

Civil engineers increasing energy created from solid waste, potential for future landfill operations

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(Phys.org)—Two UT Arlington civil engineering professors are working with a new imaging system that has doubled the amount of methane gas produced by the city of Denton landfill.

The landfill is the first in Texas to implement the Enhanced Leachate Recirculation system. The gas now provides power for about 1,500 Denton households. However, with increased efficiency of ELR operation, the system will be able to power 3,000 homes in the city of 117,000, officials said.

Sahadat Hossain and Melanie Sattler, associate professors of civil engineering at The University of Texas at Arlington, have helped the city of Denton increase the efficiency of their landfill operation.

Vance Kemler, general manager of Denton's Solid Waste and Recycling Services Department, said the UT Arlington team's work with Denton has peaked the interest of officials in Garland and Corpus Christi as well, he said.

"This research is a significant accomplishment, and it will change the landfill operation [best management practices](#) for us and others in the state of Texas," Kemler said.

Jean-Pierre Bardet, dean of the UT Arlington College of Engineering,

said the work by Hossain and Sattler holds promising results for municipalities worldwide.

"This is the kind of innovation that will help cities harness available energy resources and maximize the utilization of available spaces at a time of unprecedented urban growth," Bardet said. "I applaud the work of Drs. Hossain and Sattler."

Hossain and Sattler are funded through a three-year, \$344,414 grant from the city of Denton. Their current project will focus on monitoring what they call "fugitive emissions" of [landfill gas](#) and increasing efficiency of the landfill gas collection system.

This project will help Denton's landfill move toward operation as a sustainable landfill, a new idea in landfill management. A sustainable landfill integrates ELR landfill operation, renewable energy generation and reutilization of the same landfill space. This is the second project with city of Denton for UT Arlington.

ELR landfills use the controlled addition of water to more rapidly decompose organic materials to produce methane. In a landfill, leachate is the contaminated water that trickles through the waste. Monitoring moisture movement due to water addition remains a major challenge and roadblock for implementation of ELR landfills.

Hossain and Sattler successfully utilized a resistivity imaging method, an advanced tool, to monitor moisture movement during ELR operation. Resistivity imaging helps landfill managers know how quickly to recirculate the liquid and how effectively the system is working, Hossain said.

Hossain and his recently graduated doctoral student, Huda Shihada, developed a model through which they can quantify the moisture content

without a need for drilling or destructive sampling.

"This is the first time a model like this has been developed in the world," Hossain said. "This has the potential to change the way landfills operate."

Sattler said most current landfills require drilling to collect waste samples.

"That drilling releases some of the [methane gas](#) into the atmosphere," Sattler said. "That's bad for the air because methane is a greenhouse gas and something the EPA is concerned about. With the new system, you don't need to drill the holes."

Currently, the city of Denton is working on a permit modification to operate their [landfill](#) using the method developed by Hossain. The Texas Commission on Environmental Quality will review that permit modification soon.

Provided by University of Texas at Arlington

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