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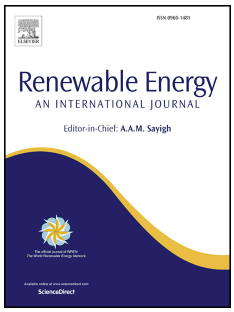

Assessment of hydropower potential in wastewater systems and application to Switzerland

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Assessment of hydropower potential in wastewater systems and application to Switzerland

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Abstract

Energy recovery through local hydropower generation is a way of coping with high electricity expenditures in wastewater systems (WWS). Installing small hydropower plants within WWS is already in some countries eligible for incentive policy mechanisms to renewable energy production. Some examples exist of hydropower units operating in wastewater treatment plants, showing that there is an interest for this type of small-hydro, but there is still a lack of awareness of its potential. This study presents a methodology to assess the potential for hydropower in wastewater systems, either upstream or downstream of wastewater treatment plants (WWTP). An algorithm was developed in two phases, first to estimate the annual electricity production in selected areas based on GIS data and the inflows to each WWTP and second to carry out an economic evaluation of the feasibility of each scheme considering local investment costs and local electricity sell tariffs. The developed method was applied to the case study of Switzerland, covering more than 41'000 km^2 and approximately 8 million inhabitants. Nineteen profitable sites were identified in the country with cumulated 9.3 GWh/year of potential energy production. Among these sites, six are already equipped for hydropower production representing 3.5 GWh/year and validated the proposed methodology.

Keywords: wastewater systems; wastewater treatment plant; hydropower; potential, economic value.

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