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## **ENERGY PRODUCTION FROM WASTEWATER USING HORIZONTAL AND VERTICAL SUBSURFACE FLOW CONSTRUCTED WETLANDS**

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### **Abstract**

The aim of the present work is to study the performance of a constructed wetland for domestic wastewater depuration also working as a microbial fuel cell (MFC) under two different subsurface flow modes in the upper cathodic compartment (horizontal flow, HF, or vertical flow, VF), and to compare the efficiency under both situations. A pilot-scale subsurface constructed wetland treating domestic wastewater was used, and the installation also included the electrodes and devices needed to work as MFC. The system worked continuously during two years: under HF mode (first year) and under VF mode (second year). The Chemical Oxygen Demand (COD) removal results and the cell voltage production were continuously monitored. The wetland successfully worked as MFC generating electric power. The organic pollution was completely oxidized in the lower anaerobic compartment, and aerobic conditions were detected in the upper cathodic compartment, thus producing electrical current. No important differences were observed in COD removal efficiencies working under the two flow modes. The cathodic compartment showed higher redox potential and dissolved oxygen values working under VF mode. The maximum cell voltage measured was approximately 250 mV in both flow modes. Despite the higher oxygenation potential of the VF option, no important differences were observed in voltage generation. The process developed in the present work showed similar cell voltage, power density and current density to other previous works using photosynthetic MFC, benthic MFC and plant-type MFC.

*Key words:* constructed wetland, horizontal flow, microbial fuel cell, vertical flow, wastewater

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