

# GUIDE

for the implementation  
and operation of ecosan school toilets  
in Moldova



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## Guide for the implementation and operation of ecosan school toilets in Moldova

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## Definitions and Acronyms

LPA	Local Public Administration. Rayon level administration (LPA II) or local level (LPA I).
Greywater	Greywater is wastewater from the kitchen, washbasins and after cleaning, without fecal contamination. Because greywater does not contain waste human pathogenic potential can be manipulated and treated with more simple technologies than domestic wastewater (black water).
ApaSan	Swiss Water and sanitation Project in Moldova
Drinking water	Water intended for human consumption, supplied from a network distribution or from a well, in bottles or containers, and which is not a threat to human health.
Waste water	Wastewater containing: human excretions, household water and water resulting from hygienic activities. Also called black water.
Sewerage	Assembly of technical works executed for collection, evacuation and treatment of the wastewater in a locality, in a technical system, on a land etc., or rainwater, in order to protect the soil, underground and surface water.
Public Health Center	Territorial subdivision of the National Agency of Health.
Ecosan	From English "ecological sanitation", ecological sanitation system, with collection separate urine and faeces.
Septic tank	Watertight underground tank with at least 2 chambers, where the solids in the wastewater is retained and digested anaerobically at the bottom, while the solid-free liquid is usually discharged into a soil infiltration system.
Pit	Watertight underground tank of relatively small size, used for collection faeces and urine.
Pit latrine or pit toilet	A type of sanitary group that includes rudimentary construction located on an underground basin.
Sanitation	Generic term used to describe a range of facilities, services, and actions in order to safely and hygienically eliminate human excretions and waste water in order to reduce the spread of pathogenic germs and to maintain a healthy and sustainable environment.  Specific actions related to sanitation include wastewater treatment, household waste and rainwater management.
Sanitation System	A system that includes: sanitation groups (WCs, external toilets), collection, containment, transport (with or without sewerage network) of toilet waste (urine, faeces, liquid waste or wastewater), treatment and final disposal or utilization. A sanitation system includes the technical infrastructure as well as the organizational structure for management, operation and system maintenance.
Treatment station	Assembly of constructions and installations for wastewater treatment by mechanical, mechanic-chemical and/or biological methods.
Local treatment of the waste water	On site wastewater treatment, or in close proximity from where the wastewater is produced. It is also called in situ wastewater treatment.
Water toilet	WC (water closet)
Ecosan toilet	Dry toilet with urine separation system (also known as UDDT – Urine Diverting Dry Toilet). A toilet that runs without water and has a separator so that the urine and the faeces are collected separately and do not mix.

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# Introduction

## What is this guide about?

The aim of this guide is to give advice on how to implement ecosan school toilets: how to provide information and promote the system, how to design and construct it, how to maintain and use it, how to provide training, and how to monitor.

## By whom this guide can be used?

The guide is written for professionals, institutions and decision makers in Moldova who are working on improving school sanitation.

- Decision makers and experts in rayon school authorities and school administration
- Mayors and municipal technical staff
- Consultants and engineers
- Experts of donor or NGO funded projects

## What is the scope of this guide?

This guide focuses on the implementation of ecosan school toilets, covering all steps, from design to use, monitoring and maintenance.

This guide does not describe other options for sanitation system and how to select the most suitable sanitation option, as this is done by a separate guide “Options for the improvement of sanitation in rural schools in Moldova”<sup>1</sup>.

This guide also does not cover water supply and hygiene education, which are other important elements that need to be provided together with good sanitation.

### **How to use this guide?**

This guide should be used once an informed decision for implementing ecosan school toilets is made. For guidance on the decision-making, see the separate guide “Options for the improvement of sanitation in rural schools in Moldova”.

Chapter 3 describes how ecosan toilets work, how they are used, how they need to be maintained and how products from the toilet are dealt with. This chapter is useful for those who want to get a good understanding of the ecosan toilet system, for example decision makers in school administrations, teachers or parents.

Chapter 4 gives detailed advice on the different steps of implementing an ecosan school toilet project. This chapter is most useful for professionals implementing the projects, engineers, consultants, construction supervisors, trainers.

Chapter 5 gives references to a range of documents useful for the implementation of ecosan school toilet projects.

