Unfulfilled promise: biogas systems

Bob Hamburg

WHY HAS PERMACULTURE NOT EMBRACED biogas systems? This is not an idle question! My involvement with the domestication of anaerobic microbes began with mid-70s participation in the Peace Corps in Nepal. Involvement with permaculture began in the early 80s with preliminary consideration of *Permaculture One*'s application to some West Virginia (North American, central Appalachian) hillside, upon which are a couple of shallow fossil natural gas wells. My PDC came from the notable 1997 event in Half Moon Bay, California… coordinated by Bill Mollison, Scott Pitman, and David Blume.

For decades, it's seemed to me that biogas systems offer huge potential to further permaculture's philosophy and ethics. (See Bill's *Design Manual.)* I do not understand why this has not happened. What is wrong with my reasoning?

Biogas systems offer a broad range of benefits:

- *Nutrient conservation.* All nutrients going into a digester are available in the effluents (except for a small amount of sulfur released as H_2S, and some N_2 if the digester feed is imbalanced), thus providing a full spectrum of plant nutrients and reducing or eliminating the need for chemical fertilizer input.
- *Soil regeneration.* Organic compounds in the effluents increase the humic content of agricultural soils.
- *Sanitation.* When allowed to go toward completion, anaerobic digestion results in total destruction of most disease vectors that may have been present in the feed materials and significant reduction of the most recalcitrant (e.g., *Ascaris* eggs). Also, the digestion process does not introduce any new pathogen vectors.
- *Production of natural gas.* With minor adjustments, biogas (generally 65% CH_4, 35% CO_2, traces of other gases) can be used in any way fossil gas is used. [Editor's note: biogas production has never been shown to pollute aquifers or induce earthquakes in Oklahoma.]
- *Reduction of indoor air pollution and respiratory problems.* Emissions from biogas combustion are similar to those from burning fossil gas. When biogas is used to replace biomass or coal as a cooking fuel, indoor air pollution and related health problems are greatly reduced.
- *Odor control.* Volatile compounds (what we smell in solid waste) are largely consumed by digestion.
- *Fly and rodent control.* Insects and rodents are generally not attracted to digester effluents.
- *Weed control.* The digestion process reduces the number of viable weed seeds in feed material.

I suggest that biogas systems offer more than a fair share for the effort.

There are basically two biological pathways for recycling organic materials: aerobic (composting) and anaerobic (digestion). In nature, they have much in common, and there is actually much collaboration.

The energetic difference is that aerobic composting releases organic material's embodied solar energy as heat, whereas anaerobic digestion releases it as natural, renewable methane.

The material difference is that organic material's embodied nutrients may be lost through volatilization and leaching during the composting process, whereas nearly all nutrients are conserved for reuse in the digester effluent. Both pathways prepare the organic material's hydrocarbons for long-term incorporation into the soil.

From its evolutionary beginnings, our species has had a very intimate symbiotic relationship with anaerobic microbes. We provide them a home in our guts, and they digest our food. Without them, our bodies would not be able to make use of the nutrients we consume. There also appears to be a quickly growing understanding that these beasties have much broader impacts on our health and our individual physiologies.

I continue to maintain that "externalization" of our symbiotic relationships with anaerobic microbes holds huge promise for a regenerative agricultural future. Dragon Husbandry (dragonhusbandry.com) might start with biogas production, but that is just the tip of its potential for kickstarting regenerative spirals.

There are currently several 100 million households around the world using biogas systems and working on improvements. I would have thought that permaculturists would be at the forefront. (And yes, I saw Geoff's bits on one digester, and Andrew Faust has installed one type of digester at his NY site, and I'm sure there are many examples I'm ignorant of….) I figured the permaculture community would be so receptive to development of such a symbiotic, regenerative tool. But that doesn't appear to be the case, and I can't understand why.

Please help me understand. Δ

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A PERMACULTURE FAIR-SHARE VIEW OF DRAGON HUSBANDRY

WE PROVIDE	WE GET
• A "BODY" IN WHICH TO EXIST	* NUTRIENT CONSERVATION * SOIL REGENERATION
• A WARM PLACE IN WHICH TO LIVE	* SANITATION
• APPROPRIATE WATERING	* PROVISION OF CARBON-NEUTRAL NATURAL GAS
• APPROPRIATE FEEDING	* REDUCTIOON OF INDOOR AIR POLLUTION AND RESPIRATORY PROBLEMS
• ADEQUATE CARE	* ODOR CONTROL * FLY AND RODENT CONTROL * WEED CONTROL
• RESIDUALS REMOVAL AND RECYCLING	PLUS SYMBIOTIC EARTH CARE AND PEOPLE CARE