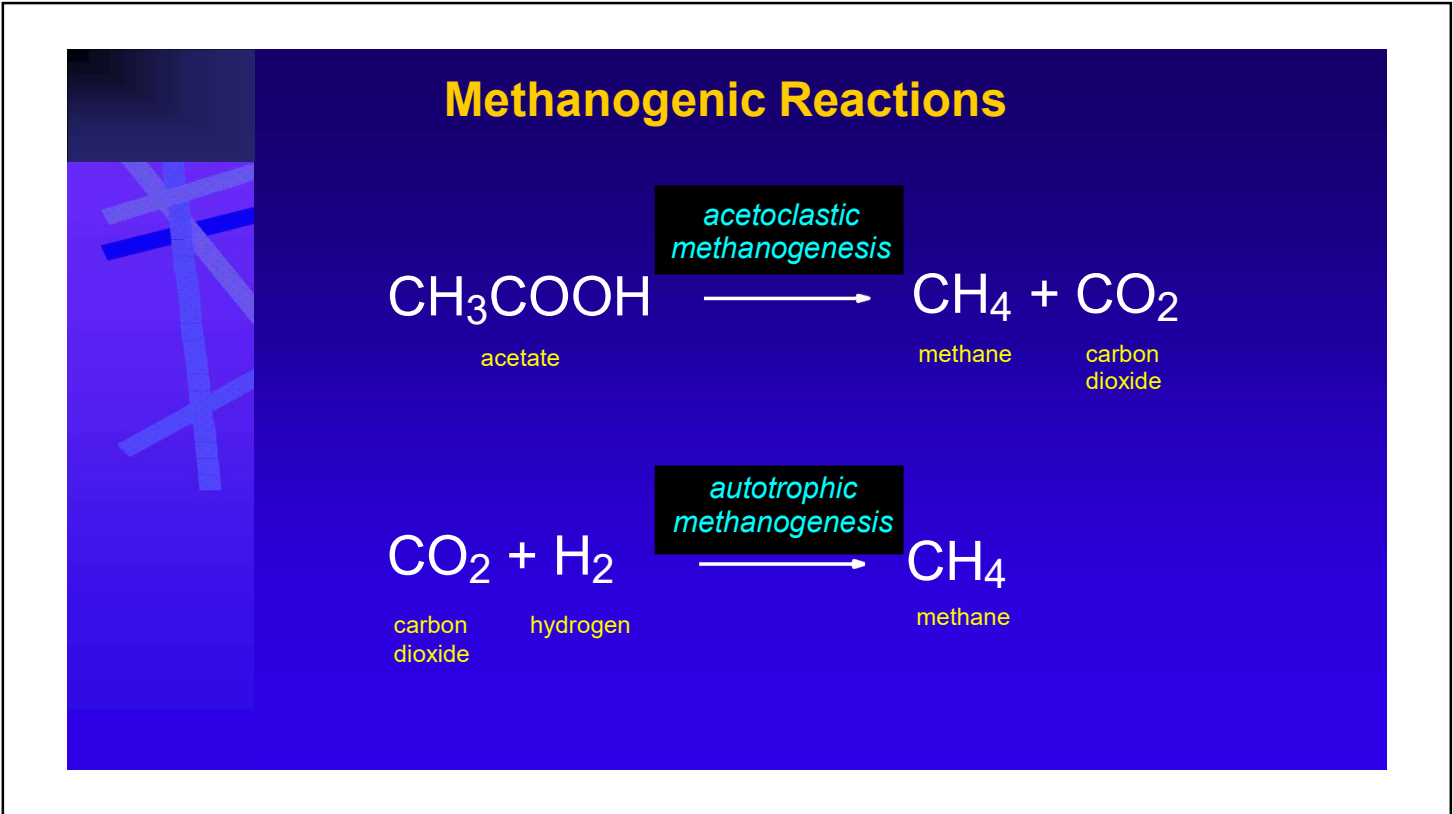


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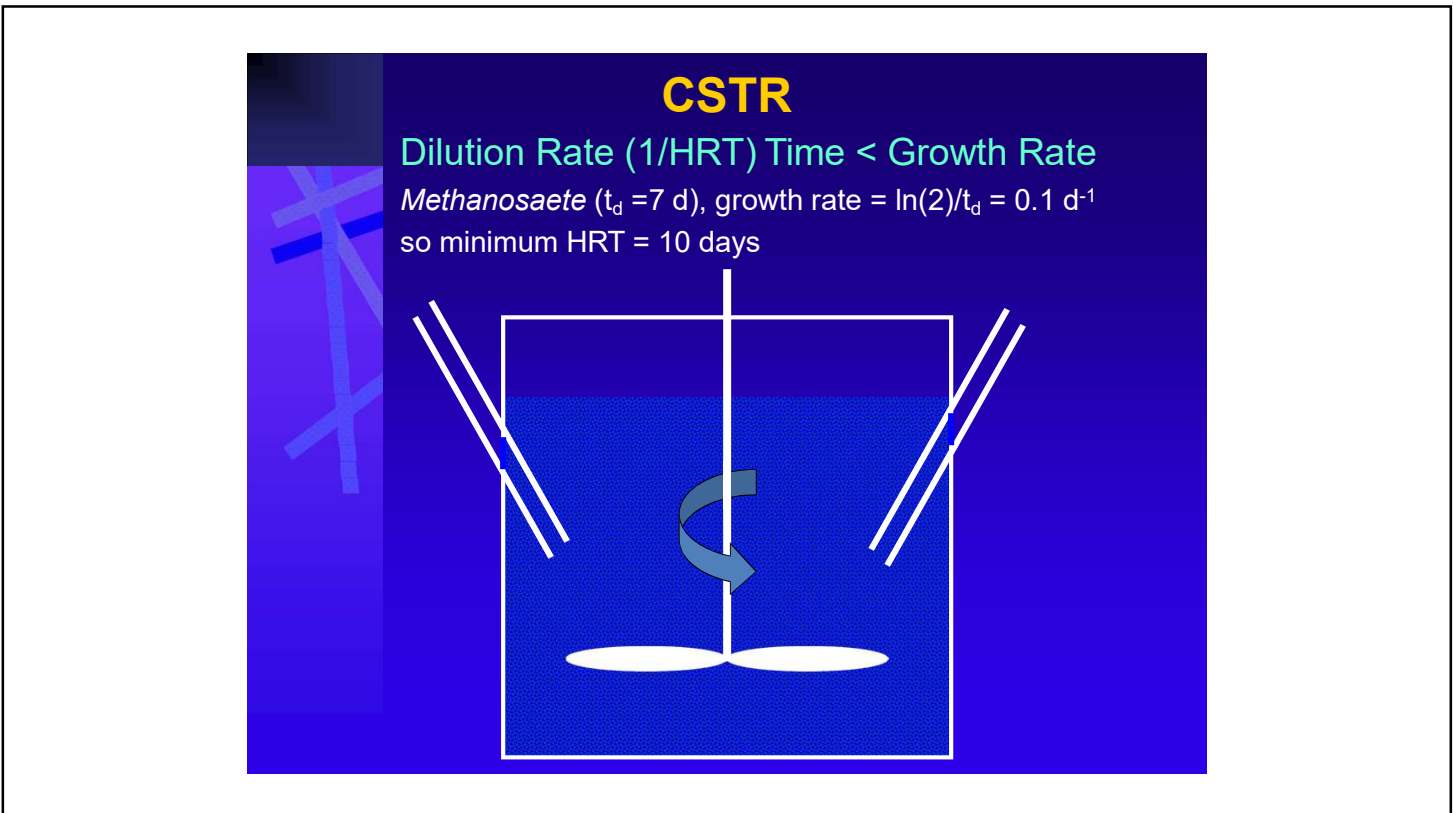
## Overview Anaerobic Biodegradation



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