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The Benefits Of Biogas

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Biogas has been known to exist for many centuries but only in the last one have people begun to realize its true value. In the late eighteen hundreds, England developed technology to help protect their septic systems from the dangerous gases emitted by the wastes it carried. A lamp called the "sewer gas destructor lamp" was devised to burn off the harmful gases that would collect in high spots of the septic (1) (5). As the sewer systems developed and became more advanced most of these lamps fell into disuse (1) (5). What this discovery tells us however is that it is possible to create electricity from crude biogas.

So why is biogas valuable? Biogas is a crude form of natural gas. Two primary gases make up biogas, 50 to 65 percent is made up of Methane (CH4) and 35 to 40 percent is made up of Carbon Dioxide (CO2). Four ingredients are needed to produce biogas: the organic matter, bacteria to begin the process of anaerobic digestion, the proper anaerobic conditions, and of course heat (4) (2). The valuable component in the end product is methane gas.

Anaerobic digesters are in use all over the world. Many farms in India use gas from digesters to cook their food (7). According to Kishore (7), in 2012 there will be approximately 200,000 terapascals of solid waste generated from cattle, poultry, and municipal waste used for energy. When the energy potential of these wastes is harnessed using the facilities in operation, India has the ability to generate 3,500 Mw/yr of energy (7). This is a tiny number next to India's

overall consumption of electricity which stands at close to 600 million megawatts (9). But the fuel used to generate that electricity is essentially free because it is now predominantly unused.

It just so happens that humans and animals produce large quantities of organic matter in the form of feces every day. Enough in fact to power much of our electricity needs. According to the Environmental Protection Agency, methane is twenty times more effective at trapping infrared radiation than carbon dioxide (3). Burning Methane decreases the potential global warming effect by twenty because the byproduct of burning methane is carbon dioxide (which is less harmful). Many people are turned off by the idea of using municipal wastes for fertilizer because it has the stigma for being dangerous and smelly, in reality it is only a stigma.

There are pathogen-fighting microbes that kill harmful bacteria during the anaerobic process (2). The exiting solids are safe and nutrient rich, with a distinct but not obscene odor. This of course is dependent on the residence time within the digester, the temperature, and the quality of the biomass used (2). The owner now has the capability to use or sell electricity *and* fertilizer. Through the responsible use of digesters, a society can create a very efficient and lucrative recycling process that could pay for their investment within a decade. Assuming that 8,000 cows produce around 100,000 terapascals of cow slurry, between 3,110 Mw/hrs per year and 5,710 Mw/hrs per year could be produced from those 8,000 cows (10).

So why are digesters not used more widely across the globe?

Bottom line is that anaerobic digesters become expensive when the gas has to be purified. India is able to implement so many digester facilities into use because the government will subsidize close to 50 percent of the overall project cost (7). As a result this subsidy has led to a wide development of digester facilities across India. What makes the purification process expensive is that biogas, as previously stated is “low grade natural gas”. Using the crude gas

wears down materials reasonably quickly due to the hydrogen sulfide acid in the released gases. To remove this acid methane must be purified through a reasonably expensive water scrubbing, distillation, or membrane filter process before it can be used to generate electricity (8).

Most of the commercial business and residential interest in the technology is lost when the expense of operating and maintaining such technology is calculated. If local electricity is cheap enough, comparing a biogas powered generator next to the conventional generator will prove economically inadequate. However with the help of government subsidies in the United States similar to those given in India, the potential for a wider use of digesters is great. What it takes is forward thinking individuals in both the public and private sector to realize that the long term benefits outweigh the upfront expense.

Once the people are made aware of the benefits of anaerobic digestion facilities, they have the ability to approve tax breaks and incentives. Research funding in this sector will make the process more efficient and potentially cheaper for the purchaser. If incentives are created by the government, the cost benefit analysis for the implementation of such technology is now much more lucrative for a power company because not only are they able to sell power but they can sell manure as well. The waste water treatment plants in Lincoln have already recognized the benefits of anaerobic digestion; their digesters produce over 900 kilowatts of power, therein decreasing the need for fossil fuels (11) but they can still do more. The United States could export more of our coal instead of burning it, thus bringing in more Gross Domestic Product. The biogas/natural gas industry will explode, producing needed employment. The benefits are clear, if we are able to show power companies and our government the long term value of such practices we would be a cleaner, more sustainable, and financially secure society.

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