



# Experiences with urine diverting dry toilets (UDDTs) for households, schools and kindergarten in Eastern Europe, the Caucasus and Central Asia (EECCA)

*This paper summarizes the experiences of WECF and partners from implementing UDDTs for individual households and in schools.*

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## Abstract

This paper presents experiences with the implementation of urine diverting dry toilets (UDDTs) in the EECCA countries. In total 960 individual, 50 school and kindergarten and 7 public UDDTs have been implemented. A huge variety of different designs and materials of the sanitation facilities was applied by the WECF network partners. Experience based indications are given related to the success factors for acceptance of the individual toilets and for school sanitation projects.

## Introduction

Women in Europe for a Common Future (WECF) has its roots in the 1992 Earth Summit of Rio de Janeiro. WECF was officially registered in 1994 as a foundation in the Netherlands following an initiative of European women to work together on sustainable development. WECF is now an international network of over 100 women's, environmental and health organizations implementing projects in more than 40 countries and advocating globally for a healthy environment for all. WECF strives for balancing environment, health and economy taking into account the needs and perspectives of men and women.

WECF implements demonstration projects with local network partners that aim to develop and implement sustainable solutions to local problems in the areas of water and sanitation. Since 2003, WECF has implemented Urine Diverting Dry Toilets

(UDDTs) (individual and public/schools) as sustainable sanitation solution in Central and Eastern Europe, the Caucasus and Central Asia (EECCA), specifically in Afghanistan, Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, Kyrgyzstan, Kazakhstan, Moldova, Romania, Tajikistan, Ukraine and Uzbekistan. The UDD technology is especially suitable for areas without functioning water supply and wastewater and improves the hygienic and environmental conditions at once.

## Individual UDDTs

Since 2003, WECF and its network partners have implemented 960 individual UDDTs in the EECCA region (Figure 1).

The construction of UDDTs started after initial training and awareness raising in the target area and with a hands-on

## Key Messages:

- The urine diverting dry toilet (UDDT) is a sustainable sanitation option for households and schools in rural areas of the EECCA region where reliable water supply and wastewater management is missing. The successful introduction of such a new technology requires a change in behavior and must be accompanied with awareness raising, training and motivated local partners.
- The main drivers for people to become a beneficiary for a UDD toilet were the dissatisfaction with the pit latrine, especially limited comfort and hygiene (cold, windy, smell and flies), the need to move the latrine frequently in areas with high groundwater tables and the interest to obtain cheap fertilizer (mainly among farming-orientated households).
- Decisive factors for the acceptance of UDDT were identified: smell prevention, own contribution in terms of finances and/or labor, involvement of women and men, groundwater level and distance to the house.
- In comparison to individual toilets, the introduction of the UDDT in schools is a particular challenge where a number of key factors in terms of software and hardware must be fulfilled.

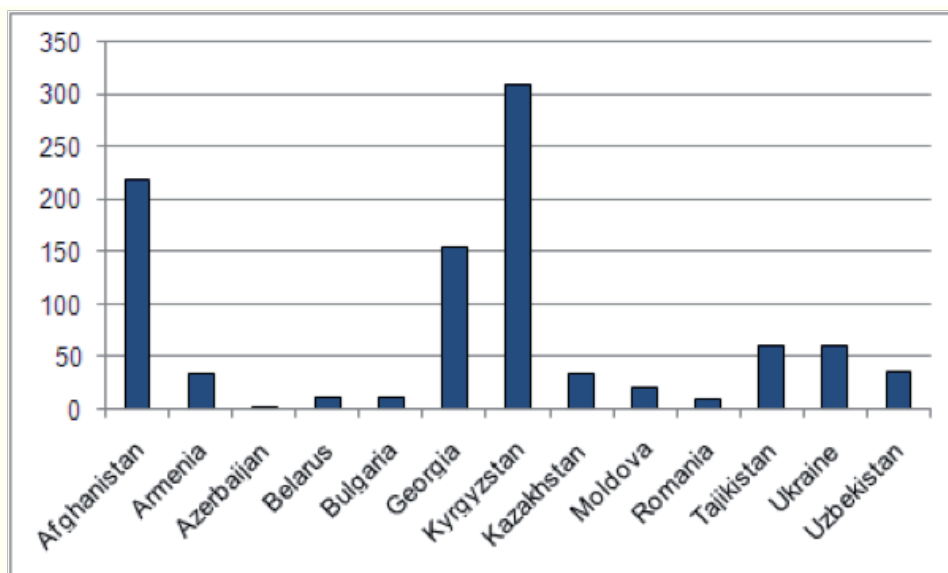
workshop where the first demonstration toilet was built by WECF trainers. An important aspect is the adaptation of the UDDT technology to local conditions (e.g. using locally available materials) and for demonstration. All partners developed criteria for the selection of beneficiaries, which differed somewhat per partner. Common criteria were the commitment to use the UDDT as meant, including proper cleaning and the sanitation products (urine and sanitized faeces) as fertilizer, the willingness to demonstrate their toilet to others and to lesser extend removal of the

