



What is a biogas system?

Biogas systems use anaerobic digestion to recycle organic waste, turning it into biogas, for energy (the gas), and valuable soil products (liquid and solids), using a natural, biological process. After simple processing, biogas is a renewable substitute for natural gas, and the digested materials—the liquid and solids—can be turned into a wide variety of useful soil products, similar or identical to peat moss, pellets and finished compost. Biogas systems can also recover nutrients helping to protect waterways from runoff and preventing over fertilization to increase nitrogen levels in soil.

What counts as organic waste? Manure from dairies, sludge filtered from sewage water, municipal solid waste, food waste, yard clippings, crop residues and more.

Operational US Biogas Systems

The U.S. has over 2,200 sites producing biogas in all 50 states: 259 anaerobic digesters on farms, 1,269 water resource recovery facilities using an anaerobic digester (~860 currently use the biogas they produce), 39 stand-alone systems that digest food waste, and 652 landfill gas projects. For comparison, Europe has over 10,000 operating digesters and some communities are essentially fossil fuel free because of them.

Potential US Biogas Systems

The potential for growth of the U.S. biogas industry is huge. We count over 13,500 new sites ripe for development today: 8,241 dairy and swine farms and 3,888 water resource recovery facilities (including ~380 who are making biogas but not using it) could support new biogas systems, plus 931 food scrap-only systems and utilizing the gas at 415 landfills who are flaring their gas. If fully realized, according to a recent industry assessment conducted with the USDA, EPA and DOE as part of the Federal *Biogas Opportunities Roadmap*, plus data from ABC, these new biogas systems could produce enough energy to power 7.5 million American homes and reduce emissions equivalent to removing up to 15.4 million passenger vehicles from the road. They would also catalyze an estimated \$40 billion in capital deployment for construction activity which would result in approximately 335,000 short-term construction jobs and 23,000 permanent jobs to build and run the digesters.

Find more detail on biogas in the 50 states here: <http://www.americanbiogascouncil.org/stateprofiles.asp>

Sources: American Biogas Council, Biogas Opportunities Roadmap (USDA, EPA, DOE, 2014), EPA AgSTAR 2016, EPA LMOP 2017, Water Environment Federation "Enabling the Future" last updated October 31, 2016



Use the interactive map at http://www.americanbiogascouncil.org/biogas_maps.asp

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Organic material is delivered to the digester system

This may include animal manure, food scraps, agricultural residues, or wastewater solids.

Digested material may be returned for livestock, agricultural and gardening uses.



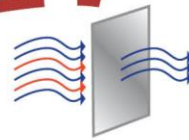
Organic material is broken down in a digester

The digester uses a natural biological process under controlled conditions to break down organic material into products for beneficial use or disposal.

Some biogas can be used to heat the digester.

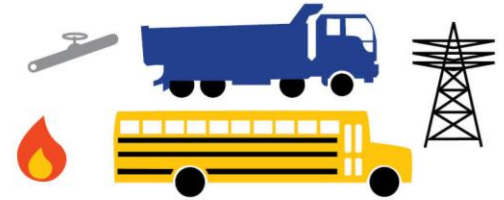
BIOGAS

DIGESTED MATERIAL



Raw biogas is processed

Typically, water, carbon dioxide and other trace compounds are removed, depending on the end use, leaving mostly methane.



Processed biogas is distributed and used

The gas may be used to produce heat, electricity, vehicle fuel or injected into natural gas pipelines.

SOLIDS

LIQUIDS



Digested material is processed and distributed

Solids and liquids from the digester may be used to produce marketable products, like fertilizer, compost, soil amendments or animal bedding.

organic material

Organic materials are the "input" or "feedstock" for a biogas system. Some organic materials will digest more readily than others. Restaurant fats, oils and grease; animal manures; wastewater solids; food scraps; and by-products from food and beverage production are some of the most commonly-digested materials. A single anaerobic digester may be built for a single material or a combination of them.

the digester

An anaerobic digester is one or more airtight tanks that can be equipped for mixing and warming organic material. Naturally occurring microorganisms thrive in the zero-oxygen environment and break down (digest) organic matter into usable products such as biogas and digested materials. The system will continuously produce biogas and digested material as long as the supply of organic material is continuous, and the microorganisms inside the system remain alive.

biogas processing

Biogas is mostly methane, the primary component of natural gas, and carbon dioxide, plus water vapor, and other trace compounds (e.g. siloxanes and hydrogen sulfide). Biogas can replace natural gas in almost any application, but first it must be processed to remove non-methane compounds. The level of processing varies depending on the final application.

biogas distribution

Processed biogas, often called "biomethane" or "renewable natural gas," can be used the same way you use fossil natural gas: to produce heat, electricity, or vehicle fuel, or to inject into natural gas pipelines. The decision to choose one use over another is largely driven by local markets.

digested material

In addition to biogas, digesters produce solid and liquid digested material, containing valuable nutrients (nitrogen, phosphorus and potassium) and organic carbon. Typically, raw digested material, or "digestate," is processed into a wide variety of products like fertilizer, compost, soil amendments, or animal bedding, depending on the initial feedstock and local markets. These "co-products" can be sold to agricultural, commercial and residential customers.