



# Sustainable Energy Practice on Small Scale Farms

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## Summary



The future of farming, especially for small to mid-sized, farms is at a crossroads. Adopting innovative solutions can provide tangible opportunities for farms to secure a sustainable future. This report illustrates how a small on-farm anaerobic digester is able to generate sufficient natural gas to supply a Filipino pig farm with sufficient energy to meet his household needs.

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## Anaerobic Digestion in Agriculture

A remarkable amount of energy is contained in organic waste. Under the right conditions, this energy can be extracted in the form of a combustible hydrocarbon gas, called biogas. The biological process by which organic material can be converted to hydrocarbon gas is anaerobic digestion. Anaerobic digestion is a natural process that has been used in myriad applications in the past, including for the production of biogas energy from manure (Trivett & Hall, 2009).

Biogas is produced using well- established technology in a process involving several stages:

1. Biowaste is crushed into smaller pieces and slurrified to prepare it for the anaerobic digestion process. Slurrifying means adding liquid it to the biowaste to make it easier to process.
2. Microbes need warm conditions, so the biowaste is heated to around 37-degree Celsius.
3. The actual biogas production takes place through anaerobic digestion in large tanks for about three weeks
4. In the final stage, the gas is purified (upgraded) by removing impurities and carbon dioxide.

After this, the biogas is ready to use by enterprise and consumers, for example in a liquified form or following injection into the gas pipeline network.

## Ballesteros Pig Farm in Cagayan, Philippines



Mr. Raymart Ballesteros of Solana Cagayan, testifies that a 10 heads of pigs farm can produce methane gas which can be used for his daily household needs particularly in cooking. According to him, the raw materials or the pig waste, manure, processed through the digester (digestate) can be used as fertilizer. The fertilizer produced as one of the end products from the digester can be directly applied or mixed with soil media to the soil in his backyard garden. Trivett and Hall attest to “the value of improved fertilizer, the solid matter in the digestate (which) can be separated, composted, and used as animal bedding. The liquid portion (“filtrate”) contains the high quality fertilizer. There is some evidence to suggest that filtrate from anaerobic digestion. can give better yields than conventional fertilizer” ( Trivett & Hall, 2009, p. 11).

Based on the experience of this farmer who found innovative ways to economically and environmentally manage his farm’s livestock waste, this sustainable practice provides opportunities for rural economic growth. Constructing and operating an anaerobic digester offers new local job opportunities and increases local tax revenue. Job opportunities include; local expertise in feedstock surveys and general resource assessments, site work, concrete, plumbing, electrical, permitting and engineering during planning and constructing of anaerobic digester, onsite operations and management.

### Question and Answer:

1. How much waste does the bio-digester drum handle per week? Or per month?

The size of the biogas plant is to be decided based on availability of raw materials. It is generally said that, average cattle yield is about 10 kg dung per day. For example, the average gas production from dung may be taken as 40 lit/kg.

2. How much alternative energy, methane, is it able to produce? Does it cover the amount of 1 week of energy use?

The composition of biogas varies from 40%-60% methane to 60%-40% carbon dioxide (CO<sub>2</sub>), with small amount of water vapor and other gases. .03125 kg methane/head per week

3. How much money can he save in terms of energy requirement on his farm with this technology?

Previous to the implementation of the biogas digester, Mr. Ballesteros' expenses amounted to more or less PhP2000 a year. He was buying Gasul or shallain from a local petron dealer or gas station. Now that he is using the drum biogas digester that comes from the waste of his swine he is able to save this said amount. Mr. Ballesteros is proud to promote this kind of technology.

### References:

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