old pit latrine. Some partners included poverty as a criterion for beneficiary selection, but others choose to also build toilets for (relatively) better off families, including those of local leaders, to avoid UDDTs being seen as a solution just for the poor. Several partners gave preference to larger families, especially with several children, women and/or girls. Another common criterion was the absence of a proper existing toilet or the intention to build conventional toilets (i.e. whether a central sewage system and/or central water supply system (for flushing) was absent).

The main drivers for people to become a beneficiary for a UDDT were the following aspects:

- Dissatisfaction with the pit latrine, especially no comfort (cold, windy, smell and flies) and difficulties with cleaning
- In areas with high groundwater level, there is a lot of smell and the need to move the latrine frequently
- Interest to obtain cheap fertilizer such as urine (mainly among farmer-orientated households)

For the successful introduction of UDD technology and its sustainability, adequate training and awareness raising is crucial. That is why the implementation is always accompanied by hygiene training and workshops. In Central Asia WECF adopted the WHO tool "Participatory Hygiene and Sanitation Transformation" (PHAST) into one that is in line with resources-oriented sanitation: „Participatory Hygiene and Ecological Sanitation Transformation“ (PHAEST). This tool helps participants to analyse their hygiene behaviour, discuss safe and unsafe toilets and learn about pathogens in excreta. The use, cleaning and maintenance of UDDTs are discussed in a participatory way. This PHAEST tool was especially adopted in the Central Asian countries, but the above topics were included also in the training



**Figure 1: Number of individual toilets constructed by the WECF network in EECCA countries (2003-2010).**

and awareness activities in the other countries. These training and awareness activities seem to have been well effective in the sense that they enabled the construction and (largely) proper use of UDDTs.

Only in Afghanistan the situation on the implementation of the UDDTs was different from the other countries and the local partner worked very independently based on its own experience with the local culture and background. That is why and due to the political situation this paper is basically about the experiences in the other countries where a closer monitoring was feasible.

#### Location, design and material of the toilets

##### Location

People in the rural areas of the EECCA country mostly have a toilet – commonly a pit latrine in their garden. Due to often unhygienic situations, smell and problems with flies, the location of the pit latrine is far from the house, sometimes close to the livestock. When introducing UDDTs people first are very skeptical about placing the toilet close to the house or even indoor because they cannot imagine that the technology is odor free and hygienic. To raise awareness about the advantages of the UDD technology, it is helpful to build first a demonstration toilet or to visit an existing functioning UDDT.

In general, the people in Eastern Europe and the Caucasus are more open to construct the toilets indoor while in Central Asia most toilets are constructed outdoor.

As the photos display, the realized toilet design and location were various. In the trainings, the principles of ecosan were explained in detail (2) and the partners were encouraged to make their own designs with locally available material. The local partners were often very creative.



Figure 2: Outdoor toilets



Figure 3: Toilets attached to the house



Figure 4: Indoor toilets

**UDDT devices**

The only specific device which is needed for the UDDT is the user-interface or urine diverting part of the toilet not available on the market in EECCA countries. In the Eastern European and Caucasus households, most people decided to implement a toilet for sitting which is considered as major advantage in terms of comfort compared to the pit latrine.