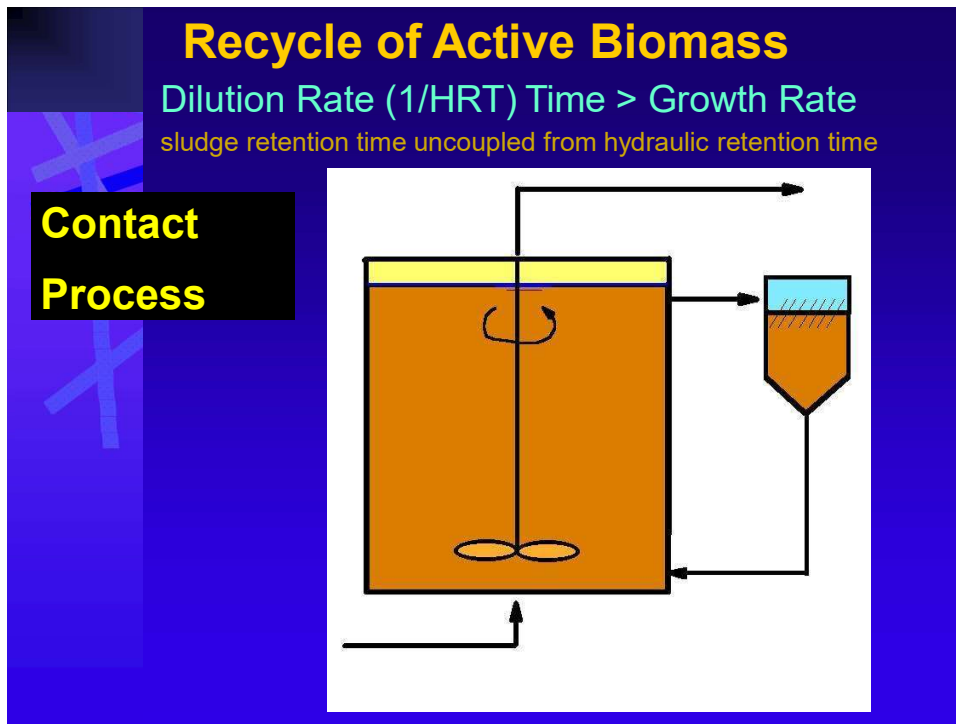


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## Anaerobic Sludge Granules

**Physical:**

dense compact biofilms  
high settleability (30-80 m/h)  
high mechanical strength

