Recycle Program
in
JIS College of Engineering, Kalyani

1. Biogas Generation Project

Biogas is the gas produced by fermentation of organic matter (animal and vegetable) in the absence of oxygen and it is mainly composed of methane (CH_4).

Its production can take place from different ways:

Naturally :

• In moors and lakes, biogas is produced by the organic sediments accumulated at the bottom

• In landfills which contains organic wastes

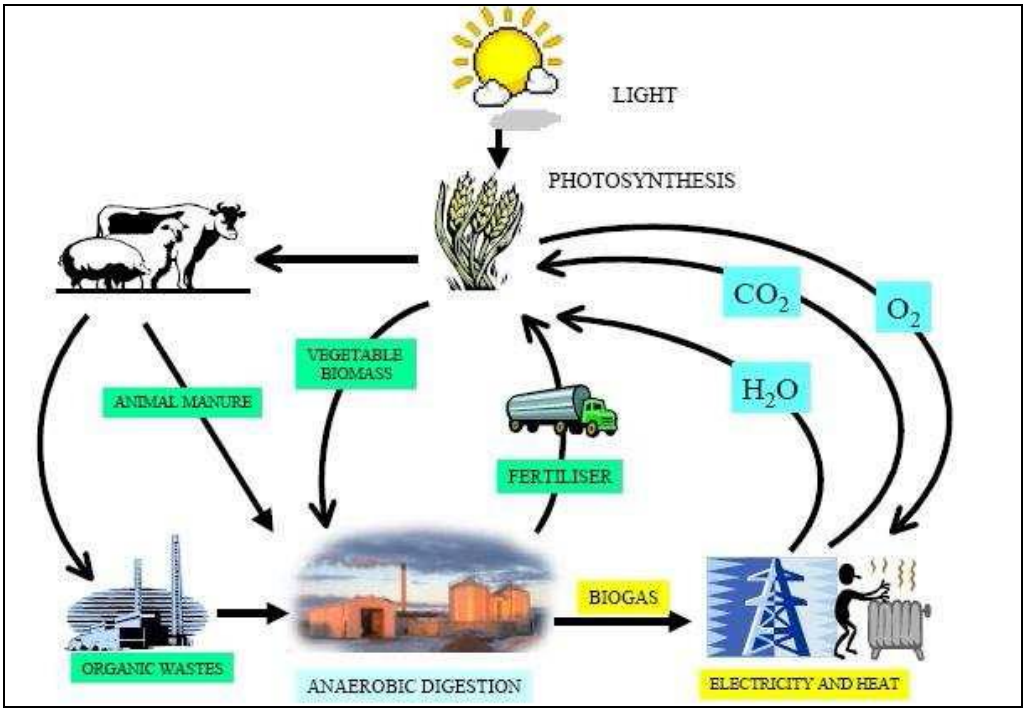
Artificially in anaerobic digesters, where it is heated, with :

• Sewage sludge

• Municipal waste (like food waste)

• Manure or dung in farms

• Energy crops (like maize silage)

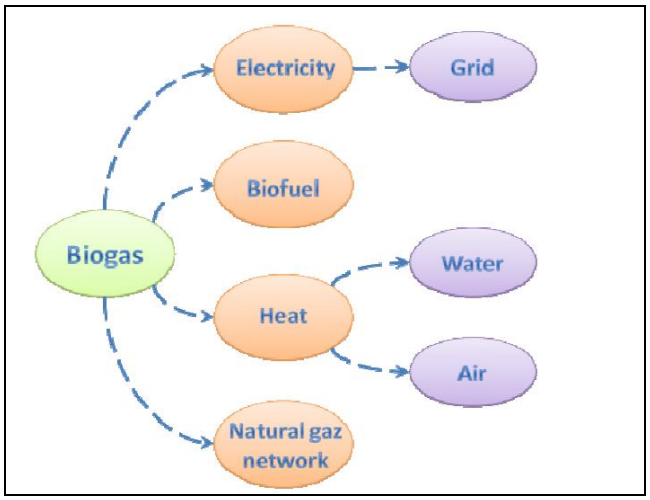


Biogas cycle

Like this, biogas can be called swamp, marsh, landfill or digester gas. The anaerobic digesters are usually called “biogas plant”. In fact, the composition of biogas is different depending on its origin: landfill gas typically has methane concentrations around 50 % contrary to some advanced waste treatment that can produce biogas with 55 to 75 % of methane.

Uses:

Biogas is renewable fuel that can be used to produce heat and electricity. Indeed, the gases methane, hydrogen and carbon dioxide can be combusted or oxidized with oxygen and that release some useful energy. Like this, biogas can be used for space heating, cooking, water heating and process heating.



Advantages:

Methane is a very powerful greenhouse gas: its global warming potential it 23 times higher than that of C02. In this way, recovering of biogas is very interesting to limit the greenhouse effect. Furthermore, biogas is a renewable energy form because biomass naturally releases biogas by decomposition. By using biogas as an energy source, we can reduce our dependency on fossil resources as coal, oil and natural gas.

