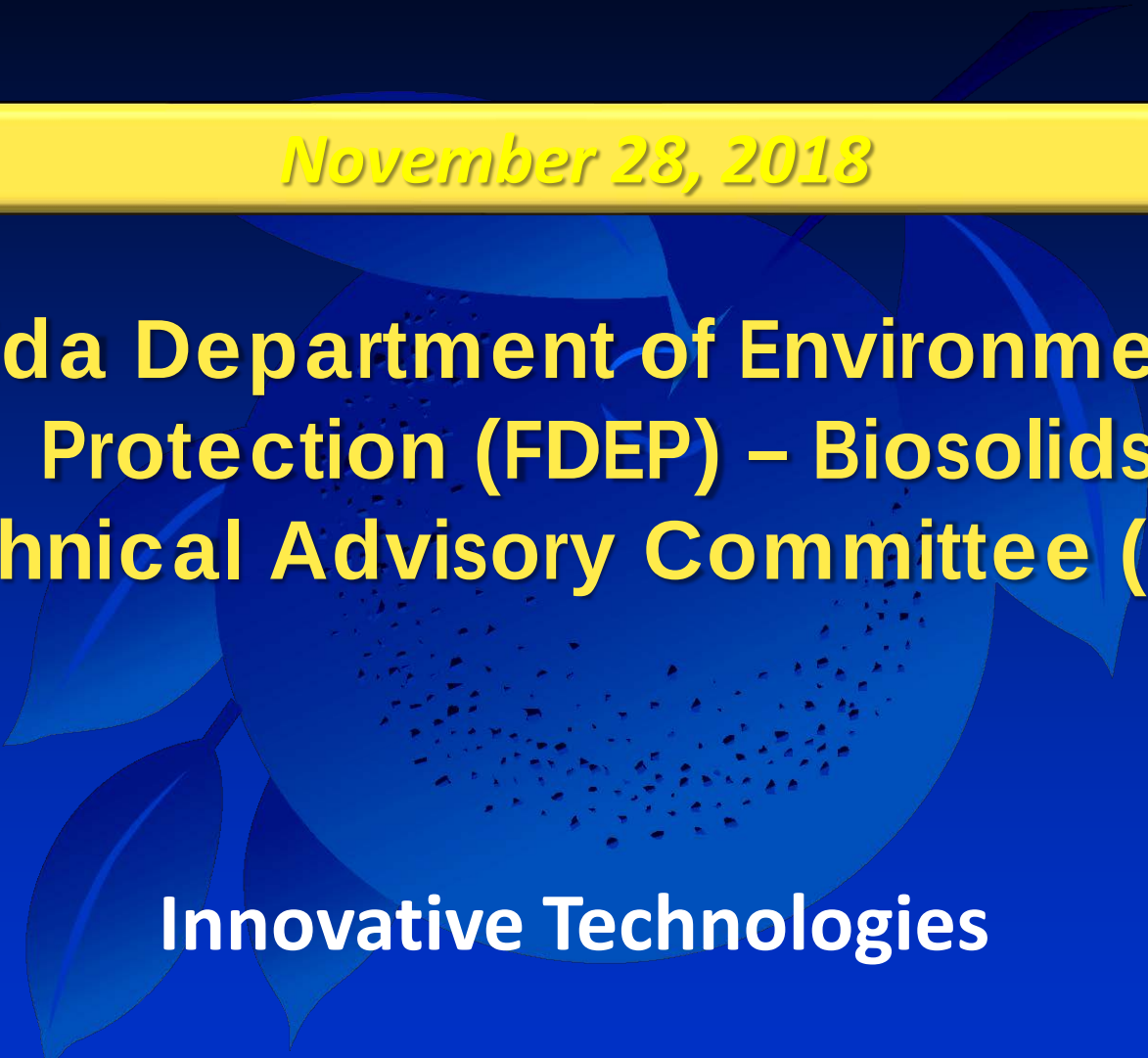




November 28, 2018

Florida Department of Environmental Protection (FDEP) – Biosolids Technical Advisory Committee (TAC)

Innovative Technologies

Innovative Technologies

Three innovative technologies were presented at the Treasure Coast Regional Planning Council Regional Biosolids Symposium on Friday, June 8, 2018

<http://www.tcrpc.org/announcements/Biosolids/Summit.html>

- Future possibilities for biosolids management**
- Still under development**
- Concerns about scalability, safety, and number of actual installations**

Innovative Technologies

Three innovative technologies presented at the Treasure Coast Regional Planning Council Regional Biosolids Symposium on June 8, 2018

- Supercritical Water Oxidation**
- Advanced Pyrolysis Technology System**
- Vapor Recompression Distillation and Boiler Technology Electric Generation**

Innovative Technologies

Supercritical Water Oxidation (SCWO)

Presented by Kobe Nagar, Senior Process Engineer, Pratt School of Engineering at Duke University

Supercritical Water Oxidation is a process that occurs in water at temperatures and pressures above a mixture's thermodynamic critical point. Under these conditions water becomes a fluid with unique properties that can be used to quickly convert biosolids and other hazardous wastes into hot water, electricity, CO_2 , N_2 , O_2 , inorganic materials and distilled water.

Innovative Technologies

Supercritical Water Oxidation (SCWO)

Duke's vision for the future of SCWO technology is decentralized SCWO treatment facilities that can be housed in a standard 40-foot long container capable of servicing 6,000 people per day. Duke has developed a working industrial scale prototype capable of treating the fecal waste of 1,000 people per day. A new prototype is under design.

Innovative Technologies

Advanced Pyrolysis Technology System

**Presented by Steve Wirtel, P.E., Executive Vice President of
Business Development at Kore Infrastructure**

This technology is made up of individual processes that operate in series: material handling, drying, lower-temperature pyrolysis, and gas conversion into renewable natural gas, methane and hydrogen for power generation. These gases can be used to power the process, with the excess sold on the open market.

Innovative Technologies

Advanced Pyrolysis Technology System

The process produces a crystallized form of carbon termed “biochar.” Biochar sequesters carbon in the soil and can be used as a soil supplement to provide soil structure that helps retain key nutrients and water. It does not contain nitrogen or phosphorus. The equipment used in each step is modular, mobile, and compact to enable multiple system configurations and ease in siting requirements

Innovative Technologies

Vapor Recompression Distillation (VRD) and Boiler Technology Electric Generation

Presented by Peter Janicki, P.E., CEO, Janicki Bioenergy

The combination of these two technologies are also made up of individual components and processes that can operate in series to produce electricity and fresh distilled water. TN is converted to aqueous ammonium, and the TP ends up in its elemental form in the final ash. The aqueous ammonium can be made available as a more efficient N source for fertilizer. The electricity produced provides the power needed to operate the facility with excess electricity sold back to the power grid.

Innovative Technologies

Vapor Recompression Distillation (VRD) and Boiler Technology Electric Generation

The TP in the reduced volume of final ash can now be transported economically to areas that are currently depleted of nutrients such as the “bread basket region” in middle North America from years of corn, wheat, and soy bean production, or the Caribbean which has seen soil nutrient depletion from years of sugar cane production and other practices.