



Anaerobic Treatment of Waste Water Will Produce Biogas or Energy

Introduction

To protect and prevent the environment, river, lake and other water bodies waste water has to be treated properly until it fulfills the government of RI standard of WW prior to discharge. With the anaerobic treatment high polluted waste water with high COD and BOD value can be processed to produces biogas ($\text{CH}_4 + \text{CO}_2$). Biogas with a heat value of $36,0 \text{ MJ/m}^3$ can be used as a renewable energy source.

The slogan of it is:

Waste turns to Revenue

Waste water from palm oil-, cassava starch-, bioethanol-, MSG- and other food industries with high COD value are a good source of biogas.

The anaerobic process

The anaerobic process is caused by anaerobic bacteria, which do not consume oxygen. These bacteria are already existed in our environment since the beginning of our world.

Examples from the anaerobic process or digestion in our environment happen in the garbage collection point (Tempat Pembuangan Akhir / TPA) with "***open dumping sanitary landfill***". This system is still practiced in Indonesia.



Picture 1.

Garbage collection point (TPA)

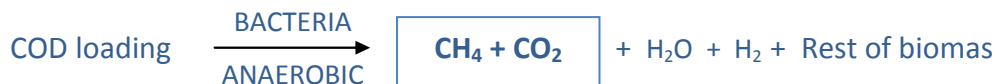


This system will emit methane into the air and the emission of methane can destroy the ozone layer. It has to be avoided. How? The simple solution is to cover the sanitary landfill area with geomembrane and the produced methane shall be diverted to gas holding tank. Therefore the methane can be used as an alternative energy.

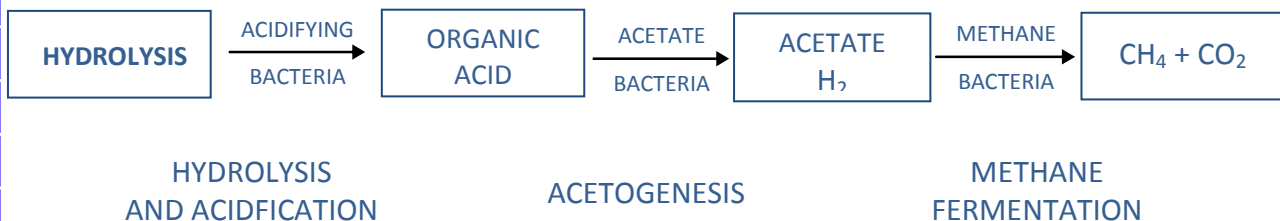
The utilization of the biogas in sanitary landfill is subjected to CER (Certified Emission Reduction) of the Kyoto Protocol.

Anaerobic treatment of heavy polluted waste water from palm oil-, cassava starch-, bioethanol-, MSG- and other industries can be used to claim CER or carbon credit. Since biogas can be used to produce electricity or thermal energy and the utilization of it can generate CER, so the anaerobic treatment will lead to additional income. Waste water turns to REVENUE.

The simplified anaerobic process is as follow :



and the process stages are :



The biogas value

The biogas production is proportional to the COD loading of treated waste water.

COD loading is equal with volume of waste water per day [m^3/day] multiplies by average COD of waste water [g/m^3] \longrightarrow kgCOD/day

- 1 kg COD \approx 0,5 m^3 biogas
- Methane contents of biogas is approximately 50 – 60 %
- In term of calorie :
 - ❖ Diesel fuel (solar) 36,295 MJ/liter
 - ❖ Biogas 36,0 MJ/ m^3

Example : In case that the waste water has a COD loading of 5.000 kg/day, so the volume of produced biogas will be 2.500 m^3 . This is equivalent with 2.500 liters diesel fuel.



How to produce biogas ?

Biogas is produced by the anaerobic digestion process in a reactor.

There are several type of biogas reactors such as :

- The simplest one is a covered lagoon.
- Continuous stir tank reactor (CSTR)
- Upflow anaerobic sludge blanket reactor (UASB)
- Fixed film or fixed bed reactor
- Fluidized bed reactor

Based on the design, each reactor has its characteristic and capability to produce biogas. As an example the UASB reactor has a much better capability than the covered lagoon and the fluidized bed reactor better than the UASB. The biogas reactor will be designed based on volume of waste water per day, COD concentration, available space, type of waste water and the budget.

Picture 2 shows a fixed bed reactor at the Cakung Slaughter House and picture 3 a biogas genset.

Picture 2.

Picture 3.



**Wastewater Treatment dengan Anaerobic Digester (Fixed Bed)
Rumah Potong Hewan Cakung**

To treat your high polluted waste water (COD > 2.500 ppm) we will assist you to select the most efficient anaerobic reactor.

We have the expertise and experiences to help you to build the right and proper anaerobic digester.



Some of our references:

1. Fixed bed reactor

- Cakung Slaughter House
- Aqua Pandaan
- Aqua Klaten
- Aqua Cicurug



Picture 3.

URC Indonesia - Cibitung

2. UASB

- URC Indonesia
- Honda Prospect



Picture 4.

Aqua Pandaan

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