Biogas Consortium Afghanistan (BCA)

گروه مشارکین بیوگاز

Biogas And Sanitation

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These papers are part of a series to share infromation on biogas in Afghanistan. They have been compiled by experts working in this sector and cross checked by Mr. Christopher Kellner.

Introduction

Connecting toilets to biogas systems is widely used in Asia for the treatment of human excreta. In china there are almost 40 million biogas systems used to treat human waste or the hygienically safe on-site treatment of toilet water and recovery of valuable energy in the form of biogas to be used as a substitute to firewood and LPG (Liquefied Petroleum Gas) in cooking.

In a typical Afghan domestic house the bio-digester in the sanitary biogas unit receives the wastewater from pour-flush toilets and degrades it anaerobically, thus producing biogas. Aside from the gas, another output from this process is bioslurry, a manure that can be utilized as soil enrichment or fertiliser. The use of this bioslurry is only advisable after further treatment in sludge drying beds.

Biogas production from human excreta only is limited (ca. 40 liters per person per day), the main focus is however mostly on sanitary or wastewater treatment aspects, i.e. decentralized wastewater treatment with low maintenance demand, rather than a high gas productivity. In rural areas in Afghanistan animal manure is added to the bio-digester to increase the gas production.

Public health, environment as well as agriculture would benefit substantially from adoption of this technology in Afghanistan. Given the severe lack of wastewater treatment systems across Afghanistan, this is a very cost effective and viable solution.

In addition to benefits for public health and agricultural production from properly managed sanitary biogas systems, there are also potential benefits for the environment, as compared with septic tanks with soak away pits. This system avoids the underground water pollution that might occur from discharge of contaminated water in underground water bodies, into rivers or lakes. It conserves fresh water resources used for flush toilets, and it improves the soil structure and fertility on fields to which it is applied.

Today only few Sanitary Biogas systems are implemented in Afghanistan (see Box 1) but for the successful and sustainable implementation of this system in Afghanistan it's crucial to:

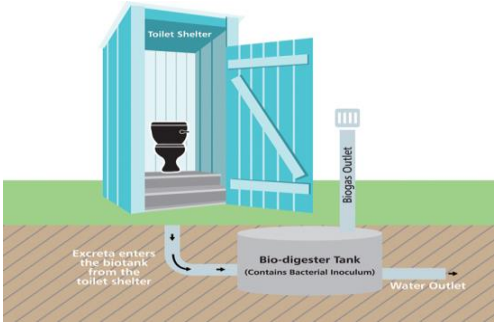
- create awareness amongst future users (sanitation related problems in general and value of wastewater in particular);
- participatory planning and decision making;
- training of users on how to operate and maintain the system.

Advantages of Sanitary Biogas systems:

- No handling of raw wastewater and bioslurry;
- Increased biogas production if additional feed material (e.g. animal manure, etc.) is available for co-digestion;
- Biogas may be used as a substitute to firewood in cooking;
- Application of digested effluent as soil amendment to agricultural plots possible.

Disadvantages of Sanitory Biogas systems:

- Limited biogas production if only toilet water is treated.



Picture. 1 Schematic view of Toilet linked Biogas Plants (Courtesy of Wockhardt Foundation)

Picture.2 Toilet Linked Biogas Plant in Bamyan (Courtesy of BORDA Afghanistan)

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Box Topic 1. Getting Benefit from Waste – Case Study of Koti Sangi Public Toilet Complex

This project was implemented by Sulabh International Social Organization with financial support of Indian Government in Kabul at 2007. It is 20 seated toilet complex with 2 Biogas digesters, and it is maintained and operated by Kabul Municipality.

Biogas digesters have been provided for the treatment of the human waste and to supply the energy need of the toilet complex and the guard room, the biogas produced is used for the cooking, heating and lighting.

Given the drop in the temperature during winter in Kabul, biogas digesters are constructed 3' to 4' below ground level. During winter the temperature in the digester will be slightly lower than during the other seasons but it is expected that the temperature below the ground level will enable the bacteria to stay alive and there will be only slight variation in the efficiency of the digester.

The plant is well functional and routine maintenance is done by the operator who is well trained to do the operation and maintenance of the plant.

Picture .3 Koti Sangi Community Toilet Linked Biogas Plant (Courtesy of BORDA Afghanistan)

Box Topic 2. Bio-slurry facts:

- Bio-slurry discharged from the digester retains all nutrients originally present in the feeding material which makes bio-slurry a potential organic fertilizer.
- As it is fully fermented, it has less smell and does not attract flies.
- Bio-slurry is pathogen free; the fermentation of dung in the digester kills organisms causing plant disease.
- Bio-slurry reduces weed growth (proved to reduce weed growth by up to 50%).
- Bio-slurry is high in nitrogen and phosphorous.
- Bio-slurry is an excellent soil conditioner, adds humus, and improves the soil capacity to retain water.
- Soil fertility and structure is improved through use of bioslurry as an organic fertilizer and resulting in improved crop yields and reduced erosion.
- Dried digested slurry has great potential to be used as feed supplement for cattle, poultry, and fish.

Some common Misperceptions about Biogas and Toilets:

Is the gas clean? There is no difference between biogas from animal manure or human excreta. What could be different is that there are traces form toilet cleaning chemicals in human sewage. But they would only have a minimal impact on the gas and then only on the raw gas and not on the burned gas.

Is there a bad smell from the gas? All raw biogas smells bad. Burnt biogas has no smell… if it has; this shows that the burner does not allow primary air to mix with the gas before it burns. Again that has nothing to do with the gas originating from sewage or animal manure. If there is smell in the kitchen it is likely that this originates from a leakage.

Is the gas explosive or not? In normal operating conditions (low pressure and low temperature) biogas is an uncompressed, wet gas, and tests have shown that it can simply be burned off and it is not explosive.