

Invention generates power, cleans water using untapped source

October 31 2017, by Tina Meketa



The USF-developed NEWgenerator will soon be installed in Durban, South Africa. It generates nutrients, energy and water by safely recovering them from wastewater. Credit: University of South Florida

Rapid, unplanned urbanization is becoming a serious threat across the world, because it puts major stress on critical infrastructure such as water and sewer lines. Building on his team's success in India, Daniel Yeh, PhD, associate professor of Civil and Environmental Engineering

at the University of South Florida College of Engineering, is the principal investigator of a two-year, \$1.14 million grant from the Bill & Melinda Gates Foundation to install a new and improved version of his NEWgenerator in Durban, South Africa.

The NEWgenerator generates nutrients, energy and [water](#) by safely recovering them from wastewater containing fecal organic matter and urine. It will accompany a Community Ablution Block (CAB), which is a modified shipping container that has toilets, showers and sinks. The South African government has provided the CABs to informal settlements that lack such amenities. But with these populations growing rapidly in the urban fringe, CABs are putting a major strain on sewer systems. The NEWgenerator will aim to allow CABs to operate, without being hooked up to sewer lines.

Generate energy

The NEWgenerator mimics a miniature wastewater treatment plant without the usual energy-intensive aeration tank that blows air to break down pollutants and the plethora of chemicals. By harnessing an army of anaerobic microorganisms, the process eliminates the need for oxygen, causing organic material to turn into biogas. Biogas is a renewable form of energy, allowing the NEWgenerator to generate electricity and run completely on its own when coupled with solar panels.



Rapid urbanization is straining the sewage system in Durban, South Africa.
Credit: University of South Florida

Generate water

The NEWgenerator has a multistage disinfection process. First, a fine-pore microscopic membrane filter traps bacteria and viruses. Then, the clean water that passes through is disinfected with chlorine, similar to municipal drinking water. The recycled water can be used for toilet flushing in the CABs, thereby drastically cutting down on water demand, especially during times of drought. The water can also be used for irrigation.



Government-installed Community Ablution Blocks (CABs), pictured here, contain toilets, showers and sinks. The NEWgenerator allows them to operate without being connected to the sewage system. Credit: University of South Florida

Generate nutrients

Community gardens are often found throughout unplanned settlements near CABs. However, plant growth is hard to sustain without fertilizer. Nutrients (nitrogen and phosphorus) safely recovered with the NEWgenerator will help make these community gardens vibrant by providing the fertilizers needed. This not only creates an urban greenspace, but a potential food source and financial asset as well.

Dr. Yeh and USF postdoctoral researcher Dr. Robert Bair leave for South Africa at the beginning of 2018 to begin field testing with their

partners at the University of KwaZulu-Natal. They are one of four crews selected by the Bill & Melinda Gates Foundation to develop technologies called Reinvented Toilets that help solve water and sanitation problems in Durban and worldwide.

The USF team will bring two versions of the NEWgenerator to Durban. The first is an updated version of the unit used in India in 2016 and provides service to 100 users a day. That unit was connected to two electronic toilets in India. In South Africa, they'll be connected to CABs. The second unit will ambitiously increase the capacity of the NEWgenerator 10-fold and serve 1,000 users a day.

Provided by University of South Florida

Citation: Invention generates power, cleans water using untapped source (2017, October 31) retrieved 26 April 2024 from <https://phys.org/news/2017-10-power-untapped-source.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.