In order to start a local production in the countries, a mould made of fiber glas (ESAC, Cesar Anorve) was

imported to produce toilet seats of concrete. With the mould, it is simple to produce good concrete seats which need to be painted afterwards in multiple layers, to obtain a long lasting and high quality finish. People like very much the option to have toilet seats in a selected colour, however the quality of paint influences the durability of the surface in the urine bowl. A very high quality seat can be produced with concrete, e.g. the Georgian NGO RCDA added ceramic powder which provides an excellent surface very close to ceramic. In Kyrgyzstan, the fiber-glass mould imported from Mexico





**Figure 5: Different types of toilet model**

was recently replicated for increasing the production. In Georgia, the factory production of ceramic UDDT interfaces was started in the frame of a WECF project. Another option is to use the ceramic dry toilet model which is available in most EECCA countries, so-called dacha model, and to insert a simple cut plastic bottle, a funnel or a plastic device for urine diversion, e.g. by the Swedish company Separett.

Some beneficiaries, especially in Central Asia, prefer to have a squatting toilet instead of a sitting model. Either they select the robust plastic slab produced large-scale in China which can easily be imported or they installed self-made versions with tiles or plastic funnels.

#### Toilet room

There is a wide variety of equipping the toilet room inside. Recommended was to install a hand wash basin inside which was not always followed as many people have their hand wash basin somewhere outside as they were used to have it outside. Also a urinal is recommended for the men, however often not used. There is some evidence that urinals are considered not to fit in Islamic cultures. The rest room can be very simple inside, the floor covered with local available floor cover, like linoleum or painted wood but many beneficiaries put tiles on the floor and decorated the room very nicely.

#### Urine collection

In individual toilets, the urine is usually collected in containers of 20 up to 50 liters volume next to the faecal chambers. The urine pipe is equipped just behind the toilet device with a smell stop (use of a condom). Typical problem of urine collection in these comparatively

small canisters is that the containers are overflowing. Sometimes urine pipes are not implemented with a proper slope so that urine can stand in the pipe and starts to smell. This can also lead to freezing in winter and thus blocking of the pipe. Bigger containers are recommended for several reasons: reduced maintenance intervals, better frost-protection and storage during winter. The drawback of large volume containers compared to smaller sized canisters are higher costs, sometimes limited availability and the need of a pump for emptying.

#### Acceptance of the toilets

The decision to construct an UDDT also involved the willingness to invest time and money by the beneficiary. The projects provided only advice and guidance in the construction process and covered about 75% of the costs, in some cases less or even none at all.

Changing from one sanitation system to another involves a change in behaviour. This is a long process. There are a few examples of toilets that were initially not used because the family considered the toilet as “too beautiful” and instead used it as a showpiece for visitors. The old pit latrine continued to be the toilet used most. In one case, it took the owners about a year to gradually switch to using the UDDT until finally, when the old pit latrine was full, they decided not to move it to a new place and completely switched to using the UDDT.

The standard of cleanliness, however, is not always satisfactory. A main reason is a lacking habit of toilet cleaning as people hardly clean their pit latrines.



**Figure 6: View into different toilet rooms**

Concerning the location of the new toilet, sometimes the first beneficiaries in a village select the location for the ecosan toilet still quite far away from the house. When the people see during the project course that these toilets are indeed odor free and hygienic they build it more and more close to the house or attached to or even inside. Around 10% of all toilets in the WECF projects are installed inside the house. Some beneficiaries who had been skeptical in the beginning said that if they had known before that it is so comfortable they would have installed it indoor or attached.

WECF identified factors as being decisive for the acceptance of UDDTs. Major factors which are likely to play role for acceptance and non-acceptance of the new toilet:

1. **Smell prevention:** A crucial factor in user satisfaction is the absence of smell. This is maybe the most important advantage of the UDDT. In the cases where there was a smell problem, mainly coming from the urine either not properly cleaned, lack of smell stop or wrong slope in the pipe, it was the predominant reason for the non-acceptance of the toilet.
2. **Involvement in construction:** Households should significantly contribute both with labour and materials. If an external constructor was hired, there is not always the feeling of responsibility and ownership. The decision to construct a UDDT for the household should be taken by wife and husband together and both should take part in the trainings. In general it can be said that women focused more on hygiene aspects of the toilet while men paid more attention to technical aspects, and in some cases were especially focused on the reuse of nutrients. With the toilets fully in use and functioning properly, as a rule, men construct the toilets and/or repair them, while women clean them and make sure the family uses it properly. Anyway it was shown that the best acceptance was in cases where both man and woman were involved in decision-making and training.
3. **Financial contribution:** In all cases beneficiaries had a contribution to their UDDT ranging from 10-60% of the cost. In the cases where micro-credit was provided, beneficiaries reached a 100% contribution. An uncounted number of toilets were constructed in addition by interested people without any financial support from the project funds. It should be expected that the purely owner-funded toilets would be better accepted, due to the implied high levels of motivation. The chances for acceptance are indeed higher if the cost share of the owner is above 50%. But the distribution of costs between project funds and the owners has no automatic link to acceptance— some cases of initial non-acceptance were found among toilets funded

completely by their owners. But in these cases the family switched to using the toilets after technical problems were solved.