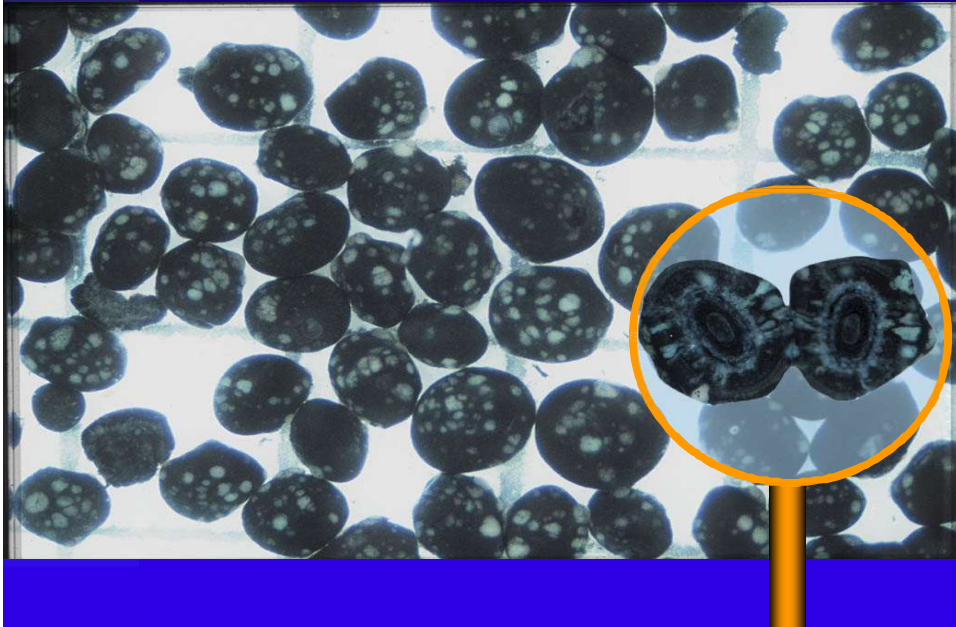
**Microbial:**

balanced microbial community  
syntrophic partners closely associated  
high methanogenic activity  
(0.5 to 2.0 g COD/g VSS.d)  
protection from toxic shock



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## Anaerobic Sludge Granules (close up)

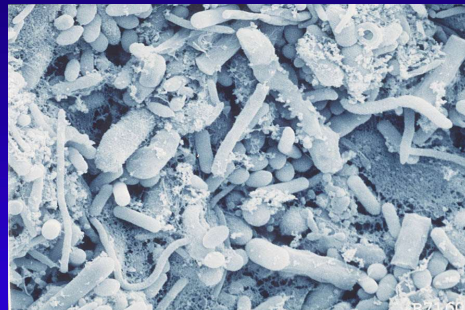


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## Anaerobic Sludge Granules (SEM)



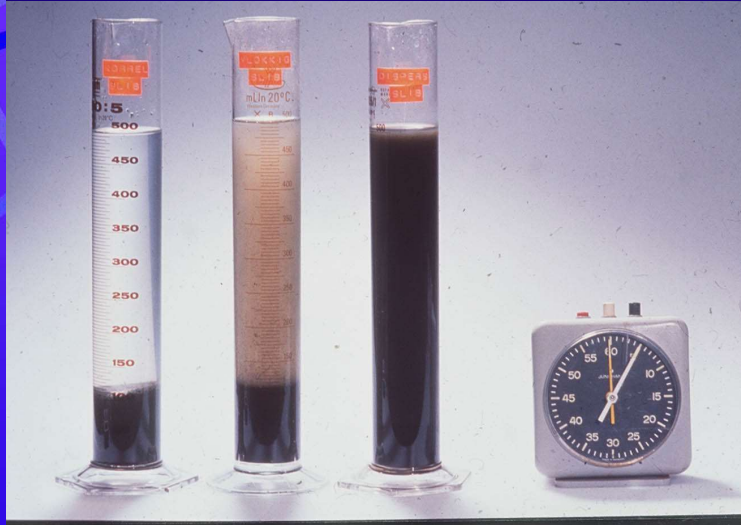
Acetate as Substrate  
(*Methanosaeta*)



Sucrose as Substrate  
(mixed culture)

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## Anaerobic Sludge Granules (settling)



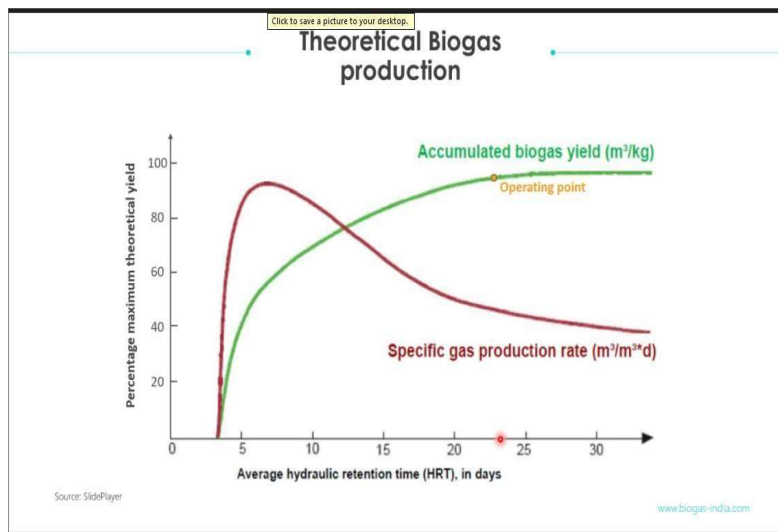
granular      flocculent      dispersed

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Click to save a picture to your desktop.

