

Eco-design of Water Network Systems to Improve Environmental and Economic Performances

임성린, 박종문^{1,*}

포항공과대학교 환경연구소; ¹포항공과대학교 화학공학과
(jmpark@postech.ac.kr*)

Water network synthesis has been used for water reuse to conserve water resource and to reduce economic cost. This synthesis has, however, focused on finding the global optimums minimizing freshwater consumption in water network systems (WNSs) and on minimizing construction and operating costs without taking into account disposal cost. The objectives of this study are (i) to evaluate environmental impacts and economic costs associated with WNSs from a life cycle perspective, and (ii) to develop mathematical optimization models to design environmentally and/or economically friendly WNSs. Life cycle assessment (LCA) and life cycle costing (LCC) are used to quantify and analyze environmental impacts and economic costs and to develop the mathematical models. These models are applied to case studies and validated by comparing the environmentally and/or economically friendly WNSs with conventional WNSs. This study can contribute to eco-design of processes and systems in the context of cleaner production.