

Biogas



Biogas is a mixture of methane and carbon dioxide produced during the digestion of organic matter in the absence of oxygen which can be collected, piped, and lit for cooking or lighting. Suitable organic materials include food and agricultural waste, animal manure, human waste and other sources of biomass mixed with water. ¹

Resource Availability

Biogas can be produced from a number of raw feed materials. The most common sources are vegetable matter, agricultural residue, animal dung and human waste.

Production/Processing

Biogas is produced through a process called anaerobic digestion, the biological degradation of organic material in an oxygen-free, air-tight tank known as a biogas digester. In this environment, naturally occurring bacteria decomposes and ferments the biodegradable material and produces energy-rich gases that make up biogas. The rich organic slurry which is a by-product of the biogas production process makes a high value agricultural fertilizer.

Two main digester designs exist. In a floating dome digester, the digester is underground and the water sealed cover rises as gas is produced, acting as a storage chamber. A fixed dome digester has a non-movable gas holder which sits on top of the digester. ²

Distribution

After a period of 30 to 70 days in the digester, the waste materials produce gas that can be collected, stored in a tank, and piped on demand to households and used for cooking, lighting and heating.

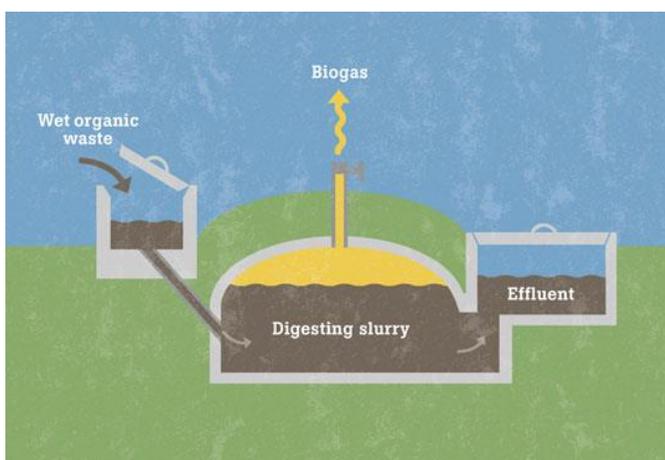


Figure shows an illustration of a fixed dome biogas digester.



Advantages and Impacts of Biogas^{3,4,5}

Biogas is well suited for households and commercial farms where sufficient animal manure can be collected on a daily basis, or in communities that produce substantial agricultural waste. Digesters can be built on a variety of scales, from household to commercial, and is fairly efficient for use in stoves, providing instant heat upon ignition, which can be regulated in most burners.



- **Environment and Health:** Biogas reduces the need for directly burning solid biomass fuels like firewood and charcoal and burns cleanly without producing smoke or ash.⁶ Biogas systems help make waste products productive, which can improve health, sanitation and the environment.⁷
- **Gender:** With the absence of smoke and soot, washing pots becomes an easier task. And time spent gathering wood or needing to tend to the fire is reduced.
- **Agriculture:** The slurry that remains after digestion is rich in nitrogen and phosphorus and can be used as a high quality organic fertilizer and increase crop productivity.⁸

Barriers to Adoption

- Building a biogas digester and installing proper infrastructure to deliver gas to homes requires high capital investment. Biogas systems can be expensive for poor families and communities, even on a small scale.
- At a larger scale, further treatment or conditioning of biogas is sometimes necessary to remove water, hydrogen sulphide or carbon dioxide from the raw gas before it is used.
- The fermentation process needs a continuous supply of feedstock and water, which can be a problem in arid areas. Feeding the digester, removing obstructions, and maintaining the mixture and equipment can be labor-intensive.
- Some cultures may be reluctant to allow the handling of animal or human waste and using it indirectly for cooking purposes.⁹
- Biogas currently does not work as well in colder conditions since the bacteria need warmth to thrive and multiply.
- Biogas has been cited as being highly flammable if not stored correctly.

Alliance Focus Country Opportunities

China - China has made significant progress in reducing solid fuel burning since the 1980s through improved stove and fuel promotion. Trends show that the share of biogas use in rural areas in the country experienced growth post 2004, mostly due to large-scale national biogas promotion programs and the lifestyle and income changes of rural consumers. In an analysis of 6 provinces in China, biogas stoves were the 2nd most used stove (27%).

The Chinese government is currently exploring a switch from the household biogas model to a biogas station model and assessing the financial viability for doing so. Through interactions with the government, the Alliance will continue to engage with them to see how can support such efforts in the future.

Alliance Partners

- Africa Biogas Partnership
- HIVOS
- Biogas International Ltd.
- Simgas
- SNV

FOR MORE INFORMATION:

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