CLEMSON UNIVERSITY

Engineering and Earth Sciences

Departmental Seminar

Spring 2019 Seminar Series

High- and Low-Tech Approaches to Decentralized Sanitation in Less-Developed Countries

Marc Deshusses
Professor of Civil and Environmental Engineering
Research Professor of Global Health
Duke University

Sadly, over two billion people do not have access to a decent toilet… This has significant environmental and health impacts. We have been working on two different sanitation approaches to address this issue. One system is a very simple low-tech self-sanitizing toilet, best suited for rural or peri-urban areas. Sanitation relies on anaerobic digestion which produces biogas, then used to pasteurize the digester effluent. This approach allows recovery of the nutrients (N, P) for local application as a fertilizer. After laboratory research, systems have been piloted in Kenya, the Philippines, Madagascar and in India. The second approach is a neighborhood-scale high-tech and intensive treatment for the urban poor relying on supercritical water oxidation (SCWO). We have designed and built a prototype that can treat the fecal waste produced by roughly 1000-1200 persons daily. The unit is housed in a standard 20 ft shipping container and has been undergoing testing at Duke since early 2015. At supercritical conditions (~400 C, 240 bars) organics in the waste are rapidly oxidized to CO_2, with the corresponding heat of combustion released in the reaction medium. In this talk, I will present a few highlights from my research and focus more specifically on these two projects, including details of system design and performance, and challenges and opportunities moving forward.

About Dr. Deshusses:
Dr. Deshusses' research interests are related to the design, analysis and optimization of processes for waste treatment. Applications include treatment of air toxics, biogas production, waste to energy, and novel sanitation technologies for less developed countries. Dr. Deshusses holds degrees in chemical engineering from the Swiss Federal Institute of Technology (Lausanne and Zurich). Dr. Deshusses was a professor and department chair at the University of California, Riverside prior to joining Duke University in 2008.

March 15, 2019 – 2:30 pm to 3:30 pm
Brackett Hall 100

Attendance is mandatory for those enrolled in EES 8610 and GEOL 8510