### Intrinsic Buffer system in digester

Common Buffer Reactions

a.  $CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow HCO_3^- + H^+ \leftrightarrow CO_3^{2-} + 2H^+$

b.  $NH_4^+ \leftrightarrow NH_3 + H^+$

c.  $CH_3COOH \leftrightarrow CH_3COO^- + H^+$

#### The bicarbonate buffer system

$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^- \leftrightarrow 2H^+ + CO_3^{2-}$

$P_{K_1}=6.7$                        $P_{K_2}=10.3$

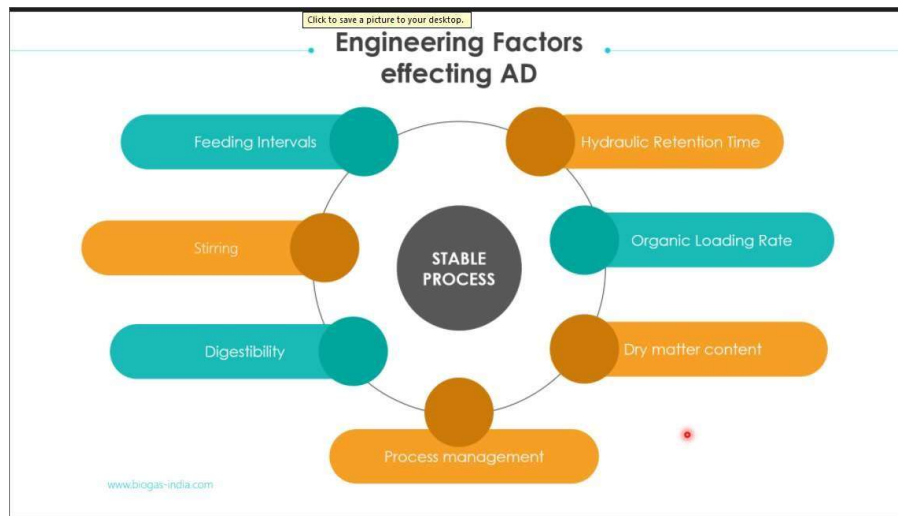
[www.biogas-india.com](http://www.biogas-india.com)

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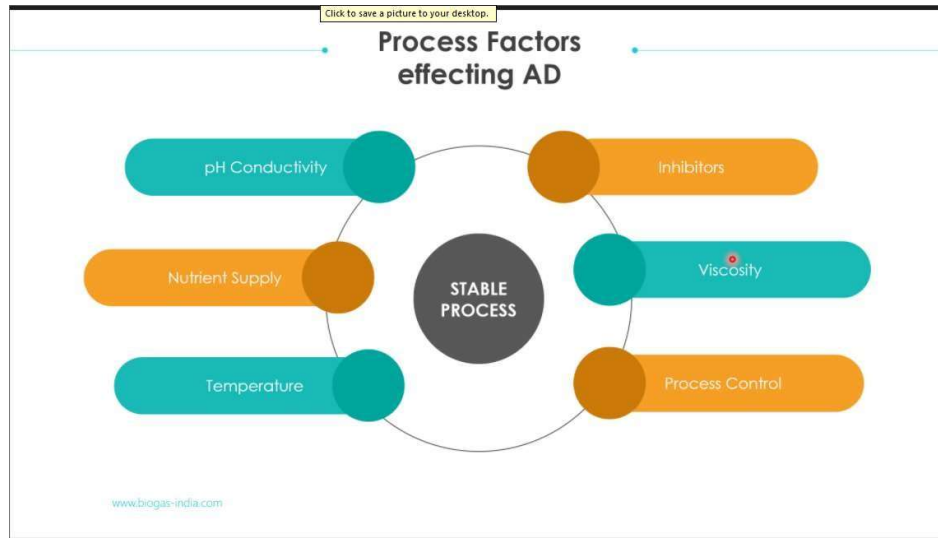


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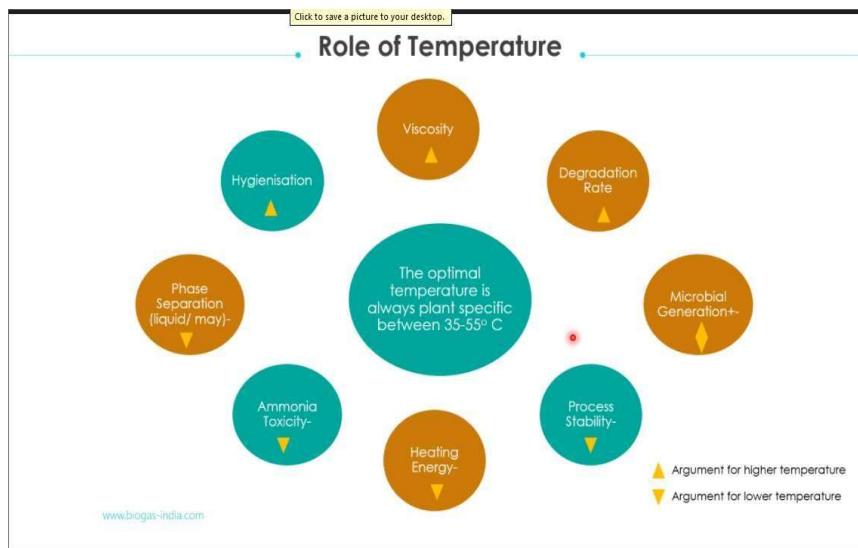


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## **Case Study -1 : A project In India**

Industry : Marigold Flower Processing Industry

Synthite Industries Ltd  
Harihar, Karnataka , India

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Tagetes Erecta  
Marigold Flower

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Lutein Powder extract from Marigold Flower

Uses of Marigold Lutein : 1.Pharmaceutical 2. Supplement 3.Pet Food 4.Animal & Fish Feed

International Price :  
US Dollar 500 / Kg  
(INR 37,000/Kg) approx.

