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Systemic eco-efficiency assessment of industrial water use systems

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ABSTRACT

Eco-efficiency can become the basis of an environmental decision making framework, towards a greener economy, by combining the economic welfare with the ecological impact of products. It has been already highlighted that a potential enhancement to the eco-efficiency of a given system may also lead to the improvement of its sustainability, if it is successfully linked with resource efficiency and eco-innovation. Thus, there is the need to develop a set of eco-efficiency indicators, for measuring the environmental and economic performance of a given system, and, more importantly, to define a range for each one of them in order to allow better interpretation of the calculated numerical values. The current paper briefly presents a systemic eco-efficiency assessment methodological framework, which is then applied to three industrial water use systems, a bottling plant, a textile dyeing industry and a dairy industrial unit, in an attempt to frame and compare the selected eco-efficiency indicators. The proposed approach captures the complexity of all interrelated aspects and each studied system includes the corresponding production chain, the water supply chain and the background system (energy, raw materials and supplementary resources production processes). The analysis does not attempt to identify the industry with the best eco-efficiency performance but to reveal the most important environmental impacts of each system through a relative comparison on eco-efficiency basis is conducted. It also provides useful insight about the weaknesses of the methodology and suggests ways to overcome them.

Keywords: Eco-efficiency indicators; Industrial sector; Water use systems

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