by Paul van der Werf

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Anaerobic Digestion Comes of Age

The Georgian Bluffs/Chatsworth biogas facility

When asked eleven years ago about new technologies for organic wastes I replied that "…Anaerobic digestion seems to be the flavour of the week. I'll get more excited when I see that it works." That comment was less about AD and more about the dubious allure of technologies that appear successful in other jurisdictions (especially Europe) that might nevertheless be problematic here.

Eleven years later AD has created its own value proposition, though its acceptance in the marketplace remains tentative. One of the best examples of AD acceptance is Toronto's Dufferin Organics Processing Facility, set for renovation and expansion that city treats its green bin wastes.

Momentum has accelerated in recent years from the emergence of on-farm anaerobic digestion, which has improved general awareness and is especially effective for low-solids wastes (that don't work well in composting systems). Subsidization programs for green energy, like Ontario's feed-in-tariff (FIT), are attracting investors like ants to a picnic; hopefully the frenetic activity will produce something meaningful.

Biogas project

In that spirit, the Georgian Bluffs/Chatsworth Biogas Energy Project re-affirms the power of cooperation to solve a mutual problem. The partnership between the Townships of Georgian Bluffs and Chatsworth, on solving a septage disposal problem, started in 2006 after the mayors from both communities spoke with the environment ministry and it became clear that direct land application of untreated septage was not viable over the long term.

The municipalities have about 9,000 households and no municipally-owned sanitary sewers. Georgian Bluffs owns a sewage lagoon facility with 57.5 cubic metres of daily treatment capacity close to the border with Chatsworth (where raw septage has traditionally been delivered but not treated).

It was natural that any solution started at the sewage lagoon facility. An anaerobic digester built there would generate biogas, and so could solve the land application problem while generating green energy and revenue.

The Georgian Bluffs/Chatsworth biogas facility showing digester.

The facility was constructed in 2010 by Maple Reinders Constructors Ltd. It includes: a septage receiving and screening facility; a 1,000 cu/m anaerobic digester; a hydrolyzer; a fats, oils and grease (FOG) tank; a dry substrate feeder; a 100 kw cogeneration biogas generator; a biogas control facility; a pasteurization system; a digestate storage facility; and, an odour control system.

Incoming septage is dewatered to about 10 per cent solids and fed into the digester. Other wastes such as FOG agricultural wastes, restaurant wastes and green bin wastes are blended in the hydrolyzer and then mixed with the septage in the digester to provide an appropriate AD recipe. Pasteurization for the FOG takes place in a separate pressurized vessel prior to the FOG being directed to the anaerobic digestion tank.

Currently the anaerobic digester is fed at a rate of 11 cu/m per day with about seven of that being septage and the balance other wastes.

The anaerobic digestion process lasts about 30 days, during which the average temperature is about 42°C. Methane is directed to the onsite genset. Electricity generated is directed to the grid. Currently, any excess methane generated that can't be handled by the genset is directed to an onsite boiler and burned.

The remaining solids, or digestate (which is deemed 99.9 per cent pathogen free) is land applied. The AD doesn't cause any nutrient loss. Digestate is still considered a biosolid and falls under the auspices of the *Nutrient Management Act* and associated land application requirements.

The AD facility cost about $3.9 million to permit and build. Federal and provincial funding of $1.7 million was received with the balance paid by the two municipalities. Payback is estimated at about eight years.

About 15 per cent of revenue comes from power generation; the balance comes from tipping revenues. The enhanced price for the electricity generated at the facility is $0.16/kWh. Incoming septage is levied a tipping fee of $25/cu/m. Incoming feedstocks are received at the site are charged $25-$45/cu/m or (in the case of more solid wastes) $25-$45/tonne.

The municipalities have the opportunity to double the wastes they currently manage. The bottle neck right now relates to transmission. Presently they have access to single-phase power, which means they're limited to using a 100 kW genset. If the lines were upgraded to three-phase power, a 350 kW genset could be used. (Upgrading would require about 1.6 kilometres of lines to connect it to the nearest three-phase transmission line.)

In future it's hoped that revenue from power generation will make up about 60 per cent of the revenue mix.

In the next few years the performance of this plant will help determine whether this approach represents a solution that other smaller municipalities can replicate to help solve their unique waste management challenges.

The facility was constructed in 2010 by Maple Reinders Constructors Ltd.

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