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**A Make in India product earning high foreign exchange for the country  
encounters major Challenge  
EFFLUENT TREATMENT**



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### RAW EFFLUENT CHARACTERISTICS

SN	Parameters	Unit	Details/Value
1	Nature of effluent	-	Organic
2	Odor	-	Floral
3	Color	-	Dark yellow to Dark brown
4	pH	-	3.5 – 4.0
5	TSS	ppm	2000 -2500
6	TDS	ppm	14000-22000
7	COD	ppm	45000 – 55000
8	BOD	ppm	18000 – 23000

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### PRIMITIVE METHOD OF EFFLUENT TREATMENT : LAGOONS



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Anaerobic Reactor Shell-2

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Anaerobic Reactor Roof

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Mounting of Central Agitator On Reactor Roof

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PRE TREATMENT & PRIMARY TREATMENT STAGES

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SECONDARY & TERTIARY TREATMENT STAGES

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RAW & TREATED EFFLUENT SAMPLES  
Location : Site



RAW & TREATED EFFLUENT SAMPLES  
Location : Laboratory

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## **Case Study -2 : A project In Malaysia**

Industry : PALM OIL MILL

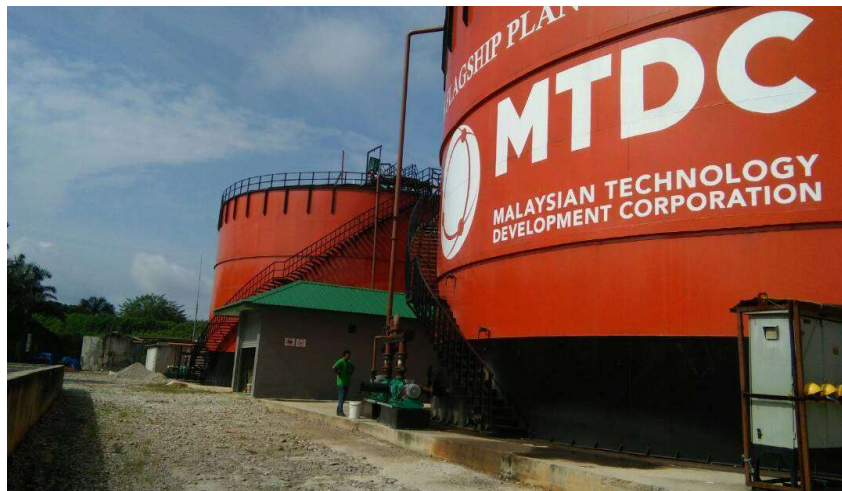
Green & Smart Sdn Bhd  
Kahang , Johor state , Malaysia

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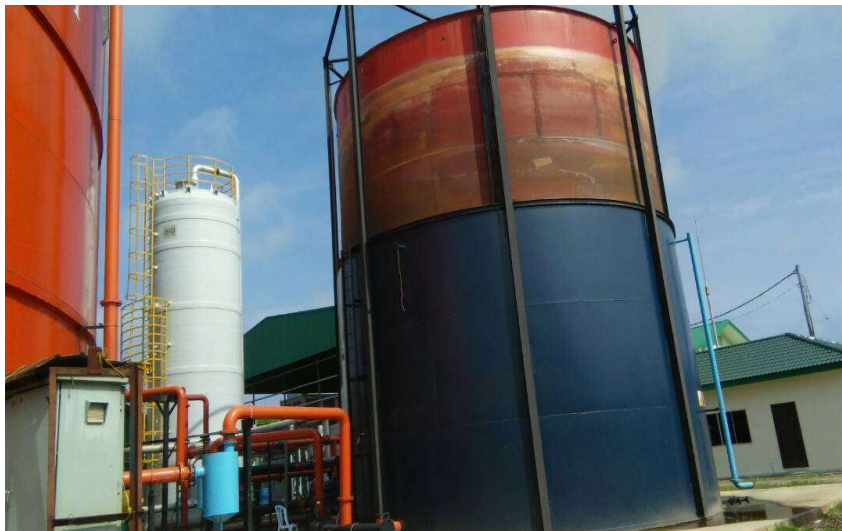


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### What is Bio-CNG?

Purified Biogas is called Bio CNG

- Bio CNG is **renewable Natural Gas**
- Bio CNG is exactly similar to Natural Gas in composition and properties
- It is a direct replacement of NG and for applications of LPG

Parameters	Biogas	Bio-CNG
Methane (v/v)	55-65%	92-98%
CO <sub>2</sub> (v/v)	35-45%	2-8%
H <sub>2</sub> S (ppm)	500 – 30,000	<20 ppm
Moisture (deg C dew point)	Saturated	< -40 deg
Other Impurities (e.g. Siloxanes)	Present	Not present
Calorific Value (LCV)	~ 19500 kJ/kg	~ 52000 kJ/kg

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### Bio-CNG vs LPG for cooking and heating

Parameter	Bio-CNG composition	LPG Composition	
Methane min.	90%	Propane (min)	95%
Moisture (max.)	5 ppm	Butane (max)	4%
Sulfur (max)	16 ppm	C5 and higher	2%
Oxygen (max)	0.50%	Sulfur (max)	5 ppm
CO <sub>2</sub> (max)	4.00%	Free water	None
Net Calorific value (kcal/kg)	11,200 - 11,500	Net Calorific value (kcal/kg)	11,200

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### **Drivers FOR BioCNG Projects :**

•Government of India has taken a decision to shift the country from the present fossil fuels base to Gas based Economy.

•In order to achieve this the Organic waste Biomass available in India to be harnessed to convert as BioCNG to an extent of 15 million tonnes by 2030, enough to reduce the country's CNG import bill by 40 per cent.

