



# Executive Summary

## Treasure Coast Regional Planning Council Regional Biosolids Symposium Charting the Future of Biosolids Management June 08, 2018



On Friday June 08, 2018 the Treasure Coast Regional Planning Council and the Indian River Lagoon National Estuaries Program sponsored a “Regional Biosolids Symposium” at the Indian River State College Chastain Campus, Wolf High-Technology Center in Stuart Florida.

With 170 people in attendance, Martin County Commissioner Doug Smith welcomed everyone and put forth a purpose and challenge for the attendees to listen to one another and find a better, more sustainable path forward on how we manage and reuse our biosolids resources.

Henry Dean, St. Johns County Commissioner and former Executive Director for both the St. Johns River Water Management District and the South Florida Water Management District provided opening remarks encouraging that with open minds and cooperative efforts, we can solve any problem.

Jennifer Smith, the Director of the Southeast District, Florida Department of Environmental Protection announced the creation of its Biosolids Technical Advisory Committee to evaluate current management practices and potential opportunities for enhancements to better protect Florida’s water resources.

The event included presentations by wastewater utility representatives from Palm Beach, Martin, St. Lucie, and Indian River counties and the Florida Department of Environmental Protection about standard utility practices and current challenges, programs, and regulations related to providing wastewater services cost effectively to the public and managing disposal of human waste biosolids.

Today, Florida’s central sewer wastewater treatment facilities produce approximately 340,000 tons of biosolids which are the human waste effluents from central sewer wastewater treatment facilities. Approximately 100,000 dry tons of biosolids are designated as Class B biosolids which are treated sewage sludge that meets U.S. Environmental Protection Agency guidelines for land application as fertilizer, and are allowed to have detectable levels of pathogens. Another 100,000 dry tons of biosolids are deposited in various landfills throughout the state. The final 140,000 dry tons of biosolids are further processed, dried, and composted with material from the landscape industry to produce approximately 200,000 tons of Class AA biosolids. These biosolids can then be distributed and marketed as fertilizer. This class of biosolids is unregulated and land-applied mainly on pasture lands, and to a lesser extent on citrus.

Both Class B biosolids and Class AA biosolid fertilizers contain approximately 5.5% Total Nitrogen (TN) and 2.2% Total Phosphorus (TP). Therefore, the 300,000 dry tons of land-applied Class AA and Class B biosolids contribute over 33 million pounds of TN and 13.2 million pounds of TP to agricultural lands each year. While the practice of land-applying Class B biosolids was recently banned in the Lake Okeechobee, Caloosahatchee, St. Lucie River and Everglades watersheds, the St. Johns River Upper Basin in 2016 received nearly 74,000 tons of Class B biosolids in its watershed.

A representative from the University of Florida's Institute of Food and Agricultural Services (IFAS), Maria Silveira Ph.D., Associate Professor at the University of Florida Range Cattle Research and Education Center, presented information on the fertilizer recommendations for pastures in Florida and explained the differences in P solubility and availability from various P sources and described the limitations associated with current soil testing using P as a tool to predict environmental hazards.

Presentations by Del Bottcher Ph.D., President of Soil & Water Engineering Technology, and Anthony Janicki Ph.D., President of Janicki Environmental, Inc., included information on the current conditions and probable future trends of nutrients in lakes, streams, springs and our coastal estuaries. Their conclusions were though we have made progress in reducing nutrients within our surface waters we still need to do more.

The symposium also included Edith Widder, Ph.D., CEO and Senior Scientist for the Ocean Research and Conservation Association (ORCA) who commented on some concerns related to compounds found in human wastewater biosolids which may include: hormones; steroids; bacteria; viruses; polychlorinated biphenyls (PCB); pharmaceuticals; antibodies; polybrominated diphenyl ethers (PBDE fire retardants); polyfluoroalkyl substances (PFAS) like Teflon, polishes, waxes, paints, and household cleaning products; organics, metals, and artificial sweeteners. Although these materials are applied in a manner that may not be harmful to humans according to EPA guidelines, their accumulated secondary impacts are not entirely known.

Many Florida residents are alarmed about the recent water releases from Lake Okeechobee, including the threats from the presence of blue-green algae blooms. According to Dr. Widder, blue-green algae also known as cyanobacteria, can produce toxins in surface waters that can cause problematic respiratory issues. The toxins also specifically target the liver and studies have documented liver damage and cancers from these toxins in cases from China to the Indian River Lagoon. The toxins may reduce crop production when found in irrigation water and they may actually be absorbed by the crop.

Gary Roderick an environmental consultant and former Environmental Administrator for the Southeast District Office of the Florida Department of Environmental Protection gave a comprehensive presentation on nutrient loading and the importance of and progress being made by implementing South Florida Basin Management Action Plans (BMAPs). He stressed the importance that bahia grass pastures in Florida can generally produce satisfactorily without TP fertilization and every crop in Florida can be grown economically

without the use of biosolids as a fertilizer. It was indicated that biosolids provide an inefficient form of fertilization that provides only a fraction (less than 40%) of plant available nitrogen that can result in both TN and TP over fertilization, which may negatively affect surface and other coastal waters.

The main highlight of the symposium came in the afternoon when Todd O. Williams, P.E., BCEE, Principal Technologist, Residuals Resource Recovery Global at Jacobs, presented the importance, value and urgency of improved nutrient recovery and sustainable biosolids management. His presentation was immediately followed by a panel on the technologies and future trends in biosolids management.

The symposium audience was given a look into the future of biosolids management. Instead of depositing biosolids into the landfill or using agricultural lands to dispose of human biosolid wastes, there are alternatives that allow for improved recovery and sustainable management. The future of biosolids management was discussed by a panel chaired by Fred Mussari, Ph.D., Vice President of Technology at BCR Solid Solutions and included three new technologies.

Although each process is different, all three processes recover useful byproducts from human biosolids and capture its stored energy, water, and nutrients.

Kobe Nagar, P.E., Senior Process Engineer, Pratt School of Engineering at Duke University, presented Supercritical Water Oxidation or SCWO, which 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<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, inorganic minerals and distilled water. 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 a day. Duke has developed a working industrial scale prototype (A) capable of treating the fecal waste of 1,000 people per day. A new prototype (B) is under design. Its current focus is on technology transfer and commercialization, with the establishment of a spinoff company to bring the first units to the market in 2020.

The Advanced Pyrolysis Technology system was 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. 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.

Peter Janicki, P.E., of Janicki Industries and Bioenergy provided information on Vapor Recompression Distillation (VRD) and Boiler Technology Electric Generation. 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. 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.

A final “Roundtable Panel” of summit participants and elected officials was moderated by the Executive Director of the Indian River Lagoon National Estuaries Program, Duane De Freese, Ph.D., with questions also being taken from the public. The discussion and public comment centered around how best to move forward to prioritize the review of existing alternatives based on a better understanding of the performance, economics, and funding needed for constructing Pilot Projects that will eventually reduce negative nutrient impacts to surface waters. It was suggested by local elected officials on the Roundtable, that assembling a virtual panel of national experts to help local governments vet new wastewater technology proposals would be extremely helpful for them to have access to when they need it. It was also suggested that state and local governments join together in establishing a Pilot Project Implementation Program that would create Request for Proposals to encourage competitive bids on new wastewater technologies capable of achieving wastewater treatment goals and outcomes for the region.

The video/audio proceedings and PowerPoint presentation from the symposium may be found at: [www.tcrpc.org/announcements/Biosolids/Summit.html](http://www.tcrpc.org/announcements/Biosolids/Summit.html)