

GERMANY: A CASE STUDY – RELATED BEST PRACTICE OR LESSONS LEARNED IN WATER AND SANITATION

National: Lübeck-Flintenbreite

In Lübeck-Flintenbreite, the innovative sanitation system of source separation is realized in an entire housing estate in Germany for the first time. The housing estate, with 350 inhabitants and 3.5 ha, is an example for a densely populated rural area. To reduce consumption the houses are also designed as low energy houses. The construction of the technical equipment and the buildings started in February 1999. By 2002, 28 houses for 95 inhabitants were completed. The project demonstrates the feasibility of the source control system combined with water saving technology as well as fertiliser and energy production.

Description of the project

The area of the housing estate is not connected to the central sewerage system. The main technical equipment is installed in a central community building. All components of the sanitation concept are in use in different fields of application since many years and therefore well developed. The sanitation system consists mainly of the following components (fig.):

- Vacuum toilets with vacuum-sewer system and anaerobic digestion with co-treatment of organic waste in a semi-centralised biogas-plant, recycling of digested anaerobic sludge for agriculture with further storage for growth periods. Utilisation of biogas in combined power and heat generator (heating for houses/digester and production of electricity) in addition to natural gas
- decentralised treatment of grey water in vertical flow constructed wetlands (reed-bed filters) with interval feeding
- Storm water retention and infiltration in a swale system.

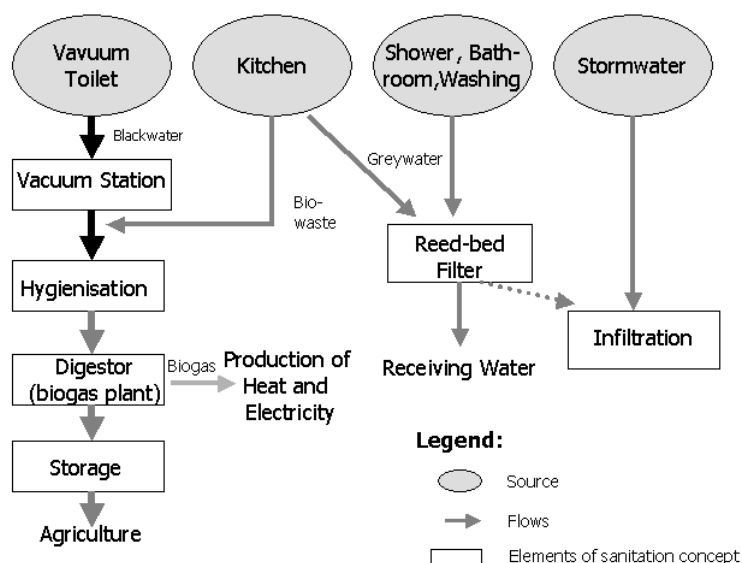


Figure: Scheme of sanitation system in Lübeck-Flintenbreite

Operation experiences with the vacuum toilet system

The vacuum toilet system has been running for two years without any technical problems. The flushing system which has been optimised during operation needs only about 0.7 l per flush. Therefore the drinking water consumption is significantly low compared to the German average. The long time drinking water consumption in Lübeck-Flintenbreite is carried out to be only 77 l/(p*d).

The average amount of blackwater is found to be approximately 6 l/(p*d). The average amount of greywater is about ten times higher. Regarding the nutrients in these two water flows, the source separation is very effective. Almost 90% of the nitrogen load is found in the blackwater. Accordingly, the blackwater composition shows a high concentration of organic substances and nutrients compared to conventional domestic wastewater.

To find out the acceptance of the vacuum system by the users, a questionnaire for the inhabitants was carried out. The evaluation showed that the vacuum toilets are as accepted as the conventional system. A number of residents see vacuum toilets as being even more hygienic. Noise might be a concern with vacuum toilets but the modern units which are installed in Lübeck give a shorter and a different but not a louder noise than conventional toilets. As an overall result of the questionnaire it can be emphasized that the residents are very satisfied with the vacuum toilet system.

Results

The results of the first three years of operation with the source separation can be summarized as:

- Low water consumption is achieved due to the installation of water saving technologies.
- A very effective source separation is realised. Nearly 90 % of nitrogen is found in the blackwater.
- The rate of operational problems/disturbances caused by misuse of the system is very low. Problems and their reasons can be identified very easily.
- The vacuum toilet technology is accepted by the inhabitants. After a time of accustoming the vacuum toilets are accepted and are seen as more hygienic than conventional flushing toilets.
- The first results from the anaerobic digestion of blackwater in laboratory scale are confirming common design parameters like the gas production.

The semi-central system is capable to recover resources and energy in more densely populated housing areas up to 5000 people. Despite the high technical approach the operation costs can be much lower than for conventional sanitation systems.
