



Fig. 1: Project location

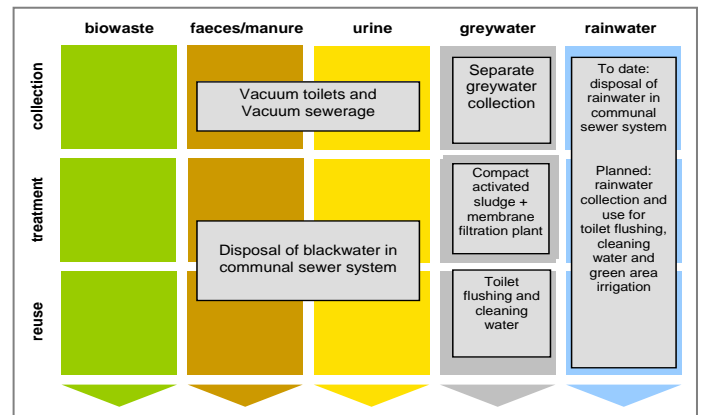


Fig. 2: Applied sanitation components in this project

1 General data

Type of project:

New office building in urban area

Project period:

Start of operation: November 2002

Project scale:

300 workplaces and 13 apartments

Address of project location:

Palmgartenstrasse 5 –9
60325 Frankfurt am Main, Germany

Planning institution:

RKW Architektur + Städtebau
Ip5 Ingenieurpartnerschaft

Executing institution:

KfW Bankengruppe, Frankfurt am Main

Supporting agency:

2 Objectives and motivation of the project

Improvement of KfW's in-house environmental balance.

Reduction of operation and maintenance costs through water saving and recycling.

Demonstration of innovative technologies in closed-loop concepts of waste-water management.

3 Location and conditions

The KfW, among other activities, finances investments and accompanying consulting services in developing countries on behalf of the German Ministry for Economic Cooperation and Development (BMZ).



Fig. 1: KfW building "Ostarkade" in Frankfurt am Main, Germany.

At its Frankfurt offices, staff of the KfW presently work in nine different buildings in the city centre. KfW moved into the first property, the main building at the Palmengarten, in 1967; this building is undergoing basic renovation. Construction work has started and is scheduled for completion by the end of 2005. The most recent building in the group, the Ostarkade, was opened in November 2002. The Ostarkade building contains many

innovative facilities and combines economic with ecologic demands in many different ways.

The building has 7 floors and offers space for around 300 workplaces, with 13 apartments on the two top floors.

4 Project history

No data available till date. Has to be updated

5 Technologies applied

60 vacuum toilets, 20 vacuum urinals, vacuum pipes and a vacuum pumping station are installed in the building. Greywater from hand washing, cleaning and kitchens is collected in a separate gravity pipe system.



Fig. 2: Vacuum toilet in KfW building ostarkade (photo: gtz)

Greywater is treated in a compact activate sludge reactor combined with membrane filtration. The membrane filtration guarantees pathogen free water for reuse. The treatment plant is located in the basement of the building and also receives wastewater from the KfW's catering facilities.



Fig. 3: Vacuum pumping unit (Photo: KfW)

The vacuum sewerage and the grey-water collection and treatment system will also be extended to the main building, currently being renovated.

A rainwater collection system has not yet been installed, as only a small volume of water is expected to be collected from the

Ostarkade building. Rainwater collection and reuse is however planned for all buildings during the renovation of the main building.

6 Design information

The target value for the design of the water supply and disposal system was 50 l per capita and day. The vacuum system and greywater recycling has en-abled the actual water consumption to be reduced to less than 20 l per day and capita.

The greywater treatment system oper-ates at a capacity of ca. 500 l/h and produces bathing quality water.

The vacuum system was supplied by the company Roediger Vakuum- und Haustechnik, and the greywater treatment system by ACO Passavant. with the membrane technology in particular being supplied by Weise Water Systems.



Fig. 5: Greywater treatment facility in KfW Ostarkade (Photo: GTZ)

7 Type of reuse

The treated greywater is used for toilet flushing and cleaning water. Blackwater (faeces, urine and flushing water) collected in the vacuum system is not treated and used, due to local regulations and the complexity of reuse in this case. It is currently disposed of in the communal sewerage system. The possibility of anaerobic treatment of the blackwater was considered, but has not been implemented due to financial constraints and the limited space available.

When a rainwater collection system is installed it is planned to use it for the irrigation of green areas, toilet flushing and cleaning.

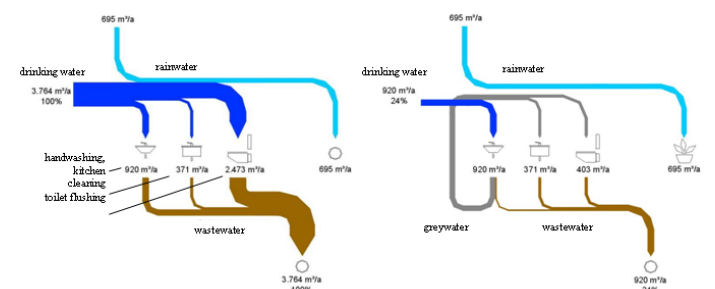


Fig. 4: Water balance in the KfW building Ostarkade: on the left with conventional technology and on the right with vacuum system and greywater recycling (Figures: IP5, Martin Selig)

8 Further project components

No data available till date. Has to be updated

9 Costs and economics

Investment costs vacuum system: 80.000 Euro
 Investment costs greywater system: 50.000 Euro
 Initial cost estimates showed that the return on the additional costs of KfW's wastewater management system is about 2-5 percent per year depending on the future rise in waterprices.
 Combined water and wastewater fees in Frankfurt are around 4 Euro/m³.

The economic benefits need to be updated.

10 Operation and maintenance

No data available till date. Has to be updated

Attendance of the process described in chapter 10 by skilled personnel on a regular basis is necessary. During the project personnel from the treatment plants was permanently involved in all tasks and trained to be capable to plan and operate a sludge conversion plant after the project.

11 Practical experience and lessons learnt

As the pilot project involved many innovative technologies, several initial technical problems arose. All problems could be solved quickly with the support of the highly committed suppliers. The toilet and treatment facilities are now well accepted by users and operating staff.

12 Sustainability of the system components

Table 1: Relative sustainability of system components

	collection and transport			treatment			transport and reuse		
	+	o	-	+	o	-	+	o	-
Sustainability criteria:									
• health and hygiene									
• environmental and natural resources									
• technology and operation									
• finance and economics									
• sociocultural and institutional									

13 Available documents and references

Environmental report, KfW Banken-gruppe, 2003.
http://www.kfw.de/DE/Service/OnlineBibl48/KfWUmweltbericht_engl.pdf

14 Institutions, organisations and contact persons

Project owner:
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Case study of SuSanA projects

Project name (max. 1 line)

SuSanA 2008

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