Swiss Researchers invent a new Toilet

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There are 2.6 billion people in the world who have no access to a decent toilet. An interdisciplinary team of Swiss aquatic researchers and designers from Austria won with their invention as part of the 'Re-invent the Toilet' competition, sponsored by the Bill and Melinda Gates Foundation a special recognition award. The new toilet model will provide a sanitary solution that ensures human dignity and hygiene, while also being environment-friendly and economically feasible. All for less than five Cents per day and person.

22 universities and research facilities submitted proposals to the Bill and Melinda Gates Foundation in 2011 for the 'Re-Invent the Toilet Challenge' (RTTC). Goal of the competition: invent the toilet of the future! Prerequisites: the new toilet should need no sewer and no outside energy source, should be part of a recycling and treatment system for wastes and should cost no more than five cents per day and person. By the end of 2011, eight teams were still in the running, among them such renowned institutes as the Massachusetts Institute of Technology in Boston and the California Institute of Technology. They all presented their projects yesterday in Seattle (USA). The team from the Swiss Federal Institute of Aquatic Science and Technology Eawag and the Austrian design firm EOOS in Vienna is among the best. Their 'Diversion' toilet was highlighted with the Special Recognition Award for outstanding design of a toilet user interface

The Toilet is also a small Waterworks

Project leadership lay in the hands of process engineer Tove Larsen. For years her work at Eawag has been concerned with the separation of urine and faeces. 'It was obvious that separation technology should also be part of the competition model,' says Larsen, 'only thus can the valuable raw materials and the water in urine and faeces be recovered efficiently.' A separating toilet acceptable in every culture and to every user does not yet exist; it must therefore be developed and designed. The result: a modern squatting toilet. The special features of the 'Diversion' model are not only separation of urine and a clever seal against odours but, more important, the use of very little water, about 1 to 1.5 litre per individual use. 'This is absolutely decisive for cleaning the toilet, hand washing and the anal hygiene with water practised by Muslims and Hindus,' says Larsen. The new separation toilet needs no connection to a water supply. Every time a user operates a foot pedal, water flows into the small water reservoir and already used water is pumped upwards behind the toilet. Cleansed by means of a membrane filter, the used water is also guaranteed free of germs, thanks to electrolysis by a solar powered electrode.

A Business Model for one's Business

For Tove Larsen, it is not only the new technology in the toilet that is decisive. 'It is important that our toilet is part of a total sanitation system that can be managed by the local people - cost-covering or even with a profit.' A major concern of the Eawag-EOOS team has thus been the research and development of a logistic concept for transport that is applicable to conditions in informal settlements in low and middle income countries. A modular system of self-sealing faeces containers and urine barrels, along with a transport vehicle, makes the collecting tour as efficient and hygienic as the toilet itself. Finally, the researchers have already worked out how urine and faeces can be processed in semi-central treatment plants into saleable products like fertilizer and biogas. A complete business model has thus been developed for the 'Diversion' toilet, a type of contracting: a local entrepreneur rents the toilets to the users, manages the collecting tours, runs the treatment and processing plants and finally sells the

products.

The Challenge is yet to come

The prize money of 40’000 USD awarded by the Bill and Melinda Gates Foundation is payment and praise alike for the research team. But the engineers, technicians, social scientists and designers can't rest on their laurels. Up to now they have shown that their system can function. Now real prototypes of their toilet have to be built and tested. That's the challenge until the end of 2013. It will be some years yet before the 'Diversion' toilet, the collecting vehicle and the processing plants can be put into widespread use all over the world. For Larsen however it is already clear that: 'Whether our system can really become established depends on the quality of our business model. No system that depends permanently on subsidies can function over the long term.

Contact

Andri Bryner

Media officer

Tel. +41 58 765 5104

andri.bryner@eawag.ch

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