

Cost-effective farm waste-to-energy technology focus of research

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Michigan State University researcher Steven Safferman demonstrates a manure digester Oct. 15, 2008. Safferman and a group of MSU researchers are using public and private funding to help develop technology for smaller farms to cost-effectively process manure into biogas and other valuable products. Credit: G.L. Kohuth, Michigan State University

State and foundation grants exceeding \$3 million will assist Michigan State University researchers in developing technology for smaller farms to turn animal waste into usable heat, electricity and other valuable products.

MSU's planned Anaerobic Digestion Research and Education Center will consolidate new and existing programs in a planned 3,280-square-foot building south of campus, at MSU's expanding farm animal and environmental research complex.

Researchers aim to develop and commercialize turn-key digester/microturbine modules for affordable waste-to-power systems for small and mid-sized farms.

"The initiating of the center completes our vision for a continuum of research capabilities from theoretical calculations, laboratory-scale, bench-scale, pilot-scale and farm-scale anaerobic digestion research," said Steven Safferman, the center's director and an associate professor in the Department of Biosystems and Agricultural Engineering.

A two-year, \$1.5 million Michigan Public Service Commission research grant "recognizes MSU's strong capacity to address the critical issues of sustainability of animal agriculture and the need for renewable energy and economic development in Michigan," department chairperson Ajit Srivastava said.

An additional three-year grant totaling \$1.5 million from a private southeastern Michigan foundation to build the facility and fund new programs "is an excellent example of how universities and foundations can work together to address critical issues of society such as food, environment and energy," Srivastava added. The foundation prefers to remain anonymous.

Farm waste management is a growing issue due to concerns over food contamination, pollutant runoff, odor and, most recently, greenhouse gas emissions. Petrochemical cost spikes, meanwhile, have added to farmers' costs for fertilizer and fuel. The MSU ADRE Center will develop ways to efficiently convert manure liquid into methane for heat and electricity while extracting fiber for soil enrichment or ethanol manufacture and water for irrigation. Other valuable output could include animal feed and algae, which can be processed into biofuels.

Anaerobic digestion is not a new concept, and has been applied in recent

years by some large dairy farms to generate power. Development of scalable, modular systems could allow smaller farms, those with fewer than 500 head of cattle, to convert waste into valuable resources. Despite the loss of two-thirds of U.S. dairies since 1988, such smaller operations still account for 53 percent of the 71,510 remaining and 48 percent of U.S. milk production, according to the U.S. Department of Agriculture.

"The enhanced revenues and reduced pollution from the proposed system will significantly improve the quality of life and health of residents in rural communities and turn an environmental and economic liability into a public and private asset," said project lead investigator Wei Liao, an assistant professor of biosystems and agricultural engineering. "It is our hope that success at this level will lead to extensive applications of similar technology throughout Michigan and the nation."

The ADRE Center also is expected to conduct contract testing of related equipment and processes to help support itself, and to house a recently created farm energy auditing program that could conduct digester/power system feasibility studies for dairy clients.

"Agricultural operations are extensive energy users. Most can reduce their energy use, sometimes even resulting in increased production, by adopting new high-efficiency technologies," said MSU professor Truman Surbrook, who is managing director of the Michigan Agricultural Electric Council. "Advances in this field are occurring at such a rapid pace that it is hard for producers to keep up without the assistance of highly trained personnel such as Michigan's certified farm energy auditors."

Source: Michigan State University

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