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<sup>1</sup> Guide: Options for the improvement of sanitation in rural schools in Moldova, <http://apasan.skat.ch/sanitation-in-schools/>

## Background

Access to safe water supply, adequate sanitation and hygiene (WASH) in schools is important for a many reasons: it contributes to ensuring healthy learning environment and lessening the spread of disease, it positively affects school participation and learning, helps to improve gender equality and supports school attendance of girls, and it can help reaching communities for adoption of good WASH behaviours and technologies.

The Republic of Moldova has set targets to improve WASH in schools as a party to the Protocol on Water and Health in 2010<sup>2</sup>. By 2020, 100 % of the schools and pre-schools should achieve full compliance with drinking water quality and provide access of children to improved water supply and sanitation systems.

The Sustainable Development Goals, adopted in 2015 by the United Nations<sup>3</sup>, emphasise the importance of WASH in schools in its goal 6 on universal and equitable access to safe and affordable drinking water and adequate and equitable sanitation and hygiene for all: “universal access” means access not only at households but also at schools, health facilities, workplaces, etc<sup>4</sup>.

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<sup>2</sup> Government Decision, No 1063, dated September 16, 2016 on National Program for implementation of the Water and Health Protocol 2016-2025.

<sup>3</sup> <http://www.md.undp.org/content/moldova/en/home/sustainable-development-goals.html>

<sup>4</sup> WHO, UNICEF (2015) Methodological note: Proposed indicator framework for monitoring SDG targets on drinking-water, sanitation, hygiene and wastewater



Currently, most schools in rural areas in Moldova don't have facilities satisfying basic WASH standards. The most common option is the use of cesspit toilets located away from the school building. According to a UNICEF study<sup>5</sup> from 2009, 95 % of schools in rural areas use such toilets. However, frequently these toilets are in bad conditions, without cabins or separators for privacy, without electricity or heating in winter, with no hand washing facilities, poorly maintained and rarely cleaned. In addition, these toilets often also pollute the environment, e.g. when contents of cesspits are dumped in the environment.

A range of options are available to improve sanitation in schools. The common cesspit toilets can be improved and better maintained, flush toilets can be constructed when sewer connections are available or wastewater is treated locally. Ecosan toilets are an increasingly popular alternative option.

Ecosan toilets are known worldwide as an alternative sanitation option, but their application in Moldova is rather recent. Since 2007, the Swiss Agency for Development and Cooperation (SDC) has supported various NGOs for the promotion of UDDTs as an alternative option to the often desolate backyard cesspit toilets. Acceptance of this type of toilet was good and SDC increased its support to ecosan school toilets via the ApaSan project.

More than 60 school toilets have been built meanwhile in all parts of Moldova in cooperation with district authorities, local design and construction companies, and with technical and financial support of the Swiss project. These toilets are built attached to the main school building and to modern standards with tiles, heating, lighting, ventilation and hand washing facilities, with separate areas for boys and girls, each with several closed cabins for privacy. Facilitator teams for teachers and pupils give instruction of proper usage to all pupils, while school administration and caretakers ensure the operation and financing.

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<sup>5</sup> UNICEF (2009): Summary Report Study on the Quality of Water, Sanitation and Hygiene Practices in the Schools of Moldova.

This guide, developed by Skat Consulting Ltd. (mandated by SDC for implementing the ApaSan project), summarizes the experience with implementing ecosan toilets and makes it available to decision makers, planners, engineers and trainers working on the implementation of future ecosan school toilet projects.

## What are ecosan school toilets?

### 3.1 Technical characteristics

Ecosan toilets collect urine and faeces separately, without the use of flushing water. The technical term for ecosan toilets is Urine Diverting Dry Toilets, UDDT. The toilet bowl has a divider or two separate openings, which allow the separate collection of urine and faeces. A urine separation toilet can be both done as a squatting pan or toilet seat.