4. **Groundwater level:** The groundwater level is considered to be high if it is less than 2 meters below the surface. At this height it can interfere with the pit latrine, causing a lot of smell. A high groundwater level also means that the pit latrine has to be moved often, because it is impossible to dig a deep pit. In some areas, where the groundwater level is only about 50 cm below the ground level in the irrigation season, this means moving the pit latrine every 3 months. Such conditions prompted a higher interest in constructing a UDDT. It is in line with these results that UDDT in areas with high groundwater levels faced no acceptance problems. The toilets which were or still are not being used are all in areas with low groundwater levels.
5. **Distance:** a toilet close to the home is considered as being part of the home and therefore maintained and used better. The comfort for the owners is much higher as well which is of particular importance for women, children and old people.

Although the re-use of the sanitation products is not a subject in this paper, a proper training on the safe handling and re-use of urine and treated faeces is obligatory for a high sustainability of the projects. Hands-on application training is necessary to demonstrate the application of the products. It was shown that theoretical workshops are not sufficient because the application of human excreta is completely new to most beneficiaries and stakeholders in the EECCA countries. Here the saying “seeing is believing”, which is often used when smell free pilot UDD toilets are shown to stakeholders, is even more true. WECF also recommends the installation of demonstration gardens during these workshops to show the fertilizing effect of human excreta. They can be a real eye-opener and play a big role in convincing the people of the advantages of sustainable sanitation.

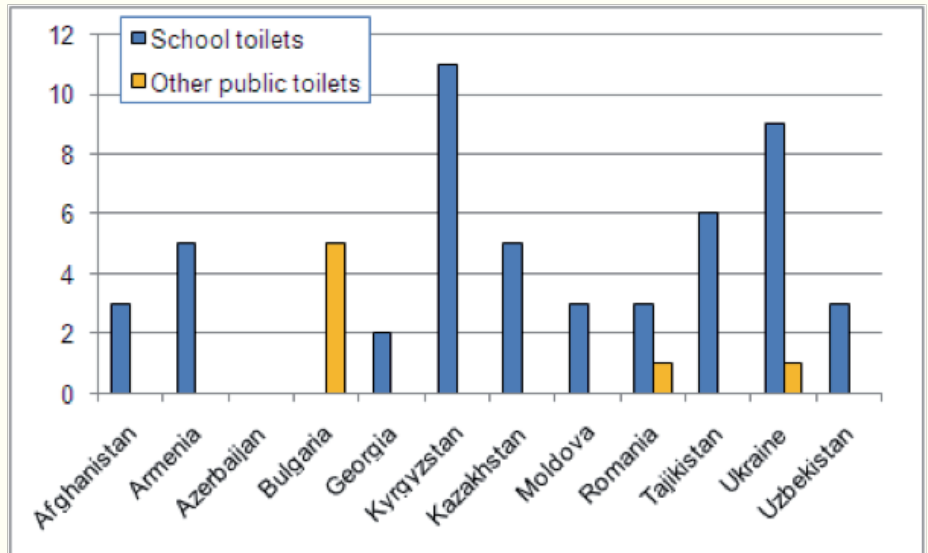


Figure 7: Agricultural workshop in Kyrgyzstan



**School and kindergarten toilets**

One of WECF’s key issues is the provision of sustainable school sanitation conditions because children are vulnerable and most affected by poor sanitation. In rural areas of the EECCA countries, the hygienic and sanitary conditions in schools are often terrible. Related diseases, particularly diarrhea and parasite infections hinder the children’s physical and intellectual development. In the WECF network, 50 toilets for schools and kindergarten and 7 public toilets have been built in the last years (Figure 8).



