

# Frequently Asked Questions about the Ecosan Project in the GTZ Headquarter Building 1 in Eschborn, Germany

## **1. Why does GTZ have waterless urinals and urine-diversion toilets in its Building 1?**

When Building 1 had to be renovated during 2004-2006, the GTZ ecosan team promoted the implementation of a demonstration and research project on sustainable sanitation. At that time, the GTZ ecosan team suggested that the opportunity should be used to implement a novel, closed-loop sanitation system. The new system should demonstrate a certain concept suitable under German conditions. Note that this system is only one possible example for an ecosan system. Completely waterless systems exist, too (e.g. UDD toilets – urine-diversion dehydration toilets). The system is in operation since late 2006.

## **2. How do the urine-diversion flush toilets work?**

The urine-diversion toilets have two separate compartments in the toilet bowl: one for urine and one for faeces and water (together also called brownwater). The urine is collected without flush water, by means of a valve located inside the toilet seat. When the user is seated, the valve is opened by pressure on the toilet seat, allowing the urine to flow to the storage tank. The valve closes again when the user stands up, so that the subsequent flushing water does not enter the urine pipe but drains off through the brownwater outlet in the rear.

## **3. Do urine-diversion flush toilets save water?**

Yes, because there are two buttons for toilet flushing: the smaller button is for the urine flush, which releases about 2 L of water, and the larger button is for the faeces flush, using 6 L of water. The average toilet in Germany uses about 9 L of water per flush, so particularly by using the smaller urine flush there is a considerable water saving potential with the two flush buttons. – There are also other types of modern toilets which use no water at all for flushing (e.g. urine-diversion dehydration toilets and composting toilets).

## **4. What happens when a user does not sit down?**

When a user does not sit down, the urine pipe valve is not activated (opened). Therefore, the urine from that person will not flow to the urine storage tank but out the back with the brownwater. This urine is therefore not collected separately, but “wasted”.

## **5. Why does the urine sometimes drain off through the back part of the urine-diversion toilet, even when the user is seated?**

This happens when the urine valve opening mechanism does not work properly anymore. Certain substances (minerals) contained in the urine can precipitate inside the urine pipe valve and form a slime, which can lead to pipe blockages. This problem can be prevented by regular application of urine scale removing chemicals (by the service staff). In some of the toilets, the urine valves are now being replaced as well as proper maintenance was not performed.

## **6. Why is the flushing strength not always sufficient to flush away everything in one flush?**

Due to the special design of the toilet bowl, the flushing strength is reduced compared to conventional toilets. Thus, there is a trade-off between sufficient flushing strength and water saving. It has to be pointed out that the toilets implemented now are pilots. The design is not the final choice and has to be improved further. However, with some simple measures the toilet users can improve the situation, e.g. toilet paper should be used in moderate amounts and dropped in the back part of the toilet. Or, even better: toilet paper which is only urine-soiled (from ladies toilets) can be placed in the bin next to the toilet. Otherwise, flushing water is merely wasted to flush away only toilet paper.

## **7. Do the waterless urinals cause bad odours?**

The waterless urinals in Building 1 are equipped with a special mechanical odour seal (flat rubber tube), which only opens when urine flows through. This prevents odour to come back from the urine storage tank. The maintenance staff ensures that this mechanical seal is cleaned regularly, and they also clean the urinals every evening (on the highly frequented ground floor additionally every hour between 9.00 and 13.30). If you observe bad odours in the restroom facilities, please feel free to contact the Kundencenter (Email: Kundencenter@gtz.de, phone: 7575) for assistance.

## **8. Do the urine-separation toilets cause bad odours?**

The urine-separation toilets in Building 1 are equipped with a valve on the urine pipe which opens when the user sits down. This prevents odour to come back from the urine storage tank. If you observe bad odours in the restroom facilities, please feel free to contact the Kundencenter (Email: Kundencenter@gtz.de, phone: 7575) for assistance.

## **9. Why are only the urinals and toilets in the centre part of Building 1 special (and not those in the building's two wings as well)?**

Equipping the entire building including the wings with the urine-separation system would have required a larger urine storage tank and longer pipelines, and thus increased the costs. As this project is seen as a demonstration project (with scope for applied research), it was felt that the additional costs would not be warranted. 50 urine-diversion flush toilets and 23 waterless urinals are installed in the centre section of Building 1, which was thought to be sufficient at the time. It would actually be relatively easy to replace the remaining water-flushed urinals with waterless urinals for additional water saving.

