

Recent Trends in Wastewater Treatment and Resulting Research Needs

Dr. Jan A Oleszkiewicz

Department of Civil Engineering, Price Faculty of Engineering,
The University of Manitoba, Winnipeg, Canada

Abstract

Current expectations of a modern wastewater treatment plant (WWTP) have changed to the point that requires disruptive revisions to meet the challenge of attaining autarky or self-sufficiency in becoming the water resource recovery facility (WRRF) of tomorrow. The conversion of WWTP to WRRF calls for implementation of technologies that allow: 1. Radical decrease of energy consumption with simultaneous increase of energy production to the point of meeting or even exceeding energy self-sufficiency of the WRRF; 2. Improvement of effluent quality. Attainment of close-to-limit of technology (LOT) level of treatment; 3. Simultaneous limitation of importation of carbon and inorganic chemicals to the WRRF; 4. Recovery of resources such as power, phosphorus, heat, water; 5. Intensification of treatment within the existing plant footprint; 6. Producing effluent ready for water reuse.

The talk will present several new processes that will address some aspects of the conversion to WRRF, in particular: 1. Low-carbon enhanced biological phosphorus removal EBPR; Side-stream enhanced biological phosphorus removal S2EBPR; Continuous aerobic granular sludge CAGS; Denitrifying phosphorus accumulating organisms process DPAO; 2. Low-carbon nitrogen removal processes in A/B configuration: Anammox in the main stream with steady control of nitrite oxidizers (NOB Control); Denitrifying phosphorus accumulating organisms process DPAO; 3. Gas permeable membrane biofilm reactors, such as MABR.