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ANAEROBIC DIGESTER POWER SYSTEM COMES ONLINE AT MAINE FARM

DAVID QUILTY | 11 JUNE, 2012 | [BIOGAS \(HTTP://REVMODO.COM/CATEGORY/CLEAN-TECH/BIOGAS/\)](http://revmodo.com/category/clean-tech/biogas/), [CLEAN TECH \(HTTP://REVMODO.COM/CATEGORY/CLEAN-TECH/\)](http://revmodo.com/category/clean-tech/)



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Stonyvale Farm, a dairy farm located in Exeter, Maine, has [unveiled](http://www.mainebiz.biz/apps/pbcs.dll) (<http://www.mainebiz.biz/apps/pbcs.dll>)

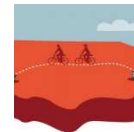
[/article?AID=%2F20120607%2FNEWS0101%2F120609970](#)) their new anaerobic digester energy system which turns manure and food waste into electricity and heat for the farm. Local agricultural officials and representatives were on hand to help with the unveiling. Funding was provided by the USDA Rural Development program ([PDF \(http://www.rurdev.usda.gov/me/Success%20Stories/MAINE%20Annual%20Report.pdf\)](http://www.rurdev.usda.gov/me/Success%20Stories/MAINE%20Annual%20Report.pdf)) through a \$1.66 million loan and \$500,000 in grant funds.

“The overall support and funding award from USDA Rural Development has been instrumental in moving the Stonyvale Farm biogas project forward. The assistance

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will allow the venture to achieve its long term economic, social, and environmental goals while improving the energy efficiency of the dairy operation on a day to day basis,” said Travis Fogler, a co-owner of Stonyvale Farm.

Generating biogas from biomass is not a new concept, as humans have been using the technology for millennia to generate heat for cooking and survival. Anaerobic methane digester systems have typically been used by farms for dealing with animal waste and at sewage treatment plants for treating sewage and water runoff, governments and utility companies are starting to realize their potential as source of clean energy. In the UK, the Department for Environment, Food and Rural Affairs has even released its own Anaerobic Digestion Strategy and Action Plan ([PDF \(http://www.defra.gov.uk/publications/files/anaerobic-digestion-strat-action-plan.pdf\)](http://www.defra.gov.uk/publications/files/anaerobic-digestion-strat-action-plan.pdf)) outlining how it is planning on using the technology to generate power and heat.

So what is an anaerobic digester? Simply put, it’s a closed system that promotes the decomposition of biodegradable materials in the absence of oxygen as a way to manage waste materials or to generate energy. In this case, at Stonyvale Farm, manure and food waste is fed into the digester where it is kept at a high temperature long enough so that naturally-occurring bacterial microbes can do all the hard work of breaking down the organic materials in the product. The result of this breakdown is a digested solid which can be used as fertilizer or soil conditioner and methane gas, which is captured and burned to generate electricity.

There are four stages to the anaerobic decomposition process:

- In the first stage, bacterial hydrolysis starts a chemical reaction which breaks down insoluble organic polymers, converting them into simpler, easier to digest monomers. Glucose is the most common monomer, present in over 77% of all plant matter.
- In the second stage, acidogenesis, bacteria then converts these monomers into carbon dioxide, hydrogen, ammonia, and volatile fatty acids.
- The third stage, acetogenesis, converts these fatty acids into acetic acid and generates more CO₂, hydrogen, and ammonia.
- In the final stage, methanogenesis, bacteria converts the CO₂, hydrogen, and ammonia into a final product consisting of methane and carbon dioxide.