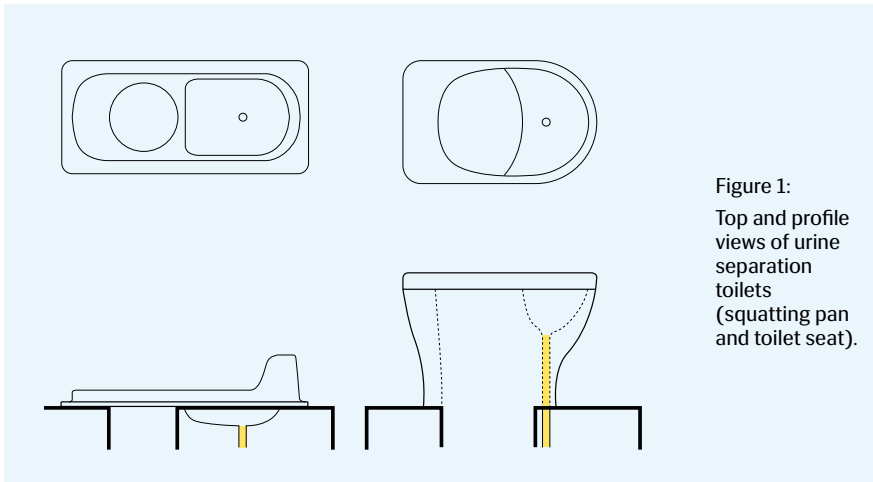


Figure 1:  
Top and profile  
views of urine  
separation  
toilets  
(squatting pan  
and toilet seat).

The urine is drained away in pipes and collected in tanks. The faeces fall in a chamber beneath the toilet where they are collected. As urine is collected separately, the faeces dry in the collection chamber. Ash, sawdust or dry soil is added after use to enhance the drying process. Good ventilation of the chambers also helps drying.

An important effect of the separating of urine and the drying of the faeces is that development of bad smells is greatly reduced and can be completely controlled by good ventilation of the chambers and the toilet building. Urine pipes need an odour seal after the toilet to avoid bad smells from urine collection tanks reaching the toilet building. If properly designed and well maintained, UDDTs do not smell. Therefore, ecosan toilets can be integrated into the school building, just as flush toilets.

Urine and dried faeces need to be removed periodically from the collection tanks or chambers. Volumes that need to be managed are relatively small, as urine and

faeces are not mixed with flushing water. The largest fraction to be handled is urine, which is easy to pump out as it remains liquid, not being mixed with faeces. Faeces are of very small volume, and drying further reduces their volume. The drying process renders them inoffensive and they resemble of compost that is easy to handle.

In order to reduce health risks from handling of urine and dried faeces, parallel tanks are being installed that allow storage of urine and dried faeces for some time without fresh material being added. This allows for drying of pathogen organisms. Urine

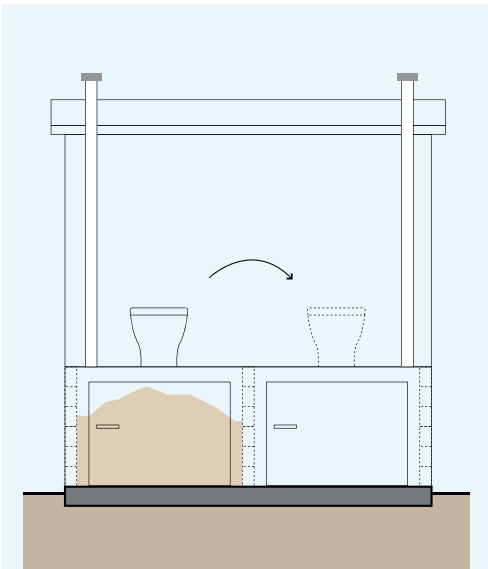
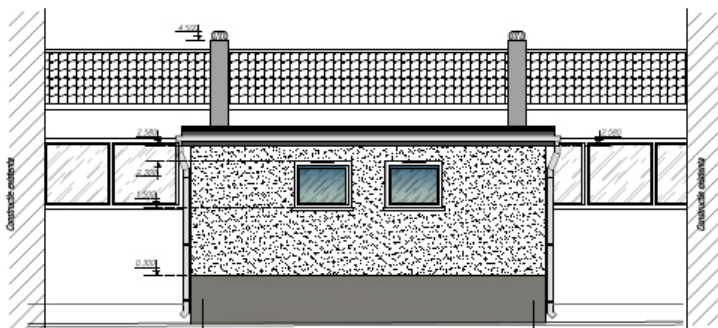
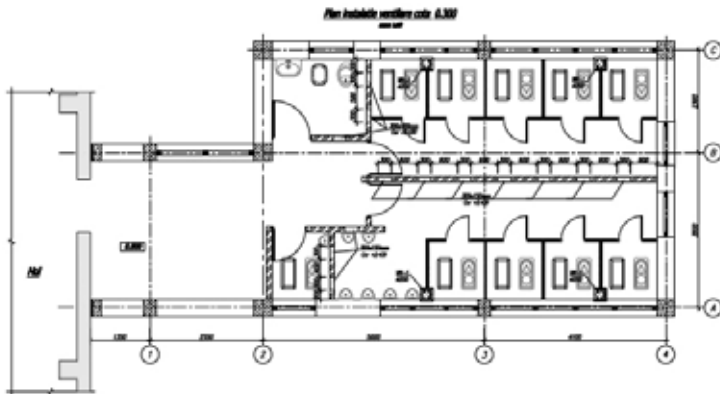


