7th International Conference on
Smart Materials and Sustainable Technologies
April 08-09, 2019 | Toronto, Canada

ACCEPTED ABSTRACT *JOURNAL OF MATERIAL SCIENCES & ENGINEERING 2019, VOLUME 8 | DOI: 10.4172/2169-0022-C3-132*

Sustainable wastewater treatment plants networks design through multiobjective optimization

Alicia Roman Martinez
Autonomous University of San Luis Potosi, Mexico

Nowadays, an adequate design for wastewater treatment plants (WWTPs) taken sustainability factors under consideration is fundamental. This can be achieved by developing systematic methodologies based on mathematical models, where multiobjective optimization problems are defined and solved. This contribution proposes and applies a methodology with these characteristics, which uses as decision criteria sustainability metrics, to say total cost, consumed energy and wastewater reuse. The methodology is applied for a case study where a non-convex mixed integer nonlinear programming (MINLP) problem arises from the proposed framework representing a general superstructure for WWTPs, where all potential process options are included. The multiobjective problem is solved by implementing a hybrid method that combines the ε-constraint and the lexicographic methods for the case study of the municipal wastewater treatment from Mexico city. The set of feasible solutions obtained is provided in the form of a Pareto front. M-TOPSIS analysis is used for Multiple Criteria Decision Making (MCDM) to find the best trade-off solution for the three sustainability criteria. The results show that the methodology enables to find the optimum sustainable WWTP when multiple antagonistic criteria are assessed (total cost, consumed energy and wastewater reuse). The optimal sustainable resulted configuration considers three levels of treatment and 100% of the water treated can be reused for human activities.

alicia.romanm@uaslp.mx