Why this type of plant?

The proper disposal of kitchen waste will be done in an eco-friendly and cost effective way. While calculating the cost effectiveness of waste disposal we have to think more than monitory

prospects only. The dumping of food in places and making the places unhygienic can be takengo od care of; it adds to the value of such Biogas plants. Natural components like micro-organisms, kitchen waste & biodegradable waste viz paper, pulp can be utilized.

The bio-gas produced from food waste, decomposable organic material and kitchen waste, consisting of methane and a little amount of carbon di oxide is an alternative fuel for cooking gas (LPG). Also, the waste materials can be disposed off efficiently without any odor or flies and the digested slurry from the bio-gas unit can be used as an organic manure in the garden.

Components of the Bio-gas Plant

The major components of the bio-gas plant are

- Digester tank,
- Inlet for feeding the kitchen waste,
- Gas holder tank,
- Outlet for the digested slurry
- Gas delivery system for taking out and utilizing the produced gas.

This project is also useful for students to have a hands-on learning experience in constructing a Mini Bio-Gas Plant, using the kitchen waste of our Canteen.

Objective:

Designing of a portable biogas plant for utilizing kitchen waste of JISCE Canteen to generate green fuel.

Compositions of Kitchen Wastages are:

(A) Cooked Rice

(B) Cooked Vegetables

(C) Uncooked Vegetables and Fruits

(D) Cooked eggs and meat

Material Required:

1. Empty PVC tank 1000 ltrs capacity: 1 No. (to be used as Digester Tank)
2. Empty PVC tank 500 ltrs capacity: 1 no. (to be used as Gas Holder Tank) (Make sure the smaller can fits inside larger one and moves freely)
3. 110 mm dia. PVC pipe: (to be used for feeding waste material)
4. 70 mm dia. PVC pipe: (fixed inside gas holder tank as a guide pipe)
5. M-seal or any water-proof adhesive
6. Gas outlet system
7. A single burner bio-gas stove or a Bunsen Burner used in school laboratories

The Biogas generator:

This is floating type biogas generator consist of two PVC water buckets of 1000lt and 500lt capacity respectively (one bigger than the other), with the top of each bucket is cut open so that the smaller one can fit into the bigger bucket and move like a “telescope“. The bigger bucket (ordrum) serves as a digester, and the smaller, placed upside down inthe bigger one serves as the gas holder. The inlet flexible pipe, a bit longer than the height of the tank, is fitted at the bottom side ofthe bigger tank. The effluent outlet is fitted to the upper part of the bigger tank and determines the maximum level of matter in the tank. The gas outlet is fitted to the smaller inner tank and directed toward a gas stove.

Factors Affecting Yield and Production of Biogas

Many factors affecting the fermentation process of organic substances under anaerobic condition are,

- The quantity and nature of organic matter
- The temperature
- Acidity and alkanity (pH value) of substrate
- The flow and dilution of material

Comparison of conventional biogas and kitchen waste Biogas system:

Biogas systems are those that take organic material (feedstock) into an air-tight tank, where bacteria break down the material and release biogas, a mixture of mainly methane with so mecarbon dioxide. The biogas can be burned as a fuel, for cooking or other purposes, and the solid residue can be used as organic compost. Through this compact system, it has been demonstrated that by using feedstock having high calorific and nutritive value to microbes, the efficiency of methane generation can be increased by several orders of magnitude. It is an extremely user friendly system.

Comparison with Conventional Bio-Gas Plants	Conventional Bio-gas Systems	Kitchen Waste Bio-gas System
Amount of feedstock	40kg + 40ltr water	1.5-2 kg + 15 lit water
Nature of feedstock	Cow-Dung	Starchy & sugary material
Amount and nature of slurry to be disposed	80ltr, sludge	12ltr, watery
Reaction time for full utilization of feedstock	40 days	52 hours

Standard size to be installed	4,000 lit	1,000 lit
Operation	Skilled Person	Any Individual
Expenditure on Construction	Expensive	Cheap
Flame	Orange flame	Invisible Bluish Flame

Scope of the project:

According to our purpose of our project we were trying to design reactors of 1000 lit at the backside of administrative building, using kitchen waste directly as a feedstock and we have to calculate number of LPG cylinder we can save.

Calorific value of Biogas = 6 kWh/m3

Calorific value of LPG = 26.1 kWh/m3

Let us assume we need to boil water sample of 1000 gm per day on an average

We have Energy required to boil 100 gm water = 259.59 kJ

Hence, we need Biogas to boil 1000 gm water = 120.18 lit

And, we need LPG to boil 1000 gm water = 27.6 lit.

Therefore, amount of biogas which is produced = 120.18 lit/day

Now, amount of LPG required to boil 1000gm water per day = 27.6 lit So.