Figure 2: Scheme of drying chambers in ecosan toilets (urine diverting dry toilets)

that has been stored for several months can be safely used as fertilizer. Faeces need to be stored longer before they can be safely used, but safe disposal by burying them local is also possible as quantities are small.

Ecosan toilets have special requirements how they are to be used, cleaned and maintained. Thorough training of users and caretakers is therefore required.

Ecosan toilets are difficult to be integrated in existing school buildings, due to the faeces collection chambers needed under the toilet floor. However, they can be attached to the school building, which allows direct access of users to the toilets, while the faeces collection chambers can be accessed from outside for emptying.



Design toilet at the building attached to the school building



Figure 3: Examples of ecosan toilet blocks attached to existing school buildings Source: Skat Foundation (ApaSan)

All materials needed for building ecosan toilets can be procured locally. Urine separating toilet bowls, both squatting pans and seats, can be procured in Moldova. Odour seals for urine plumbing can be made from locally available materials.

### 3.2 Operation and maintenance, use of stored urine and dried faeces

Correct use and cleaning is crucial for the functioning of ecosan toilets. Faeces and urine need to go into the right holes of the toilet bowl, dry material needs to be added to the faeces chamber after use, and cleaning has to minimize water going into the chambers. This requires thorough instruction and training of users and cleaning personal, including regular refreshing.

Urine tanks need to be emptied once or twice per year at maximum. Caretakers need to monitor the filling level of the urine tanks to plan for emptying. The school administration needs to organise the emptying, e.g. by contacting a farmer who is interested to use the urine to fertilize his fields. Urine has a high fertilizer value and if stored for sufficient time is safe to be used as fertiliser. It is normally used by distributing urine uniformly on a field according to the fertilizer needs of the crops. Urine should in no circumstances be dumped at one point at a field or in a water body, as the nutrients then will cause environmental pollution.

Faeces chambers need to be monitored for the filling level. When one chamber approaches a certain level, the toilet bowl needs to be switched so that the parallel chamber is used. Once this chamber also approaches full level, the first one can be emptied. Experience shows that the filling up of faeces collection chambers in schools takes several years, so emptying of the chambers is necessary only every few years. Dried and stored faeces from ecosan toilets resemble compost and are easy to handle with rakes shovels and simple receptacles. Dried faeces will be mostly pathogen free, but some may remain, e.g. worm eggs. Caretakers emptying the chambers should therefore wear protective clothing and gloves. Dried faeces can have considerable value as compost and can be used in gardening. However, as some pathogens may remain when taking the compost from the toilets, they should be stored for additional time or used only with adequate safety measures. Dried faeces can also simply be buried for final disposal.

### 3.3 Application in Moldova

Ecosan toilets are known worldwide as an alternative sanitation option, but their application in Moldova is rather recent. Since 2007, Swiss cooperation has supported various NGOs for the promotion of UDDTs as an alternative option to the often desolate backyard cesspit toilets. Acceptance of this type of toilet was good and Swiss cooperation increased support to ecosan school toilets via the ApaSan project.

More than 60 school toilets have been built meanwhile in all parts of Moldova in cooperation with district authorities, local design and construction companies, and with technical and financial support of the Swiss project. These toilets are built attached to the main school building and to modern standards with tiles, heating, lighting, ventilation and hand washing facilities, with separate areas for boys and girls, each with several closed cabins for privacy. Facilitator teams for teachers and pupils give instruction of proper usage to all pupils, while school administration and caretakers ensure the operation and financing.

