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Assessment of hydropower potential in wastewater systems and application to Switzerland

Cécile Bousquet, Irene Samora, Pedro Manso, Luca Rossi, Philippe Heller, Anton J. Schleiss



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4 Cécile Bousquet ⁽¹⁾, Irene Samora ⁽²⁾, Pedro Manso ⁽³⁾, Luca Rossi ⁽⁴⁾, Philippe Heller ⁽⁵⁾, Anton J.
5 Schleiss ⁽⁶⁾

6 ⁽¹⁾ *Laboratory of Hydraulic Constructions, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, cecile.bousquet@gmail.com¹*

7 ⁽²⁾ *Laboratory of Hydraulic Constructions, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland and Instituto Superior Técnico –
8 Universidade de Lisboa, Lisboa, Portugal, irene.a.samora@gmail.com²*

9 ⁽³⁾ *Laboratory of Hydraulic Constructions, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, pedro.manso@epfl.ch*

10 ⁽⁴⁾ *e-dric.ch, Le Mont-sur-Lausanne, Switzerland, luca.rossi@e-dric.ch*

11 ⁽⁵⁾ *e-dric.ch, Le Mont-sur-Lausanne, Switzerland, philippe.heller@e-dric.ch*

12 ⁽⁶⁾ *Laboratory of Hydraulic Constructions, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, anton.schleiss@epfl.ch*

13 Abstract

14 Energy recovery through local hydropower generation is a way of coping with high electricity
15 expenditures in wastewater systems (WWS). Installing small hydropower plants within WWS is
16 already in some countries eligible for incentive policy mechanisms to renewable energy production.
17 Some examples exist of hydropower units operating in wastewater treatment plants, showing that there
18 is an interest for this type of small-hydro, but there is still a lack of awareness of its potential. This
19 study presents a methodology to assess the potential for hydropower in wastewater systems, either
20 upstream or downstream of wastewater treatment plants (WWTP). An algorithm was developed in two
21 phases, first to estimate the annual electricity production in selected areas based on GIS data and the
22 inflows to each WWTP and second to carry out an economic evaluation of the feasibility of each
23 scheme considering local investment costs and local electricity sell tariffs. The developed method was
24 applied to the case study of Switzerland, covering more than 41'000 km² and approximately 8 million
25 inhabitants. Nineteen profitable sites were identified in the country with cumulated 9.3 GWh/year of
26 potential energy production. Among these sites, six are already equipped for hydropower production
27 representing 3.5 GWh/year and validated the proposed methodology.

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

¹ Presently at Syzygy Renewables, Londres, UK.

² Presently at BG Ingénieurs Conseils, Switzerland.

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