We can save up that much amount of LPG

2. E-Waste Management

E-waste is a term used to cover almost all types of electrical and electronic equipment (EEE) that has or could enter the waste stream. For many, electronics are part of modern life – cell phones, laptops, TVs and a growing number of gadgets. Every year we buy new, updated equipment to support our needs and wishes – in 2012, global sales of new equipment included 238.5 million televisions, 444.4 million computers and tablets, and 1.75 billion mobile phones (Gartner). All of these electronics become obsolete or unwanted, often within 1- 3 years of purchase. This global mountain of waste is expected to continue growing 8% per year. Electronic waste includes computers, entertainment electronics, mobile phones and other items that have been discarded by their original users. The disposal of electronics is a growing problem because electronic equipment frequently contains hazardous substances. In a personal computer, for example, there may be lead in the cathode ray tube and soldering compound, mercury in switches and housing, and cobalt in steel components, among other equally toxic substances.

PROBLEMS CAUSED BY ELECTRONIC WASTE :

Due to lower environmental standards and working conditions in China, India, Kenya, and elsewhere, electronic waste is being sent to these countries for processing—in most cases illegally. Delhi and Bangalore in India and Guiyu in Shantou region of China have electronic waste processing areas. Uncontrolled burning and disposal are causing environmental and health problems due to the methods of processing the waste.

E-waste contains toxic materials such as lead, mercury, cadmium and brominated flame retardants.

Lead Found as solder on printed circuit boards and in television and computer monitor glass	Lead can cause damage to the central and peripheral nervous systems, blood systems, and kidneys in humans.
Mercury Found in all fluorescent lamps, printed circuit boards, laptops and LCD screen backlights	Mercury in lakes and rivers converts to methylated mercury in sediments. The toxin can then accumulate in living organisms and travel up the food chain. Mercury can adversely affect a baby's growing brain and nervous system. Adults can suffer organ damage, mental impairment, and a variety of other symptoms.
Cadmium Found in chip resistors and	Cadmium and several cadmium-containing compounds are carcinogens that can induce various types of cancer. Cadmium can also accumulate in, and harm, the

semiconductors	kidneys.
Brominated Flame Retardants (BFRs) Found in printed circuit boards and some plastics	Less is known about BFRs than some other contaminants, these toxins may increase the risk of cancer (digestive and lymph systems) or cause endocrine disruption.

In our JISCE College of Engineering, E-Waste management has been done with the collaboration with Firdous Enterprise, The following are the documents.

All Bank Factory Office & Home
Mobile : 9830595006

FIRDOUS ENTERPRISE

Furniture, Buyers of Old Scrap Goods, Deals in Computer, UPS, Battery, A.C & all rejected items
9A, Marquis Street, Kolkata - 700 016 (Park St.)
E-mail : mdfirdous007@gmail.com

Ref. No..... Quotation for IT & Electric Items. Date 29/08/17

To
The manager
Register Dpt.
IIS collage of engineering.
Block A Phase III Kalyani Nadia. 741235

* Approved for No. 1 for disposal

(1) * All lot computer items and elictarnic material.
CPU. monitor. UPS. Stablizer, electronic machine.
and All listed. and non listed meterial. etc.

Total materials. My highest offer Price is

Rs = 125000/-

II) ewest Room 2/1 computer CUP. UPS, monitor. 5pc A/c window and scard Fron chair and All lot Price.

is Rs: 51000/-

Total Amount is = Rs = 176000/- only.
one lakh seventy six thousand only excluding of All Tax 9.8%.

FIRDOUS ENTERPRISE KOLKATA-16
mdfirdous Raja
29/08/17

MINUTES OF THE MEETING ON " E WASTE MANAGEMENT " HELD ON 23/09/2017

Members Present

1 Mrs Sila Sing Ghosh

2 Dr Papun Biswas

3 Mr Swapan Bhattacharjee

4 Md Samiuddin

5 Mr Suvendu Banerjee

6 Mr P.K.Guha Thakurta

7 Dr Trina Dutta

List produced by Dept of Electrical & ECE in details. clearly certifying the quality status of the materials handed over.

Studied the List by the Committee. Enclosed Annexure I

Tenders from the prospective buyer. →

Comparative chart of the offered tender

Scrutiny by the Administration along with accounts & purchase

Finalisation & execution of disposal

As decided & Finalised the e-waste staggered as per list attached finally sold out for Rs 1,25,000/- on Lumpsum basis.

Sila Sing 23/09/17.

Ch no - 887849 Rs- 125000/- 23/9/2017
Credited on - 26/9/17 to
JISCB A/c No - 23509

Su-Sam 11/10/17

3. Solid Waste Management

Facilities for segregation of Bio-degradable and Non bio-degradable waste for composting.

For Non Biodegradable Waste For Bio Degradable Waste.

Then the two types of wastes are kept into the following chamber.

From that chamber, the biodegradable wastes are used for composting Purpose and Non bio degradable wastes are taken by Municipility.