Ecosan toilets enjoy increasing popularity and demand for them is on the rise. Monitoring of the existing toilets showed that most of them are in good state of use and maintenance.

## Legal situation

Ecosan is a new system in Moldova and thus not mentioned yet in most legal documents, norms and standards. However, the introduction of the system has been done in close cooperation with national and local authorities, and in all projects, authorities have accepted ecosan as a valid system and provided required approvals. The technology is also increasingly integrated in the legal system and official guidelines are becoming available:

- The document “Setting Targets and Target Dates under the Protocol on Water and Health in the Republic of Moldova, 2011” mentions ecosan as one of the solutions to achieve sanitation targets
- The “Code of Practice for the Design and Construction of Urine Diverting Dry Toilets” (Cod Practic CP C.01.08:2016) has been adopted by the Ministry of Construction and Regional Development in 2016.
- The present guide “Guide for the Implementation of Ecosan Toilets in Schools”

## 3.4 Advantages, disadvantages, conditions of application

Ecosan toilets can offer a similar comfort and safety as modern flush toilets. As they are smell free and can be attached to main buildings, they are much more comfortable than cesspit toilets.

Ecosan toilets are very environmentally friendly as due to the separation of urine and faeces they turn toilet waste in products that are much easier to handle and to safely dispose or reuse than sludge from cesspit toilets or wastewater from flush toilets. With ecosan toilets, a school alone can take care of the entire sanitation system up to final disposal or reuse, which is much more difficult with cesspits or flush toilets.

Costs of ecosan toilets are in a similar range as cesspit toilets, if built to the same standards. Ecosan toilets need to be slightly larger to give room for two faeces collection vaults per toilet cabin, but cesspits need a bigger underground structure.

The main disadvantage of ecosan toilets is that they are still not as well-known as flush toilets and cesspit toilets. Parents and teachers and administrations may be opposed to this system, unknown to them, and some authorities may hesitate to give required approvals. Experience has shown that these problems can be



overcome with awareness raising and good communication, but this requires some effort and dedication.

If ecosan toilets are not properly used or well maintained, as any other type of toilet they can quickly develop smell problems. Good training and information of users and caretakers is therefore necessary.

Ecosan toilets can be applied in principle in any rural school, as long as sufficient space is available for an annex building. They are most suitable if a school wants to upgrade from a cesspit toilet, but if there is no sewer connection available.

## How to implement ecosan school toilets?

Implementation of ecosan toilet blocks involves several steps and actors. Considering the technical information provided by the guideline and Code of practice, construction of a Ecosan toilet block can be initiated by the school administration, by school founders (LPA in the case of the rural schools), donors or projects that target improvement of the WASH conditions in school, national authorities.

All the elements, from the selection of the sanitation technology to the operation and maintenance of the ecosan school toilet block are described in this chapter.

### 4.1 Roles and responsibilities

In accordance with Article 147 of the Education Code, the State is responsible for providing public education institutions with the necessary material basis, including facilities for institutions, in accordance with state educational standards. The development of the material basis of the educational institutions is provided with public financial resources or other financial resources that the school can attract.

Quality standards for primary and secondary general education institutions from the perspective of the child-friendly school contains an indicator for sanitary blocks (Indicator 1.1.10.) “The educational institution has sanitary units (toilets, washbasins equipped with hot water, soap and electric driers for rest)”.

The decision to improve the sanitary conditions in the educational institution is on the administration of the institution and for these works will be requested public resources or fundraising from external sources (projects, support programs for partnerships with structures economic).

The identification of the sanitation solution or work to be done to improve sanitary conditions is, according to the Education Code, the founder's responsibility (Level 1 or 2 LPA) and must be done with the participation of construction specialists, public health professionals and territorial education structure.

Once the solution or improvement work has been identified, the founder of the institution in partnership with the administration of the school institution will contract design services and based on the technical project will obtain all the opinions from the authorities concerned and why it needs resources. Environmental and public health authorities must approve the technical project. This will ensure that the selected option respects the environmental norms and from the public health perspective that all the requirements are met. We recommend coordination with the mentioned authorities even if the planned works do not require approval.

