

## **Decentralized Anaerobic Treatment of Blackwater: A Sustainable Development Technology Concept for Urban Water Management**

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**Abstract.** As populations continue to increase, the demand for limited water resources has increased. Sustainable water technologies and management methods are critical to our meeting future water quantity and quality demands. Decentralized treatment of blackwater under anaerobic conditions is a wastewater treatment technology being explored for application in new developments. This technology produces methane which can be used as a source of renewable energy. Decentralized anaerobic treatment of blackwater is an attractive alternative to traditional wastewater management because water and energy are conserved and reuse of these resources at a local level is enhanced.

A pilot scale anaerobic reactor is under design and construction at the Colorado State University Foothills Campus to treat blackwater (toilet and kitchen sink wastewater) from a building occupied by laboratory and office space. This project is a demonstration study which will answer questions regarding technical feasibility of anaerobic digestion for blackwater treatment. Treatment efficiency and methane production capacity of the anaerobic process will be evaluated with varying design and operation parameters. Biogas produced in the demonstration digester will be assessed for use as a source of alternative energy and treated effluent water will be evaluated for localized reuse in irrigation or for other non-potable uses after wetland treatment.

In conjunction with the demonstration study, a decision analysis tool is under development to evaluate technical and economical feasibility of decentralized wastewater treatment (DWWT) systems under user defined development conditions. This tool is expected to greatly assist decision making entities in determining the applicability of DWWT systems for use in new development, where limited practical guidance is available.

It is anticipated that the data presented in this study will also contribute to the basis for necessary legislation related to the effectiveness and safety of DWWT and reuse of resources contained within wastewater. Such data is vital to encourage incorporation of sustainable treatment technologies, e.g. DWWT, as aging and failing infrastructure is rapidly becoming in need of replacement and new developments are constructed.

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