

Family size bio digesters in Asia

Introduction

The world population of 6.3 billion people is expected to reach 10 billion people within the next decades. More than half of them live in Asia, therefore environmental issues such as the greenhouse effect and correct waste disposal methods as well as providing energy for all the people in rural areas will gain much attention all over the world.

The concept of controlled anaerobic digestion is perhaps a much overlooked example of a way to reduce green house gas emissions, to provide a better waste disposal method for organic waste and to simplify the life of people in rural areas in developing countries.

Controlled anaerobic digestion is by no means a radical or new concept. Large scale industrial digesters and small domestic digesters are in operation in many places around the world. The purpose of all these digesters is to produce on the one hand combustible biogas which can be burned and fertilizer material for the agricultural use.

A small step to improve the situation is a bio gas digester.

Need for biogas digesters and alternative fuels:

Limited resources

Huge distances and therefore logistical problems

Improvement of the living quality

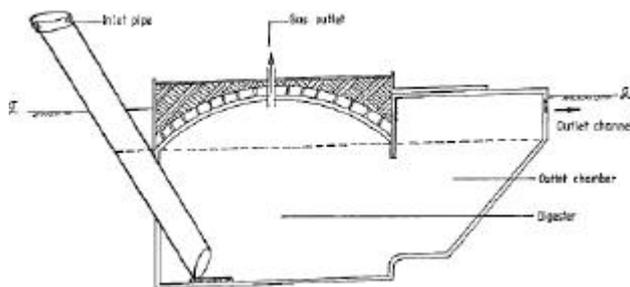
Obstacles and problems:

Current problems that are complicating the use and introduction of biogas digesters are:

- Regional development statuses
- Climates
- Financing of the digesters
- Maintenance

Working principle

Biogas production via digestion is the bio-chemical conversion of organic material to biogas, a mixture of methane and carbon dioxide. Anaerobic reactors are generally used for the production of biogas from manure and crop residues. There has to be a special focus on the temperature of the digester and



Requirements

In order that anaerobic digesters are sufficiently attractive as a waste treatment alternative and a source of fuel, particularly for the small farmer, a number of conditions have to be satisfied:

- The digester must be cheap.
- The installation must be simple.
- The management and maintenance must be simple.
- The digester must reliably produce a satisfactory quantity of biogas over an extended period of time.

Benefits

- Cheap alternative to fuel or wood
- Welfare improvement of women, children and the environment due to decreased fumes
- Improvement of crop-tree livestock farming system through nutrient recycling.
- Increase of the productivity of a small farm due to reduced wood collecting times
- Easy and sufficient energy for cooking
- Decrease of the animal manure problem
- Devices run by methane gas can be produced locally

In most developing countries, when the subsidies from governments are reduced, the number of plants built each year falls dramatically. The most important problem in biogas programs in developing countries has been the price of digester plants.

For example, the price of a concrete digester plant installed for an average family in Vietnam varied from 180 to 340 US\$.

Chinese designers tried to reduce the cost of red-mud digesters to 25-30 US\$/m³ but it was still high in comparison with the polyethylene digesters (5 US\$/m³). This is obviously one important feature which makes the polyethylene digesters attractive.

Cooking time (hours)	4.5
Fuel saved in cooking (US\$/month)	7
Number of pigs/ farm	11
Biogas digester cost (US\$)	35
Payback time (month)	5-6
Time to first gas production (days)	15

Country	Units
China	6900000
India	2750000
Nepal	49280
Bangladesh	417
Indonesia	166
Pakistan	4750
Philippines	2500
Sri Lanka	2000
Thailand	5000
Vietnam	2000,00

Example

2 cattle, 8 pigs or produce enough dung to fill and guarantee a constant flow of dung in a 5m³ digester. The output of this digester produces around 0.5m³/day, that is enough methane gas for a family of six members so that they can cook for 3 hours/day

The firewood consumption in rural areas is reduced of 2000kg/year.