## **10. Where is the urine collected and stored?**

In the basement of Building 1 (underground parking area), four urine storage tanks with a total volume of 10,000 L are installed. With the 25 waterless urinals and 50 urine-diversion flush toilets, approx. 110 L of urine are collected each day. Thus the filling time for the storage tanks is approx. 3 months. When the tank is full, additional urine overflows to the sewer. See questions 12 and 15 for information on reuse of urine.

## **11. What happens to the faeces and the flushing water?**

The faeces, toilet paper, and flushing water (together called brownwater) currently flows to the sewer, but in the future it could be treated onsite (e.g. with a membrane bioreactor or a biogas reactor) and then reused for toilet flushing. The BMBF-funded research project SANIRESCH (<http://www.saniresch.de/>) with six research partners started in July 2009 to investigate this option.

**12. What happens to the greywater?**

Membrane bioreactors are also very effective in treating greywater (the kitchen and washbasin water). The treated water fulfils the EU regulations for bathing waters and is well-suited for in-door usage such as toilet flushing.

**13. Is the collected urine being reused at the moment?**

Yes, complete reuse started in August 2009 within the BMBF-funded research project SANIRESCH. The urine is used for fertilising experiments at fields of the University Bonn as well as for MAP precipitation. Till now, on some occasions urine was collected by various universities in the vicinity (Bonn, Aachen, Giessen) for research purposes. SANIRESCH has six research partners and started in July 2009 to investigate urine, brownwater and greywater treatment and reuse.

**14. Is it true that there is a research project running in connection with the ecosan installation in Building 1?**

Yes. In 2006 an application for funding of a research project was lodged to the federal ministry BMBF by the GTZ ecosan program together with three university (FH Gießen-Friedberg, RWTH Aachen, University of Bonn) and two industrial partners (Hans Huber AG and Roediger Vacuum GmbH). The research project, called SANIRESCH, was approved and started in July 2009. In this project treatment of urine and brownwater as well as urine reuse in agriculture is investigated.

**15. Is it cost-effective to build several pipe networks for the separate collection of wastewater streams?**

It depends on the specific circumstances, e.g. whether a conventional sewer system is already in place or not, whether flushing water is cheap or not, etc. For GTZ Building 1, there was an additional cost for the separate collection. But for a new building, which is built in an area without a sewer system and where water is expensive, separate collection and on-site treatment may be more cost-effective than building a water-flushed sewer system and treatment plant. This has to be evaluated on a case-by-case basis.

**16. Is it allowed to use urine as a fertiliser in Germany? Is there a demand for it?**

No, it is currently not allowed in Germany as it is not listed as fertiliser in the "Düngemittelverordnung" (German ordinance on fertiliser). But the GTZ ecosan team together with its partners will apply for a special permission to apply urine in agriculture for research purposes (such permissions have been granted in the past). E.g. in Sweden, human urine is used on quite a large scale as fertiliser. At the present time, artificial fertilisers are relatively cheap in Germany. Therefore, the demand for urine as a fertiliser is low at the moment. However, this is expected to change in the medium-term future, as the limited resource phosphorus will eventually run out, and as energy prices will continue to rise (artificial nitrogen-fertiliser production has a relatively high energy demand).

**17. Does GTZ pay for urine transportation?**

So far urine transport costs were borne by the recipients (universities), as they were taking it for research purposes. If regular urine reuse was realised, GTZ would probably be paying a small fee for the transport (similar to the regular service fee for wastewater collection and treatment).

**18. Where can I find more information about the ecosan project in Building 1?**

We have written a 7-page description of the ecosan project in Building 1. See here: <http://www.susana.org/lang-en/case-studies/region/europe>. If you have further questions you are welcome to contact anyone from the GTZ ecosan team at [ecosan@gtz.de](mailto:ecosan@gtz.de) (e.g. Elisabeth von Münch, Martina Winker, Steffen Blume, Christian Rieck, Rahul Ingle, Carola Israel, Jürgen Stäudel). Furthermore, there is more information available on the webpage of the research project SANIRESCH: <http://www.saniresch.de/>.

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