

Public urinal generates electricity from urine

July 6 2016



The public urinal installed this year at Glastonbury festival can generate enough electricity to light the cubicle's LED tubes. Credit: Bristol BioEnergy Centre (UWE)

Pee can be transformed into electricity with the help of bacterial metabolism, thanks to a device created by researchers at the University of the West of England, where Spanish researchers are working. A test cubicle was installed at Glastonbury festival, but the final aim is to



improve sanitation facilities in Developing World countries or in areas where there is limited electricity generation, such as refugee camps.

One of the public urinals installed this year at Glastonbury, the United Kingdom's largest music festival, can generate enough electricity to light the cubicle's LED tubes using a system developed by scientists at the University of the West of England (UWE), Bristol.

"The technology in the prototype is based on <u>microbial fuel cells</u> (MFC), which, like batteries, has an anode and a cathode," explains Irene Merino, who is a researcher on the team thanks to a grant from the Bill and Melinda Gates Foundation and works alongside another Spanish worker, Daniel Sánchez.

The cells are installed inside a container which collects the urine, currently only from male users due to the design of the urinals. Inside, bacteria colonise the anode electrode and act as a catalyst, decomposing the organic material in the pee.

This decomposition releases both protons, which travel from the anode to the cathode across a semipermeable membrane, and electrons, which travel through an external electrical circuit. To complete the cycle, an <u>oxygen reduction reaction</u> also takes place in the cathode. The process generates enough energy to power light bulbs or LED tubes.

"Our project is aimed at developing countries, with a view to improving or incorporating sanitary facilities. In addition to producing electricity, the system reduces chemical oxygen demand (COD); in other words, it also serves to treat the urine," Merino emphasises.

At present, the researchers have carried out two field tests: one at the campus of their university, with limited numbers of participants, and another at Glastonbury festival, where last year it was tested by around a



thousand users per day. The findings have been published in the journal *Environmental Science: Water Research and Technology*.

More cells, more milliwatts

In both experiments, the electricity generated was used to illuminate the interior of the cubicle where the urinal was installed. The university campus prototype contained 288 MFC cells and generated an average of 75 milliwatts, whereas the Glastonbury prototype included 432 cells and generated 300 mW. COD removal was above 95% with the campus device and around 30% at the festival.

Now, in collaboration with Oxfam and other organisations, the researchers are planning to test these urinals in India or in some regions of Africa. Specifically, at refugee camps, in communities, at schools and in public toilets that lack lighting.

"The ultimate purpose is to get electricity to light the toilets, and possibly also the outside area, in impoverished regions, which may help improve the safety of women and children, in countries where they have to use communal toilet facilities outside their homes", concludes Ioannis Ieropoulos, the Director of the Bristol BioEnergy Centre (BRL, UWE), who leads the research.

More information: Ioannis Andrea Ieropoulos et al. Pee power urinal – microbial fuel cell technology field trials in the context of sanitation, *Environ. Sci.: Water Res. Technol.* (2016). DOI: 10.1039/C5EW00270B

Provided by Spanish Foundation for Science and Technology (FECYT)



Citation: Public urinal generates electricity from urine (2016, July 6) retrieved 27 April 2024 from <u>https://phys.org/news/2016-07-urinal-electricity-urine.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.