•Government of India has set a target of setting up 5000 plants to produce CBG by 2030

Government has mandated all Public sector / private sector Oil Marketing companies to compulsorily ensure at least 1% of sales of CNG per year to come from CBG starting from FY 2025-26 and incrementally increased to 5% within 5 years.

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### **ENABLERS FOR BioCNG Projects :**

•Inclusion of BioCNG projects under priority sector lending by RBI

•Central Financial Assistance from Ministry of New & Renewable Energy .  
Subsidy available – Rs.4.0 Crore for 4.8MT/Day.(Max Cap – Rs.10 Crore)

•Ministry of Agriculture and Farmers Welfare has issued FCO ( Fertiliser Control Order) Dated 13<sup>th</sup> July 2020 approving the Fermented Organic Manure as a Fertilizer.

MDA(Market Development Assistance ) of Rs.1500/MT of FOM is implemented by Government of India.

Capital Subsidy of Rs.1.0 Crore announced for Harvesting equipment used in sourcing feedstock for Compressed Biogas Plants.

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### **Various Feed Stock : Theoretical yield of Biogas**

SN	FeedStock	Biogas Yield	Unit
1	Pressmud	95.0	Cu.m Per MT
2	Maize Silage	195.0	Cu.m Per MT
3	Napier Grass Silage	155.0	Cu.m Per MT
4	Organic Fraction of MSW	90.0	Cu.m Per MT
5	Pig Slurry	40.0	Cu.m Per MT
6	Cattle Slurry	50.0	Cu.m Per MT
7	Poultry Litter	90.0	Cu.m Per MT
8	Wheat Straw	140.0	Cu.m Per MT
9	Sewage	65.0	Cu.m Per MT
10	Potato Pulp	120.0	Cu.m Per MT

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### **Super Napier Grass or Pakchong-1**

It is a cross of ordinary Napier grass (*Pennisetum purpureum*) and pearl millet (*Pennisetum glaucum*).

This plant developed by the Thailand nutritionist Dr. Krailas Kiyothong.

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### What is Special IN Super Napier Grass?

- 1) **Fast Growth:** It has the fastest growth of 10 feet in 59 days
- 2) **High Yield:** 25 tons per acre and 8 harvests per year. In other words, 200 tons per acre which can feed 20 dairy cows, 30 - 35 goats for 12 months.
- 3) **Best Nutrition:** Presence of 16-18 % of the protein that is very important for the animals particularly for dairy cows to produce more milk.
- 4) **All Weather Friendly Growth:** Dr. Krailas Kiyothong says that it is drought resistant and grows in any kind of location irrespective of the wet or dry season. The only need is the soil rich in organic matter that makes it perfectly suitable for the Indian subcontinent.
- 5) **Easy Storage:** This has water-soluble carbonate 18, which means no need to add anything to store this plant (silage).

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## STEPS IN CBG PRODUCTION

- Feedstock pre-treatment
- Anaerobic Digestion
- Biogas purification to convert as BioCNG
- Compression , storage and dispensing
- FOM Processing

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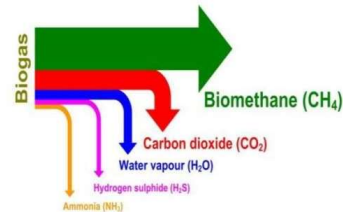
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## Raw Biogas Composition

Organic matter + anaerobic bacteria ----  $\text{CH}_4 + \text{CO}_2 + \text{H}_2\text{S} + \text{NH}_3 +$   
other end products + energy

Biogas is a mixture of gases composed of following:

- Methane ( $\text{CH}_4$ ) 40 - 70 % by volume,
- Carbon dioxide ( $\text{CO}_2$ ) 30 – 60 % by volume,
- Other gases 1 – 5 % by volume including hydrogen ( $\text{H}_2$ ) 0-1 % by volume and hydrogen sulphide ( $\text{H}_2\text{S}$ ) 0 – 3 % by volume.



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### Comparative Analysis:H2S Removal Technologies

Method	Efficiency	Cap Cost	O&M	Complexity
<b>Biological Fixation</b>	Moderate	Moderate	Low	Moderate
<b>Iron chloride dosing</b>	Moderate	Low	Moderate	Low
<b>Water scrubbing</b>	High	High	Moderate	High
<b>Activated Carbon</b>	High	High	Moderate	Moderate
<b>Iron Hydroxide or Oxide</b>	High	Moderate	Moderate	Moderate
<b>Sodium Hydroxide</b>	High	Moderate	High	Moderate

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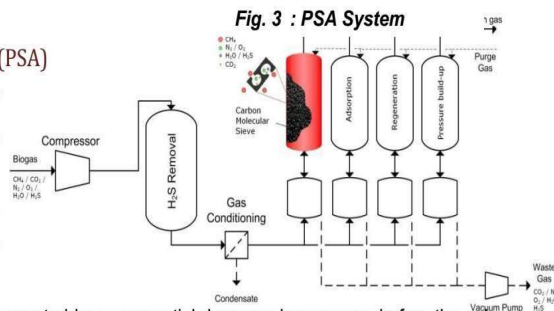
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### C02 Removal Technology: 1.PSA(Pressure Swing Adsorption)

- PRESSURE SWING ADSORPTION (PSA)**

This technology is most prevalent for large bio-gas systems in India. With this technique, carbon dioxide is separated from the biogas by adsorption on a surface under elevated pressure. The adsorbing material,

usually activated carbon or zeolites, is regenerated by a sequential decrease in pressure before the column is reloaded again, hence the name of the technique. Hydrogen sulphide and water needs to be removed before the PSA-column. There is significant loss of methane (20-30%) in this process.