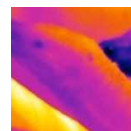
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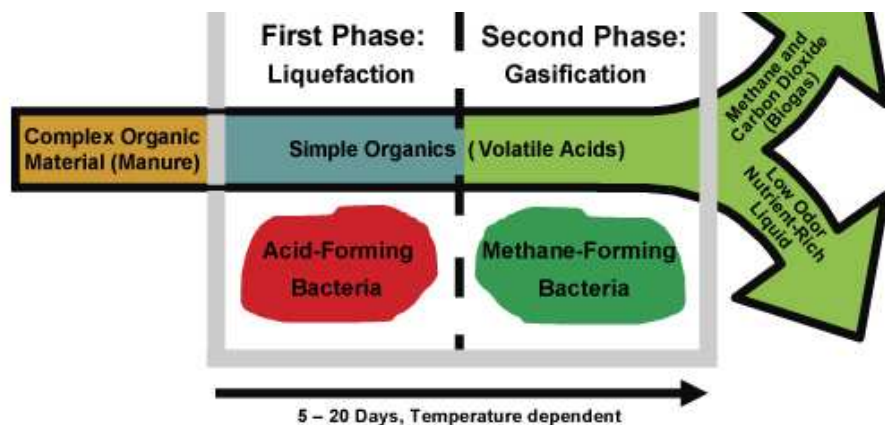
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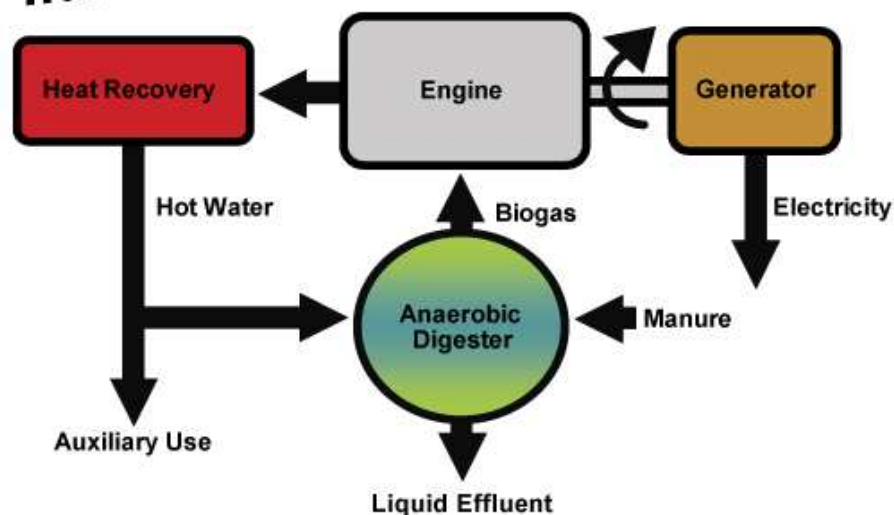
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How it works...





How it's used...



Generally speaking, there are two types (http://www.energysavers.gov/your_workplace/farms_ranches/index.cfm/mytopic=30004) of anaerobic digester systems in use today: **Completely Mixed** and **Plug Flow**.

Completely Mixed, also called Batch, consists of loading a large tank with waste, shutting the door, and allowing the microbes to do their job and digest it all. The generated methane gas is captured from the tank and once everything has been processed, the resulting solids are removed and used as fertilizer or conditioner.

In a Plug Flow system, sometimes referred to as Continuous, the waste is fed into long tube-like channels where it is moved along by the force of additional waste being constantly added to the channel. The methane gas is captured on a constant basis as the waste is digested in the tubes.

In a lot of ways, an anaerobic digester works just like how your backyard compost pile could work but on a much larger, much more efficient scale – and if you were able to capture any of the methane gas coming off the pile to heat your home with.

The anaerobic digester at Stonyvale Farm is the first one to be installed at a dairy farm in Maine and one of only about 12 large-scale systems in the entire country. It is owned and operated by [Exeter Agri-Energy \(http://www.exeteragrienergy.com/\)](http://www.exeteragrienergy.com/), a subsidiary of Stonyvale, Inc., and [Biogas Energy Partners \(http://biogasenergypartners.com/\)](http://biogasenergypartners.com/) is the development firm responsible for regulatory issues surrounding biogas plants.

Excess heat produced by the digestion system will be used to heat the buildings on the farm, helping to offset over \$250,000 of expenses per year.

Stonyvale produces 7,000 gallons of milk each day from its 1,100 dairy cows. The anaerobic digester is expected to process at least 10,000,000 gallons of manure and food waste per year, generating enough electricity to power 800 average-sized homes. It will cut the farm's annual CO2 emissions by 8,000 tons, the equivalent of removing 3,000 cars from the road.

Special thanks to Adam Burk from [TEDxDirigo \(http://tedxdirigo.com/about/\)](http://tedxdirigo.com/about/) for the tip and to the [Agricultural and Biological Engineering Department \(http://www.biogas.psu.edu/basics.html\)](http://www.biogas.psu.edu/basics.html) at Penn State for the graphics.

Image credit: [Exeter Agri-Energy \(http://www.exeteragrienergy.com/\)](http://www.exeteragrienergy.com/)

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David Quilty is a writer and activist working to protect the environment and the less fortunate, having founded [The Good Human \(http://thegoodhuman.com\)](http://thegoodhuman.com) in 2006. After years working in television, David chose a different path and turned his passion for the environment into a career as a publisher and writer. His work has been featured in the New York Times, Albany Times Union, Green Lifestyle Magazine, and on NPR. He lives in Santa Monica, California. You can follow him on Twitter at [@thegoodhuman \(https://twitter.com/#!/thegoodhuman\)](https://twitter.com/#!/thegoodhuman).

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I know it's an estimate, but enough power to run 800 homes from a clean energy source like this is impressive. Hopefully this model works out and is used at more farms in the future.

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