Stanford | Codiga Resource Recovery Center

Creating Value From Waste

The William and Cloy Codiga Resource Recovery Center (CR2C)

Many regions around the world urgently need new approaches to treating and managing water, wastewater and related solid waste. Most current water infrastructure is at the end of its design life, and not up to challenges posed by drought, population growth, climate change and dwindling government funding. The William and Cloy Codiga Resource Recovery Center (CR2C) at Stanford eases the path to commercialization for promising technologies by providing a unique proving ground. A first-of-its-kind pilot-scale testing facility, it uses a novel core infrastructure and test beds for flexible analysis of mobile treatment systems fed multiple grades of water. CR2C opens the door to market-based solutions that boost water availability, energy independence and environmental resilience.

Mission

CR2C aims to usher in a new era of sustainable resource recovery technologies that generate revenue by recovering freshwater from wastewater, fertilizer from nutrient-rich waste streams and energy and valuable biomaterials from waste organic matter.

Goals

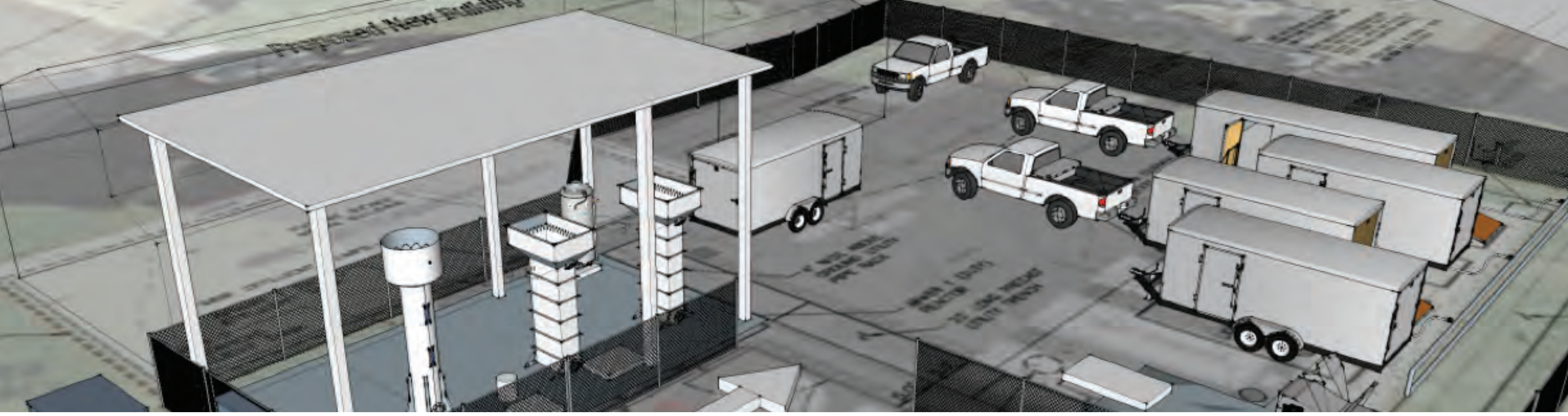
- Accelerate commercial development of promising technologies for resource recovery by testing and optimizing them at a scale credible for investment
- Provide policymakers with information needed to make judicious decisions on sustainable infrastructure for water, wastewater and waste management
- Educate engineers and scientists in the design and operation of new resource recovery technologies

We Are

A collaborative testing and teaching facility developed by the Stanford School of Engineering, the Stanford Department of Sustainability and Energy Management, the Stanford Woods Institute for the Environment and the Engineering Research Center for Re-inventing the Nation's Urban Water Infrastructure.

We Reach

Universities, municipalities, private water and wastewater organizations, governmental agencies, engineering firms, entrepreneurs and nonprofits.



Resources Recovered

High-Quality Water at Low Cost and Low Energy

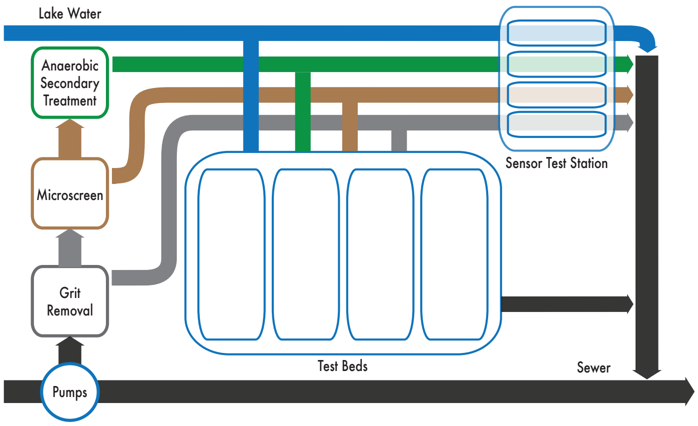
Conventional approaches to aerobic wastewater treatment consume large amounts of energy and generate large amounts of biosolids for disposal. A CR2C flagship technology, the Staged Anaerobic Fluidized Bed Membrane Bioreactor, generates high quality water and converts organic matter into biogas methane that can be used to power the process. Compared to conventional approaches, the system is expected to have lower operational and capital costs, and — according to studies — is more effective at removing trace contaminants such as pharmaceuticals.

Renewable Energy

When methane enters the atmosphere, it is a potent greenhouse gas. When captured for use in vehicles, turbines and industrial heating systems, it is a renewable source of energy. CR2C researchers investigate a range of systems — such as microbial fuel cells and microbial batteries — that convert waste organic matter directly into power.

High-Value Biomaterials

In addition to power and heat, waste organic matter and the methane that results from its anaerobic digestion can be converted into valuable products such as soil amendments, bioplastics, and animal feed supplements. CR2C assesses use of waste organic feedstock to produce biodegradable plastics and nutritional supplements for aquaculture.



Nutrients

There are several promising approaches to using nutrients in anaerobic waste treatment effluent. A low-energy system called ANAMMOX shows potential for removing nitrogen, and a process called CANDO converts ammonia into nitrous oxide, a source of renewable energy. The nutrient-rich effluent of treated wastewater can also serve as a valuable source of fertilizer, offsetting demand for fertilizer produced with energy-intensive industrial processes.

Information Needed to Protect Public Health

Use of DNA-based tools to monitor domestic wastewater can potentially provide insights into public health concerns such as antibiotic resistance and the burden of infectious disease within a community.

For more information:

Sebastien Tilmans, PhD
Director of Operations
William and Cloy Codiga Resource Recovery Center
Stanford University
650.724.6893 • stilmans@stanford.edu

web.stanford.edu/group/cr2c

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