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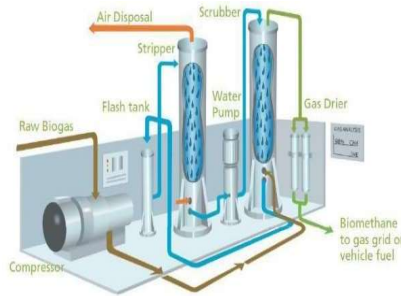


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### C02 Removal Technology: 2. Water Scrubbing

Carbon dioxide has a higher solubility in water than methane. Carbon dioxide will therefore be dissolved to a higher extent than methane, particularly at lower temperatures. In the scrubber column carbon dioxide is dissolved in the water, while the methane concentration in the gas phase. There are technologies available through which 97% purity of methane can be achieved with minimal (<5%) methane loss.



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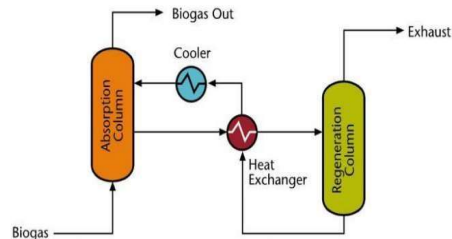


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### C02 Removal Technology: 3. Chemical Scrubbing :MonoEthylAmine

This is one of the best systems for bio-gas purification achieving 99.9% purity with negligible loss of methane. The systems are being extensively used in Germany for purification of bio-gas. Carbon dioxide is not only absorbed in the liquid, but also reacts chemically with the amine in the liquid. Since the chemical reaction is strongly selective, the methane loss might be as low as <0.1%.



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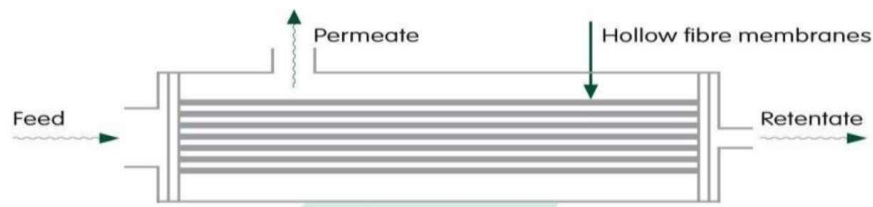


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## C02 Removal Technology: 4.Membrane Systems

Dry membranes for biogas upgrading are made of materials that are permeable to carbon dioxide, water and ammonia. Hydrogen sulphide, and oxygen permeate through the membrane to some extent while nitrogen and methane only pass to a very low extent. Usually membranes are in the form of hollow fibers bundled together.



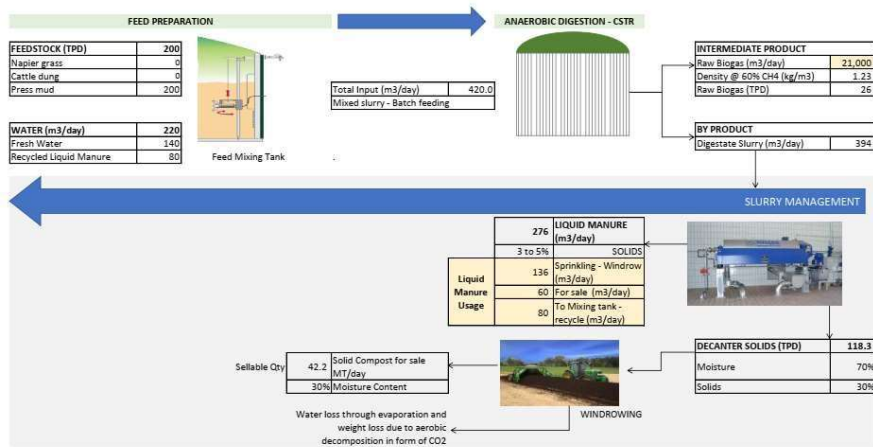
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BIOGAS MASS AND WATER BALANCE DIAGRAM (INDICATIVE)



Pressmud / Napier Grass to Raw Biogas

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### Pricing Framework of BioCNG

- The long term procurement price of CBG as per IS 16087: 2016 standards (**or its latest version**), compressed at 250 bar pressure and delivered to CGD Retail outlets in cascades shall be as under:
  - The procurement price of CBG will be based on the principle "The Retail Selling Price (RSP) of CBG in a market shall be at par with RSP of CNG (as provided by the authorized CGD entity)".
  - Rs. 54/Kg plus applicable GST shall be the minimum procurement price of CBG delivered at Retail Outlet situated at any distance (up to 75 km one way) as per IS 16087 2016 specification (**or its latest version**) and compressed at 250 bar pressure and delivered to OMC Retail Outlets in cascades w.e.f. from 01.06.2022. Further, the procurement price of CBG will vary as per the RSP of CNG.
  - The CBG procurement price shall be as per the following slabs, which will be the minimum procurement price of CBG delivered at Retail Outlet situated at any distance (up to 75 km one way) as per IS 16087 2016 specification (**or its latest version**) and compressed at 250 bar pressure. The slabs have been formulated starting from Rs.70.01/Kg with Rs.5 intervals. For markets where CNG is not available the CBG RSP shall be considered in lieu of CNG RSP.

