

UTA civil engineers shaping sustainable solutions, increasing energy output at landfill

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Sahadat Hossain, a UTA civil engineering professor, is working with the City of Denton to produce more energy through closed landfill cells through a project that involves mining the already buried refuse. Credit: UT Arlington

Cities, counties and countries have spent decades covering trash with

intricate layers of liners and soil in landfills as the best way to protect groundwater and eventually reclaim usable green space.

Now civil engineers at The University of Texas at Arlington are asking whether that refuse should be dug up to recycle it or convert it to energy through modern processes designed to boost methane production in landfills.

UTA and the City of Denton are partnering on a groundbreaking landfill project. The project is supported through a three-year, \$399,806 Denton grant. It is the first ever landfill [mining project](#) in Texas and first-ever landfill mining project as part of sustainable waste management system in the country.

Professor Sahadat Hossain, director of the UTA Solid Waste Institute for Sustainability, will discuss some of his team's findings and explore best practices in landfill management during the International Solid Waste Association's Winter School on Solid Waste Management - Landfill and Landfill Mining scheduled now through Jan. 29 on the UTA campus. The training program brings together more than 50 representatives, professors, environmental experts and students from 25 countries.

Hossain is currently leading the second phase of a research initiative with the City of Denton that is mining the existing closed landfill with the goal reusing the space - a major component of a sustainable waste management system.

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The current phase will investigate mined landfill samples to see if the buried materials can be recycled, used for scrap or converted to energy as they degrade. The UTA team also will develop a protocol for future landfill mining operations.

"The idea behind landfill mining is to take out what won't break down in the landfill, and speed up the degradation of what's left," Hossain said. "That allows different cells within the landfill to be used again and again."

Sustainable [waste management](#) systems that incorporate landfill mining could extend the typical life of a landfill from the current 25 to 30 years to more than 150 years.

"This would be a major accomplishment as getting new space for landfills in urban cities around the world is getting extremely difficult and expensive," Hossain said.

Hossain and his colleague Melanie Sattler, an associate professor of civil engineering, first designed an extensive sensor system to boost methane production as an [alternative energy source](#) in 2012. With UTA's advanced bioreactor, the Denton landfill system now generates enough methane gas to power 5,000 homes monthly.

Vance Kemler, Denton's general manager of [solid waste](#) operations, said the collaboration with UTA is attracting attention across North Texas and beyond.

"Those landfill and environmental officials are discovering that landfills are resources, not just expenses," Kemler said. "This latest research will show that mining could be productive to cities. What's recyclable or not has changed since some of this refuse has been buried. Dr. Hossain will show if those materials can be used for additional energy."

In addition to Denton, representatives from Irving and Grand Prairie have joined the Solid Waste Institute for Sustainability's advisory board as have researchers and officials from Brazil, Japan, Portugal, Thailand, Turkey, Serbia and the United Kingdom.

Khosrow Behbehani, dean of the UTA College of Engineering, said Dr. Hossain's work exemplifies the global environmental impact envisioned in UTA's Strategic Plan 2020 | Bold Solutions: Global Impact.

"Dr. Hossain is advancing both our understanding of how to extend the lifespan of landfills and how to capitalize on them as an alternative energy source," Behbehani said. "This is truly exciting research in a living laboratory with the potential to increase sustainability in a critical sector worldwide. And this work has the potential to provide energy to parts of the world with limited resources."

Provided by University of Texas at Arlington

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