

## **UWO Biodigester team studying new bioplastics' potential**

by Alex Hummel - Wednesday, January 09, 2013

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Imagine a future where the fast-food soda cups, the sandwich wrappers and the grocery store bags we go through on a daily basis are made of molecules that rapidly break down and return to the earth as reusable carbon, not concerning chemicals.

Now, imagine that, as they safely decompose, these next-generation materials also yield a bonus: Biogas, such as methane, a natural, safely combustible source of renewable energy, of heat and electricity.

It's an exciting, potentially revolutionary future involving "bio-based plastics," or "bioplastics." And it is not so far from reality. The University of Wisconsin Oshkosh is turning to its student and faculty scientists to determine just how possible it is.

UW Oshkosh researchers are tackling big questions with the help of bioplastics manufacturers, state energy and sustainability agencies and the essential instrument: The campus's 14 month-old dry fermentation anaerobic "Biodigester."

The University-owned research and energy-production facility's anaerobic digestion chambers have, to date, largely composted and consumed campus food waste, city of Oshkosh grass clippings and some sourced farm plant material to produce biogas and energy. Now, opportunities to test next-generation bioplastics are expanding thanks to the first digester of its kind in the western hemisphere and the collaborative faculty-student research team running it.

UW Oshkosh academic leaders and students are working with a growing pool of local, regional, national and international companies eager to test bioplastics in the Biodigester and the connected UW Oshkosh Environmental Research and Innovation Center (ERIC) laboratory. The plastics research testing will ultimately focus on a few key issues: The impact of these new biodegradable plastics on the environment, particularly how quickly and safely they break down in the lab and in the Biodigester; the biogas and energy yield of the materials as they decompose and the readiness of a mass-consumer public to embrace the next-gen materials.

Since the Biodigester launched last fall, UW Oshkosh research teams have been examining the biodegradability of bioplastics. They have mixed in a small percentage of "biobag" material into the organic food and plant mixture that forms a master dough of compost inside the Biodigester chambers.

With the support of Wisconsin's State Energy Office, the plan is now to expand the bioplastics research. It will involve the inking of new agreements with manufacturers eager to get some hard data on the "end-of-life" nature of their bioplastic materials.

"The reason we're doing this is because of this new capability on campus," said Greg Kleinheinz, associate dean in the College of Letters and Science and professor of environmental microbiology.

Among other bioplastics suppliers, UW Oshkosh is working through a consortium – one of which represents fast food industry packaging companies. They also hope to collaborate with Fox Valley and Wisconsin manufacturing companies already developing the bioplastic containers and packaging of the future.

Kleinheinz said the manufacturers' new wave of bioplastics are made of polymers that are different than those in petroleum-based plastics. On a molecular level, they break down more readily in the right conditions and release carbon back into the environment. And as they break down, they have potential to produce methane, which can be combusted into heat and electricity.

Given the Biodigester's one-of-a-kind status in North and South America, the facility's potential to help answer questions about bioplastics' performance after entering the waste stream is extremely valuable to companies hoping to introduce the new materials into the marketplace.

The potential for these everyday plastics to not only have a neutral impact on the environment but also produce biogas is equally tantalizing to the state of Wisconsin. State clean energy advocates are also adamant that the new materials can happily coexist alongside current packaging methods. There can be a gradual shift to the more sustainable materials as companies such as bottlers and bag-producers embrace the new bioplastics. They believe industry will welcome materials that can ultimately help generate additional, clean sources of heat and electricity, lowering overall energy costs.

"We're literally throwing away energy," John Baldus, of the State Energy Office, which has supported UW Oshkosh's Biodigester research since its fall 2011 launch.

The bioplastics research is only the latest development involving UW Oshkosh digester research and energy production initiatives.

In March 2012, Wisconsin Department of Administration (DOA) Secretary Mike Huebsch joined University and BIOFerm™ Energy Systems representatives to announce DOA and State Energy Office support for a feasibility study installing a "Titan 55" anaerobic digestion unit on the Allen Farm, a dairy farm with fewer than 500 head of cattle northwest of Oshkosh. The "EUCOLino" (OY-co-lino) project conducted by BIOFerm and UW Oshkosh, through the UW Oshkosh Foundation, involves the first small-scale digester unit in Wisconsin. It began producing energy as the New Year turned.

The small-farm scale wet digester system, using manure from the operation to produce methane and on-site energy, is now installed and soon will help provide an answer to concerns about livestock waste infiltrating ground and surface waters while demonstrating a sustainable power source for family farms. It also foreshadows the potential of industrial development and job-growth for the region and state, should these smaller-scale digesters be manufactured in Wisconsin.

That project followed the summer 2011 planning for a wet anaerobic digester facility with an attached Education Center at the site of Pickett's Rosendale Dairy (Milksource). The facility will be developed in a partnership between the College of Letters and Science, UW Oshkosh Foundation and BIOFerm. It will be dependent on Rosendale Dairy's livestock waste (9,000 cows), will use that waste to produce an estimated 3 megawatts a year while enhancing learning and facilitating scholarship, research and community education.

“In just one year of operation, our Biodigester has proven an invaluable scientific and educational investment and asset for our campus, the region and the state,” said Thomas Sonnleitner, UW Oshkosh vice chancellor of Administrative Services. “Just as important, this new bioplastics research gives our students and faculty incredibly hands-on, career-propelling opportunities to assist industry in developing and adopting more sustainable materials and practices. We are excited to carry this research forward.”

Learn more:

- [UW Oshkosh Sustainability](#)
- [Video: How the Biodigester works...](#)