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S No	Lower Retail Selling Price of CNG in Slab	Higher Retail Selling Price of CNG in Slab	Procurement price of CBG	Procurement price of CBG
	including tax	including tax	Without GST	With GST
	Rs./kg	Rs./kg	Rs./kg	Rs./kg
1	Upto 70		54.00	56.70
2	70.01	75.00	55.25	58.01
3	75.01	80.00	59.06	62.01
4	80.01	85.00	62.86	66.01
5	85.01	90.00	66.67	70.01
6	90.01	95.00	70.48	74.01
7	95.01	100.00	74.29	78.01

Note: For further populating the slabs beyond Rs.100/Kg same formula will be followed.

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### CBG SALES

- Oil Marketing Companies under SATAT
- GAIL and CGD Companies
- Direct Retail under own brand
- Industries and commercial establishments

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### BioCNG PROJECT- Capacity : 8 MT/DAY

- ✓ Annual Turnover –INR 25.79 Crores
- ✓ Capital Cost – INR 35 Crores
- ✓ Profit after Tax – INR 9.89 Crore
- ✓ DSCR-Avg Net – 2.39
- ✓ Payback – 2.27 Years
- ✓ IRR – 39%
- ✓ Capital Subsidy – INR 6.67 Crores

#### BioCNG Project: Financial Snapshot

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### Composition of BioCNG for sale

IS 16087 : 2016 Standard		
S No.	Characteristic	Requirement
1	Methane percentage (CH <sub>4</sub> ), minimum	90.0 %
2	Only Carbon Dioxide percentage (CO <sub>2</sub> ),, maximum	4%
3	Carbon Dioxide (CO <sub>2</sub> )+ Nitrogen (N <sub>2</sub> )+ Oxygen (O <sub>2</sub> ) percentage maximum	10%
4	Oxygen (O <sub>2</sub> ) percentage maximum	0.5%
5	Total sulphur (including H <sub>2</sub> S) mg/m <sup>3</sup> , maximum	20 mg/m <sup>3</sup>
6	Moisture mg/m <sup>3</sup> , maximum	5 mg/m <sup>3</sup>

Also as per the IS 16087:2016 specifications, the following shall also be met

- i. CBG shall be free from liquids over the entire range of temperature and pressure encountered in storage and dispensing system
- ii. The CBG shall be free from particulate matter such as dirt, dust, etc.
- iii. CBG delivered shall be odorized similar to a level found in local distribution (ref. IS 15319)

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### Transportation of Compressed BioCNG



TROLLEY MOUNTED



LORRY MOUNTED



BULK TRANSPORT

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### Description of FOM

One ton of slurry provides 44 kg of nutrients as compared to 19 kg through farmyard manure and 27 kg by compost. Micro nutrients such as zinc (Zn), copper (Cu) and manganese (Mn) present in the original material are also recovered in biogas slurry and can proved useful to crops when used as organic manure. The nutrient composition of slurry manure is shown in Table:

S. NO.	PARAMETER	AMOUNT
1.	Total Nitrogen (%)	1.40 – 1.84
2.	Total Phosphorous (%)	1.10 – 1.72
3.	Total Potash (%)	0.84 – 1.34
4.	Organic Carbon (%)	35.0 – 38.4
5.	Zinc (mg/kg)	103 – 116
6.	Copper (mg/kg)	51 – 68
7.	Manganese (mg/kg)	231 – 295
8.	Iron (mg/kg)	3200 – 3600
9.	Carbon / Nitrogen ratio	10 – 15
10.	Organic matter	65%

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### **LIST OF IMPORTANT & MAIN STATUTORY APPROVALS REQUIRED**

#### **Pre-Construction:**

1. Obtaining Land Ownership Documents from Panchayat/Municipal/Revenue
2. Town & Country Planning – Change of Land Use OR NOC if exempted
3. Forest Department – NOC regarding the said land out of their jurisdiction
4. Pollution Control Board – Consent to Establish
5. PESO – Prior Approval
6. Town & Country Planning – Building Plan Approval
7. Fire Department – Provisional Fire NOC
8. Municipal Corporation – Permission for mining
9. Electricity Board – Temporary/Permanent Electrical Connection
10. Water Supply – Ground/Surface Water Extraction for construction
11. Labour Licenses & Insurance for construction

#### **Pre-Operation:**

1. Pollution Control Board – Consent to Operate
2. Fire Department – Final Approval
3. PESO – Final Approval
4. Electricity Board – Permanent Electrical Connection
5. Water Supply – Ground/Surface Water Extraction for Operation
6. Sewage Disposal related permissions
7. Factory Plan Approval / Registration / Completion
8. Labour related Licenses
9. Product Sale related Licenses (CBG / Fertilizer etc)

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### **FLOW OF ACTIVITIES FOR THE PROJECT :**

- MOU between Developer & M/s.Kaashyap as Technical consultant for the project
- Application to be submitted as Expression of Interest attaching the above MOU to GAIL / Oil Marketing Companies
- Receipt of Letter of Intent from GAIL /Oil Marketing Companies confirming Long term purchase of BioCNG
- Entering into commercial contract with GAIL /Oil Marketing Companies
- DPR Preparation by M/s.Kaashyap and application for approvals from PCB , PESO etc
- Application to Bank under BioCNG Loan product and obtaining sanction Letter
- BioCNG Project execution by M/s.Kaashyap
- Launch of BioCNG Product for commercial sales
- Realization of subsidy from MNRE ; M/s.Kaashyap to facilitate with Technical support
- Operations & Maintenance by M/s. Kaashyap

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**KIRAN KK**  
**+916304254968**  
[kirankk@kaashyapenvergy.com](mailto:kirankk@kaashyapenvergy.com)