The founder of the institution, together with the school administration, must identify the financial resources needed to build a new sanitary block or improve existing sanitation systems. Potential funding sources are:

- LPA budget
- The budget of the institution
- Education budget at rayon level (3% rayon component)
- Special funds targeted by the Ministry of Education, Culture and Research
- Social Investment Fund
- External source

The responsibility for monitoring the quality of the work is the manager of the institution. As this aspect requires thorough knowledge, it would be advisable to be responsible and responsible for Level 2 LPAs responsible for construction.

The operation and maintenance of sanitary facilities, irrespective of their type, is respecting sanitary norms. For appropriate use, it is important that the costs of materials and equipment necessary for operation and maintenance are budgeted and purchased on time.

In order to ensure the proper functioning of the sanitary blocks it is necessary to establish procedures for cleaning and maintenance, as well as monitoring and control mechanisms with the involvement of the auxiliary staff, the medical worker, etc.

### **Donor supported projects**

Donor funded consultants or NGOs may take over part of the responsibility for promotion, financing, procurement of design and construction works, training of staff.

Involvement of the donor supported projects are needed to ensure the improvement of the sanitation conditions at the national level, not only isolated cases. To facilitate and monitor the implementation process ensuring the changes in terms of operation, maintenance and information/training of the users.

ApaSan supported construction of the ecosan toilet blocks (until 2018) covering all the project cycle steps (information, solution selection, contracting the design and construction works, quality monitoring, use training).

In the implementation process the technical design was improved considering the local conditions, needs of the schools, capacities and experiences of the schools in terms of use and maintenance

## **4.2 Promotion and information**

Ecosan school toilets blocs were new for the school authorities, design companies and control authorities (environmental inspection and public health centres). Introduction of the sanitation technology required efforts to inform all the stakeholders and to create possibilities to see how ecosan toilet works. The first Ecosan School toilet blocks served as learning stations. The demo toilet blocks were constructed without financial participation of the school or the authorities but served as site visit locations.

Apasan organised several site visits to existing ecosan school toilet facilities for school managers from other regions/rayons, for mayors and rayon authorities, for public health and environmental specialist.

When the solution proved to be efficient and adapted to the local school process and climate conditions, school administration and local authorities came with requests to support them, but already ensuring local contribution.

In the implementation process of the ecosan toilets it was important to create opportunities for school managers to see and exchange with their peers how the ecosan sanitation facilities were used, operated and maintained.

Before construction an ecosan school toilet block was important that the school managers, support staff and even parents know what an ecosan toilet is and how it works and the best learning option was to visit a working ecosan toilet block and to exchange with school management, caretakers and users.

Model materials for promotion and info session are provided in chapter 5.

## 4.3 Design

Ecosan toilets should be built to high standards, as this increases comfort, acceptance and leads to better maintenance: If ever possible, attached to the school main building. It is strongly recommended to attach the toilets to main buildings, as this increases user comfort and accessibility considerably, compared to separate backyard toilets. It also leads to better cleaning and maintenance, as the toilets are treated as part of the main school building.

Technical designs for ecosan toilets are developed considering the provision of the following documents:

- Urban planning permit
- Technical design ToR
- Technical conditions
- Construction norms

The toilet block will include:

- Separate toilet tracts for girls and boys, and closed cabins
- Adapted cabins for disabled people (model offered)



Design samples (Annex 5.3.a), part of the chapter 5 includes all the elements: general plan, positioning, networks, and architectural solutions.

## 4.4 Construction

The construction will be contracted according to the regulations of the implementation structure (public procurement if involves public resources) ensuring that the qualifications of the selected companies fit to the construction standards and also ensuring that the construction companies learn from the experience of building the Ecosan toilet blocks. Could be also considered the companies that were previously contracted to build Ecosan toilets.

Construction process has to be supervised by the technical supervisor. ApaSan had the experience of technical supervision as required by the construction norms and by ApaSan technical staff.

Support documents for construction works and technical supervision are part of the Chapter 5, Annex 5.4.

### Ecosan school toilet construction phases in pictures







## 4.5 Information and Training

Considering the specifics of the sanitation solution and the sensibility of the subject it is imminent to inform and teach all subjects involved including school authorities, teachers, technical staff, students/pupils, representatives of parents and also public health and environmental authorities.

