Using Life Cycle Assessment to Integrate Sustainability into the Civil Engineering Decision-making Process

By

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Abstract
In major civil engineering projects, we are frequently presented with multiple alternatives that can meet the project goals. Present worth analysis, in some instances augmented by the evaluation of non-monetary criteria, has been utilized in the decision making process. With an increasing number of public and private organizations attempting to define and incorporate sustainability as a core value in their mission statements, the engineering community is seeking tools that can be integrated into conventional decision models allowing the decision making process to incorporate sustainability considerations. One such tool is the framework provided by Life Cycle Assessment (LCA), an ISO process which allows the engineering team to quantify not only the cost implications, but the net environmental impacts of the alternative under consideration. To illustrate the application of LCA in wastewater treatment, two alternative nutrient removal technologies are evaluated using LCA in conjunction with economic and technical criteria. One of the alternatives is based on biological processes (nitritation/denitrification with chemical addition) while the second is based on physicochemical treatment (vacuum distillation with chemical addition) for removal of ammonia from concentrated wastewater.

Bio
Dr. Katehis completed his B.E, M.E. and Ph.D at the City College of New York and is serving as a Principal Technologist with CH2M HILL, where he is provides technical leadership to the firm’s Northeast Region. He has led process designs for nutrient removal facilities such as Washington DC’s 370 million gallon per day (MGD) Blue Plains Advanced Wastewater Treatment Plant, Chicago’s 350 MGD Calumet Water Reclamation Plant, and Indianapolis’ 150 MGD Belmont Wastewater Treatment Plant. He is currently serving as the Director of Research for NYC’s Applied Nitrogen Removal Research and Demonstration Program. An active participant in technology transfer efforts he has given over 50 technical papers and presentations and is the lead chapter author for Sidestream Nutrient Removal Technologies in two Water Environment Federation Manuals of Practice.