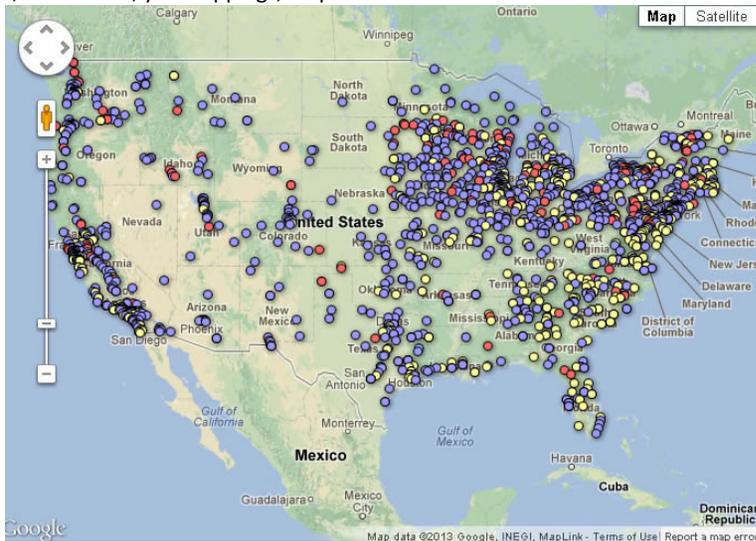




Current and Potential Biogas Production

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.

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



Operational US Biogas Systems

The U.S. has over 2,000 sites producing biogas: 239 anaerobic digesters on farms, 1,241 wastewater treatment plants using an anaerobic digester (~860 currently use the biogas they produce) and 636 landfill gas projects. The potential for U.S. growth is huge. We count nearly 11,000 sites ripe for development today: 8,002 dairy and swine farms and 2,440 wastewater treatment plants (including ~381 who are making biogas but not using it) which could support a digester and 450 untapped landfill gas projects. For comparison, Europe has over 10,000 operating digesters and some communities are essentially fossil fuel free because of them.

If fully realized, these biogas systems could produce enough energy to power 3.5 million American homes and reduce emissions equivalent to removing 800,000 to 11 million passenger vehicles from the road.

Source: Biogas Opportunities Roadmap (USDA, EPA, DOE, 2014)



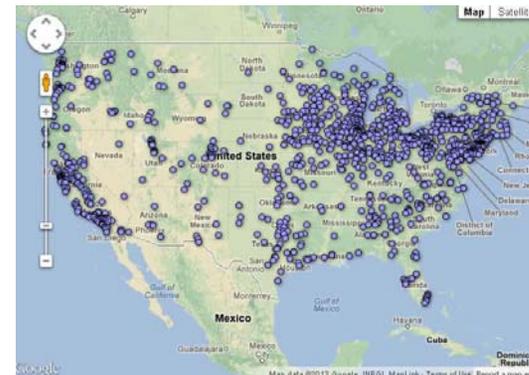
Potential Methane Production from Landfills

284 billion scf: enough for 1.86 million homes or to make 22.5 billion kWh of electricity/year



Potential Methane Production from Livestock Manure

257 billion scf: enough for 1.09 million homes or to make 13.1 billion kWh of electricity/year



Potential Methane Production from Wastewater

113 billion scf: enough for 539,000 homes or to make 5.6 billion kWh of electricity/year

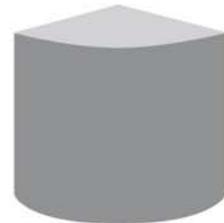
www.americanbiogascouncil.org 202/640-6595



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

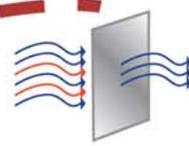
The digester uses a natural biological process under controlled conditions to break down organic material into products for beneficial use or disposal.

Some biogas can be used to heat the digester.

BIOGAS

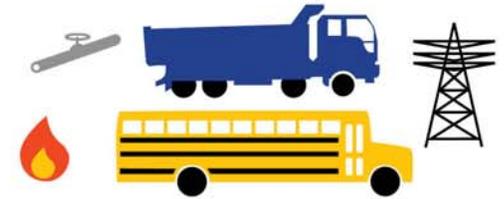
DIGESTED MATERIAL

Liquids and solids may be separated.



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.