Energy Consuming Comparison of Wastewater Treatment Technologies through Life Cycle Assessment
A Case Study of Sequencing Batch Biofilm Reactor

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ABSTRACT

One the main impacts of the rapid urbanization and economic growth in China is the increasing generation of municipal wastewater in big metropolis. To address this challenge, the government has been promoting the construction of wastewater treatment plants. Most of the treatment technologies have been selected based on the contaminants treatment efficiency and cost. In addition there is an increasing number of innovations in this field that could have potential benefits for the environment and the society. In this study, we have selected three representative types of treatment technologies and compared their environmental and cost performance from a life-cycle perspective.

The selected technologies are Activated Sludge, Sequencing Batch Reactor (SBR), and Intelligent controlled Sequencing Batch Biofilm Reactor (ICSBBR). Activated Sludge is a mature technology which has been implemented globally. However, this traditional technology is argued to have bad performance in terms of GHG emissions, energy consumption and waste sludge treatment. SBR is a more advanced technology and could provide advantages on construction costs and maintenance rather than Activated Sludge, but its disadvantages include high demand on automation, subsequent treatment units and dross issues. SBBR with IC is a new approach that could potentially benefit in terms of both environment and economy. This study analyzes ICSBBR in terms of Life Cycle Assessment (LCA).

The final result suggests that the introduction of new treatment technologies will benefit in terms of costs.

Keywords: Municipal wastewater, Waste treatment technology, intelligent controlled SBBR, Life Cycle Assessment (LCA)