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DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING SPECIALTY SEMINAR

Opening our Own Gate to Hydrothermal Carbonization Technology in Costa Rica, as an Option to Manage Wastewaters with High Biomass Contents and Waste Biomass with High Water Contents in the Humid Tropics.

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Summary: Wastewater with high contents of biomass and waste biomass with high contents of water are two waste materials that often have significant management costs, if properly treated. As a consequence, whenever and wherever possible, these materials are preferably fed into water bodies, buried, left to rot on the field, or managed in a variety of other cost-effective ways that have several down sides. The humid tropics are areas where these practices are particularly common and attractive, as drying is difficult and the materials rapidly ferment as soon as produced, due to warm temperatures. Eutrophication of water bodies, emissions of methane and odors, and leaching of pollutants into the soil and groundwater, are only a few of the negative effects of the improper management of these materials. Hydrothermal carbonization (HTC) is a relatively simple process that can be applied to such wastes in order to valorize them, by turning them into a carbonaceous material with some interesting characteristics. Energetic valorization is an obvious first choice, as it can easily consume large amounts of feedstock. Use as biochar in soils could employ large amounts as well, but unfortunately seems not to be feasible. A variety of other small scale uses are being currently explored, some with very high end values. An initiative tending to design a middle scale continuous HTC reactor has been going on at ITCR in Costa Rica, with a starting point at a bench scale semi continuous reactor for laboratory tests. The lab-scale reactor is described as well as some results of its application to wastes from the coffee industry, which is particularly important for Costa Rica and many other tropical countries.

Bio: Jaime Quesada (born 1963 in Los Angeles, CA) is currently teaching different chemistry courses at ITCR, the main technological university in Costa Rica. His PhD is in atmospheric chemistry and physics from the Johannes Gutenberg in Mainz (2003), where he worked on emissions of the tropical forests to the troposphere in coastal regions, at the Max Planck Institute of Atmospheric Chemistry. His degree in chemistry was achieved at UCR, a prestigious university in Costa Rica (1991). After working in atmospheric chemistry until 2005, he has reoriented his interests towards development of instrumentation and of simplified technological systems that can aid in environmental issues. A main area of interest for Mr. Quesada is the valorization of waste biomass, due to the environmental implications it has. Water treatment for purification has been another area of interest, with a focus on simplified technologies based on photoelectrocatalytical systems.