Training of teachers, pupils and caretakers was performed by the NGOs contracted by the project (before ca. 2011), since 2011 Training of Trainers (selected teachers and pupils) by the project teams, the trainers then train all teachers and pupils in the schools.

The information was performed before designing the Ecosan school block in order to secure the collaboration and to make sure the solution is understood and accepted by the school administration, staff and parents representatives. The info sessions were focusing on explaining how the school ecosan toilet block will be used, specifics of the solution and need for proper operation and maintenance.

The training, performed when the facility was constructed was provided to teachers and students, covering the use of the toilet, hygiene practices and advises on continues training and follow up sessions. The training for students and teachers was performed in a Training for trainers' format, ensuring that the reference people in schools have all the information and will organise the user training considering the age, gender specifics.

Trainings included several mandatory subjects:

- Ecosan toilet use rules
- Hygiene practices
- Ecosan toilet functioning principles

Separate training was organised for caretakers, one-day sessions with theoretical inputs on functionality, operation, maintenance and demonstration of the cleaning and maintenance procedures.

Training materials used by ApaSan are part of the Annex 5.5.

## 4.6 Operation and Maintenance

Operation of the toilet has two elements: proper use of the toilets and regular cleaning. Especially in the first month of operation was important that the caretaker/janitor checks the cabins after each break and if needed to remind the students and teachers the toilet use procedures.

Cleaning has to be organised and reshaped to the indoor toilet needs, respecting the sanitary norms<sup>6</sup>. It is also welcomed to introduce cleaning procedures checklist (not a common practice in school maintenance).

Cleaning procedures, checklists and reference to the sanitary norms are provided in the annexes.

School toilet block maintenance procedures covers all the technical elements (installations, pipes, ventilation) and is organised according to the recommendations (Maintenance checklist) but has to be considered and budgeted the immediate repairs/interventions in case of accidents (e.g. Replacement of broken tap).

Proper maintenance involves planning, budgeting and preparations for emptying of the urine tanks and faeces chambers and reuse or disposal of urine and faeces.

All information must be correlated and supervised by the technical personnel. Reference materials provided in the annexes will facilitate the establishment of maintenance and monitoring practices. Reference documents for operating procedures, among others and the monitoring of ecosan toilet, are part of Annexe 6 of Chapter 5.

## 4.7 Monitoring and support

Monitoring and support was provided by ApaSan covering operation and maintenance (technical interventions or troubleshooting in case the school management could not find the solution).

Periodical monitoring was performed and all the learnings were considered in the design improvements and the annexes presented in this guideline.

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<sup>6</sup> Sanitary norms for schools / Reguli și normative sanitaro-epidemiologice "Igienă instituțiilor de învățământ primar, gimnazial și liceal", Legea nr.424-XV din 16 decembrie 2004

Ecosan toilet monitoring can be done at the institution level and every year, maintenance or improvement interventions should be evaluated and planned. It must take into account the fact that the monitored aspects are similar or even the same ones that are verified by the public health institutions when issuing operating permit for schools. Based on that, ecosan school toilets monitoring forms can be integrated into the assessment of the territorial centers of public health. Monitoring questionnaires are part of chapter 5.7.

## Useful documents

1. “Code of Practice for the Design and Construction of Urine Diverting Dry Toilets” (Cod Practic CP C.01.08:2016)/ Construcția toaletelor uscate cu colectarea separată a excrețiilor
2. List of schools/villages with ecosan toilets (contact person)
3. Design Reference Documents
  - a. Technical design model
  - b. Bills of quantities
  - c. Permits
  - d. Technical design ToR
  - e. Design contracts
  - f. List of experienced design companies
4. Construction reference documents
  - a. Checklists for construction supervision
  - b. Image galleries on construction process
  - c. Tender document
  - d. Contract sample

5. Training materials
  - a. Training of trainers concept
  - b. Reference information for information session on ecosan toilets
  - c. ToT agenda Model
  - d. Follow up training plan
6. Operation and Maintenance Reference document
  - a. User checklists / Instructions / Posters
  - b. Cleaning checklists, instructions
  - c. Maintenance checklists, instructions
  - d. Guideline for reuse
7. Monitoring reference materials
  - a. Checklists, questionnaires

