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# R4<sup>th</sup> INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

“INTEGRATING CLEANER PRODUCTION INTO SUSTAINABILITY STRATEGIES”

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## **P+WATER: A Model for Selecting Sustainable Opportunities of Industrial Wastewater Reuse from Process Integration Approach**

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### **Abstract**

The current trend of rising costs related to consumption, water treatment and wastewater disposal has encouraged the development of methodologies aimed at industrial water reuse. Techniques and procedures from integration of chemical processes applied to the reduction of water consumption and the generation of industrial wastewater have been extensively studied in recent years. One such tool is called Water Sources Diagram (WSD), an algorithmic procedure that uses heuristics rules and searches the best connections between sources and sinks of water within the industrial processes. It allows the synthesis of the mass exchange networks with maximum water reuse, including regeneration and recycling of wastewater in the process. The WSD method may be applied as part of a program for implementation of Cleaner Production. This work presents a procedure aimed at the selection of promising alternatives for reuse obtained by applying the WSD method, in a systematic and efficient way. Furthermore, this procedure is part of a proposed industrial management model called P+WATER, applied to the sustainable management of water resources in production processes, and based on the tripod CP / WSD / Valuation of negative environmental impacts. A case study using data obtained from literature review for a typical oil refinery was carried out. Based on descriptive statistics and criteria of cost and relocation of streams, the water networks were then evaluated by a selection mechanism. In this case, it was possible to identify two scenarios considered promising, starting from an initial set of seven opportunities generated after application of WSD. The results indicated that the procedure can be useful as a preliminary assessment of sustainable opportunities for wastewater reuse. This review is important for the next steps of the model P+WATER and facilitates the search for more practical results in order to study the feasibility of problems that involve many complex scenarios.

**Keywords:** *Industrial water management; Water/wastewater reuse; Decision making; Process Integration.*

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