**Figure 8: School, kindergarten and public toilets (2003-2010).**

**Location and design of school UDDTs**

At the beginning of a school sanitation project is the selection of the school. WECF recommends to select a school which shows sincerely interest to build the school toilet inside as this is most convenient for the users:

- Convenient temperature, i.e. warmer in winter and colder in summer compared to a toilet in the yard. This is especially important for girls who are more prone to urinary infections (UTIs) exacerbated by cold temperatures.
- Keeping the toilet room cleaner and more hygienic is much easier if the children have not to cross the yard to access it.

A new school-building is the best opportunity to properly plan and design the infrastructure of the UDDT inside or attached. In most projects however the school building already exists and only the toilet facility is newly constructed. Then it is often possible to use intelligent planning or to retrofit a room that is not needed anymore such as a storage room. In other cases, it is possible to attach a new toilet building to the school and install a new door so that the children can directly enter into the new toilet. If there is no place available inside and no suitable place to attach the toilet, it should be implemented in the yard, as close to the exit of the school as possible to keep the distance short for the users. Hand wash facilities should optimally be installed in a separate room in front of the toilet rooms. Otherwise they should be as close



**Figure 9: Boys’ urinals and rest room**

to the toilets as possible. More detailed information about designs, no of rest rooms and other aspects can be found in (WECF, 2009b).



**Figure 10: Smell stop (condom) in a boys’ urinal**

**Sustainability of school UDDTs**

It is a challenge to make a school UDD sanitation facility a sustainable success. Based on our experiences the key criteria that need to be considered are summarized in Table 1.

Compared to individual toilets, more effort is needed in terms of hardware. It is recommended to construct really robust and with good quality material to ensure long term operation without replacing spare parts too quickly. Also for school sanitation, the smell prevention is a key challenge - similar to individual toilets. In some cases where smell problems occurred the children were unsatisfied.

Concerning the software, to fix responsibilities from the beginning is crucial, often it is not clear that a school sanitation facility needs daily cleaning, requires the provision of material to cover the faecal matter and emptying the waste bins. Also the training for all groups—children, teachers, cleaning staff—which must take place at least every year for the new pupils again is crucial to ensure sustainability.

WECF is currently carrying out an “Assessment of Selected Health and Acceptance Aspects of UDDTs at Schools” based on a children’s questionnaires, focus group discussions and class book surveys to get a better overview and understanding of the real impact on the life and health of the children.

**Table 1: Key criteria for sustainability and success of school sanitation**

| Hardware  | Software  |
|---|---|
| <ul style="list-style-type: none"> <li>Indoor if possible</li> <li>Separate rooms for boys and girls with special facilities for girls during menstruation period (depends on culture)</li> <li>Rest rooms that can be closed</li> <li>Proper smell prevention</li> <li>Hand wash basin and simple grey water treatment</li> <li>Big urine tanks to guarantee a storage time of 6 months</li> <li>High quality materials for long term sustainability</li> <li>Make footprint near the squatting slab so children know where to stand.</li> </ul> | <ul style="list-style-type: none"> <li>Get insight in school budget available for the toilet operation (for salary caretaker and equipment like toilet paper, soap etc)</li> <li>Make a contract with the school in advance to fix responsibilities (especially staff for cleaning)</li> <li>Talk to the related authorities (approval needed from different authorities - education, architectural, health, environment, emergency, utilities, fire, electricity)</li> <li>Assure very strict control of proper usage in the first month of taking the toilet into use. The school might decide to first educate elder classes.</li> <li>Provision of hygiene education (e.g. PHAEST)</li> <li>Regular training for the use, operation and maintenance of facilities for pupils, teachers and personnel</li> <li>Training on re-use</li> <li>Contract with farmer who is willing to use the urine and can arrange equipment for pumping the urine out and transport</li> </ul> |



**Figure 11: Examples of school sanitation facilities**

**References**

WECF (2006): Urine diverting dry toilets – Principles, operation and maintenance. WECF ([http://www.wecf.eu/cms/download/urine\\_divert\\_toi.pdf](http://www.wecf.eu/cms/download/urine_divert_toi.pdf))

WECF (2009a): Introducing sustainable sanitation in Kyrgyzstan. WECF ([http://www.wecf.eu/download/2009/2009\\_ubareport.pdf](http://www.wecf.eu/download/2009/2009_ubareport.pdf))

WECF (2009b): Sustainable and Safe School Sanitation. WECF ([http://www.wecf.eu/download/2009/wecf\\_school\\_sanitation\\_english.pdf](http://www.wecf.eu/download/2009/wecf_school_sanitation_english.pdf))

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